Inventory Report of
Non Forest Area
Bangalore Rural District

सत्यमेव जयते

Government of India
Ministry of Environment and Forests
Forest Survey of India
Southern Zone
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Preface

Forest Survey of India started the inventory of trees growing in the rural areas in 1992 with the primary objective of assessing the distribution of trees and their growing stock to have an overview of the impact of various social forestry schemes implemented by the state forest departments. The inventory is carried out according to stratified random sampling method. One of the important features of this survey is to categorize various types of trees in a village such as farm forestry, Roadside plantation, village woodlot, block plantations, canals, railway lines, ponds and rest.

This report pertaining to Bangalore (rural) district, Karnataka is one such attempt made by the southern zone, Bangalore. It presents the results of inventory of trees outside the traditional forest areas.

The geographical area of Bangalore rural district is 5,814 sq.km. making about 3% of the total area of the state comprising with a population of 1.67 million as per 1991 census. The survey was carried out during 1996-97 in the non-forest areas of the district covering an area of 4759.93 sq.km.

Out of the total species inventoried, fifteen species have been identified as predominant and commercially important and 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 12.5 million lakhs ie., 26.23 trees/ha and the corresponding volume is 21.23 lakh cubic metres ie., 4.44 cu.m of volume/ha. *Eucalyptus* spp. *Azadirachta indica* and *Ficus* spp., were found to be the main species comprising 17.23%, 6.31% and 5.26% respectively.

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

It is hoped that this report will be used by all those concerned departments and agencies besides the State forest department.

Sd/-

Date: 31.12.1999

Dr.Devendra Pandey
Director,
Forest Survey of India.

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ACKNOWLEDGEMENTS

The state of Karnataka is situated in the South-west part of India. It has moderate climate with cool winters and slightly hot summers. The Bangalore (rural) District is in southern part of the state and known for its solubriant weather with four clear seasons. The villages are characterized by the presence of ponds. The staff of the southern zone were engaged in carrying out the inventory survey of non forest area of Bangalore rural district with the active co-operation of State Forrest Department Officers and staff. The panchayat pradhans and members and also the villagers were very kind to extend their co-operation in making our field work smooth and easy. It is worthwhile to mention the kind help and assistance rendered by Sri P.B.Ramamuurthy, I.A.S, the then Dy.Commissioner, who was also a member of the forest freternity before his joining the Administrative Service, who personally directed his staff to render all possible assistance to the servey party in accomplishing their task. I sincerely acknowledge with thanks the co-operation and help extended by all those concerned as mentioned above.

I am specifically grateful to Sri A.Sadashivaiah, IFS., the Principal chief Conservator of Forests, Karnataka for directing the officers and staff of his department to extend full co-operation to our field staff. I am also thankful to Sri. N.Chandrasekhara Murthy and Sri.P.C.Pandey, Conservators of Forests and also the Divisional Forest Officer, Bangalore Rural Division for providing us the required data and informations. Sri Rajandran, IFS, Conservator of Forests, Social Forestry, Bangalore and Range officers (Territorial) and other field staff have been very co-operative in extending all possible assistance.

I sincerely acknowledge with thanks, the help rendered by all the concerned as mentioned above but for whose co-operation and help this organisation would not have completed the present inventory.

Sd/-
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SUMMARY

- The inventory of wood resource outside forest area in Bangalore Rural district of Karnataka was carried out in 1996-97 to assess its availability for production of timber, fuelwood and raw material for paper pulp, packaging cases, construction timber, agricultural implements etc.

- Bangalore Rural district has a total of 1707 inhabited and 11 uninhabited villages spread over an area of 5,814 sq.km.as per revenue records. The inventory was confined to 4760 sq.km of non forest area, having 8 talukas. A total of 14 villages were selected randomly for the inventory as sample size. One field party comprising of one Junior Technical Assistant, two Fieldman with a driver completed the inventory in about 8 months period.

- The inventory revealed that the entire non-forest area of Bangalore Rural district has 12.5 million trees giving an average of 26.2 trees/ha. The analysis shows that the maximum number of (72%) trees are in 10-20 cms dia-class and only 0.4% trees in the highest dia class of 60-70cm. Whereas the contribution of these two dia classes to the total volume is 31% and 16% respectively.

- The estimated total volume was 2.1million cu.m. of wood with an average of 4.4 cu.m. per ha. The volume in the lowest dia class 10-20cm is 31% where as in the highest dia class only 16%.

- The species wise distribution of total number of trees shows that *Eucalyptus* spp. has the largest representation 17.2% followed by *Azadirachta indica* 6.3% and *Ficus* spp. 5.3%, *Acacia arabica* 2.6% and *Tamarindus indica* 1.2%

- The distribution of number of trees into different category of plantations shows that block plantation dominate the plantations having about 43.6% or 54.3 lakh trees followed by farm forestry 39.6 lakh trees (31.7%) and village woodlot 17.90 lakh trees (14.3%) minimum was in canal side plantation ie., 2441 trees (0.02%).

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CHAPTER - I

General Features of the District

1.1 *Introduction*

The present inventory was conducted to asses the availability of forest resources for production of timber, fuel wood, fodder and thatching grass, raw material for paper and pulp, match wood etc. in area outside the traditional reserve forest and those forest area which could not be covered during the course of regular inventory of Karnataka state.

1.2 Description of the District

Bangalore Rural district came into being on the 15th of August 1956 with the division of erstwhile Bangalore district into Bangalore Rural and Bangalore (Urban) districts. The headquarter is located in Bangalore city itself. The district has the plateau with an average elevation of 600 mts. to 900 m from the mean sea level has ranges of hills which are actually spurs of the eastern ghats stretching north wards with peaks like Bananthimari Betta, Mudavadi Betta, Bilikal Betta, Siddadevara Betta etc. The Savandurga and Shivaganga peaks are another row of hill ranges, spreading up to the Nandi Hills, running across the Bangalore (Urban) district. Bangalore rural district has many prehistoric sites at places like Jadigena halli (Hosakote Taluka) Bellandur and Savanadurga. The district abounds in wonderful tourist spots, places of scenic beauty. Tall hills, forts and beautiful monuments. The district forms a part of Deccan plateau and the rock formations belong to the category of peninsular

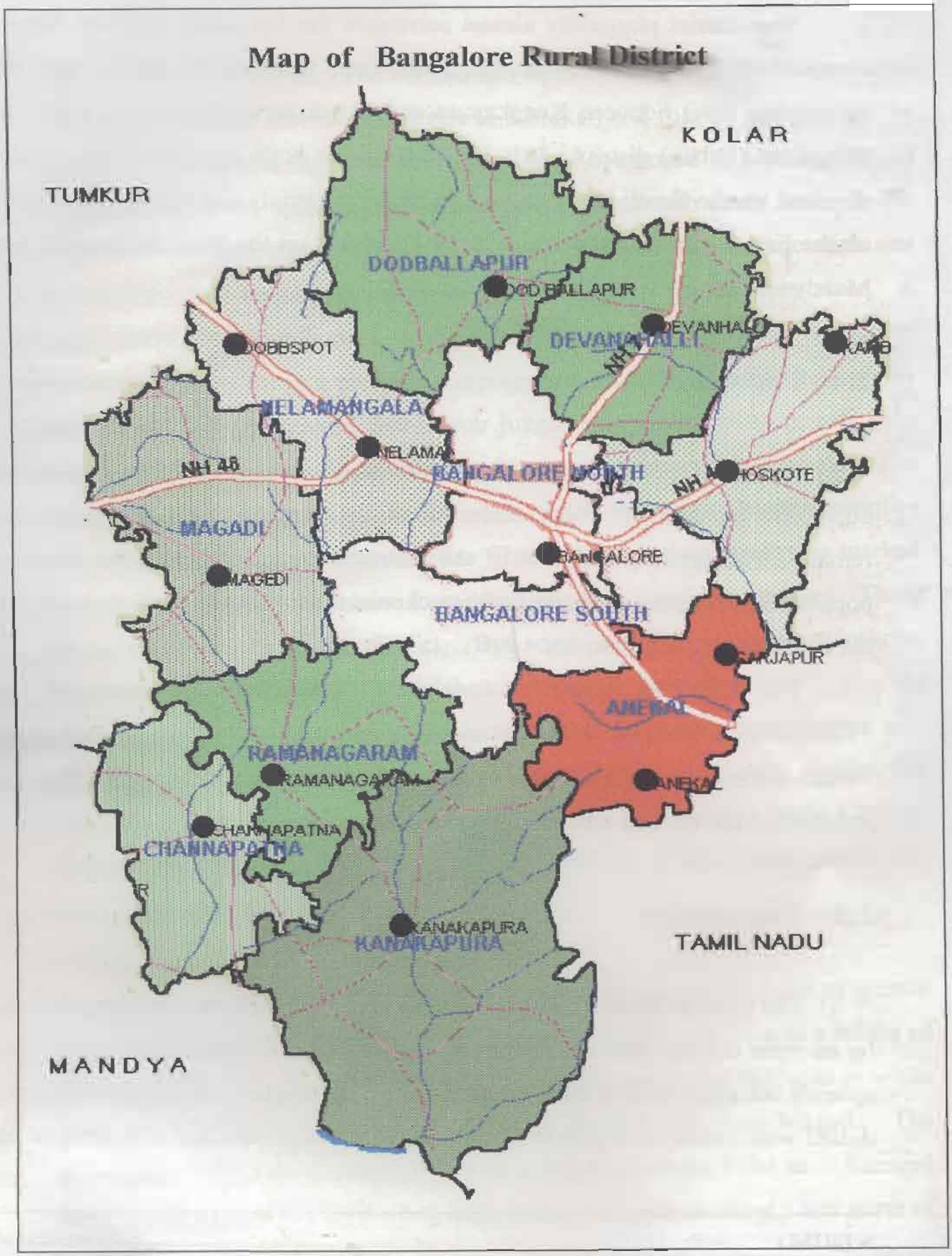
Gneiss. The granite gneisses that abound in Kanakapura, Nelamangala, Devanahalli and Ramanagaram talukas have created captivating landscapes all along and they have provided jobs to hundreds engaged in quarrying.

The Bangalore Rural District derives its name from its headquarter town Bangalore and majority of the district consists of rural areas. The earliest reference to the name is seen in a ninth century Ganga inscription from Begur as **Bengāluru**. The present name Bangalore is the anglicised form of 'Bengaluru" A popular story suggests the origin of "Bengaluru" from "Bendakaluru", Hoysala Ballala. During his long journey he is stated to have been fed by an old woman, with "Bendekalu" (boiled beans). The prince named the place as "Benda kal uru" (village that abounds boiled beans). But the story is incredible, as the place had the present name much earlier than the Hoysalas. It appears to have had a floral origin from the tree benga or rakthahonne in Kannada (*Pteroocarpus marsupium* roxb., the Indian kino).

