

T.F.I. Unit



GOVERNMENT OF INDIA
MINISTRY OF
ENVIRONMENT AND FORESTS

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REPORT
ON
INVENTORY OF NON-FOREST AREA
IN
AMRAVATI DISTRICT
(MAHARASHTRA STATE)



FOREST SURVEY OF INDIA
CENTRAL ZONE
NAGPUR
2003



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PREFACE

This report pertains to the Inventory of Non-forest area of Amravati district of Maharashtra State. The field survey was carried out by the staff of the Central Zone of the Forest Survey of India Nagpur during the year 1995.

The Geographical area of the district is 12210 sq. km. and the net rural Non-forest area is 8435 sq. km. The report incorporates details of the villages surveyed, methodology adopted, findings and conclusion.

The results of the survey reveal that the non-forest area of Amravati district have 7242424 trees in all @ 8.586 trees/Ha with a corresponding growing stock of 3893224 M³ @ 4.62 M³/Ha. Hence, there is a substantial quantity of wood in the non-forest area of the district to meet the need of villagers for timber and fuelwood etc.

The data collected by the Field Staff of Central Zone was analyzed at Forest Inventory Unit of Forest Survey of India, Dehradun under the guidance of Sri. Rajesh Kumar, Deputy Director. The draft report was prepared under the guidance of Dr. F.S. Jafry, Regional Director with the secretarial assistance of Smt. Gressamma Varghese, Stenographer. The efforts made in bringing out this report by the concerned officials are highly appreciated.

I trust, the report gives adequate details on the tree vegetation existing in non-forest area of Amravati district that may be useful to the user agencies and the planners as well.

Dr. J.K. Rawat,
Director
Forest Survey of India
Dehradun.

ACKNOWLEDGEMENTS

On behalf of Forest Survey of India, Central Zone, Nagpur, the undersigned expresses deep sense of gratitude and sincere thanks to the office bearers of the Village Panchayats and special thanks to the villagers for extending every possible help, co-operation and hospitality to the field staff of this zone during the course of field survey without which the endeavour would not have been successful.

The organization is also grateful to the Collector, Amravati district and other revenue officials of the revenue department for providing required information and valuable co-operation extended to the staff for the smooth conduct of survey work. The organization also expresses sincere thanks to the Conservator of Forests, Amravati Circle, the Deputy Conservators of Forests, Amravati, East Melghat, South Melghat (Akot) and West Melghat Forest Divisions, and their field staff who extended much needed co-operation to our field parties without which the survey work could not have been completed in the stipulated time.

Forest Survey of India
Central Zone, Nagpur.

Dr. F.S. Jafry,
Regional Director

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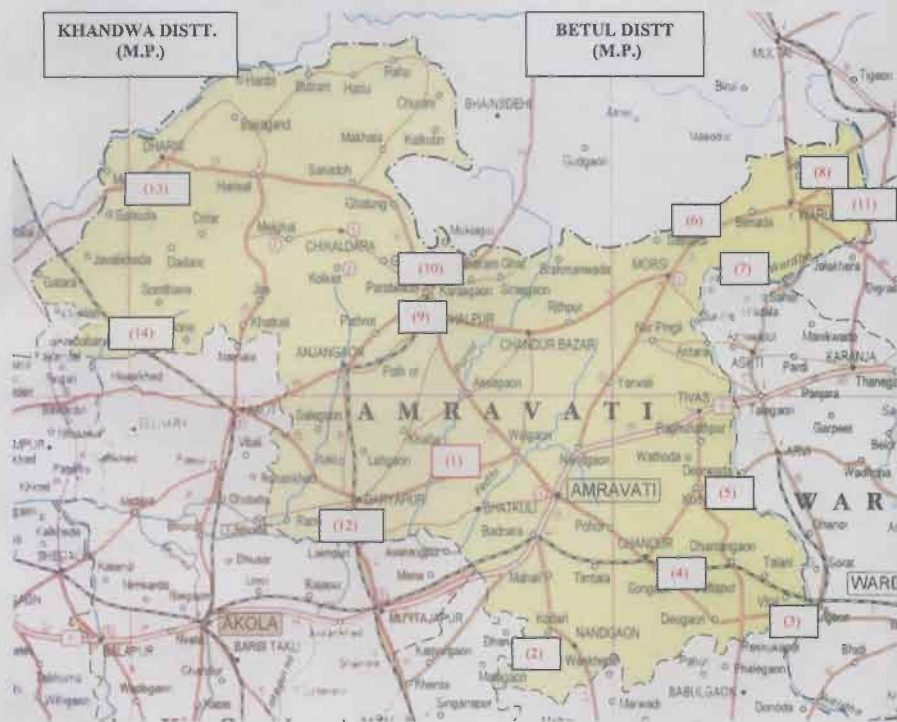
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MAP OF AMRAVATI DISTRICT OF MAHARASHTRA STATE



LEGEND: Name & Location of sample villages - (1) Maheshpur (2) Fattepur (3) Hirpur
 (4) Kamanapur (5) Bharwadi (6) Dapori (7) Ekdara (8) Pusla (9) Shahpur (10) Kumbhi
 (11) Dhanbari (12) Bhulkheda (13) Chulia (14) Barakheda

CHAPTER – I

GENERAL

1.1 INTRODUCTION:

The Pre-Investment Survey of Forest Resources (PISFR) was created in 1965 as a joint project of Food & Agriculture Organization (FAO) of United Nations Development Programme (UNDP) and Government of India (GOI) to collect forest data and present it on scientific lines for forestry planning. The joint project ended in 1968 and PISFR started functioning as a GOI organization. In 1976, the National Commission on Agriculture converted the Pre-Investment Survey of Forest Resources into National Forest Resources Survey Organization to carryout country-wide comprehensive forest resources surveys at regular intervals and present the information in suitable form for the use of planning purposes at the national, the state and the local levels. The National Forest Resources Survey Organization was re-christened as **Forest Survey of India (FSI)** with effect from 1st June 1981, with its headquarters at Dehradun and four zonal offices, namely, Northern Zone at Shimla, Central Zone at Nagpur, Eastern Zone at Kolkata and Southern Zone at Bangalore. The main activities of Forest Survey of India include the following:

- * To prepare Forest Cover/Vegetation Maps of the country on 1: 2,50,000 scale and comprehensive biennial "**State of Forest Report**" (**SFR**) including **National Vegetation Map (NVM)**.
- * To prepare **Thematic Maps (TM)** on 1: 50,000 scale depicting forest types and density classes by visual interpretation of aerial photographs procured from the Survey of India.
- * To carry out **Inventory of Forest Resources** in conventional forest areas of selected States/Union Territories.
- * To carryout **inventory of trees outside conventional forest areas** (non - forest areas) in villages/towns/cities of selected districts falling in different physiographic zones across the country.