The district lies in the Southern maidan region of the state and is by and large an open country, which is lacking in natural barriers.

1.3 Location

The district is located in the south-eastern corner of Karnataka State, spanning a geographical area of 5,814 sq.km. between the latitudinal parallels of 12^0 15′ N and 13^0 35′ N on the one hand and longitudinal meridians of 77^0 5′ East and 78^0 E on the other.


Map of Bangalore Rural District
KOLAR
TUMKUR
DODBALLAPUR
DEVANHALLI
DOBBSPOT
NELAMANGALA
NH 48
BANGALORE NORTH
HOSKOTE
MAGADI
BANGALORE
BANGALORE SOUTH
ANEKAL
RAMANAGARAM
CHANNAPATNA
KANAKAPURA
TAMIL NADU
MANDYA

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The district physically almost surrounds the Bangalore (Urban) district except having an opening in the South-East, the Anekal taluka, and the connecting areas between Kanakapura and Hosakote talukas, being a part of Bangalore (Urban) district. It is bounded on the north by Tumkur and Kolar districts, on the South by Mandya and Mysore districts and Tamil Nadu state, on the East by Kolar district and Tamil Nadu and on the West by Tumkur and Mandya district.

1.4 Population

The total population of Bangalore rural district in 1991 was about 16,73,000 persons of which males constitute 8,60,231 and the rest were females. The urban population of the district accounts for 18% of the total population, while the rural population reckoned 82%. The population density in the district was 288 per sq km.

The district comprises of 8 talukas, 35 hoblies, 1707 inhabited and 11uninhabited villages, 9 towns and 102 mandal panchayath. Kanakapura Taluka is the largest Taluka with an area of 1,590 sq km and Devanahalli is the smallest taluka with an area of 451 sq.km.

1.5 Topography

The Central, northern and eastern portions of the district are characterised by an open country side consisting of vast stretches of undulating plains. The uplands are often bare or covered with low scrub jungles and the low lands are dotted with series of irrigation tanks. It represents an uplifted peneplain at an

elevation of about 900 m. The surface has been dissected on the western and southern parts of the district giving rise to a broken and rugged topography. In the west the terrain is rugged and broken and is composed of a succession of hills and valleys intersected by rocks and rapid streams with sandy beds. In the south, the hills gets closer. The lands are covered with denser vegetation and the general level declines as one moves south towards the Cauvery river. A range of hills and Kanakapura in the south to Nijagal in the north formed of course grained granite is a prominent topographic feature. The hills are usually boulder strewn and covered with scrub jungle. In some places granite hills abruptly rise from the surrounding plain forming conspicuous land marks. The valley in between the granite hills form very fertile tract with abundant supplies of water harnessed by means of wells. The low lying plain country is marked by series of tanks varying in size from small ponds to considerable lakes. There are no natural lakes in the district. But some of these tanks like Hoskote, Madhure, Doddaballapur etc adorn the country side forming beautiful spreads of water. These tanks serve to store rain water for a temporary period and making it available for agriculture. Among the hills found in the district, the following are notable, Shivagange Betta 1,380 m. Savanadurga Betta 1207 m. Nijagal Betta 1050 m. Bananthimari Betta 1043 m. Bilikal Betta, Mudavadi betta and Narasimhadevara Betta.

The Savanadurga Betta (Magadi taluka) is an enormous mass of granite which stands on a base of about 12 km in circumference and rises to a height of 1207 m above msl. The hill consists of two peaks, one called Bilibetta or white peak, another Karibetta or black peak. It is about 8 Km from Magadi. The Shivaganga hill, conical shaped, rises to a height of about 1380 m . Ramgiri Betta, a picturesque hill on the left bank of the Arkavati, is about 5 km north of

Ramanagaram and give its name to the taluka. Sivagiri is a large fortified rock, near Ramanagaram on the right bank of Arkavati.

1.6 Rivers

A major portion of Bangalore Rural district lies in the Arkavati valley. The basins of the Dakshina pinakini and the shimsha account for small portions of land in the eastern and Western sections respectively. A line drawn north and south from the Nandidurga range of hills to the west of Bangalore and then to Anekal and would run along the highest parts of the ridge that separates the Arkavati basin from that of the Dakshina pinakini. This watershed forms the western boundary of the Cauvery system. A broken chain of rocky hills which runs parallel to this watershed extends from the western corner of Nelamangala Taluka through the talukas of Magadi, Ramanagaram and Channapatna as well as Kanakapura. Lands lying west of this hilly belts are drained by the Shimsha river.

The Arkavathi, the Kanva and the Dakshina Pinakini (Southern Permar) are the rivers which flow through the district in the general direction from North to South.

The Arkavati

The Arkavati is a tributary of the Cauvery and its source is a well in the south-western portions of the Nandi Hills. Taking a south westerly route, the river enters Doddaballapur taluka, passes through the eastern portions of

Nelamangala taluka, receives the rivulet, Kumudvati from the west at Tippagondana halli and then flows through the Magadi taluka, passing east of Savanadurga, penetrating between the hills, Ramagiri and Sivanagiri. It runs through Ramanagaram taluka and then through Kanakapura taluka. Another tributary the vrishabhavati, meets the river near Muduvadi durga and finally the river flows into the Cauvery on the southern borders of the district in Karnakapura taluka at Sangama. The length of the main stream is about 190 km. Though the river is not exactly a seasonal stream, in summer months it presents the usual aspect of a sandy bed with a small current of water flowing at one side. However, the holes scooped in the sandy bed furnish a ready supply of water. During rainy season it is a formidable stream, swollen by the mountain turrets, especially near Magadi where after it traverse mainly amid a wild country side full of rocky hills and precipices. Major part of its course, especially southern part is through wild country amid rocky hills. Consequently its waters are little utilised. In the northern upstream side it finds many big tanks like Doddaballapur and Madhure in the dist apart from Hesaraghatta and Thippagondana halli tanks in Bangalore urban district.

The Kanva

The Kanva river emerges from the hills to the north of Malur in Channapatna taluka and enters a broad and fertile valley that stretches out up to the borders of the taluka and finally it joins the Simsha river. A reservoir has been formed by building a dam across the river near Abbur and its waters are being effectively utitlised for purposes of irrigation. Number of coconut gardens are found on the lower part of the river, the soil being well suited for the purpose.

The Dakshina Pinakini

The river takes its name from Pinaka, the bow of Shiva. Along with its northern counterpart it raises in the range of the Nandi Hills at the Channakeshava Betta. Its course, after entering the dist, is southwards and it passes through the talukas of Devanahalli and Hoskote where it forms the large lakes known as Jangarnakote (Kolar dist) and Hosakote kere. The river continues its southward journey and crosses the district and finally crosses the state border at a place a little to the east of Sarjapura in anekal taluka of Bangalore dist. The total length of this river within Bangalore rural district is about 60 Kms.

The rivers that flow through the district are too small to evoke any hopes about the feasibility of putting up any major irrigation works within the district. The irrigation potential is indeed quite low. Currently some amount of water from these rivers, is however being utilised to a little extent in different parts of the district. Kanva reservoir which was built in 1946 is the only irrigation project that deserves mention as an important source of irrigation with a network of canals. Mention may also be made of the Manchanabele project in Magadi taluka and Iggalur project in Channapatna taluka, each of which is providing irrigation facilities to about 3,800 ha of land.

1.7 Ground water

Ground water in the district occurs in various geological formations, underwater table conditions and the ground water recharge is mainly through precipitation. The water bearing formations include the altered and weathered gneisses and laterite. The depth to the unconfined water in the district is related to the altitude of the land surface. Generally the depth is more where the land surface is low. The depth of water ranges between one to three meters in Arkavati and Kanva basins. It is deeper in other parts and extends up to 12 m depending on the topographic location of wells. The wells normally range in diameter between 2 to 10m and 2 to12m in depth. The fluctuation in water table between summer and monsoon water level ranges from 1 to 4 m. The fluctuation is least in the low-lying basins. The yields from wells range between 10 to 15,000 gallons per day. In exceptional cases where revitalization is done by sinking bores from the bottom, the wells are yielding between 25 to 30,000 gallons per day. The yields from borewells in the district ranges between 800 to 1000 gallons per hour.

The highly porous and senile nature of the soil, weathered and jointed and fissured bedrock permits increased percolation of meteoritic water underground. Smaller amounts are derived by infiltration of water used for irrigation. It is assessed that about 90% of the rain that is precipitated, is lost through surface runoff and evaporation and remaining 10% eventually seeps through and reaches the ground reservoir. In view of concentration of large number of irrigation wells in Hosakote and Devanahalli talukas. It has been found advisable to discourage the sinking of new borewells as water supply is likely to decrease.

1.8 Flora

The natural vegetation of the area may be broadly grouped into two types. The hilly vegetation and pond and riverbed vegetation apart from the roadside and avenue trees which are planted. The vegetation in general is regarded as deciduous jungle types with the exception of the valleys and a majority of species inhabiting these areas exhibit xeromorphy. The Bannerghatta forest in Anekal taluka, represents the original flora typical of this region, which includes dry deciduous and thorny shrub forests, Most of the area is under cultivation for several centuries and now there has been felling of all woody plants for fuel, resulting in growth of scrub vegetation. Vast areas are covered by thickets of extensive growth of lantana and other xeromorphic thorny shrubs rendering the area impenetrable and forming a most striking feature of the vegetation. The district has 1094.sq Kms., (18%) under forests. The reserved forest 1078 sq.km, protected forests 8 sqkm and the rest is village forests. The territorial forest ranges in the district are Hosakote, Doddaballapur, Channapatna, Sathanur, Kanakapura and Ramanagaram in Bangalore forest division. The social forestry ranges are at Doddaballapur, Nelamangala, Ramanagaram, Magadi and Harohalli.

1.9 Climate

The district enjoys salubrious climate. It is free from extremes, classified as seasonally dry tropical savana climates, with four main seasons. The cold weather season, from December to February is a period of generally cool weather with mainly clear blue skies. It is a period of little or no rainfall. The

hot weather season begins in March. March is a dry month with low relative humidity. April and May are the months of considerable thunderstorms. The Southwest monsoon season from June to September, is a moist cloudy and rainy period. It is a period of fairly strong and steady winds, blowing from the southwest to west. The northeast monsoon season from October is also a moist and rainy period but with slightly less clouding. Winds are weaker and blow from east to northeast. The change in wind direction from west-southwest to east-northeast between September and earlier October is very characteristic. The main features of the climate of the district are the agreeable range of temperatures and the two rainy seasons.

1.10 Rainfall

The district has two rainy season viz., June to September and November to December, coming one after the other but with opposite wind regimes corresponding to the southwest and northeast monsoons. The marked thunder storm activity with occasional hailstorms and squeals in April-May and September-October are also typical. More than half of the annual rainfall occurs during the southwest monsoon period and about a quarter in the northeast monsoon period. Appreciable rainfall also occurs in April-May. The average annual rainfall in the district is 793 mm. The rainfall in the district varies from 725 mm at Hosakote to 845 mm in Ramanagaram. On an average there are 53 rainy days in a year in the district. The heaviest rainfall recorded in 24 hours was 231 mm in Devanahalli in 1874 on May 7th.

1.11 Temperature

April is usually the hottest month with the mean daily maximum temperature at 33°C and the mean daily minimum at 21°C . In the hot season the temperature usually goes above 36° C with the onset of the monsoon early in June, there is appreciable drop in day temperature but that of night temperature is only slight. In October the temperatures are as in the southwest monsoon season. Thereafter, the temperature decrease, December is generally the coolest month with the mean daily maximum temperature at 26°C and the mean daily minimum at 15°C. Nights during January are however, slightly cooler than during December. On some occasions the temperature drops down to 10°C.

1.12 Relative Humidity

Relative humidity is high during the period June to December, being between 85-90% on the average. Humidity decreases thereafter and in the period February to April, the air is comparatively drier, the afternoon relative humidity being 25-35%. The relative humidity increases from May and has a large diurnal range. The maximum is at 6 A.M. and minimum at 3 p.m. RH as low as 83% occur in afternoons of March and as high as 100% occur during the rains and late nights and early morning hours from October to February when dew deposits and fog mist occurs.

1.13 Socio Economic conditions

The social and cultural life of the people of Bangalore rural district is almost uniform and similar throughout the district. Proximity of the city of Bangalore of course, has its own impact with considerable daily floating population. The rural people are mostly agriculturist and their other occupations are subsidiary to agriculture. The eastern fringe of the district, due to its proximity to Tamilnadu and Andhra Pradesh, is influenced by the language and culture of those states.

According to 1991 census the population of the present Bangalore rural district is 16,73,194 consisting of 8,60,231 males and 8,12,963 females. 13,69,908 people living in rural and 3,03,286 persons in the urban areas of the district. It has a population density of 288 persons per sq. km. There are about 2,55,432 households in the district.

Agriculture is the mainstay of the people. The important crops cultivated under rainfed conditions are mainly cereals like Ragi, Bajra, Navane, Sorghum and pulses like Tur, Avare, Horse gram, besides fields with Eucalyptus and casuerina.

In the recent past people have taken to sinking borewells and cultivating vegetables and fruit crops catering to the needs of nearby towns and cities. As the area under perishable vegetable crops such as Tomato, Beans, Bhendi, Cabbage, Knolkhol, Cauliflower, Capsicum etc., is increasing, the farmers are also subject to highly fluctuating vagaries of market prices.

Paddy and sugarcane constitute chief crops grown under canal irrigation. Sugarcane is grown as one crop per year with two ratoon crops. Paddy is grown either one or two or three crops per year depending on the availability of irrigation facilities.

Mango, Grapes, Banana, Sapota are the important fruit crops grown in the district. Commercial flowers such as Jasmine, Roses, Tuberoses, Crossandra, Chrysanthemum, Merrigold, Champaka, Spatika, Dasavala, Croton, Bougainvillas are also cultivated by the farmers located near around towns and cities.

The cattle found in the district are mainly of the popular Hallikar breed, cattle forms the main draught force besides dairying, Poultry and dairy has brought considerable economic growth among the rural population. Buffalows are chiefly used as a dairy animal and not as a draught animal. Rearing of sheep and goat is also of considerable importance in the rural sector. They are maintained mainly as animals for meat . Wool is harvested from the sheep.

Bangalore rural district has more than 1000 tanks of varying sizes that are suitable for inland fisheries. Fish farmer's development agency undertakes development of about 700 tanks and fisheries department develops about 300 tanks. These tanks and the 3 reservoirs viz., Kanva, Byramangala and Neelligudda together consititutes total waterspread area of about 25,000 ha yielding about 3900 tonns of fishes in the district.

The most general manufacturs, carried on are those of cotton, silk and woolen fabrics; the extraction of oils from castor, groundnut gingelly; twisting of coir

ropes, weaving of bamboo baskets and mats, manufacture of carpentry and blacksmith articles. Channapatna is famous for its wooden toys. Weaving of silk saries at Doddaballapur and Kanakapura. Course cotton cloth are made at Devanahalli. Mulberry growing, silkworm rearing, realing and weaving are important occupations of the district. Pottery is another occupation which is scattered allover the district.

There are the medium and large scale industries in the district with an investment of Rs.25,000 lakhs and providing employment to about 2500 people. Items manufactured are spun silk, raw silk, Viscourse-fibre yarn, weaving and dyeing silk fabrics, cotton yarn, oil inpregnated paper condensor, bushings, press boards, mica products etc. Of late exploitation of famous granite stone from quarrying is taking a leading role in augmenting the revenue and generating employment in rural areas.

1.14 Uses

The forests of the district, especially of the central and the western belts, contain valuable sandal wood though in much depleted number Among the timber yielding species such as teak (*Tectona grandis*) bete (*Dalbergia latifolia*), and the honne (*Pterocarpus marsupium*) Acacia, lac tree *Anogeissus latifolia* and *Pongamia pinnata* are in abundance. *Schizigium cuminii, Madhuca latifolia, Mangifera indica, casurina equisetifolia, Acacia auriculifornis*, Tamarind, Jack, Eucalyptus are common in non forest area of the district. Bamboo is distributed in the forests along perennial streams and adjoining slopes. Construction timber, furniture, and fuel wood are derived from these tree species. Besides the timber, minor forest products such as

medicines, oil seeds, thatching grass, fodder, honey, wax, tamarind, Jack fruit, Mango etc. are also derived from the vegetation found both in forest and village areas.

CHAPTER - II

Design and Methodology of Non-forest Inventory

2.1 Definition of Non-forest Area

For the purpose of this survey all those areas which are outside the traditional Reserved Forest boundaries are reckoned as non forest area excluding those areas within the Municipality, Corporation, Cantonment Board or a notified area Committee and the areas covered under regular forest inventory.

2.2 Sampling Design and Method of Selection of villages

The inventory was undertaken in the rural area (Non-forest area only) of the state. The design followed in the field inventory was random sampling with village as a sampling unit. A pilot survey was carried out in 10 sample villages to decide the total no. of sample villages to be selected in the state such that the results of the survey at the State level would be at the precision level of ±10% at 95% probability level. These 10 villages were selected in different districts representing different Agroecological zones of Karnataka State. The list of the villages selected for pilot survey is given in Appendix-I.

All the trees of 10cm. and above in diameter at breast height available in a sample village were enumerated. The other parameters such as total height, clear bole, etc. were also recorded in the prescribed forms.

After completion of the pilot survey the data was processed for obtaining number of trees/Ha. in each village for the 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 $c.v. = \frac{s}{\bar{x}}$

N = total no. of villages in the state

$$s = \frac{(\sum x^2 - CF)}{n-1}$$

$$CF = \frac{(\sum x)^2}{n}$$

x = No. of trees in the sample village

n = Total no. of sample villages

For large N, it will be equal to

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

Using the above ratio method a sample size of 463 villages is fixed for Karnataka state. These 463 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.

14 villages were selected for regular inventory in Bangalore Rural district from the list of villages available in the district using random numbers table.

2.3 Field Methodology

The field data was collected by a Crew led by a Junior Technical Assistant (Crew Leader) assisted by two Fieldmen and unskilled labourers engaged locally wherever necessary for showing the boundary of the village as well as helping in the survey work.

The Crew Leader is provided with a list of villages to be tackled alongwith a set of 1:50,000 scale maps with location of sample villages duly marked. The Crew is to find the nearest convenient route to reach the village with minimum traverse by jeep or on foot. After reaching the village they are to determine the boundary of the village with the help of the maps and the assistance from the Revenue officials at the village level. To begin with the survey a reference point preferably at the Center of the village is selected which may not necessarily form the center of the area. The details of the location of the reference point/center and its description are recorded in the village description form. This is important to enable the checking crew to reach this point and commence checking.

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 Crew Leader decides the size of each angular quadrant accordingly. Enumeration of trees/bamboo is commenced from the line marking due North from the center/reference point and is proceeded in clockwise direction (ie., North to East).

This procedure is important to avoid duplication/omission 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 information 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 :

1) Village Description form
2) Village Tree enumeration form
3) District Tree form

Village Description Form is used to record the information regarding the conspicuous features of the point selected as the Center of the village for starting the enumeration. The number of angular quadrants and number of trees enumerated in each quadrant are recorded in this form.

Village Tree Enumeration form is used to record the name of the species and diameter of all trees of 10 cms. and above in diameter at breast

height over bark in the sample village. The dead trees having utility of less than 70% and all saplings of less than 10 cms. diameter are ignored.

While carrying out the enumeration the category to which each tree belongs is also to be recorded in village tree enumeration form for this purpose the following 8 categories are defined

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

District Tree Form is filled up for each sample village which provided the details such as Category of the sample village and its geographical area, total area of the villages in the district, No. of sample villages in the district etc.,

CHAPTER - III

Data Processing

3.1 Processing of the Data

After completion of the field work, the field forms of the villages surveyed were consolidated and checked for inconsistencies and coding mistakes, if any. The data from each village was entered in PC and the distribution of trees in each diameter class for each category of trees was obtained species wise. For this a suitable program was developed in Dbase IV. This frequency distribution was entered in another package ***MS EXCEL*** and data was analyzed by using ratio method of estimation to arrive at the final estimate.

Since many of the species in the district occurred in small numbers, they were clubbed together under miscellaneous species. For Bangalore rural district of Karnataka, 15 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

Rural area of the district was calculated by adding up the areas of the villages given in the Census Book of 1991 of that district. The non forest area

of Bangalore rural district is 4759.93 sq.km which is obtained from the facts and figures of 1996-97 publishhed by Karnataka Forest Deaprtment.

3.3 Volume Estimation

Collection of felled tree data was not possible by zones for developing volume equations as tree felling is banned. Instead it was decided to use local volume table of Bangalore rural District by using local volume equations developed for forest inventory survey of the same district. For some of the species for which occurrence was noted to be high, volume factor of Misc. spp. Was used to determine the growing stock. By superimposing the local volume table on the stem distribution the total volume was estimated.