- * To **design methodologies relating to forest surveys** and subsequent updating.
- * To conduct **Wood Consumption Studies** in villages/towns/cities of selected districts of States/Union Territories.
- * To **impart training in modern forest survey techniques** to forestry personnel working at various levels in the Forest Departments of the States/UTs.
- * To **support and oversee techniques/inventory work** undertaken by the Forest Departments of States/UTs.

The inventory of tree species growing outside conventional forest areas in the country was first carried out by Forest Survey of India in 1991-92, with an aim to assess the extent of growing stock on non-forest areas. The rural populace in India has been planting tree species in their homestead, agricultural lands, waste lands, community lands, as well as along the road sides, canal banks, sides of railway lines etc., to meet their immediate requirements of fuel, fodder, agricultural implements and timber etc. Inventory in non-forest areas of Amravati district of Maharashtra State was carried out between January to June, 1995 simultaneously with forest inventory of the district with an objective to assess the growing stock existing on revenue lands, i.e. the areas other than the Reserved Forests, the Protected Forests and various categories of un-classed forests in the vicinity of villages.

1.2 LOCATION:

Amravati district is the second most important district in Vidarbha region of Maharashtra State. It is located between 20° 32' and 21° 46' north latitude and between 76° 37' and 78° 27' east longitude. The district is situated right in the center of the northern border of Maharashtra State. The Tapi and the Wardha rivers flow in the northwestern and eastern boundaries of the district respectively. The district is bounded on the north by Betul, north-west by Khandwa, and north-east by Chhindwara districts of Madhya Pradesh State. On the east, it is bounded by Nagpur

and Wardha, on the west by Buldana & Akola and on the south by Yavatmal, Washim districts of Maharashtra State.

1.3 TOPOGRAPHY:

The district can be distinctly divided into two natural zones viz; the dominating hilly area of the Melghat region comprising two tahsils viz Dharni and Chikhaldara and the plains comprising remaining eleven tahsils. The geographical position of Amravati district indicates that the district is predominantly undulating plains of black cotton soil. The richest tracks are lying in the basin of the Wardha and the Purna rivers. Excepting Gwaligarh hills of the Satpudas passing through the Melghat region in Chikhaldara and Dharni tahsils, all other areas are plain fertile tracks lying in the basin of the Tapi and the Wardha rivers.

1.4 GEOLOGY:

Apart from the extensive spread of Purna alluvium, much of the district is covered by Deccan Traps though hamenta, Gondwana and other metamorphic rock occur as minor inliers in the northern part of the district. Trap being hard, dense and durable is most useful for building purposes. Secondary minerals like Zeolites Cha Ice Dony and agate are however found. Decomposition of the Deccan Traps has given rise to deep brown to rich red or black cotton soils. The regur is rich in plant nutrient such as lime, magnesis and low in Nitrogen and Phosphorus.

1.5 CLIMATE:

The climate of the district is characterized by an extremely hot summer and general dryness throughout the year except during south-west monsoon season. The climate of the district can be divided into four distinct periods viz. the Winter from December to February, the summer from March to May, the rainy season (the south-west monsoon) from June to September and the post monsoon period from October to November. The average annual rainfall in the district is 877.4 mm in the

plains. The rainfall at Chikhaldara and other hilly areas of the district is about twice as much as in the plains. On an average, the number of rainy days in the plains of the district is 49 in a year. However, at Chikhaldara there are 77 rainy days in a year. The mean maximum temperature of Amravati has been recorded as 28.4° C and the mean minimum temperature as 14.7°C. However, at Chikhaldara the mean maximum and minimum temperature have been recorded as 22°C and 13°C respectively.

1.6 AGRO-CLIMATIC ZONE:

Amravati district located on Deccan Plateau, is in the hot semi-arid eco-region, with shallow and medium (with inclusion of deep), black soils and GP 90-150 days. The main group is the Semi-arid Eco system.

1.7 AREA AND POPULATION:

The district is spread over an area of 12210 km². occupying 3.96% area of the State. There are 14 Tahsils comprising 11 towns and 1681 villages in the district. The total population of the district as per 2001 census is 2,606,063, of which 1,706,632 inhabit rural areas and 899,431 dwell in urban areas making 65% and 35% respectively with a total growth rate of 18.25 (1991 – 2000). The sex ratio on the whole is 940 females per 1000 males, while it is 936 female per 1000 males in the urban areas of the district and 39.92% persons are literate. The Tahsil-wise details of area and population of the district are tabulated below:

Table 1.1: TAHASIL-WISE DETAILS OF AREA & POPULATION IN AMRAVATI DISTRICT.

Sl. No.	Sub-Division/Tahsil	Area (km ²)	No. of inhabited villages	No. of towns.	Population (Rural)
(1)	(2)	(3)	(4)	(5)	(6)
1.	Achalpur	638.12	145	1	145,132
2.	Amravati	896.44	110	1	128,602

(1)	(2)	(3)	(4)	(5)	(6)
3.	Anjangaon - Surji	520.90	110	1	99,156
4.	Bhatkuli	579.91	112	0	108,574
5.	Chandur bazar	695.40	144	1	172,484
6.	Chandur Railway	946.67	137	1	72,895
7.	Chikhaldara	2507.50	169	1	90,850
8.	Damangaon Railway	003.11	-	1	105,476
9.	Dharni	1462.50	148	0	147,033
10.	Daryapur	776.88	130	1	127,801
11.	Morshi	810.28	-	1	137,141
12.	Nandgaon-Khandeshwar	782.88	133	0	124,489
13.	Teosa	784.22	101	0	98,043
14.	Warud	745.44	121	2	148,956
	District Total	12210	1681	11	1706632

Note: 1) The total urban population of the district is 899,431.