Local Volume table for Bangalore Rural District

Sl. no.	Name of the species	Diameter Class (in cm.)						
		10-20	20-30	30-40	40-50	50-60	60-70	70+
1.	*Acacia arabica*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
2.	*Acacia catechu*	0.084	0.319	0.671	1.141	1.729	2.433	3.256
3.	*Albizzia lebbeck*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
4.	*Azadirachta indica*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
5.	*Bauhinia spp.*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
6.	*Dalbergia latifolia*	0.146	0.352	0.801	1.495	2.433	3.615	5.041
7.	*Eucalyptus spp.*	0.092	0.352	0.786	1.396	2.180	3.139	4.272
8.	*Ficus spp.*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
9.	*Pteroocarpus marsupium*	0.080	0.330	0.804	1.532	2.532	3.819	5.402
10.	*Santalum album*	0.074	0.130	0.255	0.477	0.823	1.321	1.998

Sl. no.	Name of the species	Diameter Class (in cm.)						
		10-20	20-30	30-40	40-50	50-60	60-70	70+
11.	*Syzygium cumini*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
12	*Tamarindus indica*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
13.	*Tectona grandis*	0.095	0.312	0.662	1.148	1.768	2.522	3.412
14.	*Thespesia populnea*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
15.	*Wrightia tinctoria*	0.067	0.219	0.500	0.910	1.448	2.116	2.913
16.	*Miscellaneous species*	0.067	0.219	0.500	0.910	1.448	2.116	2.913

CHAPTER - IV

Results

Bangalore Rural district has 1883 villages with a total geographical area of 5814sq.km. Out of this 14 villages were randomly selected for Non Forest Inventory (Appendix-III). All the trees of diameter 10cm. and above were enumerated from these 14 villages. The data was statistically analysed for variability in respect of tree stock and tree volume parameters besides no. of stems per hectare and Volume per hectare. The results indicate that projected trees per hectare is 26.23 and corresponding volume is 4.44cum./ha. for Bangalore Rural district.

4.1 Growing Stand

The distribution of total no. of stems and stems per hectare as well as total volume and volume per hectare have been estimated and depicted in table no.1 below. The entire rural area of Bangalore district has 1,24,85,442 trees and the distribution of these trees is shown in the following table.

Table –1

Species wise total no. of stems and stems per hectare

Sl.No.	Name of the Species	No. of stems	%	Stems/ Hecatre
1	*Acacia arabica*	3,27,940	2.63	0.69
2	*Acacia catechu*	1,08,889	0.87	0.23
3	*Albizzia lebbeck*	67,394	0.54	0.14
4	*Azadirachta indica*	7,87,483	6.31	1.65
5	*Bauhinia spp.*	2,760	0.02	0.01
6	*Dalbergia latifolia*	2,866	0.02	0.01
7	*Eucalyptus spp.*	21,51,466	17.23	4.52
8	*Ficus spp.*	6,57,053	5.26	1.38
9	*Pterocarpus marsupium*	4,882	0.04	0.01
10	*Santalum album*	4,033	0.03	0.01
11	*Syzygium cumini*	72,273	0.58	0.15
12	*Tamarindus indica*	1,50,169	1.2	0.32
13	*Tectona grandis*	27,593	0.22	0.06
14	*Thespesia populnea*	51,152	0.41	0.11
15	*Wrightia tinctoria*	10,506	0.08	0.02
16	Miscellaneous species	80,58,983	64.55	16.93
	Total	**1,24,85,442**	**100**	**26.23**

The species wise distribution of total number of trees in the district has been estimated by ratio estimation method. It shows that the rural area of Bangalore district is abundant in *Eucalyptus species* 21,51,466 trees (17.23%), followed by *Azadirachta indica* 7,87,483 trees (6.31%), *Ficus species* 6,57,053 trees (5.26%), *Acacia arabica* 3,27,940 trees (2.63%), *Tamarindus indica* 1,50,169 trees (1.2%), *Acacia catechu* 1,08,889 trees (0.87%), *Syzygium cuminii* 72,273 trees (0.58%), *Albizzia lebbek* 67,394 trees (0.54%), *Thespesia populnea* 51152 tress (0.41%), *Tectona grandis* 27,593 trees (0.22%). Rest of

The Block plantations in the district hold maximum no. of trees in the district to the tune of 43.51% followed by Farm Forestry sector which accounts to 31.71%, Village Woodlot 14.34%, Road side plantations 1.17%, Pond side plantation 0.7% and Railway line plantation 0.25%.

4.2 Growing Stock

The estimation of the growing stock in the Non forest area of the Bangalore Rural district has revealed the existence of 21,14,898cum. of timber in the district. Out of the total growing stock different *Ficus spp.* Contributed the bulk amounting to 22.92% followed by *Eucalyptus spp.* (10.14%), *Azadirachta indica* (4.12%), *Tamarindus indica* (4.08%) and *Acacia arabica* (1.74%). The contribution of the rest of the species to the total growing stock is shown in the following table.

Table – 3

Species wise total volume and volume per hectare

Sl.No.	Name of the Species	Volume (in cum.)	%	volume/ hecatre
1	*Acacia arabica*	36,847	1.74	0.08
2	*Acacia catechu*	9,372	0.44	0.02
3	*Albizzia lebbeck*	13,402	0.63	0.03
4	*Azadirachta indica*	87,180	4.12	0.18
5	*Bauhinia spp.*	985	0.05	0
6	*Dalbergia latifolia*	418	0.02	0
7	*Eucalyptus spp.*	2,14,433	10.14	0.45
8	*Ficus spp.*	4,84,675	22.92	1.02
9	*Pterocarpus marsupium*	391	0.02	0
10	*Santalum album*	298	0.01	0

Sl.No.	Name of the Species	Volume (in cum.)	%	volume/ hecatre
11	*Syzygium cumini*	27,154	1.28	0.06
12	*Tamarindus indica*	86,294	4.08	0.18
13	*Tectona grandis*	2,667	0.13	0.01
14	*Thespesia populnea*	5,858	0.28	0.01
15	*Wrightia tinctoria*	736	0.03	0
16	Miscellaneous species	11,44,188	54.1	2.4
	Total	**21,14,898**	**100**	**4.44**

Owing to the large no. of trees in the lower dia class the highest growing stock of 31.09% is seen in dia class 10-20cm. followed by 28.34% in 20-30cm., 16.2% in 70+ cm., 9.47% in 30-40 cm., 5.65% in 40-50 cm., 4.92% in 60-70cm., and 4.33% in 50-60 cm. dia classes respectively. The dia class wise distribution of volume is shown in annexure II

Analysis of the distribution of the growing stock in the district to different category of plantations have revealed that the Block Plantations hold 32.08% of the total growing stock followed by Farm forestry, Village woodlot, Road side plantation, Pond side plantation, Railway line plantation and Canal side plantation which accounted for 35.36%, 14.11%, 4.85%, 0.49%, 0.31% and 0.01% of the growing stock respectively.

Table – 4

Category wise total volume and volume per hectare

Sl.No.	Category	Volume (cum.)	%	volume/ hecatre
1	Farm Forestry	7,47,768	35.36	1.57
2	Road side plantation	1,02,565	4.85	0.22
3	Village woodlot	2,98,309	14.11	0.63
4	Block plantation	6,78,502	32.08	1.43
5	Pond side plantation	10,322	0.49	0.02
6	Railway line plantation	6,567	0.31	0.01
7	Canal side plantation	164	0.01	0
8	Others	2,70,701	12.8	0.57
	Total	**21,14,898**	**100**	**4.44**

The study to assess the contribution of different species under each category has revealed the following trends.

4.3 Farm Forestry

The Neem *(Azadirachta indica)* appears to be the most favoured species by the farmers under the Farm forestry which contributes to 13.07% of trees followed by *Ficus spp.* (12.07%), Eucalyptus species (7.82%), *Acacia arabica* (6.41%) and *Tamarindus indica* (2.06%). The rest of the species contribute less than 1% of the no.of trees under this category. Here also the general trend of more no. of trees in the lower dia classes and less no. in the higher dia class is observed.

Farm Forestry - Doddabele

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The study indicates that *Ficus* species contribute 38.14% to the standing volume of growing stock under Farm forestry followed by Neem, Tamarind, *Eucalyptus*, *Acacia arabica* and Jamoon which contributed 6.68%, 5.19%, 4.5%, 4.23% and 1.89% respectively.

The species wise distribution of stems and volume under this category is shown in the following table no.5. The dia class wise distribution of growing stand and stock are shown in annexure **VII** and **VIII** respectively.

Table – 5

Species wise distribution of stand and stock under Farm forestry

Sl.No.	Name of the Species	Stems	Stems/ hectare	Volume (cum.)	Volume/ hecatre
1	*Acacia arabica*	2,53,862	0.53	31,663	0.07
2	*Acacia catechu*	14,115	0.03	1,211	0
3	*Albizzia lebbeck*	45,848	0.1	6,523	0.01
4	*Azadirachta indica*	5,17,277	1.09	49,917	0.1
5	*Bauhinia spp.*	106	0	7	0
6	*Dalbergia latifolia*	2,866	0.01	418	0
7	*Eucalyptus spp.*	3,09,793	0.65	33,615	0.07
8	*Ficus spp.*	4,77,904	1	2,85,197	0.6
9	*Pterocarpus marsupium*	4,882	0.01	391	0
10	*Santalum album*	3,502	0.01	259	0
11	*Syzygium cumini*	55,399	0.12	14,100	0.03
12	*Tamarindus indica*	81,506	0.17	38,820	0.08
13	*Tectona grandis*	25,471	0.05	2,443	0.01
14	*Thespesia populnea*	30,776	0.06	3,514	0.01
15	*Wrightia tinctoria*	8,596	0.02	608	0
16	Miscellaneous species	21,27,164	4.47	2,79,082	0.59
	Total	**39,59,067**	**8.32**	**7,47,768**	**1.57**

4.4 Road side plantation

The analysis of table no.6 below shows that *Ficus* species (30.63%) and Eucalyptus species (22.9%) forms the major chunk of plantations along the Road side. Some other species like *Tamarindus indica* (2.11%), *Syzygium cuminii* (1.46%), Acacia species(0.73%), etc., are also found along the road side.