2) The tahsil area figures may not add up to the corresponding district total as the sources for these figures are different.

1.8 LAND USE PATTERN:

The total geographical area of Amravati district is 12210 km², out of which 3577.22 km² is forest area. Thus, the balance 8632.78 km² area is under non-forest land including urban areas. The rural non-forest area in the district is worked out to 8435 km² where survey was actually conducted and estimation of tree stand and stock was made. The rural non-forest area comprises of agriculture land, village habitation, open-land, roads, canals, ponds, tanks, railway lines, play grounds, bunds between two agriculture fields, grassy lands and waste lands etc. Lot of tree growth is seen in these areas. Hence, there is substantial growing stock to meet the requirements of local populace.

1.9 SOCIO-ECONOMIC SCENARIO:

Amravati is predominantly an agriculture based district where agriculture is main source of livelihood of the people. About 70% of the population of the district is dependent on agriculture directly or indirectly. Most of the industries of the district are agriculture based such as cotton ginning and pressing, pulses mill, oil extraction plants etc., involving processing of agricultural produce. There are about 10 industrial units functioning under medium and large scale sectors in the district. As regards small scale industries, there are about 900 registered industrial units out of which about 250 are agro-based industries. There are 101 building material units and eight are of ceramics, 90 chemical based units and 86 forest based industries (saw mills). 15 textile based and 2 mineral based industries are concentrated in and around Amravati town. These industries provide jobs to the local people substantially. Besides, the locals get job opportunities in various forestry operations also. The villagers also collect mahuwa flowers and fruits, charoli, gum, honey, wax, bark, leaves etc. from the forest areas and get monetary support from forests.

1.10 ADMINISTRATIVE UNITS:

The district headquarter is located at Amravati town. The district is divided into 14 tahsils for administrative purpose viz. Amravati, Bhatkuli, Nandgaon-khandeshwar, Achalpur, Chandur Bazar, Morshi, Warud, Chandur Railway, Teosa, Daryapur, Anjangaon, Dharni Damangaon Railway and Chikaldhara. There are 11 towns, Amravati town has Municipal Corporation while other towns have Municipal Councils. The district has 1681 inhabited villages having 13 Panchayat Samitees and 832 Gram Panchayats. 37 Police Stations and 21 Police outposts maintain law and order in the district.

CHAPTER – II

DESIGN AND METHODOLOGY

2.1 DESIGN:

In order to decide the sample size i.e. no. of sample villages to be considered for non-forest inventory, a pilot survey was conducted in the State by taking 12 villages representing each agro-climatic zone. At the time of this survey, there were 30 districts in Maharashtra State comprising of 6 Agro-ecological zones. The total geographical area of the State is 307713 km². The forest and non-forest area of State are 63767 km² and 243946 km² respectively. As per 1991 Census, the State had 39354 inhabited villages in total. On the basis of pilot survey, 351 sample villages were determined to be taken up for detailed non-forest inventory in whole of Maharashtra State. These sample villages were distributed among various districts according to their geographical areas. Accordingly, 14 sample villages were selected for Amravati district for this survey.

2.2 SELECTION OF SAMPLE VILLAGES IN THE DISTRICT:

A list of villages was prepared consulting the toposheets covering the entire Amravati district. From the above list, 14 sample villages were randomly selected using random number table for non-forest inventory in the district. The details of sample villages so selected are given in the table below:

Table 2.1: LIST OF SAMPLE VILLAGES SELECTED FOR THE SURVEY:

Sl. No.	Name of sample village	Sl. No. of the village	Area of sample village (Ha.)	Location of village	
				Map sheet	Quadrant
(1)	(2)	(3)	(4)	(5)	(6)
1.	Barakheda	340	60.39	55 C/16	B-1
2.	Bharwadi	523	348.91	55 K/4	B-2
3.	Bhuikhed	630	333.72	55 H/1	C-2

(1)	(2)	(3)	(4)	(5)	(6)
4.	Chutia	160	281.75	55 C/15	B-1
5.	Daporl	576	625.91	55 K/3	A-2
6.	Dhanbari	395	267.32	55 G/4	C-3
7.	Ekdara	551	875.09	55 K/7	B-1
8.	Fattepur	702	175.83	55 H/10	C-2
9.	Hirpur	34	773.00	55 L/2	C-1
10.	Kamanapur	332	502.00	55 L/1	B-3
11.	Kumbhi	125	80.42	55 G/11	A-3
12.	Maheshpur	162	654.75	55 H/9	A-1
13.	Pusla	559	1437.30	55 K/6	B-3
14.	Shahpur	112	553.65	55 G/7	C-3
		TOTAL	6970.04 ha		

2.3 DEFINITION OF NON- FOREST AREA:

For the purpose of this survey:

- (1) All those areas were included which are outside the traditional Reserved Forests, Protected Forests or Un-classed Forest boundaries.
- (2) All those areas were excluded which satisfy following conditions:
 - (a) All areas within the Municipal councils/Corporations, Cantonment Board or a Notified Area Committee limits,
 - (b) All areas which satisfy the following criteria
 - (i) A minimum population of 5000
 - (ii) A minimum of 75% of male population engaged in non-agricultural pursuits, and
 - (iii) A density of population of at least 400 persons per sq. km.

2.4 METHODOLOGY:

The selected sample villages were allotted to four crews, each headed by a Junior Technical Assistant and assisted by one Deputy Ranger, two Fieldmen. A Khalasi and two local unskilled labourers were also engaged to assist the crews in camping arrangement and identifying boundaries of the villages in the course of data collection. The sample villages were marked on toposheets to facilitate approach and location of villages by the shortest convenient route. On reaching the sample village, the next job of the crew was to ascertain and determine the boundary of the sample village. For this purpose, they took help of the local people and revenue maps obtained from the Revenue Department. The entire sample village was considered to be the sampling unit. To commence data collection, a starting/reference point, preferably some conspicuous object/permanent feature in the village such as well/temple/school building etc., which need not necessarily be a geometrical centre of the village was selected. A detailed description of the starting/reference point of the selected village was recorded in the **Village Description Form**. This is essential to facilitate checking the correctness of fieldwork by the check crew or supervising officers.