Table – 6

Species wise distribution of stand and stock under Road side plantation

Sl.No.	Name of the Species	Stems	Stems/ hectare	Volume (cum.)	Volume/ hecatre
1	*Acacia arabica*	955	0	142	0
2	*Acacia catechu*	106	0	9	0
3	*Azadirachta indica*	636	0	293	0
4	*Eucalyptus spp.*	33,325	0.07	5,881	0.01
5	*Ficus spp.*	44,575	0.09	58,939	0.12
6	*Syzygium cumini*	2,122	0	2,663	0.01
7	*Tamarindus indica*	3,077	0.01	5,168	0.01
8	*Thespesia populnea*	531	0	36	0
9	Miscellaneous species	60,177	0.13	29,434	0.06
	Total	1,45,504	0.31	1,02,565	0.22

The diameter class distribution shows that 52% of trees are available in lower diameter class i.e., 10 - 20 cms. The rest 14%, 14%, 7%, 6%, 4%, and 4% are available in 20 - 30, above 70, 30 - 40, 40 - 50, 50 - 60 and 60 – 70 cms. diameter classes respectively. The dia class wise distribution of growing stand and stock are shown in annexure **IX** and **X** respectively.

Road side Plantation - Jakanahalli

The analysis of stock table for road side plantation shows a significant variation in species wise contribution to the stock to that of growing stand. Owing to the larger size the *Ficus* species alone contribute about 57% to the total growing stock in this category. Two other species that has significant contribution to the growing stock are Eucalyptus and *Tamarindus indica* at 6% and 5% respectively.

4.5 Village wood lot

The trees under this category which are naturally growing tree species in community land / private land obviously shows the amalgamation of various species without predominence of any particular species. Of them Neem, *Acacia catechu* and *Ficus species* alone contribute 10%, 5% and 3% respectively to the growing stand.

The analysis of stock table for Village wood lot shows a significant deviation in the contribution of major species to that of stand. Though *Ficus* species rank third (3%) in number owing to its gigantic size, it ranks first (20.5%) in contribution to the growing stock.

The species wise distribution of stems and volume under this category is shown in the following table no.7.

Village Woodlot - Doddabele

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Table – 7

Species wise distribution of stand and stock under Village woodlot

SLNo.	Name of the Species	Stems	Stems/ hectare	Volume (cum.)	Volume/ hecatre
1	*Acacia arabica*	17,087	0.04	3,091	0.01
2	*Acacia catechu*	88,619	0.19	7,644	0.02
3	*Albizzia lebbeck*	9,552	0.02	2,688	0.01
4	*Azadirachta indica*	1,77,449	0.37	23,824	0.05
5	*Bauhinia spp.*	1,380	0	690	0
6	*Eucalyptus spp.*	637	0	59	0
7	*Ficus spp.*	50,306	0.11	61,282	0.13
8	*Syzygium cumini*	8,914	0.02	7,052	0.01
9	*Tamarindus indica*	17,086	0.04	9,532	0.02
10	*Thespesia populnea*	530	0	84	0
11	*Wrightia tinctoria*	318	0	21	0
12	Miscellaneous species	14,18,003	2.98	1,82,342	0.38
	Total	17,89,881	3.76	2,98,309	0.63

The dia class wise distribution of growing stand and stock under this category are shown in annexure **XI** and **XII** respectively.

4.6 Block Plantation

Obviously, *Eucalyptus species* forms the major chunk (31% in number and 24% in terms of volume) of block plantation because this is the most preferred fast growing species by the farmers for block plantations. Though other species like *Tamarindus indica* and *Tectona grandis* made their presence felt, their contribution to the stock is negligible at present. The species

Block Plantation - Mallarbanvadi

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wise distribution of stems and volume under this category is shown in the following table no.8.

Table – 8

Species wise distribution of stand and stock under Block plantation

Sl.No.	Name of the Species	Stems	Stems/ hectare	Volume (cum.)	Volume/ Hecatre
1	*Eucalyptus spp.*	17,04,448	3.58	1,62,016	0.34
2	*Tamarindus indica*	3,184	0.01	213	0
3	*Tectona grandis*	2,016	0	214	0
4	Miscellaneous species	37,22,191	7.82	5,16,059	1.08
	Total	**5431839**	**11.41**	**6,78,502**	**1.43**

The dia class wise distribution of growing stand and stock under this category are shown in annexure **XIII** and **XIV** respectively.

4.7 Pond side Plantation

Almost all the villages in this district have at least one water body that may perennial. Hence there found some plantation activity along these water bodies either by govt. agencies or by individuals. Here again Eucalyptus is the preferred species contributing around 42% and 33% to the stand and stock respectively. *Acacia arabica* (22.5% and 15%) occupying the second position, the obvious reason for this choice may be due to the fact that its timber is used for making agricultural implements. The species wise distribution of stems and volume under this category is shown in the following table no.9.

Table – 9

Species wise distribution of stand and stock under Pond side plantation

Sl.No.	Name of the Species	Stems	Stems/ hectare	Volume (cum.)	Volume/ Hecatre
1	*Acacia arabica*	19,739	0.04	1,581	0
2	*Eucalyptus spp.*	37,039	0.08	3,408	0.01
3	*Ficus spp.*	637	0	1,856	0
4	*Syzygium cuminii*	106	0	96	0
5	Miscellaneous species	30,035	0.06	3,381	0.01
	Total	87,556	0.18	10,322	0.02

The dia class wise distribution of growing stand and stock under this category are shown in annexure **XV** and **XVI** respectively.

4.8 Railwayline Plantation

Bangalore – Tumkur railway line passes through some of the villages of this district. The waste land along the lines are used for plantation purposes. Here again Eucalyptus forms the major chunk contributing more than 50% to the stock. The species wise distribution of stems and volume under this category is shown in the following table no.10.

Railway line Plantation - Doddabele

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Table – 10

Species wise distribution of stand and stock under Railway line plantation

Sl.No.	Name of the Species	Stems	Stems/ hectare	Volume (cum.)	Volume/ Hecatre
1	*Acacia arabica*	212	0	30	0
2	*Azadirachta indica*	1,592	0	107	0
3	*Eucalyptus spp.*	16,768	0.04	4,380	0.01
4	*Ficus spp.*	106	0	53	0
5	Miscellaneous species	12,948	0.03	1,997	0
	Total	**31626**	**0.07**	**6,567**	**0.01**

The dia class wise distribution of growing stand and stock under this category are shown in annexure **XVII** and **XVIII** respectively.

4.9 Rest/ Others

A small number of villages are having canal irrigation facilities in Bangalore Rural district and hence the contributions of canal side plantations to the growing stock and stand is negligible. About 8% of the stand and 13%of the stock in the district is contributed by trees standing in nondescript categories of plantations which are not described in the above paras. The species wise distribution of stems and volume under this category is shown in the following table no.11.

Table – 11

Species wise distribution of stand and stock which are under other category

Sl.No.	Name of the Species	Stems	Stems/ hectare	Volume (cum.)	Volume/ hecatre
1	*Acacia arabica*	36,085	0.08	340	0
2	*Acacia catechu*	6,049	0.01	508	0
3	*Albizzia lebbeck*	11,994	0.03	4,191	0.01
4	*Azadirachta indica*	90,529	0.19	13,039	0.03
5	*Bauhinia spp.*	1,274	0	288	0
6	*Eucalyptus spp.*	49,456	0.1	5,074	0.01
7	*Ficus spp.*	83,525	0.18	77,348	0.16
8	*Santalum album*	531	0	39	0
9	*Syzygium cumini*	5,732	0.01	3,243	0.01
10	*Tamarindus indica*	45,316	0.1	32,561	0.07
11	*Tectona grandis*	106	0	10	0
12	*Thespesia populnea*	19,315	0.04	2,224	0
13	*Wrightia tinctoria*	1,592	0	107	0
14	Miscellaneous species	6,86,024	1.44	1,31,729	0.28
	Total	10,37,528	2.18	2,70,701	0.57

The dia class wise distribution of growing stand and stock under other category are shown in annexure **XIX** and **XX** respectively.

4.10 Conclusion

Bangalore Rural district comprises about 3% of the total geographical area of Karnataka state. It has 5,814 sq.km. of geographical area of which 4,759.93 sq.km (82%) is non-forest area, inhabited by 16,73,194 persons (1991 census) living in 1707 villages with a population density of 288 per sq.km.

The villages have at least one pond in each and forming source of drinking water for domestic animals. Innumerable number of tube wells are coming up in the vicinity of villages for drinking water and also for irrigation purposes. People are taking up cultivation of fruit, vegetables, flowers and also plantations for fuel and small timber. The district is having enough ground water at present however, the water table appears to be receding especially in summer months. This suggests that efforts should be made to recharge the ground water in a sustained way.

The district is abundant in tree growth with an estimated 125 lakh trees, an average of 26.23 trees per ha. This works out to 21.15 lakh cu.m. of timber with an average of 4.44 cu.m per ha. Eucalyptus spp form the bulk of tree growth by their sheer number followed by Neem and Ficus. Whereas various species of Ficus contribute to the volume (22.92%) by their growth followed by Eucalyptus, Neem and Tamarind.

Bulk of the volume is produced under the farm forestry sector (35.36%) followed by block plantation (32%) and village woodlot (14.11%). Canal side plantation is the least since there are very few canals.

General observation made during the course of inventory indicates that there are still large areas available for plantation activities in the vicinity of villages many patches retained as village common land or community land. These open spaces are used for open grazing of the cattle during monsoon and cropping seasons. The fringes of these lands along with tanks and roads provide further scope for community afforestation activity to augment the tree growth of the district.

Annexure - I

Species and diameter class wise distribution of growing stand (stems)

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	242719	65376	16980	2229	212	318	106	327940	2.63	0.69
2.	*Acacia catechu*	107934	955	0	0	0	0	0	108889	0.87	0.23
3.	*Albizzia lebbeck*	41391	15071	7854	2229	637	212	0	67394	0.54	0.14
4.	*Azadirachta indica*	665434	79172	36403	5307	743	106	318	787483	6.31	1.65
5.	*Bauhinia spp.*	637	452	1698	0	0	0	0	2760	0.02	0.01
6.	*Dalbergia latifolia*	2866	0	0	0	0	0	0	2866	0.02	0.01
7.	*Eucalyptus spp.*	2100101	45953	4245	1061	106	0	0	2151466	17.23	4.52
8.	*Ficus spp.*	260762	112711	81083	53808	37252	32051	79386	657053	5.26	1.38
9.	*Pterocarpus marsupium*	4882	0	0	0	0	0	0	4882	0.04	0.01
10.	*Santalum album*	4033	0	0	0	0	0	0	4033	0.03	0.01
11.	*Syzygium cumini*	42239	12311	7111	4776	1485	1379	2972	72273	0.58	0.15
12.	*Tamarindus indica*	57522	29504	26001	15282	8065	3502	10293	150169	1.2	0.32
13.	*Tectona grandis*	27381	212	0	0	0	0	0	27593	0.22	0.06
14.	*Thespesia populnea*	44680	4032	1486	530	212	212	0	51152	0.41	0.11
15.	*Wrightia tinctoria*	10294	212	0	0	0	0	0	10506	0.08	0.02
16.	Miscellaneous species	5394376	2348975	218947	46060	14541	11568	24516	8058983	64.55	16.93
Total		***9007251***	***2714909***	***401808***	***131282***	***63253***	***49348***	***117591***	***12485442***	***100***	***26.23***
Percentage		72.14	21.74	3.22	1.05	0.51	0.4	0.94	100		
Stems per hectare		18.92	5.7	0.84	0.28	0.13	0.1	0.25	26.23		

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Annexure - II

Species and diameter class wise distribution of growing stock (volume)

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	14814	12982	6564	1645	307	226	309	36847	1.74	0.08
2.	*Acacia catechu*	9067	305	0	0	0	0	0	9372	0.44	0.02
3.	*Albizzia lebbeck*	2774	3301	3928	2029	922	448	0	13402	0.63	0.03
4.	*Azadirachta indica*	44585	17339	18202	4829	1075	224	926	87180	4.12	0.18
5.	*Bauhinia spp.*	43	93	849	0	0	0	0	985	0.05	0
6.	*Dalbergia latifolia*	418	0	0	0	0	0	0	418	0.02	0
7.	*Eucalyptus spp.*	193209	16176	3336	1481	231	0	0	214433	10.14	0.45
8.	*Ficus spp.*	17472	24683	40542	48965	53941	67820	231252	484675	22.92	1.02
9.	*Pterocarpus marsupium*	391	0	0	0	0	0	0	391	0.02	0
10.	*Santalum album*	298	0	0	0	0	0	0	298	0.01	0
11.	*Syzygium cumini*	2830	2696	3556	4346	2150	2918	8658	27154	1.28	0.06
12.	*Tamarindus indica*	3853	6462	13001	13906	11678	7411	29983	86294	4.08	0.18
13.	*Tectona grandis*	2601	66	0	0	0	0	0	2667	0.13	0.01
14.	*Thespesia populnea*	2993	884	744	482	307	448	0	5858	0.28	0.01
15.	*Wrightia tinctoria*	690	46	0	0	0	0	0	736	0.03	0
16.	Miscellaneous species	361425	514426	109475	41914	21055	24478	71415	1144188	54.1	2.4
Total		**657463**	**599459**	**200197**	**119597**	**91666**	**103973**	**342543**	**2114898**	**100**	**4.44**
Percentage		31.09	28.34	9.47	5.65	4.33	4.92	16.2	100		
Volume per hectare		1.38	1.26	0.42	0.25	0.19	0.22	0.72	4.44		

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Annexure - III

Species wise distribution of trees under different categories

Sl. No.	Name of Species	Category								Total	%	Stem per ha.
		Farm Forestry	Road side Plantation	Village Wood lot	Block Plantation	Pond side Plantation	Railway line Pltn.	Canal side Plantation	Others			
1.	*Acacia arabica*	253862	955	17087	0	19739	212	0	36085	327940	2.63	0.69
2.	*Acacia catechu*	14115	106	88619	0	0	0	0	6049	108889	0.87	0.23
3.	*Albizzia lebbeck*	45848	0	9552	0	0	0	0	11994	67394	0.54	0.14
4.	*Azadirachta indica*	517277	636	177449	0	0	1592	0	90529	787483	6.31	-1.65
5.	*Bauhinia spp.*	106	0	1380	0	0	0	0	1274	2760	0.02	0.01
6.	*Dalbergia latifolia*	2866	0	0	0	0	0	0	0	2866	0.02	0.01
7.	*Eucalyptus spp.*	309793	33325	637	1704448	37039	16768	0	49456	2151466	17.23	4.52
8.	*Ficus spp.*	477904	44575	50306	0	637	106	0	83525	657053	5.26	1.38
9.	*Pterocarpus marsupium*	4882	0	0	0	0	0	0	0	4882	0.04	0.01
10.	*Santalum album*	3502	0	0	0	0	0	0	531	4033	0.03	0.01
11.	*Syzygium cumini*	55399	2122	8914	0	106	0	0	5732	72273	0.58	0.15
12.	*Tamarindus indica*	81506	3077	17086	3184	0	0	0	45316	150169	1.2	0.32
13.	*Tectona grandis*	25471	0	0	2016	0	0	0	106	27593	0.22	0.06
14.	*Thespesia populnea*	30776	531	530	0	0	0	0	19315	51152	0.41	0.11
15.	*Wrightia tinctoria*	8596	0	318	0	0	0	0	1592	10506	0.08	0.02
16.	Miscellaneous species	2127164	60177	1418003	3722191	30035	12948	2441	686024	8058983	64.55	16.93
Total		**3959067**	**145504**	**1789881**	**5431839**	**87556**	**31626**	**2441**	**1037528**	**12485442**	**100**	**26.23**
Percentage		31.71	1.17	14.34	43.51	0.7	0.25	0.02	8.31	100		
Stems per hectare		8.32	0.31	3.76	11.41	0.18	0.07	0.01	2.18	26.23		

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Annexure - IV

Estimated Volume (cu.m.) of timber under different categories

Sl. No.	Name of Species	Category								Total	%	Volume per ha.
		Farm Forestry	Road side Plantation	Village Wood lot	Block Plantation	Pond side Plantation	Railway line Pltn.	Canal side Plantation	Others			
1.	*Acacia arabica*	31663	142	3091	0	1581	30	0	340	36847	1 74	0.08
2.	*Acacia catechu*	1211	9	7644	0	0	0	0	508	9372	0 44	0.02
3.	*Albizzia lebbeck*	6523	0	2688	0	0	0	0	4191	13402	0.63	0 03
4.	*Azadirachta indica*	49917	293	23824	0	0	107	0	13039	87180	4.12	0.18
5.	*Bauhinia spp.*	7	0	690	0	0	0	0	288	- 985	0 05	0
6	*Dalbergia latifolia*	418	0	0	0	0	0	0	0	418	0 02	0
7.	*Eucalyptus spp.*	33615	5881	59	162016	3408	4380	0	5074	214433	10.14	0.45
8.	*Ficus spp.*	285197	58939	61282	0	1856	53	0	77348	484675	22.92	1.02
9	*Pterocarpus marsupium*	391	0	0	0	0	0	0	0	391	0.02	0
10.	*Santalum album*	259	0	0	0	0	0	0	39	298	0.01	0
11.	*Syzygium cumini*	14100	2663	7052	0	96	0	0	3243	27154	1.28	0 06
12.	*Tamarindus indica*	38820	5168	9532	213	0	0	0	32561	86294	4 08	0.18
13.	*Tectona grandis*	2443	0	0	214	0	0	0	10	2667	0.13	0 01
14.	*Thespesia populnea*	3514	36	84	0	0	0	0	2224	5858	0.28	0.01
15.	*Wrightia tinctoria*	608	0	21	0	0	0	0	107	736	0 03	0
16.	Miscellaneous species	279082	29434	182342	516059	3381	1997	164	131729	1144188	54 1	2.4
Total		**747768**	**102565**	**298309**	**678502**	**10322**	**6567**	**164**	**270701**	**2114898**	**100**	**4.44**
Percentage		35.36	4.85	14.11	32.08	0.49	0.31	0 01	12 8	100		
Volume per hectare		1.57	0.22	0.63	1.43	0.02	0.01	0	0.57	4.44		

Annexure - V

Diameter class wise distribution of growing stand (stems) under different categories

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	Farm Forestry	3089867	525554	158557	63253	38737	25683	57416	3959067	31.71	8.32
2.	Road side plantation	76095	20271	9552	8172	5519	5731	20164	145504	1.17	0.31
3.	Village woodlot	1315799	311067	113347	22924	6898	6155	13691	1789881	14.34	3.76
4.	Block plantation	3829276	1538991	55718	4670	425	849	1910	5431839	43.51	11.41
5.	Pond side plantation	78642	7110	849	318	0	0	637	87556	0.7	0.18
6.	Railway side plantation	19316	10294	849	1061	106	0	0	31626	0.25	0.07
7.	Canal side plantation	2441	0	0	0	0	0	0	2441	0.02	0.01
8.	Rest	595815	301622	62936	30884	11568	10930	23773	1037528	8.31	2.18
Total		**9007251**	**2714909**	**401808**	**131282**	**63253**	**49348**	**117591**	**12485442**	**100**	**26.23**
Percentage		72.14	21.74	3.22	1.05	0.51	0.4	0.94	100		
Stems per hectare		18.92	5.7	0.84	0.28	0.13	0.1	0.25	26.23		

Annexure - VI

Diameter class wise distribution of growing stock (volume) under different categories

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	Farm Forestry	215586	117320	79614	57559	56091	54345	167253	747768	35.36	1.57
2.	Road side plantation	5729	5313	5231	7436	7991	12127	58738	102565	4.85	0.22
3.	Village woodlot	89668	68210	56675	20861	9988	13025	39882	298309	14.11	0.63
4.	Block plantation	298756	339449	28072	4250	615	1796	5564	678502	32.08	1.43
5.	Pond side plantation	6196	1557	425	288	0	0	1856	10322	0 49	0.02
6.	Railway side plantation	1597	2621	637	1481	231	0	0	6567	0 31	0.01
7.	Canal side plantation	164	0	0	0	0	0	0	164	0 01	0
8.	Rest	39767	64989	29543	27722	16750	22680	69250	270701	12.8	0.57
Total		**657463**	**599459**	**200197**	**119597**	**91666**	**103973**	**342543**	**2114898**	**100**	**4.44**
Percentage		31.09	28.34	9.47	5.65	4.33	4.92	16.2	100		
Volume per hectare		1.38	1.26	0.42	0.25	0.19	0 22	0.72	4.44		