After fixing the starting/reference point, the enumeration work started from the reference point by dividing the entire village into wedges with the help of compass in such a way that enumeration in each wedge could be completed easily without scope for omitting any tree/bamboo clump. The enumeration of all the trees having breast height diameter 10 cm and above and all the bamboo clumps were carried out. Enumeration data was recorded in the **Village Tree Enumeration Form** beginning from the north and proceeding further in a clock-wise direction. This procedure is important to avoid duplication/omission of trees/bamboo clumps. All enumerated trees/bamboo clumps were also marked with chalk stick to check any omission/duplication of work.

2.4.1 THE FIELD FORMS:

The data were collected in following field Forms. (Sample Forms are annexed to this report):

(1) Form No. 1

The details of data collection is recorded in this Form

(2) Village Description Form:

The information regarding location of village, description of reference point, various measurements taken by field staff, date of survey and abstract of enumeration in quadrants was recorded in this Form.

(3) District Tree Form:

This Form was filled in for each sample village. The information such as State, district, total no. of villages in the district, no. of sample villages in the district, area of sample village, category of sample village etc was collected together with abstract of category-wise enumeration.

(4) Village Tree Enumeration Form:

All the trees having breast height diameter 10 cms and above occurring in non-forest areas were enumerated and recorded in this Form.

(5) Village Bamboo Enumeration Form:

The enumeration of bamboo clumps occurring in the sample village was recorded in this Form by measuring its diameter at the base of the clump.

(6) Village Sample Bamboo Enumeration and Clump Analysis Form:

The enumerated clumps bearing S. No. 1, 9, 17, 25 (1st clump and every 8th clump thereafter) of each species occurring in sample village were analysed in detail and recorded in this Form.

(7) Village Bamboo Weight Form:

The length and weight of two green representative bamboo culms of each species were recorded in this Form.

2.4.2 CATEGORY OF TREES:

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 existing along the farm bunds and in small patches up to 0.1 ha in area
- (2) Road-side Plantations: Trees planted along the road side.
- (3) Village Woodlots: Naturally growing trees on community/private lands.
- (4) Block Plantations: Plantation patches covering an area of more than 0.1 ha and not falling in any of the above category.
- (5) Pond-side Plantations: Trees planted in and around ponds.
- (6) Railway-side Plantations: Trees planted along railway tracks.
- (7) Canal-side Plantations: Trees planted along canals.
- (8) Others: Trees not falling in any of the above category.

2.5 VERIFICATION OF DATA:

The data collected from selected sample villages in various forms by the field parties were counter checked in the field by supervisory staff and Group Officer and sent to the Zonal Office at regular intervals. The data were further checked for errors and rectified if any, by the technical wing. The scrutinised data were thereafter sent to the **Machine Data Management Unit (MDMU) of FSI Headquarter at Dehradun**, where it was processed and various stand and stock tables were generated.

CHAPTER – III

DATA PROCESSING

3.1 PROCESSING OF DATA:

The field forms of sample villages received at Machine Data Management Unit were consolidated and checked for inconsistencies and coding mistakes if any. The data from each village was entered in the PC and the distribution of trees in each diameter class for each category of trees was obtained species-wise with the help of "Software package dBase IV" by suitably developed programme. The data was further analysed by using ratio method of estimation to arrive at final results. Since many of the tree species in Amravati district occurred in small numbers, such species were clubbed together under miscellaneous species. 20 main species were selected for calculating the number of stems on the basis of their numerical occurrence, commercial and regional importance in this district.

3.2 AREA COMPUTATION:

The rural non-forest area of the district was worked out by subtracting forest area and the urban area from the total geographical area of the district $\{12210 - (3577.22 + 197.78)\}$ that comes to 8435 km².

3.3 VOLUME ESTIMATION:

To estimate volume of trees in non-forest areas, a local volume table was prepared using local volume equation developed during the forest inventory of the district. In the absence of any local volume equation of any species, local volume equation of nearby area was taken into consideration. A copy of the local volume table is annexed to this report.

CHAPTER - IV

ESTIMATION OF GROWING STAND AND STOCK

4.1 ESTIMATION:

The data collected during the inventory of non-forest area pertaining to 14 sample villages in Amravati district were analysed and distribution of trees in each diameter class for each category of trees was obtained, species-wise, from Machine Data Management Unit. The Amravati district has 1681 inhabited villages, covering rural non- forest area of 8435 km². Out of the 1681 inhabited villages, 14 villages were randomly selected for this survey and of the total species inventoried, 20 species have been identified as predominant and rest of the species have been clubbed together as miscellaneous species. All the tree species having breast height diameter of 10 cm & above were enumerated for calculating the total growing stand and the stock. The data was analysed statistically in respect of tree stand and stock parameters besides, calculating number of stems per hectare and volume per hectare. The estimation of total growing stand and stock was made for the entire non-forest area of the district. The result of the analysis indicate a growing stock of 3893224 M³ corresponding to 7242424 trees i.e. 8.59 trees/Ha with corresponding volume of 4.62 M³/Ha.

4.2 GROWING STAND:

Growing stand is the total number of stems and stems per hectare. The table showing species-wise and category-wise (all dia-class combined) number of stems and stems per hectare in non-forest areas of the Amravati district is annexed later in this report. The entire non-forest area of the district has an estimated 7242424 trees @ 8.59 trees/Ha. It may be seen from the table that *Acacia arabica* is the most prominent species contributing 31.24% to the growing stand followed by *Azadirachta indica* 14.55%, *Acacia lenticularis* 8.77%, *Terminalia arjuna* 1.5% and *Bombax ceiba* 1.13%. It is also relevant from the table that 72.61% of the crop

belongs to diameter Class (breast height) 10-20 cm and 20-30 cm that means the crop is young in nature. The species-wise number of stems & stems/Ha that exist in the non-forest areas of the district are shown in the table below:

Table 4.1: SPECIES-WISE NUMBER OF STEMS AND STEMS PER HECTARE

S. No.	Name of Species	Total No. of Stems	Stems/Ha	% of Stems
1.	Acacia arabica	2262306	2.682	31.237
2.	Acacia catechu	30980	0.037	0.428
3.	Acacia lenticularis	635101	0.753	8.769
4.	Ailanthus excelsa	30375	0.036	0.419
5.	Albizia lebbek	9196	0.011	0.127
6.	Azadirachta indica	1053945	1.249	14.552
7.	Bombax ceiba	81444	0.097	1.125
8.	Diospyros melenoxylon	1452	0.002	0.020
9.	Eucalyptus species	484	0.001	0.007
10.	Gmelina arborea	21661	0.026	0.299
11.	Hardwickia binata	484	0.001	0.007
12.	Madhuca latifolia	34613	0.041	0.478
13.	Mangifera indica	222916	0.264	3.078
14.	Syzycium cumini	12947	0.015	0.179
15.	Tectona grandis	25534	0.030	0.353
16.	Terminalia arjuna	106494	0.126	1.470
17.	Terminalia belerica	62807	0.074	0.867
18.	Terminalia crenulata	4840	0.006	0.067
19.	Miscellaneous	2644845	3.135	36.518
	Total	7242424	8.586	100

Distribution of various species of trees in terms of number of stems, stems/hectare found to occur under various categories in the non-forest areas of the district is shown in table No. 4.2 on succeeding page. It may be seen from the table that bulk of the vegetation in non-forest areas of the district occur in Village woodlots (65.52%), followed by Block plantations (13.74%), Farm forestry (8.89%) and Roadside plantations (7.05%). A detail category-wise (all species combined) and diameter (breast height) class-wise (all categories combined), distribution of growing stand is given in the tables annexed later in this report.

Table 4.2: CATEGORY-WISE TOTAL STEMS AND STEMS PER HECTARE

S. No.	Category	Total No. of Stems	Stems/ha	Percentage of Stems
1	Farm forestry	643934	0.763	8.89
2	Road side Plantations	510451	0.605	7.05
3	Village woodlots	4745352	5.626	65.52
4	Block Plantations	995009	1.180	13.74
5	Pond side Plantations	12947	0.015	0.18
6	Rest	334731	0.397	4.62
	Total	7242424	8.586	100

4.3 GROWING STOCK

Growing stock is the cubical content or volume that the growing stand can yield. The estimation of total growing stock in the non-forest areas of Amravati district has revealed the existence of 3893224 M³ of timber. The species-wise volume and volume/Ha, so also the percentage of occurrence is tabulated below:

Table 4.3: SPECIES-WISE TOTAL VOLUME AND VOLUME PER HECTARE

S. No.	Name of Species	Total No. of Trees	Total Volume (M ³)	Volume/Ha (M ³)	Percentage of Volume
(1)	(2)	(3)	(4)	(5)	(6)
1.	Acacia arabica	2262306	1259700	1.493	32.356
2.	Acacia catechu	30980	5874	0.007	0.151
3.	Acacia lenticularis	635101	247115	0.293	6.347
4.	Ailanthus excelsa	30375	28810	0.034	0.740
5.	Albizia lebbeck	9196	7389	0.009	0.190
6.	Azadirachta indica	1053945	685929	0.813	17.619
7.	Bombax ceiba	81444	39669	0.047	1.019
8.	Diospyros melenoxylon	1452	672	0.001	0.017
9.	Eucalyptus species	484	73	0	0.002
10.	Gmelina arborea	21661	8590	0.010	0.221
11.	Hardwickia binata	484	597	0.001	0.015
12.	Madhuca latifolia	34613	131644	0.156	3.381
13.	Mangifera indica	222916	452247	0.536	11.616
14.	Syzygium cumini	12947	9139	0.011	0.235

(1)	(2)	(3)	(4)	(5)	(6)
15.	<i>Tectona grandis</i>	25534	18872	0.022	0.485
16.	<i>Terminalia arjuna</i>	106494	65769	0.078	1.688
17.	<i>Terminalia belerica</i>	62807	36354	0.043	0.934
18.	<i>Terminalia crenulata</i>	4840	4541	0.005	0.117
19.	Miscellaneous	2644845	890240	1.055	22.867
	Total	7242424	3893224	4.616	100

Analysis of the above table indicates that the total volume of 3893224 M³ @ 4.62 per hectare is mainly contributed by *Acacia arabica* (32.36%), *Azadirachta indica* (17.62%), *Mangifera indica* (11.62%), *Acacia lenticularis* (6.35%), *Madhuca latifolia* (3.38%) and rest by other species. It is also evident that the major species which fall in the diameter (breast height) class 10-20 cm and 20-30 cm contribute maximum to the growing stock indicating young nature of the crop. The details of species-wise/category-wise (all categories combined/all dia.class combined) growing stock is given in the table annexed later in this report. However, category-wise growing stock i.e. total volume and volume per hectare is tabulated below:

Table No. 4.4: CATEGORY-WISE TOTAL VOLUME AND VOLUME PER HACTARE

S. No.	Category	Total No. of trees	Total volume (M ³)	Percentage of volume	Volume/Ha (M ³)
1	Farm Forestry	643934	496119	12.74	0.588
2	Road side Plantations	510451	397017	10.20	0.471
3	Village woodlots	4745352	2642363	67.87	3.133
4	Block Plantations	995009	202607	5.20	0.240
5	Pond side Plantations	12947	4963	0.13	0.006
6	Others	334731	150155	3.86	0.178
	Total	7242424	3893224	100	4.616

The table reveals that the distribution of growing stock in different categories of plantations is: 67.87% in Village woodlots, 12.74% in Farm forestry, 10.20% in Roadside plantations, 5.20% in Block plantations and rest by others.

4.4 CONCLUSION:

The total geographical area of Amravati district is 12210 km². and the rural non-forest area has been worked out to 8435 km². The population of the district as per 2001 census is, 2,606,063, out of which 1,706,632 inhabit rural areas while 899,431 dwell the urban areas. According to this survey, the non-forest areas of Amravati district has adequate number of trees i.e. 7242424, yielding a volume of 3893224 M³ @ 8.59 trees per hectare and 4.62 M³ per hectare respectively. The Village woodlots, Farm forestry and Roadside plantations contribute mainly to the growing stock while *Acacia arabica*, *Azadirachta indica*, *Mangifera indica*, *Acacia lanticularis* are the main tree species occurring in the non-forest areas of the district. The growing stock of the non-forest area is substantial to meet the local demand of timber and fuel wood of the villagers. However, to bring down the pressure on the Government forests which is depleting rapidly, suitable schemes are required to be formulated to grow more and more trees on the non-forest areas such as waste lands, community lands, private lands etc so that the increased growing stock shall become major contributor in improving their socio-economic conditions. This requires motivation of the villagers enticing them in the afforestation programmes. Efforts should also be made to adopt Joint Forest Management in these areas.