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Annexure - VII

Distribution of estimated trees under Farm Forestry

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	187956	53808	10188	1486	212	106	106	253862	6.41	0.53
2.	*Acacia catechu*	14009	106	0	0	0	0	0	14115	0.36	0.03
3.	*Albizzia lebbeck*	33219	9127	2759	425	212	106	0	45848	1.16	0.1
4.	*Azadirachta indica*	453493	48501	13054	1698	425	106	0	517277	13.07	1.09
5.	*Bauhinia spp.*	106	0	0	0	0	0	0	106	0	0
6.	*Dalbergia latifolia*	2866	0	0	0	0	0	0	2866	0.07	0.01
7.	*Eucalyptus spp.*	292070	16556	1167	0	0	0	0	309793	7.82	0.65
8.	*Ficus spp.*	214595	87133	56992	36190	25365	17936	39693	477904	12.07	1
9.	*Pterocarpus marsupium*	4882	0	0	0	0	0	0	4882	0.12	0.01
10.	*Santalum album*	3502	0	0	0	0	0	0	3502	0.09	0.01
11.	*Syzygium cumini*	36296	9976	4776	2335	212	743	1061	55399	1.4	0.12
12.	*Tamarindus indica*	39586	16132	10825	5306	3396	955	5306	81506	2.06	0.17
13.	*Tectona grandis*	25365	106	0	0	0	0	0	25471	0.64	0.05
14.	*Thespesia populnea*	27275	2016	849	318	212	106	0	30776	0.78	0.06
15.	*Wrightia tinctoria*	8384	212	0	0	0	0	0	8596	0.22	0.02
16.	Miscellaneous species	1746263	281881	57947	15495	8703	5625	11250	2127164	53.73	4.47
Total		**3089867**	**525554**	**158557**	**63253**	**38737**	**25683**	**57416**	**3959067**	**100**	**8.32**
Percentage		78.05	13.27	4	1.6	0.98	0.65	1.45	100		
Stems per hectare		6.49	1.1	0.33	0.13	0.08	0.05	0.12	8.32		

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Estimated volume (cu.m.) of timber under Farm Forestry

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	12593	11784	5094	1352	307	224	309	31663	4.23	0.07
2.	*Acacia catechu*	1177	34	0	0	0	0	0	1211	0.16	0
3.	*Albizzia lebbeck*	2226	1999	1380	387	307	224	0	6523	0.87	0.01
4.	*Azadirachta indica*	30384	10622	6527	1545	615	224	0	49917	6.68	0.1
5.	*Bauhinia spp.*	7	0	0	0	0	0	0	7	0	0
6.	*Dalbergia latifolia*	418	0	0	0	0	0	0	418	0.06	0
7.	*Eucalyptus spp.*	26870	5828	917	0	0	0	0	33615	4.5	0.07
8.	*Ficus spp.*	14378	19082	28496	32933	36729	37953	115626	285197	38.14	0.6
9.	*Pterocarpus marsupium*	391	0	0	0	0	0	0	391	0.05	0
10.	*Santalum album*	259	0	0	0	0	0	0	259	0.03	0
11.	*Syzygium cumini*	2432	2185	2388	2125	307	1572	3091	14100	1.89	0.03
12.	*Tamarindus indica*	2652	3533	5413	4828	4917	2021	15456	38820	5.19	0.08
13.	*Tectona grandis*	2410	33	0	0	0	0	0	2443	0.33	0.01
14.	*Thespesia populnea*	1827	442	425	289	307	224	0	3514	0.47	0.01
15.	*Wrightia tinctoria*	562	46	0	0	0	0	0	608	0.08	0
16.	Miscellaneous species	117000	61732	28974	14100	12602	11903	32771	279082	37.32	0.59
Total		**215586**	**117320**	**79614**	**57559**	**56091**	**54345**	**167253**	**747768**	**100**	**1.57**
Percentage		28.83	15.69	10.65	7.7	7.5	7.27	22.37	100		
Volume per hectare		0.45	0.25	0.17	0.12	0.12	0.11	0.35	1.57		

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Annexure - IX

Distribution of estimated trees under Road side plantation

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	637	212	106	0	0	0	0	955	0.66	0
2.	*Acacia catechu*	106	0	0	0	0	0	0	106	0.07	0
3.	*Azadirachta indica*	318	106	0	106	106	0	0	636	0.44	0
4.	*Eucalyptus spp.*	25153	6580	1592	0	0	0	0	33325	22.9	0.07
5.	*Ficus spp.*	6474	6262	6262	5519	4139	4245	11674	44575	30.63	0.09
6.	*Syzygium cumini*	1061	106	0	106	0	0	849	2122	1.46	0
7.	*Tamarindus indica*	318	0	318	849	0	531	1061	3077	2.11	0.01
8.	*Thespesia populnea*	531	0	0	0	0	0	0	531	0.36	0
9.	Miscellaneous species	41497	7005	1274	1592	1274	955	6580	60177	41.36	0.13
Total		**76095**	**20271**	**9552**	**8172**	**5519**	**5731**	**20164**	**145504**	**100**	**0.31**
Percentage		52.3	13.93	6.56	5.62	3.79	3.94	13.86	100		
Stems per hectare		0.16	0.04	0.02	0.02	0.01	0.01	0.04	0.31		

Annexure - X

Estimated Volume (cu.m.) under Road side plantation

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	43	46	53	0	0	0	0	142	0.14	0
2.	*Acacia catechu*	9	0	0	0	0	0	0	9	0.01	0
3.	*Azadirachta indica*	21	23	0	96	153	0	0	293	0.29	0
4.	*Eucalyptus spp.*	2314	2316	1251	0	0	0	0	5881	5.73	0.01
5.	*Ficus spp.*	434	1371	3131	5022	5993	8982	34006	58939	57.47	0.12
6.	*Syzygium cumini*	71	23	0	96	0	0	2473	2663	2.6	0.01
7.	*Tamarindus indica*	21	0	159	773	0	1124	3091	5168	5.04	0.01
8.	*Thespesia populnea*	36	0	0	0	0	0	0	36	0.04	0
9.	Miscellaneous species	2780	1534	637	1449	1845	2021	19168	29434	28.7	0.06
Total		**5729**	**5313**	**5231**	**7436**	**7991**	**12127**	**58738**	**102565**	**100**	**0.22**
Percentage		5.59	5.18	5.1	7.25	7.79	11.82	57.27	100		
Volume per hectare		0.01	0.01	0.01	0.02	0.02	0.03	0.12	0.22		

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Distribution of estimated trees under village woodlot

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	9764	4670	2441	212	0	0	0	17087	0.95	0.04
2.	*Acacia catechu*	87770	849	0	0	0	0	0	88619	4.95	0.19
3.	*Albizzia lebbeck*	4351	2123	2123	955	0	0	0	9552	0.53	0.02
4.	*Azadirachta indica*	140516	18254	16344	2123	212	0	0	177449	9.91	0.37
5.	*Bauhinia spp.*	0	0	1380	0	0	0	0	1380	0.08	0
6.	*Eucalyptus spp.*	637	0	0	0	0	0	0	637	0.04	0
7.	*Ficus spp.*	8172	8066	9233	4670	3184	4988	11993	50306	2.81	0.11
8.	*Syzygium cumini*	1167	2123	1910	1804	955	318	637	8914	0.5	0.02
9.	*Tamarindus indica*	3715	3290	5200	3184	1167	212	318	17086	0.95	0.04
10.	*Thespesia populnea*	212	318	0	0	0	0	0	530	0.03	0
11.	*Wrightia tinctoria*	318	0	0	0	0	0	0	318	0.02	0
12.	Miscellaneous species	1059177	271374	74716	9976	1380	637	743	1418003	79.22	2.98
Total		**1315799**	**311067**	**113347**	**22924**	**6898**	**6155**	**13691**	**1789881**	**100**	**3.76**
Percentage		73.51	17.38	6.33	1.28	0.39	0.34	0.76	100		--
Stems per hectare		2.76	0.65	0.24	0.05	0.01	0.01	0.03	3.76		

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Annexure - XII

Estimated volume (cu.m.) of timber under Village woodlot

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	654	1023	1221	193	0	0	0	3091	1.04	0.01
2.	*Acacia catechu*	7373	271	0	0	0	0	0	7644	2.56	0.02
3.	*Albizzia lebbeck*	292	465	1062	869	0	0	0	2688	0.9	0.01
4.	*Azadirachta indica*	9415	3998	8172	1932	307	0	0	23824	7.99	0.05
5.	*Bauhinia spp.*	0	0	690	0	0	0	0	690	0.23	0
6.	*Eucalyptus spp.*	59	0	0	0	0	0	0	59	0.02	0
7.	*Ficus spp.*	548	1766	4617	4250	4610	10555	34936	61282	20.54	0.13
8.	*Syzygium cumini*	78	465	955	1642	1383	673	1856	7052	2.36	0.01
9.	*Tamarindus indica*	249	721	2600	2897	1690	449	926	9532	3.2	0.02
10.	*Thespesia populnea*	14	70	0	0	0	0	0	84	0.03	0
11.	*Wrightia tinctoria*	21	0	0	0	0	0	0	21	0.01	0
12.	Miscellaneous species	70965	59431	37358	9078	1998	1348	2164	182342	61.13	0.38
Total		**89668**	**68210**	**56675**	**20861**	**9988**	**13025**	**39882**	**298309**	**100**	**0.63**
Percentage		30.06	22.87	19	6.99	3.35	4.37	13.37	100		
Volume per hectare		0.19	0.14	0.12	0.04	0.02	0.03	0.08	0.63		

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Annexure - XIII

Distribution of estimated trees under Block plantation

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Eucalyptus spp.*	1685663	18042	743	0	0	0	0	1704448	31.38	3.58
2.	*Tamarindus indica*	3184	0	0	0	0	0	0	3184	0.06	0.01
3.	*Tectona grandis*	1910	106	0	0	0	0	0	2016	0.04	0
4.	Miscellaneous species	2138519	1520843	54975	4670	425	849	1910	3722191	68.53	7.82
Total		**3829276**	**1538991**	**55718**	**4670**	**425**	**849**	**1910**	**5431839**	**100**	**11.41**
Percentage		70.5	28.33	1.03	0.09	0.01	0.02	0.04	100		
Stems per hectare		8.04	3.23	0.12	0.01	0			11.41		

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Annexure - XIV

Estimated volume (cu.m.) of timber under Block plantation

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Eucalyptus spp.*	155081	6351	584	0	0	0	0	162016	23.88	0.34
2.	*Tamarindus indica*	213	0	0	0	0	0	0	213	0.03	0
3.	*Tectona grandis*	181	33	0	0	0	0	0	214	0.03	0
4.	Miscellaneous species	143281	333065	27488	4250	615	1796	5564	516059	76.06	1.08
Total		**298756**	**339449**	**28072**	**4250**	**615**	**1796**	**5564**	**678502**	**100**	**1.43**
Percentage		44.03	50.03	4.14	0.63	0.09	0.26	0.82	100		
Volume per hectare		0.63	0.71	0.06	0.01	0	0	0.01	1.43		

Distribution of estimated trees under Pond side plantation

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	19103	212	318	106	0	0	0	19739	22.54	0.04
2.	*Eucalyptus spp.*	37039	0	0	0	0	0	0	37039	42.3	0.08
3.	*Ficus spp.*	0	0	0	0	0	0	637	637	0.73	0
4.	*Syzygium cumini*	0	0	0	106	0	0	0	106	0.12	0
5.	Miscellaneous species	22500	6898	531	106	0	0	0	30035	34.3	0.06
Total		**78642**	**7110**	**849**	**318**	**0**	**0**	**637**	**87556**	**100**	**0.18**
Percentage		89.82	8.12	0.97	0.36	0	0	0.73	100		
Stems per hectare		0.17	0.01	0	0	0	0	0	0.18		