ANNEXURE - I

LOCAL VOLUME TABLE

S.NO.	NAME OF SPECIES	DIAMETER CLASS (in cm.)							+70
		10-20	20-30	30-40	40-50	50-60	60-70		
1	Acacia arabica	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
2	Acacia catechu	0.084038	0.318965	0.671355	1.141209	1.728526	2.433306	3.25555	
3	Acacia lenticularis	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
4	Allanthus excelsa	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
5	Albizia lebbek	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
6	Azadirachta indica	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
7	Bombax ceiba	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
8	Dalbergia sissoo	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
9	Diospyros melanoxylon	0.124529	0.396528	0.821784	1.400296	2.132064	3.017089	4.05637	
10	Eucalyptus species	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
11	Gmelina arborea	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
12	Hardwickia binata	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
13	Maduca latifolia	0.070757	0.322966	0.878118	1.853436	3.365315	5.529396	8.460737	
14	Mangifera indica	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
15	Pterocarpus marsupium	0.080451	0.329875	0.804066	1.531826	2.532093	3.81864	5.402024	
16	Syzgium cumini	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
17	Tectona grandis	0.393802	0.690712	1.185848	1.87921	2.770798	3.860611	5.14865	
18	Terminalia arjuna	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	
19	Terminalia belerica	0.089288	0.353559	0.821469	1.493018	2.368207	3.447035	4.729503	
20	Terminalia crenulata	0.096945	0.423603	0.992067	1.802336	2.854412	4.148294	5.683981	
21	Rest of species	0.085168	0.344568	0.788606	1.417282	2.230595	3.228547	4.411136	

ANNEXURE - II

DISTRIBUTION OF ESTIMATED TREES IN NON FOREST AREA OF AMRAVATI DISTRICT															
Non-forest area of the District 843500 Ha.															
Area of Villages Surveyed - 6970 Ha.															
All Categories Combined															
S.NO.	NAME OF SPECIES	DIAMETER CLASS										Total	% of Trees	Stems/Ha	
		10-20	20-30	30-40	40-50	50-60	60-70	70+							
1	Acacia arabica	738088	773061	424532	214444	82049	20451	9681	0	0	0	0	2262306	31.237	2.882
2	Acacia catechu	21299	7503	1694	484	0	0	0	0	0	0	0	30980	0.428	0.037
3	Acacia lentiginis	270596	234170	90641	27592	7867	2904	1331	635101	8.769	0.753	0	30375	0.419	0.036
4	Albizia excelsa	8229	6414	7019	4236	1815	1210	1452	30375	0.419	0.036	0	9196	0.127	0.011
5	Albizia leibbeck	2783	2178	1573	1573	726	242	121	9196	0.127	0.011	0	1053945	14.552	1.249
6	Azadirachta indica	326386	351799	194355	99355	44776	18153	19121	1053945	14.552	1.249	0	81444	1.125	0.097
7	Bombax ceiba	39484	22630	10407	5809	2420	605	1089	81444	1.125	0.097	0	1452	0.020	0.002
8	Diospyros melanoxylon	726	363	121	242	0	0	0	484	0.007	0.001	0	21661	0.299	0.026
9	Eucalyptus species	363	121	0	0	0	0	0	484	0.007	0.001	0	484	0.007	0.001
10	Gmelina arborea	9439	7503	3146	968	605	0	0	21661	0.299	0.026	0	484	0.007	0.001
11	Hardwickia binata	242	121	0	0	0	0	0	121	0.001	0.001	0	346713	4.778	0.041
12	Machuca latifolia	4962	5204	3388	3389	3631	3631	10408	54943	3.078	0.264	0	12947	0.179	0.015
13	Mangifera indica	19967	34611	34490	33038	25699	19968	54943	222916	3.078	0.264	0	25534	0.353	0.030
14	Syzgium cumini	2420	4598	3872	1331	363	0	363	12947	0.179	0.015	0	106494	1.470	0.126
15	Tectona grandis	11376	8471	3751	1573	242	121	0	25534	0.353	0.030	0	62807	0.867	0.074
16	Terminalia arjuna	26745	41993	22872	8955	3146	647	1936	62807	0.867	0.074	0	4840	0.067	0.006
17	Terminalia belerica	21904	22993	10165	3994	2057	726	968	4840	0.067	0.006	0	2644845	36.518	3.135
18	Terminalia crenulata	847	1210	2057	484	121	0	121	4840	0.067	0.006	0	7242424	100	8.586
19	Rest or species	1607602	621906	272048	77330	26318	14159	24082	2644845	36.518	3.135	0	100	1.00	0.08
	Total	3112458	2146249	1086131	484797	204035	83077	125737	7242424	100	8.586	0	100	1.00	0.08
	Percentage of Trees	42.975	29.635	14.997	6.694	2.817	1.146	1.736	7242424	100	8.586	0	100	1.00	0.08
	Stems per Ha.	3.690	2.544	1.288	0.575	0.242	0.098	0.149	8.586	0.100	0.008	0	100	1.00	0.08

ANNEXURE - III

DISTRIBUTION OF ESTIMATED VOLUME OF TREES IN NON-FOREST AREA OF AMRAVATI DISTRICT														
Non-forest area of the District 843500 Ha.										Area of Villages Surveyed - 6970 Ha.				
S.NO.	NAME OF SPECIES	DIAMETER CLASS										Total	% of Volume	Volume/Ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+						
1	Acacia arabica	62862	266372	334789	303928	183018	66027	42704	1259700	32.356	1.493			
2	Acacia catechu	1791	2394	1137	552	0	0	5874	0.151	0.007				
3	Acacia lenticularis	23047	80687	71479	39106	17548	9377	5871	247115	6.347	0.263			
4	Allanthus excelsa	701	2210	5535	8003	4049	3907	6405	28810	0.74	0.034			
5	Albizia lebbbeck	237	750	1239	2228	1620	781	534	7389	0.19	0.009			
6	Azadirachta indica	27798	121219	153268	140813	98877	58609	84345	685929	17.619	0.813			
7	Bombax ceiba	3278	7797	8207	8232	5398	1953	4804	39669	1.019	0.047			
8	Diospyros melanoxylon	90	144	99	339	0	0	0	672	0.017	0.001			
9	Eucalyptus species	31	42	0	0	0	0	0	73	0.002	0			
10	Gmelina arborea	803	2585	2481	1371	1350	0	0	8590	0.221	0.01			
11	Hardwickia binata	21	42	0	0	0	0	534	597	0.015	0.001			
12	Madhuca latifolia	351	1681	2975	6281	12219	20077	88060	131644	3.381	0.156			
13	Mangifera indica	1700	11925	27199	46824	57771	64468	242360	452247	11.616	0.536			
14	Syzgium cumini	205	1583	3054	1886	810	0	1601	9139	0.235	0.011			
15	Tectona grandis	4480	5851	4447	2956	671	467	0	18872	0.485	0.022			
16	Terminalia arjuna	2278	14470	18037	12692	70181	2735	8539	65769	1.688	0.078			
17	Terminalia bellerica	1956	8131	8351	5963	4872	2503	4578	36354	0.934	0.043			
18	Terminalia crenulata	82	513	2041	872	345	0	688	4541	0.117	0.005			
19	Rest of species	136917	214079	214539	109597	63167	45713	106228	890240	22.687	1.055			
	Total	268628	742475	859877	689543	459733	276817	597251	3893224	100	4.616			
	Percentage of Volume	6.9	19.071	22.061	17.714	11.809	7.105	15.341	100					
	Volume per Ha	0.318	0.881	1.018	0.818	0.545	0.328	0.708	4.616					

ANNEXURE - IV

DISTRIBUTION OF ESTIMATED TREES IN NON-FOREST AREA OF AMRAVATI DISTRICT

Non-forest area of the District - 843500 Ha.

All Diameter Class Combined

S.NO.	NAME OF SPECIES	CATEGORY								TOTAL	% of Trees	Stems/ Ha.
		I	II	III	IV	V	VIII					
1	Acacia arabica	104559	286372	1706716	35216	6232	113151		2262306	31.237	2.682	
2	Acacia catechu	484	968	29044	121	0	363		30980	0.428	0.037	
3	Acacia leucularis	9560	61599	537682	2904	c	21783		635101	8.769	0.753	
4	Allanthus excelsa	1331	2299	26503	0	121	121		30375	0.419	0.036	
5	Albizia lebbbeck	605	968	6655	726	0	242		9196	0.127	0.011	
6	Azadirachta indica	35338	70554	894202	10286	363	43202		1053945	14.552	1.249	
7	Bombax ceiba	6777	1452	72126	0	0	1089		81444	1.125	0.097	
8	Diospyros melanoxylon	0	0	1331	0	0	121		1452	0.020	0.002	
9	Eucalyptus species	363	0	121	0	0	0		484	0.007	0.001	
10	Gmelina arborea	726	121	19725	484	0	605		21661	0.299	0.026	
11	Harwickia binata	0	0	484	0	0	0		484	0.007	0.001	
12	Madhuca latifolia	0	242	34250	0	0	121		34613	0.478	0.041	
13	Mangifera indica	146916	3388	33280	38727	0	605		222916	3.078	0.264	
14	Syzgium cumini	3025	605	7502	484	121	1210		12947	0.179	0.015	
15	Tectona grandis	9439	363	14764	726	0	242		25534	0.353	0.030	
16	Terminalia arjuna	121	121	28801	0	242	77209		106494	1.470	0.126	
17	Terminalia belerica	1936	2420	57241	121	0	1089		62807	0.867	0.074	
18	Terminalia grenulata	0	121	4719	0	0	0		4840	0.067	0.006	
19	Rest of species	322754	68858	1270206	905214	4235	73578		2644845	36.518	3.135	
	Total	643934	510451	4745352	995009	13947	334731		7242424	100	8.586	
	Percentage of Trees	8.891	7.048	65.521	13.739	0.179	4.622		100			
	Stems per Ha	0.763	0.605	5.626	1.180	0.015	0.397		8.586			

ANNEXURE - V

DISTRIBUTION OF ESTIMATED VOLUME OF TREES IN NON-FOREST AREA OF AMRAVATI DISTRICT										
Non-forest area of the District -843500 Ha										
Area of Villages surveyed - 6970 Ha										
S.NO.	NAME OF SPECIES	All Diameter Class Combined								Volume/Ha.
		CATEGORY								
		I	II	III	IV	V	VIII	TOTAL	% of Volume	Volume/Ha.
1	Acacia arabica	86457	192298	922782	11381	1889	44693	1259700	32.356	1.493
2	Acacia catechu	70	294	5440	39	0	31	5874	0.151	0.007
3	Acacia leucodonta	3498	53008	181409	802	407	7991	247115	6.347	0.293
4	Albizia excelsa	789	2730	29239	0	42	10	28810	0.74	0.034
5	Albizia lebeck	1080	722	5227	94	0	266	7389	0.19	0.009
6	Azadirachta indica	26505	98688	534934	4325	286	21191	685929	17.619	0.813
7	Bombax ceiba	3713	1537	34018	0	0	401	39669	1.019	0.047
8	Diospyros melanoxylon	0	657	0	0	0	15	672	0.017	0.001
9	Eucalyptus species	63	0	10	0	0	0	73	0.002	0
10	Gmelina arborea	250	10	7992	41	0	297	8590	0.221	0.010
11	Hardwickia binata	0	0	597	0	0	0	597	0.015	0.001
12	Madhuca latifolia	0	1130	130107	0	0	407	131644	3.381	0.156
13	Mangifera indica	274532	6043	77537	92982	0	1153	452247	11.616	0.536
14	Syzgium cumini	2318	284	5229	363	270	675	9139	0.235	0.011
15	Tectona grandis	6449	371	11432	429	0	191	18872	0.485	0.022
16	Terminalia arjuna	42	95	25184	0	137	40311	65769	1.688	0.078
17	Terminalia belerica	819	1307	33708	43	0	477	36354	0.934	0.043
18	Terminalia crenulata	0	12	4529	0	0	0	4541	0.117	0.005
19	Rest of species	89534	38488	636332	92108	1932	31846	890240	22.867	1.055
	Total	496119	397017	2642363	202607	4963	150155	3893224	100	4.616
	Percentage of Volume	12.743	10.198	67.871	5.204	0.127	3.857	100		
	Volume per Ha	0.588	0.471	3.133	0.24	0.006	0.178	4.616		