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Annexure - XVI

Estimated volume (cu.m.) of timber under pond side plantation

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	1280	46	159	96	0	0	0	1581	15.32	0
2.	*Eucalyptus spp.*	3408	0	0	0	0	0	0	3408	33.02	0.01
3.	*Ficus spp.*	0	0	0	0	0	0	1856	1856	17.98	0
4.	*Syzygium cumini*	0	0	0	96	0	0	0	96	0.93	0
5.	Miscellaneous species	1508	1511	266	96	0	0	0	3381	32.76	0.01
Total		**6196**	**1557**	**425**	**288**	**0**	**0**	**1856**	**10322**	**100.01**	**0.02**
Percentage		60.03	15.08	4.12	2.79	0	0	17.98	100		
Volume per hectare		0.01	0	0	0	0	0	0	0.02		

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Distribution of estimated trees under Railway line plantation

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	106	106	0	0	0	0	0	212	0.67	0
2.	*Azadirachta indica*	1592	0	0	0	0	0	0	1592	5.03	0
3.	*Eucalyptus spp.*	12099	2759	743	1061	106	0	0	16768	53.02	0.04
4.	*Ficus spp.*	0	0	106	0	0	0	0	106	0.34	0
5.	Miscellaneous species	5519	7429	0	0	0	0	0	12948	40.94	0.03
Total		**19316**	**10294**	**849**	**1061**	**106**	**0**	**0**	**31626**	**100**	**0.07**
Percentage		61.08	32.55	2.68	3.35	0.34	0	0	100		
Stems per hectare		0.04	0.02	0	0	0	0	0	0.07		

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Estimated volume (cu.m.) of timber under Railway line plantation

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	7	23	0	0	0	0	0	30	0.46	0
2.	*Azadirachta indica*	107	0	0	0	0	0	0	107	1.63	0
3.	*Eucalyptus spp.*	1113	971	584	1481	231	0	0	4380	66.7	0.01
4.	*Ficus spp.*	0	0	53	0	0	0	0	53	0.81	0
5.	Miscellaneous species	370	1627	0	0	0	0	0	1997	30.41	0
Total		**1597**	**2621**	**637**	**1481**	**231**	**0**	**0**	**6567**	**100.01**	**0.01**
Percentage		24.32	39.91	9.7	22.55	3.52	0	0	100		
Volume per hectare		0	0.01	0	0	0	0	0	0.01		

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Annexure - XIX

Distribution of estimated trees under Rest/Other category

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	Stem per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	25153	6368	3927	425	0	212	0	36085	3.48	0.08
2.	*Acacia catechu*	6049	0	0	0	0	0	0	6049	0.58	0.01
3.	*Albizzia lebbeck*	3821	3821	2972	849	425	106	0	11994	1.16	0.03
4.	*Azadirachta indica*	69515	12311	7005	1380	0	0	318	90529	8.73	0.19
5.	*Bauhinia spp.*	531	425	318	0	0	0	0	1274	0.12	0
6.	*Eucalyptus spp.*	47440	2016	0	0	0	0	0	49456	4.77	0.1
7.	*Ficus spp.*	31521	11250	8490	7429	4564	4882	15389	83525	8.05	0.18
8.	*Santalum album*	531	0	0	0	0	0	0	531	0.05	0
9.	*Syzygium cumini*	3715	106	425	425	3187	318	425	5732	0.55	0.01
10.	*Tamarindus indica*	10719	10082	9658	5943	3502	1804	3608	45316	4.37	0.1
11.	*Tectona grandis*	106	0	0	0	0	0	0	106	0.01	0
12.	*Thespesia populnea*	16662	1698	637	212	0	106	0	19315	1.86	0.04
13.	*Wrightia tinctoria*	1592	0	0	0	0	0	0	1592	0.15	0
14.	Miscellaneous species	378460	253545	29504	14221	2759	3502	4033	686024	66.12	1.44
Total		**595815**	**301622**	**62936**	**30884**	**11568**	**10930**	**23773**	**1037528**	**100**	**2.18**
Percentage		57.43	29.07	6.07	2.98	1.11	1.05	2.29	100		
Stems per hectare		1.25	0.63	0.13	0.06	0.02	0.02	0.05	2.18		

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Annexure - XX

Estimated volume (cu.m.) under Rest/ Other category

(Non forest area of Bangalore Rural district - 4759.93sq.km.)

Sl. No.	Name of Species	Diameter Class (in cm.)							Total	%	vol per ha.
		10-20	20-30	30-40	40-50	50-60	60-70	70+			
1.	*Acacia arabica*	237	60	37	4	0	2	0	340	0.13	0
2.	*Acacia catechu*	508	0	0	0	0	0	0	508	0.19	0
3.	*Albizzia lebbeck*	256	837	1486	773	615	224	0	4191	1.55	0.01
4.	*Azadirachta indica*	4658	2696	3503	1256	0	0	926	13039	4.82	0.03
5.	*Bauhinia spp.*	36	93	159	0	0	0	0	288	0.11	0
6.	*Eucalyptus spp.*	4364	710	0	0	0	0	0	5074	1.87	0.01
7.	*Ficus spp.*	2112	2464	4245	6760	6609	10330	44828	77348	28.57	0.16
8.	*Santalum album*	39	0	0	0	0	0	0	39	0.01	0
9.	*Syzygium cumini*	249	23	213	387	460	673	1238	3243	1 2	0 01
10.	*Tamarindus indica*	718	2208	4829	5408	5071	3817	10510	32561	12.03	0.07
11.	*Tectona grandis*	10	0	0	0	0	0	0	10	0	0
12.	*Thespesia populnea*	1116	372	319	193	0	224	0	2224	0.82	0
13.	*Wrightia tinctoria*	107	0	0	0	0	0	0	107	0 04	0
14.	Miscellaneous species	25357	55526	14752	12941	3995	7410	11748	131729	48 66	0.28
Total		**39767**	**64989**	**29543**	**27722**	**16750**	**22680**	**69250**	**270701**	**100**	**0.57**
Percentage		14.69	24.01	10.91	10.24	6.19	8.38	25 58	100		
Volume per hectare		0.08	0.14	0.06	0.06	0.04	0.05	0 15	0.57		

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APPENDIX – I

List of villages selected for Pilot Survey in Karnataka State

S.No.	District	Name of the village	Area (in ha.)
1.	Bangalore	Byrasandra	447
2.	Bellary	Basarakodu	2,183
3.	Bidar	Dabka	2,041
4.	Bijapur	Rugi	1,770
5.	Chikmagalur	Hiregarje	184
6.	Dharwad	Kengonda	732
7.	Mysore	Shyanadrahalli	297
8.	North Kanara	Mudagi	144
9.	South Kanara	Belpu	570
10.	Tumkur	Gutte	148

APPENDIX – II

District wise no. of villages selected for inventory in Karnataka State

S.No.	Name of the district	Non forest. Area (in ha.)	No. of villages selected for inventory
1.	Bangalore Urban	2,10,046	4
2.	Bangalore Rural	4,75,993	14
3.	Belgaum	1,19,825	32
4.	Bellary	7,81,867	23
5.	Bidar	4,93,534	13
6.	Bijapur	16,29,590	41
7.	Chikmagalur	5,04,167	18
8.	Chtradurga	8,59,276	27
9.	Dakshina Kannada	3,15,465	20
10.	Dharwad	12,34,527	32
11.	Gulbarga	14,96,423	40
12.	Hassan	6,08,495	17
13.	Kodagu	2,84,823	10
14.	Kolar	6,75,526	20
15.	Mandya	4,70,965	12
16.	Mysore	8,33,321	29
17.	Raichur	13,23,263	34
18.	Shimoga	7,30,538	26
19.	Tumkur	9,78,238	26
20.	Uttara Kannada	1,95,526	25
	Total	**1,52,21,408**	**463**

APPENDIX – III

List of villages selected for inventory in Bangalore Rural District

S.No.	Name of the Village	Location
1.	Sogala	57 H/2 - C3
2.	Jakanahalli	57 G/8 - B1
3.	Chikkamudigere	57 G/4 – B3
4.	Gejjagadhahalli	57 G/8 – C3
5.	T. Begur	57 G/8 – B2
6.	Doddabele	57 G/8 – B1
7.	Booragunte	57 H/13 – A2
8.	Kanavanahalli	57 H/5 – B1
9.	Madamarenahalli	57 H/6 – C1
10.	Telakere	57 G/4 – B3
11.	Mallarabanvadi	57 G/8 – B3
12.	Bisalahalli	57 G/4 – B2
13.	Karnalu	57 G/11 – A2
14.	Kodigehalli	57 G/3 – B1

VILLAGE DESCRIPTION FORM

1. State : .....
2. District : .....
3. Map Sheet No.: .....
4. Sample Village : .....
5. Area of the sample village (in ha.):.....
6. Crew Leader's 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. Quadrant-wise summary of enumerations.

Quadrant No.	Date of Survey	No. of trees enumerated
1		
2		
3		
4		
5		
TOTAL :		

Date:

Signature of Crew Leader

Rough diagram of Sample village.

VILLAGE TREE ENUMERATION FORM

Card No.	Card design	State	District.	Sample village	Geographical area of the sample village (Ha.)	Total No. of Trees
1-3	4-6	7-8	8-10	11-15	16-19	44 - 49

Name of the Tree Spe.:_____ Name of Village:_____

Species Code :_____

Dia. classes code	Category	Dia. Classes code.	Category	Dia. Class Code	Category	Dia. Class Code.	Category	Dia. Class Code.	Category.	Dia. class Code.	Category.	Dia. class code.	Category.	Dia. class Code.	Category.	Dia. class code	Category.	Dia. class code.	Category	Dia. Class. Code	Category.	Dia. class code.	Category
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43

DISTRICT TREE FORM

Job No.	Card design number	State	District	No. of villages in the district	No. of sample villages in the district	Geographical area of the district (ha.)	Sample village	Geographical area of the sample village (ha.)	Category of the sample village
1-3	4-6	7-8	9(-10	11-14	15-16	17-22	23-25	26-31	32

Number of Trees in the sample village according to category of the plantation/treck								
Farm forestry	Road side plantations	Village woodlot	Block plantations	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 :

Page No.

Total No. of pages:

Signature of Crew Leader:

Name of Crew Leader:

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