ANNEXURE - VI

DISTRIBUTION OF ESTIMATED TREES IN NON-FOREST AREA OF AMRAVATI DISTRICT											
Non-forest area of the District - 843500 Ha.		Area of Villages Surveyed - 6970 Ha.									
All species combined											
S.NO.	CATEGORY	DIAMETER CLASS						TOTAL	% of Trees	Stems/Ha	
		10-20	20-30	30-40	40-50	50-60	60-70				70+
1	FARM FORESTRY	265030	162647	82291	51433	30133	18515	33685	643934	8.891	0.763
2	ROAD SIDE PLANTATIONS	115088	176444	105528	58572	31706	11133	11980	510451	7.048	0.605
3	VILLAGE WOODLOTS	1706957	1619098	827639	348774	131547	46713	64624	4745352	65.521	5.626
4	BLOCK PLANTATIONS	890329	58572	15369	6592	4478	4962	12707	995009	13.739	1.18
5	POND SIDE PLANTATIONS	4961	5082	2420	242	242	0	0	12947	0.179	0.015
6	OTHERS	130083	124406	52884	17184	5929	1694	2541	334731	4.622	0.397
	TOTAL	3112458	2146249	1086131	484797	204035	83017	125737	7242424	100	8.586
	PERCENTAGE OF TREES	42.975	29.635	14.997	6.694	2.817	1.146	1.736	100		
	STEMS PER HECTARE	3.69	2.544	1.288	0.575	0.242	0.098	0.148	8.586		

ANNEXURE - VII

DISTRIBUTION OF ESTIMATED VOLUME OF TREES IN NON-FOREST AREA OF AMRAVATI DISTRICT														
Non-forest area of the District - 843500 Ha.										Area of Villages surveyed - 6970 Ha.				
All species combined														
S.NO.	CATEGORY	DIAMETER CLASS										TOTAL	% of Volume	Volume/Ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+						
1	FARM FORESTRY	24257	56761	65335	73285	67232	59777	149472	496119	12.743	0.588			
2	ROAD SIDE PLANTATIONS	9806	60834	83320	83013	70725	35945	53374	397017	10.198	0.471			
3	VILLAGE WOODLOTS	147114	559915	654436	496464	297884	159405	327145	2642363	67.871	3.133			
4	BLOCK PLANTATIONS	75902	20347	12120	12177	9989	16020	56052	202607	5.204	0.240			
5	POND SIDE PLANTATIONS	423	1751	1907	342	540	0	0	4963	0.127	0.006			
6	OTHERS	11126	42867	41759	24362	13363	5470	11208	150155	3.857	0.178			
	TOTAL	268628	742475	858877	689643	459733	276617	597251	3893224	100	4.616			
	PERCENTAGE OF VOLUME	6.900	19.070	22.061	17.714	11.809	7.105	15.341	100					
	VOLUME PER HECTARE	0.318	0.881	1.018	0.818	0.545	0.328	0.708	4.616					

FORM NO.1

Data collection on village forest (outside green wash area)

Mapsheet No.

Name of village: Tahsil

District:

Range:

Forest Division:

Circle:

1 Reference point for

Village

(mention distance from nearest Railway station/Bus station etc.)

2 Area planted by social forestry/Individuals, Department etc.

- a. Village woodlot
- b. Rehabilitation of Degraded forest
- c. Rural fuelwood
- d. Any other schemes
- e. Vanmahotsava etc.

3 Category of the village

4 Land use

Area under Ha.

1. Habitation i.e Schools, Colleges, Hospitals, Play ground, Samshan etc.

2. Cultivation

- A. Irrigated
- B. Non-irrigated

3. Fallow 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

Signature

Name.....

Designation

Date:

ANNEXURE - IX

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 survey
- 10 Description of the centre and approach to this point
- 11 Number of angular quadrants formed in the sample village
- 12 Compassing done by:
- 13 Tree enumeration done by:
- 14 Height measurements taken by:
- 15 Quadrant-wise summary of enumerations

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

Date:

Name & Signature of the
Crew Leader

Rough diagram of sample village

ANNEXURE - X

DISTRICT TREE FORM

Job No.	Card design	State	District	No of Villages in the district	No. of Sample villages in the district	Geographical area of the district (Ha.)	Sample Village	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 the plantation/tract.

Farm forestry	Road side plantations	Village wood lots	Block plantations	Pond side plantations	Railway side plantations	Canal side plantations	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.....

Name & Signature of the Crew Leader.....

ANNEXURE - XIII

BAMBOO WEIGHT FORM

Job Number 1-3	Card Design 4-5	Mapsheet No. 6-11	Grid No. 12-15	Plot No. 16

Spp. Code	Sample No.	Green Weight of Culms												Green weight of Sub-sample for Co-relation with dry wt.					
		Diameter Class												Weight (Grams)	Sub Sample Culm	Sub Sample Culm	Sub Sample Culm		
		2 to under 5 cm			5 to under 8 cm			8 cm and above											
		Dia. (cm)	Total Length (Dmt)	Utilizable Length (Dmt)	Weight (Grams)	Dia. (cm)	Total Length (Dmt)	Utilizable Length (Dmt)	Weight (Grams)	Dia. (cm)	Total Length (Dmt)	Utilizable Length (Dmt)	Weight (Grams)						
16-19	20	21-22	23-25	26-28	29-31	32-36	37-38	39-41	42-44	45-47	48-52	53-54	55-57	58-60	61-63	64-68	69-72	73-76	77-80

Date:

Name & Signature of the Crew Leader: