

Assessment of Trees Outside Forests(ToF) Report



By:

**TELANGANA STATE FOREST
DEPARTMENT**

PREFACE

Telangana has 26903 km² recorded forests which is 24% of the geographical area of the State. The forests are mostly Deciduous and Thorny. The detailed information on vegetation cover, growing stock & population structure, number of trees, regeneration status, etc. is essential for forest managers, planners and policy makers. The National Forest Policy envisages that 33% of the geographical area should be brought under the green cover. To formulate the strategy to achieve this objective, it necessary to have accurate assessment of the tree cover inside as well as outside the notified forests.

State Forest Department has been making of green cover inside the notified forests since 1998 and bringing out annual State specific "State of Forests Reports" since 2010. As per the assessment made by TSFD using LISS III data of 2015, the forest cover inside the notified forests is estimated as 16500.56 km², which is 14.72% of the Geographical area. As per the Forest Inventory Report published in 2010, the GS inside the notified forests in Telangana is estimated to be 118.73 Mm³ and the average GS as 41.15 m³/ ha. However, the information on the Tree cover outside the notified forests is not readily available. Hence, for the first time attempts has been made to assess the Tree/ Green cover outside the notified forests.

Trees Outside (notified) Forests (TOF) offer a wide range of ecological, economic and social services like that of notified forests. With the general ban on green felling in natural forests in India, the rural communities and Wood Based Industries have become increasingly dependent on TOF for timber and non-timber requirement for livelihood and commercial purposes. In this backdrop, the Hon'ble Supreme Court of India has directed the State Government to assess the potential of the Forests both notified as well as TOF vis-à-vis the

requirement of Wood Based Industries as the same of the State qua saw mills and timber based industry which is linked to grant of permissions to the Wood-Based Industries.

Keeping the above in view, the Forest Survey of India (FSI) commenced estimation of TOF on a small scale in India in the year 1995 and for the entire country in 2003. However, results based on this assessment do not reflect the true picture at the district level because of low level of sampling.

Therefore, the State Forest Department decided to assess the TOF in the State using the Cartosat data of 2.5 m resolution for stratification. The methodology formulated by the FSI has been followed while improving the stratification and increasing the sampling size. A customized web-enabled package was developed and deployed for capturing the information and analysis.

The thrust of this report is on providing of State and District level information on TOF resources. The results of this report will serve as a starting point for moving from a forest-centric to holistic view on monitoring the tree cover upto the smallest administrative level. It will provide necessary inputs for better planning for afforestation as well as proper management of natural resources.

Hope this report will be useful to all the Government Departments NGOs, Corporates, People's Representatives and the people at the large involved in massive planting programme under Telanganaku Karith Haram (TKHH).

Date:
Hyderabad

(P.K. Sharma, IFS)
PrI. Chief Conservator of Forests (HoFF)

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EXECUTIVE SUMMARY

“**The Report on Trees Outside Forests**” gives comprehensive information on the tree cover and growing stock etc., outside the notified forests. It is for the first time in country where the Cartosat data of 2.5 m resolution is used in stratification of the tree wealth outside the notified forests. The methodology formulated by the Forest Survey of India in assessment of Trees Outside (notified) Forests (ToF) is followed for ease of comparison, while improving the stratification and increasing the sampling size. The assessment provides necessary inputs for sustainable management of the notified forests by way of reduction of pressure on natural forests. The maps showing the geo-locations where the detailed inventory was to be carried out, were overlaid on topomaps and supplied to field officers for ground verification and the inventory carried out. A customized web-enabled package was developed and deployed for capturing the information and assessment. **The following are the key results of this assessment:**

A. EXTENT OF TREE COVER:

- a. The geographical area of the State is **112102** km², out of which **26903.70** km² is notified forests.
- b. **The total extent** under various classes of ToF in the State is **6957.22** km², which comes to **6.21%** of the geographical area.
- c. The **extent** of Natural Forests outside the notified forests is **2325.23** km²; and that of Block Plantations **1784.24** km² & Linear Plantations **198.68** km²; Rural Habitations **67.54** km², Urban Habitations **39.62** km² and Scattered trees **2542.21** km².

- d. The natural forests, plantations and habitations constitute **33.42%**, **28.50%** and **38.08%** of the total extent under ToF respectively.

B. GROWING STOCK:

- a. Overall Growing stock in the TOF is estimated as **21.444 Million cubic meters** (Mm³). Of which the GS of Natural Forests is **8.770** Mm³; Plantations **11.531** Mm³; Rural Habitations **0.085** Mm³; Urban Habitations **0.045** Mm³ and Scattered Trees **1.013** Mm³
- b. The total number of stems is estimated to be **44.154** Million (M). Of which Natural Forests account for **20.451** M; Plantations **22.258** M; Rural Habitations **0.093** M; Urban Habitations **0.066** M and Scattered Trees **1.286** M.
- c. The **top 10 species based on volume** are ***Mangifera Indica*** with **8.3956** Mm³ (53.12%); ***Azadirachta indica*** **2.5712** Mm³ (16.27%) ; ***Butea monosperma*** **1.4733** Mm³ (9.32%); ***Tectona grandis*** **1.1161** Mm³ (7.06%); ***Bombax religiosum*** **0.5048** Mm³ (3.19%); ***Tamarindus indica*** **0.4099** Mm³ (2.59%); ***Madhuca indica*** **0.3584** Mm³ (2.27%); ***Acacia nilotica*** **0.3570** Mm³ (2.26%); ***Phoenix sylvestris*** **0.3265** Mm³ (2.07%); and ***Eucalyptus camaldulensis*** **0.2926** Mm³ (1.85%)
- d. The **top 10 species based on number of stems** are ***Mangifera indica*** **16.2573** M (51.66%); ***Tectona grandis*** **4.0657** M (12.92%); ***Azadirachta indica*** **3.8156** M (12.12%); ***Butea monosperma*** **1.8610** M (5.91%); ***Acacia nilotica*** **1.5770** M (5.01%); ***Bombax religiosum*** **1.0724** M (3.41%); ***Citrus Pseudolimon*** **0.8051** M (2.56%); ***Eucalyptus camaldulensis*** **0.7070** M (2.25%);

Lagerstroemia parviflora **0.6675** M (2.12%); and *Albizia amara* **0.6403** M (2.03%).

- e. The **top species** in the Natural forests in terms of GS is *Butea monosperma* with **1.3260** Mm³ and in terms number of stems is *Tectona grandis* with **2.9690** Million.
- f. The **top species** in the Plantations in terms of GS and in terms number of stems is *Mangifera indica* with **7.8057** Mm³ of GS and *Mangifera indica* **15.2438** Million stems.
- g. The **top species** in the Rural Habitations in terms of GS as well as number of stems is **Azadirachta indica** with **41232.04** m³ and **31480** stems.
- h. The **top species** in the Urban Habitations in terms of GS is **Peltophorum pterocarpum** with GS of **6497.89** m³ and in terms of number of stems is **Azadirachta indica** with 6565.
- i. The **top species** in the category of Scattered Trees in terms of GS as well as number of stems **Azadirachta indica** with GS of **224756.21** m³ and **0.2766** Million stems.
- j. In all there are **363** species of trees outside the notified forests. Of which **57** are Timber species, **Six** Pulpwood species and **300** Fuel wood species. The **annual yield** from the ToF is estimated to be **0.4982** Mcum of Timber, **0.1517** Mcum of Pulp and **0.2198** Mcum of Fuel.

C. OTHER FINDINGS:

- a) Total length of road network is estimated as **167443.7** km. However, only **8268.2** km is covered with Avenue Plantations; which comes only to 4.94% of the network. In all **159175.5** km of road network is devoid of Avenue

Plantation; this includes **1154.3** km of NH, **2858.4** km of NH and **155162.8** km of Other Roads.

- b) **1423.9** km length of Railway Tracks out of a total length of **1470.4** km is devoid of Avenue Plantation.
- c) **1473.3** km length of Canal banks out of total length of **1526.1** km is devoid of tress.
- d) **19828.0** km length of stream & river banks, out of total length of **20349.2 km** length requires planting.

CHAPTER - I

1.1 Introduction:

Sustainable use and development of natural resources is key issue for mankind's survival. Forest is one of the most important natural resources. There has been a serious threat to the forest ecosystem due to human interference and unscientific exploitation. Therefore, there is an urgent need to conserve the existing gene pool in-situ before it is lost forever. Therefore, assessment of the status of the natural resources is vital.

Trees growing in the notified forests and outside play very important role in our life. The significance of trees is as follows:

- i. **Trees add to Ecological value:** Trees fulfill fundamental ecological functions in *soil and water conservation* and environmental protection. Most of the agricultural production in India, where there are settled populations, has various species of trees. These are planted by the farmers for various purposes like food, fodder and small timber. Besides the direct benefits, these trees perform a valuable function of serving as *wind brakes and shelterbelts*. Therefore the improved management of agroforestry systems has potential impact for the whole rural ecosystem.
- ii. **Trees increase Economic value:** Trees provide traditional medicines as well as basic food commodities, including a variety of gums, oils, proteins, fruits and drinks, which are of nutritional importance for a large number of people, especially in rural areas. Agroforestry lands are also a major source of wood and non-wood products, which provide significant household income and appear to be important for local economies.
- iii. **Trees increase Social/ Cultural value:** Specific social groups including women, the poor, immigrants and young adults tend to be particularly involved in the gathering and sometimes the processing of NTFPs, because these activities require no cash investment. The marketing of these products is also predominantly a women's activity. It tends to generate a higher proportion of income for women than for men, which may have a positive impact on the nutritional status of children. People especially the rural masses attach special significance to specific trees that are not cut or harvested. These they grow in the form of traditionally managed *sacred groves* and other religious places. Certain castes trace their ancestry to certain trees, which they do not

cut. These castes also have their clan names similar to that of the trees. Thus specie is protected from being overexploited and is thus conserved for the posterity.

- iv. **Trees increase property value:** It is well known fact that property that is well landscaped with trees and other plants is more valuable than property sitting on a barren landscape. Studies have shown that (i) Healthy trees can add up to 15 per cent to residential property value (ii) Office and industrial space in a wooded setting is more in demand and commands more value in sale or renting out (iii) Trees enhance productivity.

Thus the significance of Trees can be briefly summarized in the following manner:

- **Ecological Reasons:** Biomass, Carbon sequestration, Micro climate, Biodiversity (Ecosystem, Species, Gene), Watershed functions (soil and water conservation), Pollution control (Air, Noise), Wind break/shelter belts
- **Economic Reasons:** Wood, Wood fuel, small timber, poles, bamboo, NWFP (Food, Medicines, Pesticides, Fruits, Fodder, flower, etc.), Services (Ecotourism)
- **Social/Cultural Reasons:** Religion, Subsistence, Aesthetic, Recreation, Education, Employment

Due to increase in the population, human beings are cutting down more and more trees to meet their daily needs, which is proving to be harmful. This cutting is leading to the rise of natural calamities, such as floods, landslides or land erosion. It can be prevented by planting of trees. According to the recent forest cover assessment done by the Telangana State Forest Department, out of the recorded forest areas of 26903 Km², the forest cover (areas having vegetation cover of > 0.1 canopy density) in Telangana is only **16504.33 km²** (286.66 km² of Very Dense Forest, 7789.48 km² of Moderately Dense Forest and 8428.19 km² of Open Forest) which is 14.72% of the Geographical area (112102 km²). Although the sustainable management of forest has been established as a priority by the Government, the loss of forest cover remains a major concern in the region. During the last (3) decade, Telangana has experienced highest negative rates of forest cover and area change. This deforestation is mainly attributed to the expansion of encroachments due to poverty, land hunger, inequitable lands distribution, population growth, smuggling, loss of regeneration due to grazing, incidence of fires, poaching etc. Out of these, encroachments over

forest areas have caused large scale deforestation. This process of loss of forest cover has led to fragmentation of forest lands.

To negate this, Government of Telangana has launched the flagship programme **Telanganaku Hairitha Haram** with an objective to increase the forest cover from the present about 20.93% including 6.21% of ToF to 33% of the Geographical Area. The goal of achieving 33% tree cover, is sought to be achieved by taking up activities inside and outside notified forests.

The activities proposed in the notified forests are

(i) Protecting and rejuvenating the existing degraded forests by way of giving preferential treatment to established regeneration, coppicing, singling and other silvicultural interventions collectively called as Assisted Natural Regeneration (ANR) (ii) Extensive Planting in blanks and open forests, i.e., Artificial Regeneration (AR) in the notified forests (iii) Protection against smuggling, fire, encroachment, grazing and poaching (iv) Taking up massive Water Harvesting Structures (WHS) to improve moisture regime. (v) Planting of wild fruit-bearing plants, development of grass land and fodder plot & creation of water holes in Protected Areas (PA) to improve the biodiversity (vi) Establishment of Urban Lung Spaces & (vii) Encouraging plantation works in RoFR areas

The activities proposed in the outside forests are

(i) Taking massive plantation programme outside forest areas under Social Forestry (ii) Agro-forestry Plantations for increased income levels and economic security of farmers (iii) Planting in Urban Residential colonies - Creation of "Smrithivanams" (Memory Gardens) (iv) Avenue plantations along roadsides (v) Institutional plantations (vi) Barren Hill afforestation (vii) Tank foreshore plantations (viii) Riverbank plantations and (ix) Homestead & Industrial areas

The state government has planned for planting of 230 crore seedlings/saplings in a period of 4 years which included planting and development of 100 crore in notified forests, planting of 120 crore in outside forests and 10 crore in HMDA limits. It works out to 40 lakh seedlings per Assembly Constituency and 40,000 plants per village. This will lead to making of Telangana as **GREENER TELANGANA**.

1.2 Importance of TOF

The increasing forest cover loss and fragmentation of forests on one hand, the need to conserve remnants of representative forest ecosystems and the increasing demand for forest products in developing countries on the other hand; makes the development of innovative sustainable management

tools imperative for other less studied tropical forest resources such as Trees Outside Forests (ToF).

TOF, which comprise all trees outside the notified or recorded forests, are embedded in a landscape matrix composed by different land-uses. Trees outside forest (TOF) generally include trees on farmlands, in cities and human settlements, orchards, roadsides, pastures, banks of river, streams and canals and shelterbelts which are less than 20 m wide and 0.5 ha area (FAO 1998). The area occupied by TOF, the species composition, the volume, as well as specific characteristics such as the geometry and spatial distribution, can change depending on the biophysical, socioeconomic and political characteristics of a particular landscape.

It is recognized that TOF embrace not only many ecological functions but also economic functions. TOF play an important role in global carbon cycling, since they are large pools of carbon as well as potential carbon sinks and sources to the atmosphere. In the socioeconomic context, it is clear that agroforestry systems in developing countries provide a large part of fuel wood (FAO 1999). Trees outside forests are known to serve as a major source of food and feed, contribute to a balanced diet, and provide the ingredients for various remedies. In some parts of the world, a significant amount of timber and service wood comes from this sector. We are also well-aware of the many ways in which Trees outside forests are used in construction and crafts, and their useful role in providing shade and marking the boundaries of fields and other areas, not to mention the cultural and religious aspects. Trials confirm that intercropping with trees can result in much higher capture of annual rainfall. There is mounting evidence of their impact on soil and water conservation, and their essential role in anti-desertification, climate control, and maintaining biological diversity and ecosystem balance. And yet, Trees outside forests remain a sort of overlooked and hidden treasure.

As explained above, considerable overlap is found between the economic and ecological functions of forest trees and that of TOF. Of course, non-forest and forest tree resources differ in the degree to which the different functions are present, and many ecosystem functions are specific to the forest and cannot be provided by TOF. But it is also instructive to look at TOF without making the direct comparison with forest trees. The TOF resource is often independent of the forest, forming a relevant component of non-forest landscape that should be taken into account in large-area for natural resources planning, from ecological as well as economic point of view.

In India forest legislation also extends to TOF (e.g. as regards transit permits). While there is some tradition and experience, as well as a

recognized need for sustainable management of forests, little is known about the dynamics of the tree resource outside forests. Data is therefore important as a foundation for developing management options to help sustain tree cover. It is also useful for planning, e.g. of wood production from TOF. In India there are certain rules governing felling and transportation which might act as a dis-incentive to tree farmers.

With changing of priorities of the people and development of the technology, it is essential to estimate the Growing stock outside the Forests as they reduce pressure on the natural/notified forests and also play an important role in the maintaining ecological balance, besides providing many other services. These also help conserve biodiversity, control erosion and provide fuel wood, fodder, fiber and small timber etc. Hence, assessment of Trees outside the Forest, in a way provides necessary inputs for sustainable management of the notified forests as well.

Keeping the above in view, Forest Survey of India (FSI) commenced estimation of TOF on a small scale in India in the year 1995 and for the entire country in 2003. However, the assessment of TOF by FSI suffers from the limitation of the small size of the sampling. Results based on this assessment do not reflect the true picture at the state and district levels.

Hence State Forest Department has decided to take up assessment of TOF.

1.4 OBJECTIVES:

The main objective of the TOF field inventory is to collect qualitative and quantitative information about the trees outside notified forests within precision limits, so as to serve data needs of development planning. These include:

- To estimate the contribution of TOF in tree cover
- To estimate the total number of trees in TOF,
- To estimate the Growing Stock of standing TOF,
- To evaluate the contribution of TOF in timber production,
- To evaluate the contribution of TOF in fuel wood, fodder and NTFP production,

CHAPTER-II - Materials and Methods

The inventory of the whole population requires large amount of money, time and qualified personnel. Due to the limitations of time, money and qualified personnel, sampling is the best solution to obtain the required information (De Gier). Hence, stratified random sampling is resorted to.

2.1: Sampling Design:

Sampling is the process of obtaining information by examining only a part of the population to draw conclusion about the whole. The procedure by which the samples are selected from the population is called Sampling Design. Stratified random sampling method was used for field data collection in the present study. The sampling design has been finalized by the Geomatics Center through intensive ground verification and in consultation with senior officers and field officers. For the enumeration purpose, each district was chosen as a primary sampling unit. **High resolution Cartosat 1 Imagery** has been used for stratification of the entire district into various homogeneous strata. The Cartosat 1 imagery was geo-referenced using GCPs collected in the field and with the help of DEM of ASTER & SRTM, and also GoogleEarth, Bhuvan & topomaps, as and when required. The Sampling Frame (Sample Size, Number of Samples, Size of the Sampling Unit, Sampling Intensity) for each Stratum was done after intensive field visits by the Officers of the Geomatics Center in consultation with senior officers & field officers of the Department. After rigorous exercise, it was decided

- To have more number of samples with smaller size than few number of bigger samples, since more samples cover more area and better accuracy is achieved. It also meets the criteria of optimal sample size with same resources and time.
- To adopt FSI method, as nearly as possible, for easy comparison and universal acceptance.
- To collect more parameters, but as simple as possible, keeping in view the time and other resource limits.

The maps showing the geo-locations (longitude and latitude) where the detailed inventory was to be made, were overlaid on topomaps and supplied to field officers. The **Plot Approach/ Description Form** and **Plot Enumeration Form** were finalized and communicated to field officers. The detailed procedure for conducting field inventory was communicated to field officers in the form of a Manual in Telugu and English. Crew Leaders were formed at each Division. Necessary trainings were conducted in laying of

Plots and carrying out enumeration, at each Circle upto ABO level and (4) trainings at the State Forest Academy, Dulapally to Crew Leaders as well as the officers in the cadre of FROs and above.

The inventory design for various classes is as follows:

a) Natural Forests: Block and linear (growing naturally along the streams, nallahs and rivers etc. Since the tree cover is similar to that of notified forest areas, the regular inventory methodology used for Forest areas has been adopted for this category. Two stage sampling viz., *Pre-inventory and final-inventory method* has been adopted.

- The number of sample points required N_{required} has been estimated using probability proportionate stratified random sampling method. Sampling intensity was 0.01%.
- Initially Pre-inventory has been conducted at 15 points randomly selected from above for each class. Based on variance in the population, the number of samples points N_{required} has been estimated using t-distribution at allowable error of 20% for carrying out the final inventory.
- Maximum of (i) and (ii) has been considered as N_{required}
- The information collected during pre-inventory has been reused in generation of final statistics.
- 0.1 Ha sample plot has been adopted for pre-inventory and final inventory.

b) Plantations

- **Block:** The crop in a block is generally uniform in nature in terms of age and species in 90% of the cases; hence the number of sample points N_{required} has been estimated using probability proportionate stratified random sampling method. Sampling intensity was 0.1%.
- i. **Linear:** The FSI method of using 125m long * 10m wide sample plot was considered ideal and was adopted, with 1% sampling intensity.

c) Habitations

- i. **Rural:** Villages can be stratified based on the geographical area or population (which is adopted by FSI). Hence
- Area stratification was adopted since extents were readily available using Satellite imagery.

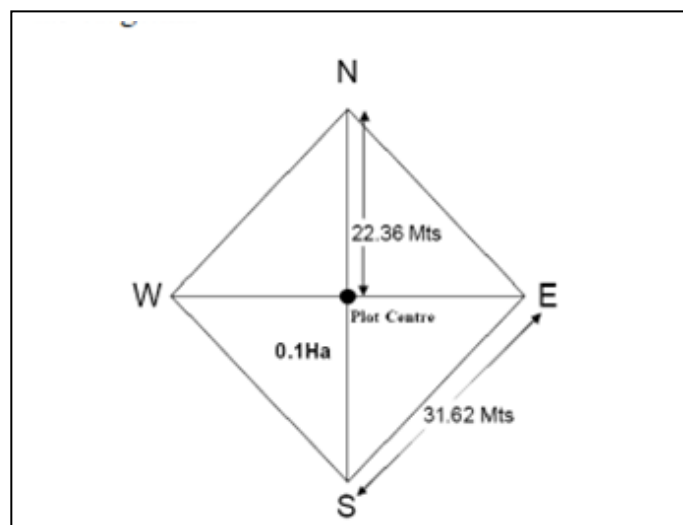
- *The classes adopted were - Area between 5 to 3 Km², 3 to 1 Km², 1 km² to 50 ha and 50 ha to 25 ha and area less than 25 ha.*
 - 6-10 samples (villages) of 0.1 ha in each class were selected using stratified Random Sampling Technique. Enumeration was carried out in each selected sample and extrapolated to entire area.
- ii. **Urban:** Area based stratification was adopted similar to rural areas, since extents were readily available from the Satellite imagery.
- The classes adopted were – Area > 50 km², 50 to 35 km², 35 to 20 km², 20 to 10 km², 10 to 5 km².
 - Habitations were divided into segments by using systematic grid based on the manmade/natural features. Segments were selected at random for carrying out enumeration at 0.1% sampling intensity. Enumeration was carried out in 0.1 ha sample plot in the selected segments and extrapolated to entire area.

d) Scattered Trees: Individual trees also contribute substantially towards TOF. Counting the number of trees on screen is cumbersome and could be prone to errors as canopy of individual trees are not differentiable for many species. 60 samples plots as suggested by FSI have been selected at random. The sample size adopted was 3 Ha.

The random points generated in the above process were overlaid on the topo maps and supplied to the field officers, along with geographic coordinates, for carrying out the enumeration.

2.2: Laying of Sample Plots & enumeration

a) Natural Forests: The size of the sample plot was 0.1 Ha and laid in the field as per the measurements shown in the following diagram:

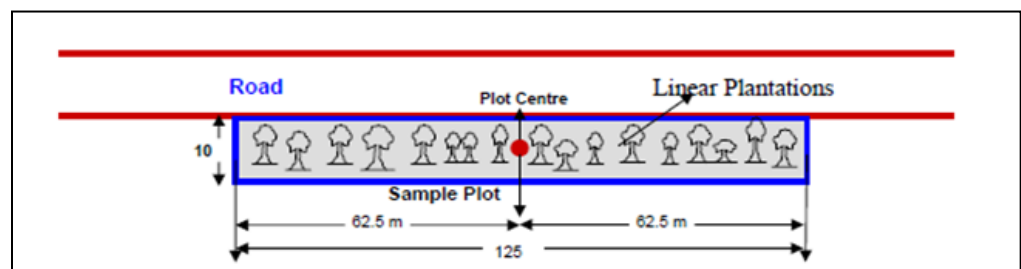


After fixing the plot center, the N, S, E and W corners of the plot were fixed by measuring 22.36m horizontal distance by tape/rope from center in all four directions. Stout pegs or bamboo of 1.5 m height were fixed at each corner and a flag attached to it. Correctness of the layout was checked by measuring each side, which measured 31.62m. Wherever possible, ranging rods were used as corner posts. A red/white colour cloth was tied at the top end of these corner posts for getting clear visibility from different spots in the plot.

b) Plantations

- i. Block Plantations:** The size of the sample point was 0.1 Ha and was laid as described above in Natural Forests.

- ii. Linear Plantations:** The size of the sample plot was kept as **10m x125m** and the number samples per district kept at 60. After reaching the center of the plot at given longitude and latitude, the plot center was fixed keeping 62.5 m on both sides. Accordingly, plot along the linear strip was laid out and width of 10m taken with the help of chain/measuring tape from the starting canopy of the strip of trees. If any of the side was found to be less than 62.5m then plot center was adjusted in such manner that each side of the adjusted plot was 62.5m respectively, as shown in the figure below. The actual longitude and latitude of the mid-point of the length (adjusted plot center) of laid out sample plot was recorded in the TOF Form.



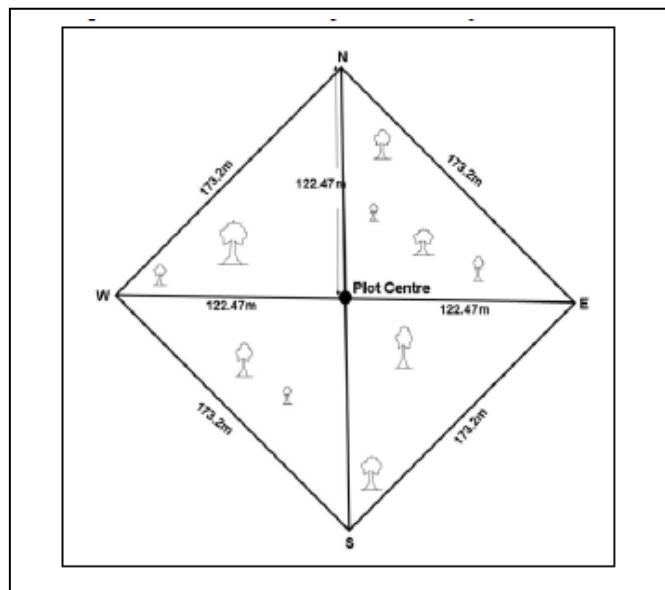
c) Habitations

- i. Urban:** The urban areas were delineated into five classes based on the geographical area calculated from the satellite imagery. Each urban habitation was subdivided into various blocks based on the roads and natural features; and these blocks were randomly selected for carrying out the enumeration. Total enumeration was done in each block.

ii. Rural: The rural areas were delineated into five classes based on the geographical area of the village calculated from the satellite imagery. In a District 6-10 sample locations in each class were considered for total enumeration.

d) Scattered trees: In a district 60 square plots of 3.0 ha size were located & enumerated. After reaching plot center at given longitude & latitude a square plot of 3.0 ha was laid out. The layout of the plot has been carried out using any method mentioned below.

- a) After fixing the plot center, the NE, SE, SW, NW corners of the plot were fixed by measuring 122.47m horizontal distance from the plot center, by tape in all four directions. These four corners were marked by thin poles or bamboos of 5 cm dia and 1.5 m height. Ranging rods have been used as corner posts wherever possible. A red/white color cloth was tied at the top end of these corner posts for getting clear visibility from different spots in the plot. In case, the 3.0 ha square plot includes part of block or/and linear stratum then plot center was adjusted suitably to exclude undesired stratum.



- b) Another method of laying out of sample plot was using GPS alone. Along with the lat-long of the center point, the other four corners lat-longs were provided in the map.

The dimensions of plot were checked so that all sides measured to 173.20 m.

2.3 Data Collection:

After laying out the plot, the enumeration work was taken up. Enumeration work commenced from Northwest corner of the plot and proceeded in clockwise direction. The information collected was recorded in (2) Forms i.e., Plot Approach/Description Form and (ii) Plot Enumeration Form. The work of data collection commenced in 2009-10 and completed in 2013-14. Adequate precautions were taken in filling up the forms. On completion of the work in a plot, the crew leaders have scrutinized the forms & if any information was missing or doubtful, necessary corrective measures were taken. The data collected was then uploaded into TOFMIS module of TGFMS for processing

2.4 Data Processing: A customized online application **TOFMIS** was developed for entering the data collected in the field forms and also for processing. The hardcopy data was sent to IT wing for cross verification. There are 3 stages in Data processing viz.,

1. Data checking or verification
2. Calculating volumes for trees and plots using volume equations
3. Generating Reports Division and District wise.

Data checking: The data submitted by field officers was verified by scientists at Geomatics center. If any inconsistency or recording error was found (particularly in dbh and more trees in the plot) necessary steps were taken duly consulting the field officers and the data rectified.

Calculating volumes for trees: After the completion of the verification of the data, the volume was calculated for each tree by using volume equations provided by FSI and TSFD. Then plot volumes also calculated.

Generation of reports District and Division wise: Using above volumes calculated and extent of areas calculated from CARTOSAT-1 images, The Stratum wise, District wise growing stock, unit volume per hectare, stems per ha and total stems estimated.

2.5 Comparison between TOF assessment methods of FSI and TSFD

| Item | TOF by FSI | TOF by TSFD |
|-------------------------------------|---|---|
| Sampling unit | For assessment of TOF, entire country has been stratified into 14 homogenous physiographic zones. Within each strata few districts are chosen for sampling | District is taken as unit and all the districts are sampled. |
| Stratification | The area is divided into following strata: <ul style="list-style-type: none"> ➤ Rural ➤ Block ➤ Linear ➤ Scattered ➤ Urban | The area is divided into following strata: <ul style="list-style-type: none"> ➤ Natural – 4 Canopy density classes ➤ Linear Plantations ➤ Block Plantations ➤ Rural – 5 classes based on area ➤ Urban - 5 classes based on area ➤ Scattered – areas don't fall into any of the above class. |
| Materials and methods | PAN (5.8 m) for some parts and LISS III (23.5 m) for rest | Cartosat-1 Stereo-pair (2.5 m) |
| Sampling for various classes | | |
| Natural forests | Clubbed in scattered class | 4 density classes - 0.1 ha plots with 0.15 sampling intensity |
| Block plantations | 50 samples of 0.1 ha each | 0.1 ha plots with 0.15 sampling intensity |
| Linear Plantations | 60 plots of 10m x 125m | 60 plots of 10m x 125m |
| Rural | Clubbed with scattered class, since it is difficult to delineate areas on LISS III data | 5 classes based on area and 6-10 samples in each class. Total enumeration. |
| Urban | Sampling unit is Urban Frame Survey (UFS) prepared by National Sample Survey Organization (NSSO). | 5 classes based on area. Division of blocks based on permanent features for easy demarcation in the field. Total enumeration in each block. |

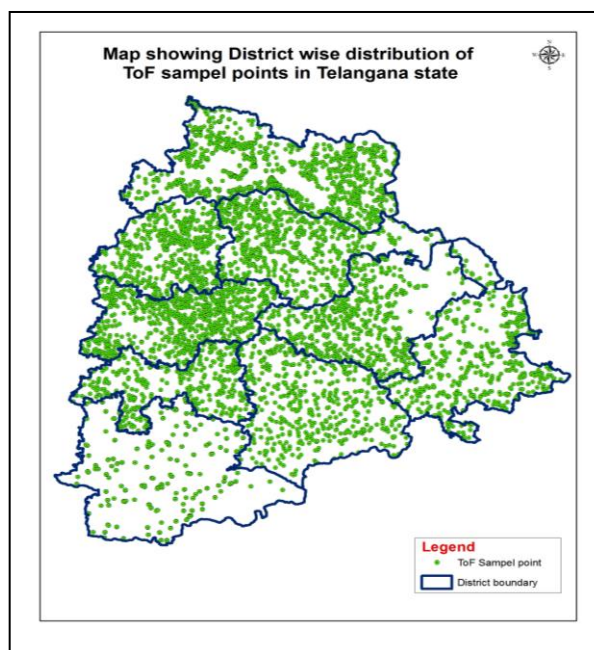
| | | |
|-----------|--|-------------------------|
| Scattered | 3 ha in non-hilly area and 0.5 ha in hilly area. | 3 ha for all the areas. |
|-----------|--|-------------------------|

2.6 Extents of tree cover, Sampling Intensity and No. of Sample Points:

| S. No | Stratum | Canopy Class | Area in Km ² | No. of Polygons | No. of sample points |
|------------------------|------------------------|--------------|-------------------------|-----------------|----------------------|
| Natural Forests | | | | | |
| 1 | Block | MDF | 200.02 | 3497 | 220 |
| 2 | | OF | 554.61 | 29151 | 677 |
| 3 | | Scrub | 1440.75 | 85541 | 1385 |
| 4 | Linear* | | 129.87 | | |
| | Total | | 2325.23 | 118191 | 2282 |
| Plantations | | | | | |
| 1 | Block | | 1784.24 | 60434 | 574 |
| 2 | Linear | | 198.68 | 230170 | 598 |
| | Total | | 1982.92 | 290604 | 1172 |
| Habitations* | | | | | |
| 1 | Rural | | 67.54 | 23886 | 507 |
| 2 | Urban | | 39.62 | 249 | 497 |
| 3 | Scattered Trees | | 2542.21 | | 583 |
| | Total | | 2649.37 | 24115 | 1587 |
| | Grand Total | | 6957.52 | 432910 | 5041 |

*The notional extents of Habitations are taken as 3.27% of the total extent.

Map showing the distribution of sampling points



CHAPTER -III - Statewide results

3.1. About the State:

Telangana State lies between 15.85484⁰ N & 19.89643⁰ N latitudes and 77.174920⁰ E & 81.80302⁰ E longitudes. The Geographical Area of the State is **112102 km²** which is **3.40%** of the landmass of the country. The State has two physiographic zones viz., the hilly region having an altitude of 500 to 1324 m, the plateau having an altitude of 46 m to 1000 m. Godavari and Krishna are the two principal rivers of the State which drain into the Bay of Bengal through Andhra Pradesh. The River Godavari with its tributaries Pranahita, Manjeera, Maneru, Indravati, Kinnerasani, Pamuleru and Sileru, drains through the northern parts of the State into Bay of Bengal. The River Krishna with its tributaries Tungabhadra, Vedhavati, Musi, Paleru and Munneru flows through the southern parts of the State.

The climate of the State is generally dry with temperatures ranging from 8⁰ C to 52⁰ C and the annual rainfall is about 500-1100 mm, received mainly from Southwest and Northeast monsoons. The geological formations found are: (1) The unclassified Archaean crystalline rocks, mainly the granite, (2) The Mesozoic coal bearing Gondwana strata, (3) Eocene lava flows (the Deccan traps) and (4) The semi-consolidated or unconsolidated tertiary and recent rocks. The soils found are Red, Black, Alluvial, Laterite and Saline/Alkaline. The population of the State is 35.29 million (2011 Census). The male population is 17.54 million and female 17.75 million. The Per capita forest area is **0.08 Ha**. The population density is 307 persons per km². The livestock population is 80 million.

3.2 Recorded Forests and Protected Areas: The total notified forest area of the State is **26903.70 km²**, which is 24% of the geographical area. Out of **26903.70 km²** of notified forest area, **5856.04 km²** is included in the Protected Area network. The Adilabad District has the **highest notified forest area** of **7101.30 km²** and the Rangareddy & Hyderabad has the **lowest notified forest area** of 771.85 km² in the State. As regards the **ratio of notified forest to geographical area**, Khammam District has the **highest 45.49 %** and Nalgonda the **lowest 6.2 %**. As per Champion and Seth's classification, the Forests of State fall under Southern Moist Mixed Deciduous Forests, Dry Teak Forests, Southern Dry Mixed Deciduous Forests, Dry Deciduous Scrub, Dry Savannah Forests, Dry Bamboo Brakes, Southern Thorn Forests.

The forest cover* in the State based on the interpretation of IRS R2 LISS-III 2013 data (Dec'2013 – Feb'2014) and LISS IV data (2011-2014) is

16504.33 km², which is **14.72%** of the Geographical area. In terms of the forest canopy cover density classes the State has **286.66** km² of Very Dense Forest (VDF), **7789.48** km² of Moderately Dense Forest (MDF) and **8428.19** km² of Open Forest (OF). The area of the Scrub is **4326.91** km², Non-Forest **5930.77** km² and Water Bodies **141.69** km².

**The forest cover is defined as area covered by VDF, MDF and OF*

3.3 Assessment of Resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **6957.22** km², which comes to **6.21%** of the geographical area and details as follows:

| | | |
|-------------------|---|--------------------------------|
| Natural Forests | - | 2325.23 km ² |
| Plantations | - | 1982.92 km ² |
| Rural Habitations | - | 67.55 km ² |
| Urban Habitations | - | 39.61 km ² |
| Scattered Trees | - | 2542.21 km ² |

The natural forests, plantations & habitations constitute **33.42%**, **28.50%** and **38.08%** of the total ToF Area respectively

The District and stratum wise details are as follows:

(Area in Km²)

| District/ Stratum | Natural Forests | | Plantations | | Habitations | | | Total |
|-----------------------|-----------------|---------------|----------------|---------------|--------------|--------------|----------------|----------------|
| | Block | Linear* | Block | Linear | Rural | Urban | Scattered | |
| Adilabad | 635.59 | 25.37 | 53.73 | 30.65 | 4.91 | 1.62 | 265.08 | 1016.94 |
| Karim Nagar | 335.33 | 20.46 | 192.54 | 33.17 | 11.02 | 2.56 | 278.52 | 873.6 |
| Khammam | 172.16 | 3.05 | 472.07 | 5.22 | 7.49 | 2.65 | 203.58 | 866.22 |
| Mahaboob Nagar | 92.56 | 5.72 | 228.05 | 9.46 | 9.31 | 2.27 | 482.23 | 829.6 |
| Medak | 456.60 | 43.46 | 44.69 | 48.17 | 6.28 | 2.13 | 259.67 | 861 |
| Nalgonda | 88.59 | 9.75 | 545.41 | 18.89 | 9.92 | 2.57 | 402.6 | 1077.73 |
| Nizamabad | 167.79 | 9.00 | 8.59 | 15.24 | 5.61 | 2.04 | 188.82 | 397.086 |
| RR & Hyd | 117.56 | 7.81 | 134.21 | 22.79 | 4.13 | 20.48 | 194 | 500.98 |
| Warangal | 129.19 | 5.25 | 104.95 | 15.09 | 8.88 | 3.29 | 267.71 | 534.36 |
| Total | 2195.36 | 129.87 | 1784.24 | 198.68 | 67.55 | 39.61 | 2542.21 | 6957.52 |

*growing naturally along the rivers, streams, nallahs etc.

B. GROWING STOCK:

Overall Growing stock is estimated to be **21.444** Mm³. Breakup is as follows:

- Natural Forests - **8.770** Mm³
- Plantations - **11.531** Mm³
- Rural Habitations - **0.085** Mm³
- Urban Habitations - **0.045** Mm³
- Scattered Trees - **1.013** Mm³

C. NUMBER OF STEMS:

Number of Stems outside the notified forests is estimated to be **44.154** Million. Breakup is as follows:

- Natural Forests - **20.451** Million
- Plantations - **22.258** Million
- Rural Habitations - **0.093** Million
- Urban Habitations - **0.066** Million
- Scattered Trees - **1.286** Million

| Top 10 species Based on Volume | | | Top 10 species Based on No. of Stems | | |
|---------------------------------------|--|---------------------------------|---|--|-------------------------------|
| S. No | Species name | Volume in Mm³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 8.3956 | 1 | <i>Mangifera indica</i> | 16.2573 |
| 2 | <i>Azadirachta indica</i> | 2.5712 | 2 | <i>Tectona grandis</i> | 4.0657 |
| 3 | <i>Butea monosperma</i> | 1.4733 | 3 | <i>Azadirachta indica</i> | 3.8156 |
| 4 | <i>Tectona grandis</i> | 1.1161 | 4 | <i>Butea monosperma</i> | 1.8610 |
| 5 | <i>Bombax religiosum</i> | 0.5048 | 5 | <i>Acacia nilotica</i> | 1.5770 |
| 6 | <i>Tamarindus Indica</i> | 0.4099 | 6 | <i>Bombax religiosum</i> | 1.0724 |
| 7 | <i>Madhuca indica</i> | 0.3584 | 7 | <i>Citrus Pseudolimon</i> | 0.8051 |
| 8 | <i>Acacia nilotica</i> | 0.3570 | 8 | <i>Eucalyptus camaldulensis</i> | 0.7070 |
| 9 | <i>Phoenix sylvestris</i> | 0.3265 | 9 | <i>Lagerstroemia parviflora</i> | 0.6675 |
| 10 | <i>Eucalyptus camaldulensis</i> | 0.2926 | 10 | <i>Albizia amara</i> | 0.6403 |

D. DETAILS OF TREE COVER AND GROWING STOCK:

i. Natural forests:

This stratum consists of 2 Major classes' viz., Block & Linear. Again Block class is sub-divided into - MDF, OF & Scrub. The total GS is estimated to be **8.770** Mm³. The total number of stems estimated to be **20.451** million.

Volume/ha & Total Volume; No. of Stems/ ha & Total No. of stems:

| Stratum | Canopy Class | Area in Km ² | GS (Mm ³) | Unit GS (m ³ /ha) | Stems in Million | Stems/ha in No's |
|---------------------------------|--------------|-------------------------|-----------------------|------------------------------|------------------|------------------|
| Natural Forests (Block) | MDF | 200.02 | 0.807 | 40.353 | 2.179 | 109 |
| | OF | 554.61 | 1.959 | 35.317 | 5.460 | 98 |
| | Scrub | 1440.75 | 4.788 | 33.230 | 11.150 | 77 |
| Natural Forests (Linear) | | 137.05 | 1.216 | 88.730 | 1.662 | 112 |
| Total | | 2332.43 | 8.770 | | 20.451 | |

Top 10 species based on volume and number of Stems are shown below:

| Based on Volume | | | Based on No. of Stems | | |
|------------------------|---------------------------|---------------------------|------------------------------|----------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Butea monosperma</i> | 1.3260 | 1 | <i>Tectona grandis</i> | 2.9690 |
| 2 | <i>Azadirachta indica</i> | 1.1698 | 2 | <i>Azadirachta indica</i> | 2.1972 |
| 3 | <i>Tectona grandis</i> | 0.5906 | 3 | <i>Butea monosperma</i> | 1.7264 |
| 4 | <i>Mangifera indica</i> | 0.5507 | 4 | <i>Acacia nilotica</i> | 1.2203 |
| 5 | <i>Tamarindus Indica</i> | 0.2999 | 5 | <i>Mangifera indica</i> | 0.9716 |
| 6 | <i>Phoenix sylvestris</i> | 0.2926 | 6 | <i>Albizia amara</i> | 0.6159 |
| 7 | <i>Madhuca indica</i> | 0.2657 | 7 | <i>Phoenix sylvestris</i> | 0.5505 |
| 8 | <i>Acacia nilotica</i> | 0.2517 | 8 | <i>Lagerstroemia parviflora</i> | 0.4647 |
| 9 | <i>Pongamia pinnata</i> | 0.2019 | 9 | <i>Holarrhena antidysentrica</i> | 0.3790 |
| 10 | <i>Terminalia arjuna</i> | 0.1879 | 10 | <i>Chloroxylon swietenia</i> | 0.3766 |

ii. Plantations:

Growing stock in this Stratum is estimated to be **11.531** Mm³. Breakup is as follows:

- Block Plantations - **10.878** Mm³

- Linear Plantations - **0.653** Mm³

Number of Stems in this Stratum is estimated to be **22.258** Million. Breakup is as follows:

- Block Plantations - **21.682** Million
- Linear Plantations - **0.576** Million

Volume/ha & Total Volume; No. of Stems/ ha & Total No. of stems:

| S. No | Stratum | Area in Km ² | GS (Mm ³) | Unit GS (m ³ /ha) | Stems in Million | Stems/ha in No's |
|-------|---------------------------|-------------------------|-----------------------|------------------------------|------------------|------------------|
| 1 | Block Plantations | 1784.24 | 10.877 | 60.96 | 21.682 | 126 |
| 2 | Linear Plantations | 198.68 | 0.654 | 106.11 | 0.576 | 108 |
| | Total | 1982.92 | 11.531 | | 22.258 | |

Top 10 species based on volume and number of Stems are shown below:

| Based on Volume | | | Based on No. of Stems | | |
|-----------------|---------------------------------|---------------------------|-----------------------|---------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 7.8057 | 1 | <i>Mangifera indica</i> | 15.2438 |
| 2 | <i>Azadirachta Indica</i> | 1.0741 | 2 | <i>Azadirachta Indica</i> | 1.2313 |
| 3 | <i>Tectona grandis</i> | 0.4947 | 3 | <i>Tectona grandis</i> | 0.9993 |
| 4 | <i>Bombax religiosum</i> | 0.3163 | 4 | <i>Citrus Pseudolimon</i> | 0.8051 |
| 5 | <i>Syzygium jambos</i> | 0.1816 | 5 | <i>Bombax religiosum</i> | 0.7697 |
| 6 | <i>Citrus limon</i> | 0.1657 | 6 | <i>Citrus limon</i> | 0.5660 |
| 7 | <i>Citrus Pseudolimon</i> | 0.1457 | 7 | <i>Eucalyptus camaldulensis</i> | 0.3834 |
| 8 | <i>Eucalyptus tereticomis</i> | 0.1348 | 8 | <i>Acacia nilotica</i> | 0.2760 |
| 9 | <i>Eucalyptus camaldulensis</i> | 0.1082 | 9 | <i>Elaeis guineensis</i> | 0.2508 |
| 10 | <i>Samanea saman</i> | 0.0980 | 10 | <i>Cocos nucifera</i> | 0.1646 |

iii. Rural Habitations:

The GS of this stratum is estimated to be **85137.91 m³** and the total number of stems estimated to be **93391**. The unit volume is **12.60 m³/ ha** and stems per ha are **13.83**.

Top 10 species based on volume and Stems are shown below:

| Based on Volume | Based on No. of Stems |
|-----------------|-----------------------|
|-----------------|-----------------------|

| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
|-------|-------------------------------|--------------------------|-------|-------------------------------|--------------|
| 1 | <i>Azadirachta Indica</i> | 41232.04 | 1 | <i>Azadirachta Indica</i> | 31480 |
| 2 | <i>Tamarindus Indica</i> | 9671.80 | 2 | <i>Tamarindus Indica</i> | 10142 |
| 3 | <i>Cocos nucifera</i> | 3601.20 | 3 | <i>Cocos nucifera</i> | 6288 |
| 4 | <i>Mangifera indica</i> | 2527.38 | 4 | <i>Acacia nilotica</i> | 4681 |
| 5 | <i>Pongamia pinnata</i> | 2481.59 | 5 | <i>Tectona grandis</i> | 4559 |
| 6 | <i>Eucalyptus tereticomis</i> | 2474.55 | 6 | <i>Leucaena leucocephala</i> | 3916 |
| 7 | <i>Tectona grandis</i> | 1790.82 | 7 | <i>Pongamia pinnata</i> | 3256 |
| 8 | <i>Acacia nilotica</i> | 1330.07 | 8 | <i>Grewia rothi</i> | 2436 |
| 9 | <i>Borassus flabellifer</i> | 1326.37 | 9 | <i>Eucalyptus tereticomis</i> | 2435 |
| 10 | <i>Leucaena leucocephala</i> | 1280.36 | 10 | <i>Mangifera indica</i> | 2183 |

iv. Urban Habitations

The total volume of this stratum is estimated to be **45510.44 m³**. The unit volume is **11.49 m³/ ha**. The total number of stems estimated is to be **65791** and stems per ha **16.61**. The notional area of this stratum is covering **0.57%** of total TOF area.

Top 10 species based on volume and number of Stems are shown below:

| Based on Volume | | | Based on No. of Stems | | |
|-----------------|---------------------------------|--------------------------|-----------------------|---------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Peltophorum pterocarpum</i> | 6497.89 | 1 | <i>Azadirachta Indica</i> | 6565 |
| 2 | <i>Azadirachta Indica</i> | 5738.65 | 2 | <i>Peltophorum pterocarpum</i> | 4486 |
| 3 | <i>Eucalyptus camaldulensis</i> | 2800.92 | 3 | <i>Cocos nucifera</i> | 4056 |
| 4 | <i>Pongamia pinnata</i> | 1496.11 | 4 | <i>Mangifera indica</i> | 3143 |
| 5 | <i>Cocos nucifera</i> | 1333.38 | 5 | <i>Eucalyptus camaldulensis</i> | 3042 |
| 6 | <i>Azadirachta Indica</i> | 1307.10 | 6 | <i>Pongamia pinnata</i> | 2458 |
| 7 | <i>Azadirachta Indica</i> | 1174.57 | 7 | <i>Azadirachta Indica</i> | 1980 |
| 8 | <i>Azadirachta Indica</i> | 1161.64 | 8 | <i>Leucaena leucocephala</i> | 1698 |
| 9 | <i>Azadirachta Indica</i> | 1139.13 | 9 | <i>Millingtonia hortensis</i> | 1470 |
| 10 | <i>Tectona grandis</i> | 1089.31 | 10 | <i>Saraca asoka</i> | 1343 |

v. Scattered Trees:

The total volume of this stratum is estimated to be **1.013 Mm³** and unit volume is **3.98 m³/ ha**. The total trees estimated to be **1.286 Million** and stems/ ha **5.06**.

Top 10 species based on volume and number of Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|--------------------------|-----------------------|--------------------------------|------------------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Azadirachta Indica</i> | 224756.21 | 1 | <i>Azadirachta Indica</i> | 0.2766 |
| 2 | <i>Borassus flabelliformis</i> | 96205.84 | 2 | <i>Borassus flabelliformis</i> | 0.1090 |
| 3 | <i>Madhuca indica</i> | 83716.45 | 3 | <i>Bombax religiosum</i> | 0.0991 |
| 4 | <i>Butea monosperma</i> | 53589.04 | 4 | <i>Butea monosperma</i> | 0.0908 |
| 5 | <i>Bombax religiosum</i> | 48471.08 | 5 | <i>Tectona grandis</i> | 0.0905 |
| 6 | <i>Tamarindus Indica</i> | 37817.53 | 6 | <i>Azadirachta Indica</i> | 0.2766 |
| 7 | <i>Acacia nilotica</i> | 36406.40 | 7 | <i>Borassus flabelliformis</i> | 0.1090 |
| 8 | <i>Madhuca Indica</i> | 34934.00 | 8 | <i>Bombax religiosum</i> | 0.0991 |
| 9 | <i>Borassus flabellifer</i> | 32765.44 | 9 | <i>Butea monosperma</i> | 0.0908 |
| 10 | <i>Ficus benghalensis</i> | 29733.95 | 10 | <i>Tectona grandis</i> | 0.0905 |

E. OTHER FINDINGS:

i. Areas having Potential for taking up linear plantations:

a. Linear Plantations along the Roads:

Total length of road network is estimated as **167443.7** km. However, only **8268.2** km is covered with Avenue Plantations; which comes only to 4.94% of the network. As much as **159175.5** km length of road network is devoid of Avenue Plantation; where planting could be taken up if these are found to be free from encroachments and encumbrances, in a phased manner. The details are given in the table below:

(Length in km)

| District | Length of roads | | | Length already covered with plantations | | | Roads length available for plantation | | |
|---------------------|-----------------|-------|---------|---|-------|--------|---------------------------------------|-------|---------|
| | NH | SH | Others | NH | SH | Others | NH | SH | Others |
| Adilabad | 290.2 | 301.4 | 21546.0 | 84.3 | 85.2 | 197.4 | 205.9 | 216.2 | 21348.6 |
| Karimnagar | 135.3 | 221.9 | 16993.0 | 55.1 | 47.4 | 130.0 | 80.2 | 174.5 | 16863.0 |
| Khammam | 24.3 | 553.7 | 14476.0 | 3.2 | 49.8 | 504.0 | 21.1 | 503.9 | 13972.0 |
| Mahabubnagar | 162.0 | 714.7 | 27582.0 | 1.9 | 33.3 | 1314.0 | 160.1 | 681.4 | 26268.0 |
| Medak | 178.3 | 354.5 | 16089.0 | 28.6 | 120.7 | 1872.0 | 149.7 | 233.8 | 14217.0 |
| Nalgonda | 201.0 | 508.5 | 24422.0 | 23.9 | 52.9 | 1026.0 | 177.1 | 455.6 | 23396.0 |

| | | | | | | | | | |
|---------------------------|---------------|---------------|-----------------|--------------|--------------|---------------|---------------|---------------|-----------------|
| Nizamabad | 177.6 | 272.9 | 9744.3 | 27.4 | 48.4 | 652.4 | 150.2 | 224.5 | 9091.9 |
| Hyderabad & RR | 59.7 | 329.7 | 13957.0 | 5.9 | 55.9 | 1000.8 | 53.8 | 273.8 | 12956.2 |
| Warangal | 179.0 | 145.7 | 17824.0 | 22.8 | 51.0 | 773.9 | 156.2 | 94.7 | 17050.1 |
| Total | 1407.4 | 3403.0 | 162633.3 | 253.1 | 544.6 | 7470.5 | 1154.3 | 2858.4 | 155162.8 |

b. Linear Plantations along the Railway Tracks:

Total length of Railway Tracks is estimated as **1470.4** km. However, only **46.5** km is covered with Avenue Plantations; which comes only to 3.16% of the network. As much as **1423.9** km length of Railway Tracks is devoid of Avenue Plantation; where planting could be taken up, in a phased manner. The details are given in the table below:

(Length in km)

| District | Total Length | With Trees | Available for plantation |
|---------------------------|---------------------|-------------------|---------------------------------|
| Adilabad | 118.5 | 9.7 | 108.8 |
| Karimnagar | 87.8 | 9.0 | 78.8 |
| Khammam | 90.0 | 3.2 | 86.8 |
| Mahabubnagar | 207.0 | 1.6 | 205.4 |
| Medak | 118.5 | 13.4 | 105.1 |
| Nalgonda | 228.9 | 2.6 | 226.3 |
| Nizamabad | 102.7 | 2.5 | 100.2 |
| Hyderabad & RR | 297.4 | 3.6 | 293.8 |
| Warangal | 219.6 | 0.9 | 218.7 |
| Total | 1470.4 | 46.5 | 1423.9 |

c. Linear Plantations along the Canals:

Total length of Canals is estimated as **1526.1** km. However, only **52.9** km is covered with Avenue Plantations; which comes only to 3.47% of the network. As much as **1473.2** km length of Railway Tracks is devoid of Avenue Plantation; where planting could be taken up, in a phased manner. The details are given in the table below:

(Length in km)

| District | Total Length | With Trees | Available for plantation |
|---------------------------|---------------|-------------|--------------------------|
| Adilabad | 149.0 | 4.2 | 144.8 |
| Karimnagar | 374.0 | 27.0 | 347.0 |
| Khammam | 341.7 | 3.7 | 338.0 |
| Mahabubnagar | 114.6 | 0.1 | 114.5 |
| Medak | 52.2 | 1.6 | 50.6 |
| Nalgonda | 149.0 | 4.2 | 144.8 |
| Nizamabad | 139.2 | 7.2 | 132.0 |
| Hyderabad & RR | 114.6 | 0.1 | 114.5 |
| Warangal | 91.8 | 4.8 | 87.0 |
| Total | 1526.1 | 52.9 | 1473.2 |

d. Linear Plantations along the Streams/ Rivers:

Total length of Canals is estimated as **20349.2** km. However, only **521.2** km is covered with tree growth; which comes only to 2.56% of the network. As much as **19828** km length is devoid of tree growth; where planting could be taken up, in a phased manner, if feasible. The details are given in the table below:

(Length in km)

| District | Total Length | With Trees | Available for plantation |
|---------------------|--------------|------------|--------------------------|
| Adilabad | 1459.9 | 10.5 | 1449.4 |
| Karimnagar | 4722.0 | 289.0 | 4433.0 |
| Khammam | 3951.0 | 59.4 | 3891.6 |
| Mahabubnagar | 1454.9 | 10.5 | 1444.4 |
| Medak | 203.9 | 1.7 | 202.2 |
| Nalgonda | 1459.9 | 10.5 | 1449.4 |
| Nizamabad | 255.6 | 7.8 | 247.8 |

| | | | |
|---------------------------|----------------|--------------|----------------|
| Hyderabad & RR | 1454.9 | 10.5 | 1444.4 |
| Warangal | 5387.1 | 121.3 | 5265.8 |
| Total | 20349.2 | 521.2 | 19828.0 |

ii. Anticipated Annual Yield:

In all, there are **363** species of trees outside the notified forests. Of which **57** are Timber species, **Six** Pulpwood species and **300** Fuel wood species. Rotation period for each species was taken into consideration and the annual yield is estimated. The total volume of timber is estimated as **15.1541** Mm³, **0.5670** Mm³ from pulpwood and **5.7229** Mm³ from Fuel wood **annual yield** from the ToF is estimated to be **0.4982** Mcum of Timber, **0.1517** Mcum of Pulp and **0.2198** Mcum of Fuel.

| Sl.No. | Class | No.of Species | Annual Yeild (Mcum) |
|---------------|--------------|----------------------|----------------------------|
| 1 | Timber | 57 | 0.4982 |
| 2 | Pulp | 6 | 0.1517 |
| 3 | Fuel | 300 | 0.2198 |
| | Total | 363 | 0.8698 |

CHAPTER 4 – DISTRICT WISE RESULTS

4.1 ADILABAD DISTRICT

4.1.1 About the District:

The Adilabad district is located in Northern part of Telangana. The total geographical area of the district is **16128** km² and the notified forest is **7101.29** km², which is 44.03% of the geographical area of the district. There are two circles in the District viz., Adilabad Circle with four divisions (**4441.2** km²) and Kawal Tiger Reserve Circle with two divisions (**2660.09** Km²).

4.1.2 Assessment of Resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **991.59** km², which comes to 6.15% of the geographical area and details as follows:

| | | |
|-------------------|---|------------------------------|
| Natural Forests | - | 660.95 Km² |
| Plantations | - | 59.01 Km² |
| Rural Habitations | - | 4.91 Km² |
| Urban Habitations | - | 1.62 Km² |
| Scattered Trees | - | 265.10 Km² |

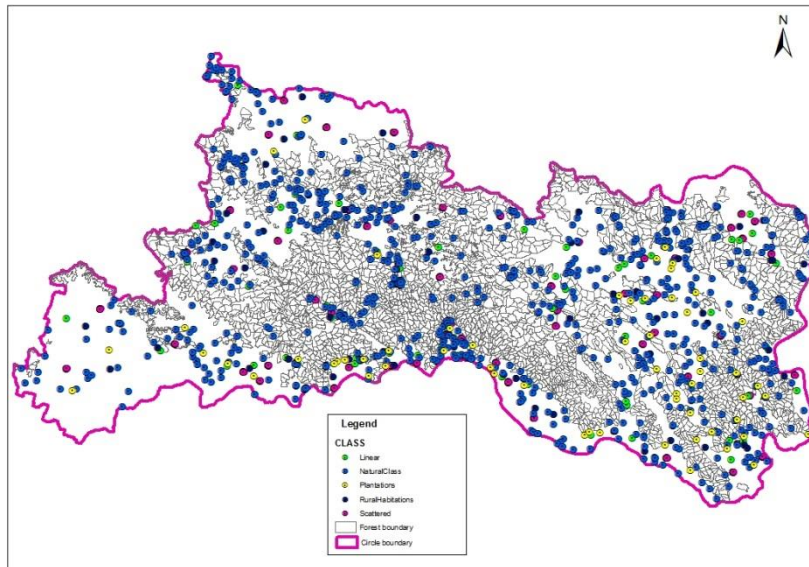
The natural forests, plantations and habitations constitute **66.66%**, **5.95%** and **27.39%** of the total ToF Area respectively.

The stratum wise details are as follows:

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 96 | 57.86 |
| | | | OF | 291 | 171.20 |
| | | | Scrub | 371 | 406.53 |
| | | Linear | 36 | 25.37 | |
| | | Total | | | 660.95 |
| 2 | Plantations | Block | | 60 | 53.73 |
| | | Linear | | 24 | 5.28 |
| | | Total | | | 59.01 |
| 3 | Habitations | Rural | | 60 | 4.91 |

| | | | | | |
|---|------------------------|--------------------|--|-------------|---------------|
| | | Urban | | 36 | 1.62 |
| | | Total | | | 6.53 |
| 4 | Scattered Trees | | | 60 | 265.10 |
| | | Grand Total | | 1034 | 991.59 |

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **3.7041** Mm³. Breakup is as follows:

- Natural Forests - **2.7021** Mm³
- Manmade Plantations - **0.7500** Mm³
- Habitations (Rural) - **0.0034** Mm³
- Habitations (Urban) - **0.0019** Mm³
- Scattered Trees - **0.2467** Mm³

Number of Stems estimated to be **7.6959** Million. Breakup is as follows:

- Natural Forests - **5.9484** Million
- Manmade Plantations - **1.4747** Million
- Habitations (Rural) - **0.0039** Million
- Habitations (Urban) - **0.0032** Million
- Scattered Trees - **0.2657** Million

C. THE STRATUM WISE DETAILS ARE AS FOLLOWS:

i. Natural forests

The total GS of this Stratum is estimated to be **2.702** Mm³. Total number of stems is **5.9484** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| 1 | Block | MDF | 57.858 | 0.332 | 57.310 | 0.542 | 94 |
| 2 | | OF | 171.200 | 0.380 | 22.203 | 1.104 | 64 |
| 3 | | Scrub | 406.528 | 1.800 | 44.277 | 4.074 | 100 |
| 4 | Linear | | 25.368 | 0.190 | 66.238 | 0.228 | 90 |
| Total | | | 660.955 | 2.702 | | 5.948 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|-------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Butea monospema</i> | 0.6799 | 1 | <i>Tectona grandis</i> | 1.6324 |
| 2 | <i>Tectona grandis</i> | 0.3395 | 2 | <i>Butea monospema</i> | 0.6340 |
| 3 | <i>Madhuca indica</i> | 0.2657 | 3 | <i>Mangifera indica</i> | 0.4307 |
| 4 | <i>Mangifera indica</i> | 0.1953 | 4 | <i>Azadirachta indica</i> | 0.3133 |
| 5 | <i>Azadirachta indica</i> | 0.1595 | 5 | <i>Lagerstroemia parvifol</i> | 0.1892 |
| 6 | <i>Terminalia arjuna</i> | 0.1583 | 6 | <i>Cleistanthus collinus</i> | 0.1448 |
| 7 | <i>Albizia lebeck</i> | 0.0707 | 7 | <i>Wrightia tinctoria</i> | 0.1442 |
| 8 | <i>Borassus flabelliformis</i> | 0.0640 | 8 | <i>Holarrhena antidysente</i> | 0.1246 |
| 9 | <i>Holoptelia integrefoli</i> | 0.0599 | 9 | <i>Madhuca indica</i> | 0.1088 |
| 10 | <i>Tamarindus indica</i> | 0.0491 | 10 | <i>Eucalyptus camaldulens</i> | 0.1063 |

ii. Plantations:

The total GS of this Stratum is estimated to be **0.750** Mm³. Total number of stems estimated to be **1.474** Million.

| Stratum | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|---------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| Block | 53.729 | 0.698 | 129.951 | 1.435 | 267 |

| | | | | | |
|--------------|--------|--------------|--------|--------------|----|
| Linear | 5.279 | 0.052 | 98.080 | 0.039 | 74 |
| Total | 59.008 | 0.750 | | 1.474 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-------------------------------|---------------------------|-----------------------|-------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 0.6767 | 1 | <i>Mangifera indica</i> | 1.3753 |
| 2 | <i>Azadirachta indica</i> | 0.0131 | 2 | <i>Eucalyptus camaldulens</i> | 0.0257 |
| 3 | <i>Eucalyptus camaldulens</i> | 0.0248 | 3 | <i>Azadirachta indica</i> | 0.0206 |
| 4 | <i>Pithecellobium dulce</i> | 0.0045 | 4 | <i>Tamarindus indica</i> | 0.0177 |
| 5 | <i>Madhuca indica</i> | 0.0007 | 5 | <i>Butea monospema</i> | 0.0046 |
| 6 | <i>Tamarindus indica</i> | 0.0010 | 6 | <i>Tectona grandis</i> | 0.0034 |
| 7 | <i>Albizia lebeck</i> | 0.0091 | 7 | <i>Pithecellobium dulce</i> | 0.0025 |
| 8 | <i>Cassia siamea</i> | 0.0017 | 8 | <i>Pongamia pinnata</i> | 0.0025 |
| 9 | <i>Pongamia pinnata</i> | 0.0090 | 9 | <i>Madhuca indica</i> | 0.0023 |
| 10 | <i>Ficus racemosa</i> | 0.0018 | 10 | <i>Cassia siamea</i> | 0.0021 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **3408.98 m³**. Total number of stems estimated to be **3929**. The unit volume (per ha) is **6.940 m³** and stems per ha are 8.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-------------------------------|--------------------------|-----------------------|-------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta indica</i> | 675.81 | 1 | <i>Azadirachta indica</i> | 1037 |
| 2 | <i>Vitex pinnata</i> | 472.65 | 2 | <i>Tectona grandis</i> | 439 |
| 3 | <i>Tamarindus indica</i> | 457.71 | 3 | <i>Leucaena leucocephala</i> | 303 |
| 4 | <i>Borassus flabelliformi</i> | 188.21 | 4 | <i>Tamarindus indica</i> | 290 |
| 5 | <i>Mangifera indica</i> | 151.00 | 5 | <i>Borassus flabelliformi</i> | 157 |
| 6 | <i>Albizia lebeck</i> | 129.90 | 6 | <i>Pongamia pinnata</i> | 156 |
| 7 | <i>Ficus benghalensis</i> | 120.75 | 7 | <i>Eucalyptus camaldulens</i> | 136 |
| 8 | <i>Bombax ceiba</i> | 116.73 | 8 | <i>Grewia rothi</i> | 111 |
| 9 | <i>Ficus racemosa</i> | 96.20 | 9 | <i>Zizyphus mauritiana</i> | 110 |
| 10 | <i>Ficus religiosa</i> | 78.64 | 10 | <i>Mangifera indica</i> | 106 |

iv. Urban Habitations:

The total GS of this Stratum is estimated to be **1887.30** m³. Total number of stems estimated to be **3154.09**. The unit volume (per ha) is **11.65** m³ and stems per ha are **19**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|------------------------------|--------------------------|-----------------------|-------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta indica</i> | 897.21 | 1 | <i>Azadirachta indica</i> | 1065 |
| 2 | <i>Mangifera indica</i> | 262.58 | 2 | <i>Mangifera indica</i> | 541 |
| 3 | <i>Delonix regia</i> | 103.50 | 3 | <i>Grewia rothi</i> | 373 |
| 4 | <i>Albizia lebbeck</i> | 89.29 | 4 | <i>Pongamia pinnata</i> | 179 |
| 5 | <i>Pongamia pinnata</i> | 64.03 | 5 | <i>Tamarindus indica</i> | 117 |
| 6 | <i>Tamarindus indica</i> | 61.74 | 6 | <i>Delonix regia</i> | 83 |
| 7 | <i>Syzygium cuminii</i> | 51.06 | 7 | <i>Leucaena leucocephala</i> | 74 |
| 8 | <i>Grewia rothi</i> | 46.98 | 8 | <i>Syzygium cuminii</i> | 69 |
| 9 | <i>Ficus religiosa</i> | 45.42 | 9 | <i>Eucalyptus camaldulens</i> | 62 |
| 10 | <i>Leucaena leucocephala</i> | 41.38 | 10 | <i>Cocos nucifera</i> | 55 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.246** Mm³. Total number of stems estimated to be **0.265 Million**. The unit volume (per ha) is **9.308** m³ and stems per ha are **10**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-------------------------------|---------------------------|-----------------------|--------------------------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |
| 1 | <i>Madhuca indica</i> | 0.0837 | 1 | <i>Borassus flabelliformis</i> | 53459 |
| 2 | <i>Borassus flabelliformi</i> | 0.0580 | 2 | <i>Tectona grandis</i> | 50219 |
| 3 | <i>Azadirachta indica</i> | 0.0232 | 3 | <i>Azadirachta indica</i> | 43003 |
| 4 | <i>Butea monospema</i> | 0.0145 | 4 | <i>Butea monospema</i> | 25920 |
| 5 | <i>Mangifera indica</i> | 0.0084 | 5 | <i>Madhuca indica</i> | 12371 |
| 6 | <i>Tectona grandis</i> | 0.0080 | 6 | <i>Zizyphus mauritiana</i> | 6038 |
| 7 | <i>Delonix regia</i> | 0.0065 | 7 | <i>Others</i> | 5302 |
| 8 | <i>Tamarindus indica</i> | 0.0050 | 8 | <i>Pongamia pinnata</i> | 4418 |
| 9 | <i>Ficus religiosa</i> | 0.0047 | 9 | <i>Acacia nilotica</i> | 3976 |
| 10 | <i>Ficus racemosa</i> | 0.0046 | 10 | <i>Ficus racemosa</i> | 3387 |

4.1.3 OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. National High Way:** NH 44 & 63 are passing through this district with a length of **290.2** km. However, it is observed that only **84.3** km length is covered with trees along the road, which comes only to 29.05% of the NH. As much as **205.9** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. State High Way:** The length of the state highway is **301.4** km, out of which only 85.2 km length is covered with the trees along the road, which comes to 28.27% of SH. Balance **216.2** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. Other Roads:** The length of these roads is **21546** km, out of which only **197.4** km length is with the trees, which comes to 0.92% of other road network. Balance **21348.6** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

b. Railway Tracks having Potential for taking up plantations: The length of the railway track is estimated as **118.5** km; however, only **9.7** km length is covered trees, which comes to 8.19% of the length of the railway track. Balance **108.8** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

c. Canals: The length of the canals is estimated as **149** km; however, only **4.2** km length is covered trees, which comes to 2.82% of the length of the canals. There is good scope for taking up planting along the canals, if suitable.

d. Streams/ Rivers: The length of the streams/ rivers is estimated as **1454.9** km; however, only **10.5** km length is covered trees, which comes to 0.72% of the length of the canals. There is good scope for taking up planting, if suitable.

4.2 KARIMNGAR DISTRICT

4.2.1 Introduction:

The Karimnagar district is located in Northern part of Telangana. The total geographical area of the district is **11855.11** km², out of this notified forest area is **2361.28** km². There are two forest divisions in the district.

4.2.2 Assessment of resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **853.14** km², which comes to 7.20% of the geographical area and details as follows:

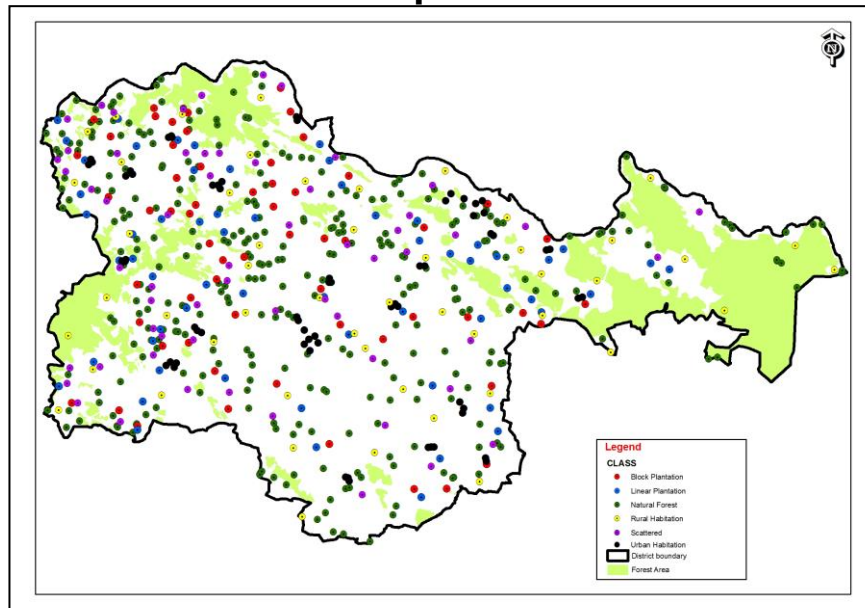
| | | |
|-------------------|---|------------------------------|
| Natural Forests | - | 355.79 km² |
| Plantations | - | 205.25 km² |
| Rural Habitations | - | 11.02 km² |
| Urban Habitations | - | 2.56 km² |
| Scattered Trees | - | 278.52 km² |

The natural forests, plantations and habitations constitute **41.70%**, **24.06%** and **34.24%** of the total ToF Area respectively.

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 55 | 55.63 |
| | | | OF | 120 | 116.74 |
| | | | Scrub | 150 | 162.96 |
| | | Linear | 19 | 20.46 | |
| | | Total | | | 355.79 |
| 2 | Plantations | Block | | 60 | 192.54 |
| | | Linear | | 41 | 12.71 |
| | | Total | | | 205.25 |
| 3 | Habitations | Rural | | 50 | 11.02 |
| | | Urban | | 66 | 2.56 |
| | | Total | | | 13.58 |
| 4 | Scattered Trees | | | 60 | 278.52 |

| | | | | |
|--|--|--------------------|------------|---------------|
| | | Grand Total | 621 | 853.14 |
|--|--|--------------------|------------|---------------|

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **1.9576 Mm³**. Breakup is as follows:

- Natural Forests - **0.6575 Mm³**
- Plantations - **1.2602 Mm³**
- Rural Habitations - **0.0065 Mm³**
- Urban Habitations - **0.0011 Mm³**
- Scattered Trees - **0.0323 Mm³**

Number of Stems is **5.5499 Million**. Breakup is as follows:

- Natural Forests - **2.4784 Million**
- Plantations - **2.9912 Million**
- Rural Habitations - **0.0102 Million**
- Urban Habitations - **0.0025 Million**
- Scattered Trees - **0.0676 Million**

C. THE STRATUM WISE DETAILS ARE AS FOLLOWS:

i. Natural forests:

The total GS of this Stratum is estimated to be **0.6575** Mm³. Total number of stems estimated to be **2.4784** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| 1 | Block | MDF | 55.631 | 0.1881 | 57.310 | 0.653 | 93 |
| 2 | | OF | 116.741 | 0.1185 | 22.203 | 0.681 | 64 |
| 3 | | Scrub | 162.962 | 0.2266 | 44.273 | 0.973 | 100 |
| 4 | Linear | | 20.461 | 0.1243 | 60.757 | 0.171 | 90 |
| Total | | | 355.795 | 0.6575 | | 2.478 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-----------------------------|---------------------------|-----------------------|-----------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 0.1068 | 1 | <i>Tectona grandis</i> | 0.5111 |
| 2 | <i>Phoenix sylvestris</i> | 0.0784 | 2 | <i>Butea monosperma</i> | 0.2726 |
| 3 | <i>Tectona grandis</i> | 0.0605 | 3 | <i>Acacia nilotica</i> | 0.2715 |
| 4 | <i>Borassus flabellifer</i> | 0.0493 | 4 | <i>Azadirachta Indica</i> | 0.2176 |
| 5 | <i>Butea monosperma</i> | 0.0447 | 5 | <i>Phoenix sylvestris</i> | 0.1888 |
| 6 | <i>Azadirachta Indica</i> | 0.0439 | 6 | <i>Dalbergia sissoo</i> | 0.0944 |
| 7 | <i>Acacia nilotica</i> | 0.0338 | 7 | <i>Terminalia arjuna</i> | 0.0804 |
| 8 | <i>Bombax religiosum</i> | 0.0258 | 8 | <i>Holarrhena antidysenterica</i> | 0.0728 |
| 9 | <i>Albizia lebbeck</i> | 0.0230 | 9 | <i>Albizia amara</i> | 0.0635 |
| 10 | <i>Terminalia tomentosa</i> | 0.0155 | 10 | <i>Mangifera indica</i> | 0.0629 |

ii. Plantations:

The total GS of this Stratum is estimated to be **1.2803** Mm³. Total number of stems estimated to be **3.1047** Million.

| Stratum | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| Block | 192.537 | 1.1340 | 129.951 | 2.8977 | 267 |
| Linear | 12.706 | 0.1262 | 90.080 | 0.0935 | 74 |
| Total | 205.233 | 1.2602 | | 2.9912 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------------|---------------------------|-----------------------|---------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 1.0053 | 1 | <i>Mangifera indica</i> | 2.7187 |
| 2 | <i>Samanea saman</i> | 0.0538 | 2 | <i>Azadirachta Indica</i> | 0.0458 |
| 3 | <i>Eucalyptus camaldulensis</i> | 0.0407 | 3 | <i>Tectona grandis</i> | 0.0301 |
| 4 | <i>Azadirachta Indica</i> | 0.0393 | 4 | <i>Bombax religiosum</i> | 0.0294 |
| 5 | <i>Bombax religiosum</i> | 0.0323 | 5 | <i>Eucalyptus camaldulensis</i> | 0.0225 |
| 6 | <i>Albizia lebeck</i> | 0.0221 | 6 | <i>Samanea saman</i> | 0.0217 |
| 7 | <i>Mangifera indica</i> | 1.0053 | 7 | <i>Phoenix sylvestris</i> | 0.0161 |
| 8 | <i>Samanea saman</i> | 0.0538 | 8 | <i>Mangifera indica</i> | 2.7187 |
| 9 | <i>Eucalyptus camaldulensis</i> | 0.0407 | 9 | <i>Azadirachta Indica</i> | 0.0458 |
| 10 | <i>Azadirachta Indica</i> | 0.0393 | 10 | <i>Tectona grandis</i> | 0.0301 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **6490.78** m³. Total number of stems estimated to be **10221**. The unit volume (per ha) is **5.890** m³ and stems per ha are 9.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-----------------------------|--------------------------|-----------------------|------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 2884.02 | 1 | <i>Azadirachta Indica</i> | 3781 |
| 2 | <i>Tamarindus Indica</i> | 1060.38 | 2 | <i>Tamarindus Indica</i> | 1394 |
| 3 | <i>Madhuca Indica</i> | 459.00 | 3 | <i>Acacia nilotica</i> | 848 |
| 4 | <i>Bombax religiosum</i> | 315.55 | 4 | <i>Tectona grandis</i> | 715 |
| 5 | <i>Cocos nucifera</i> | 261.38 | 5 | <i>Cocos nucifera</i> | 497 |
| 6 | <i>Borassus flabellifer</i> | 231.32 | 6 | <i>Leucaena leucocephala</i> | 303 |
| 7 | <i>Acacia nilotica</i> | 160.57 | 7 | <i>Bombax religiosum</i> | 291 |

| | | | | | |
|----|-------------------------|--------|----|-----------------------------|-----|
| 8 | <i>Pongamia pinnata</i> | 123.33 | 8 | <i>Grewia rothi</i> | 255 |
| 9 | <i>Tectona grandis</i> | 95.97 | 9 | <i>Borassus flabellifer</i> | 206 |
| 10 | <i>Albizia lebeck</i> | 94.57 | 10 | <i>Dalbergia sissoo</i> | 158 |

iv. Urban Habitations:

The total GS of this Stratum is estimated to be **1179.392** m³. Total number of stems estimated to be **2479**. The unit volume (per ha) is **4.607** m³ and stems per ha are **9**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------|--------------------------|-----------------------|---------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 563.34 | 1 | <i>Azadirachta Indica</i> | 892 |
| 2 | <i>Bombax religiosum</i> | 78.25 | 2 | <i>Tectona grandis</i> | 241 |
| 3 | <i>Samanea saman</i> | 58.86 | 3 | <i>Pongamia pinnata</i> | 154 |
| 4 | <i>Tamarindus Indica</i> | 53.17 | 4 | <i>Acacia nilotica</i> | 129 |
| 5 | <i>Cocos nucifera</i> | 47.74 | 5 | <i>Mangifera indica</i> | 127 |
| 6 | <i>Mangifera indica</i> | 47.73 | 6 | <i>Cocos nucifera</i> | 105 |
| 7 | <i>Tectona grandis</i> | 44.47 | 7 | <i>Tamarindus Indica</i> | 103 |
| 8 | <i>Delonix regia</i> | 38.83 | 8 | <i>Bombax religiosum</i> | 91 |
| 9 | <i>Azadirachta Indica</i> | 563.34 | 9 | <i>Grewia rothi</i> | 74 |
| 10 | <i>Bombax religiosum</i> | 78.25 | 10 | <i>Delonix regia</i> | 62 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.0323** Mm³. Total number of stems estimated to be **0.0676** Million. The unit volume (per ha) is **9.308** m³ and stems per ha are **2**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------|---------------------------|-----------------------|-------------------------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 0.0067 | 1 | <i>Azadirachta Indica</i> | 18103 |
| 2 | <i>Tectona grandis</i> | 0.0033 | 2 | <i>Tectona grandis</i> | 14235 |
| 3 | <i>Ficus religiosa</i> | 0.0031 | 3 | <i>Butea monosperma</i> | 6653 |
| 4 | <i>Butea monosperma</i> | 0.0028 | 4 | <i>Acacia nilotica</i> | 4642 |
| 5 | <i>Ficus benghalensis</i> | 0.0025 | 5 | <i>Tamarindus Indica</i> | 3714 |
| 6 | <i>Tamarindus Indica</i> | 0.0022 | 6 | <i>Phoenix sylvestris</i> | 3404 |
| 7 | <i>Ficus mollis</i> | 0.0018 | 7 | <i>Mangifera indica</i> | 2476 |
| 8 | <i>Mangifera indica</i> | 0.0018 | 8 | <i>Eucalyptus tereticomis</i> | 2011 |

| | | | | | |
|----|---------------------------|--------|----|--------------------------|------|
| 9 | <i>Albizia lebbeck</i> | 0.0013 | 9 | Grewia rothi | 1547 |
| 10 | <i>Phoenix sylvestris</i> | 0.0011 | 10 | Bombax religiosum | 1393 |

4.2.3 OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. **National High Way:** NH 63 are passing through this district with a length of **135.3** km. However, it is observed that only **55.1** km length is covered with trees along the road, which comes only to 40.72% of the NH. As much as **80.2** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. **State High Way:** The length of the state highway is **221.9** km, out of which only **47.4** km length is covered with the trees along the road, which comes to 21.36% of SH. Balance **174.5** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. **Other Roads:** The length of these roads is **16993** km, out of which only **130** km length is covered with the trees, which comes to 0.77% of other road network. Balance **16863** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

b. Railway Tracks having Potential for taking up plantations: The length of the railway track is estimated as **87.8** km; however, only **9** km length is covered trees, which comes to 10.25% of the length of the railway track. Balance **78.8** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

c. Canals: The length of the canals is estimated as **374** km; however, only **27** km length is covered trees, which comes to 7.22% of the length of the canals. There is good scope for taking up planting along the canals, if suitable.

d. Streams/ Rivers: The length of the streams/ rivers is estimated as **4722** km; however, only **289** km length is covered trees, which comes to 6.12% of the length of the canals. There is good scope for taking up planting, if suitable.

4.3 KHAMMAM DISTRICT

4.3.1 Introduction:

The Khammam district is located in Northern east part of Telangana. The total geographical area of the district is **13080.17** km², out of this notified forest area is **5995.20** km². There are four territorial forest divisions and one wildlife management division in the district.

4.3.2 Assessment of resources under Trees Outside notified Forests:

A. Tree cover:

Extent of tree cover under various classes is **863.17** km², which comes to 6.60% of the geographical area and details as follows:

| | | |
|-------------------|---|-------------------------------|
| Natural Forests | - | 175.21 km ² |
| Plantations | - | 474.24 km ² |
| Rural Habitations | - | 7.49 km ² |
| Urban Habitations | - | 2.65 km ² |
| Scattered Trees | - | 203.58 km ² |

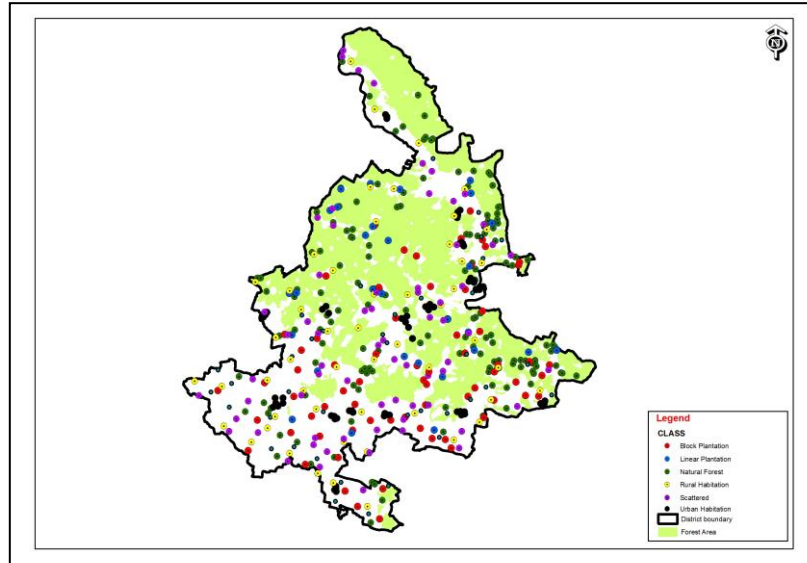
The natural forests, plantations and habitations constitute **20.30%**, **54.94%** and **24.76%** of the total ToF Area respectively.

The stratum wise points and extent of area shown below:

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 45 | 60.68 |
| | | | OF | 54 | 52.28 |
| | | | Scrub | 60 | 59.2 |
| | | Linear | 35 | 3.05 | |
| | | Total | | | 175.21 |
| 2 | Plantations | Block | | 64 | 472.07 |
| | | Linear | | 43 | 2.17 |
| | | Total | | | 474.24 |
| 3 | Habitations | Rural | | 57 | 7.49 |
| | | Urban | | 64 | 2.65 |

| | | | | | |
|---|------------------------|--------------------|--|------------|---------------|
| | | Total | | | 10.14 |
| 4 | Scattered Trees | | | 60 | 203.58 |
| | | Grand Total | | 482 | 863.17 |

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **4.7275** Mm³. Breakup is as follows:

- Natural Forests - **0.4508** Mm³
- Plantations - **4.1299** Mm³
- Rural Habitations - **0.0069** Mm³
- Urban Habitations - **0.0033** Mm³
- Scattered Trees - **0.1366** Million

Number of Stems is estimated to be **8.5879** Million. Breakup is as follows:

- Natural Forests - **1.6579** Million
- Plantations - **6.7693** Million
- Rural Habitations - **0.0112** Million
- Urban Habitations - **0.0043** Million
- Scattered Trees - **0.1452** Million

C. THE STRATUM WISE DETAILS ARE AS FOLLOWS:

i. Natural forests:

The total GS of this Stratum is estimated to be **0.4508** Mm³. Total number of stems estimated to be **1.6579** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| 1 | Block | MDF | 60.685 | 0.1140 | 87.778 | 0.5327 | 87 |
| 2 | | OF | 52.279 | 0.2081 | 39.795 | 0.5296 | 101 |
| 3 | | Scrub | 59.507 | 0.1011 | 17.074 | 0.5605 | 94 |
| 4 | Linear | | 3.050 | 0.276 | 90.628 | 0.0351 | 114 |
| Total | | | 175.521 | 0.4508 | | 1.6579 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------------|---------------------------|-----------------------|---------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Dalbergia paniculata</i> | 0.0613 | 1 | <i>Tectona grandis</i> | 0.1030 |
| 2 | <i>Lannea coromandelica</i> | 0.0275 | 2 | <i>Lagerstroemia parviflora</i> | 0.0896 |
| 3 | <i>Lagerstroemia parviflora</i> | 0.0257 | 3 | <i>Diospyros melanoxylon</i> | 0.0845 |
| 4 | <i>Borassus flabellifer</i> | 0.0181 | 4 | <i>Strychnos nuxvomica</i> | 0.0713 |
| 5 | <i>Azadirachta Indica</i> | 0.0176 | 5 | <i>Azadirachta Indica</i> | 0.0645 |
| 6 | <i>Tectona grandis</i> | 0.0163 | 6 | <i>Cleistanthus collinus</i> | 0.0638 |
| 7 | <i>Diospyros melanoxylon</i> | 0.0162 | 7 | <i>Lannea coromandelica</i> | 0.0622 |
| 8 | <i>Mangifera indica</i> | 0.0148 | 8 | <i>Dalbergia paniculata</i> | 0.0596 |
| 9 | <i>Anogeissus latifolia</i> | 0.0112 | 9 | <i>Albizia amara</i> | 0.0551 |
| 10 | <i>Xylia xylocarpa</i> | 0.0101 | 10 | <i>Pterospermum xylocarpum</i> | 0.0419 |

ii. Plantations

The total GS of this Stratum is estimated to be **4.1299** Mm³. Total number of stems estimated to be **6.7693** Million.

| Stratum | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|---------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
|---------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|

| | | | | | |
|--------------|----------------|---------------|---------|---------------|-----|
| Block | 472.070 | 4.0993 | 86.837 | 6.7417 | 142 |
| Linear | 2.166 | 0.0306 | 140.925 | 0.0276 | 127 |
| Total | 474.236 | 4.1299 | | 6.7693 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------------|---------------------------|-----------------------|---------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 3.7508 | 1 | <i>Mangifera indica</i> | 5.7092 |
| 2 | <i>Elaeis guineensis</i> | 0.0850 | 2 | <i>Elaeis guineensis</i> | 0.2508 |
| 3 | <i>Azadirachta Indica</i> | 0.0598 | 3 | <i>Tectona grandis</i> | 0.2141 |
| 4 | <i>Borassus flabellifer</i> | 0.0499 | 4 | <i>Azadirachta Indica</i> | 0.2010 |
| 5 | <i>Borassus flabellisformis</i> | 0.0449 | 5 | <i>Eucalyptus camaldulensis</i> | 0.0516 |
| 6 | <i>Eucalyptus tereticomis</i> | 0.0310 | 6 | <i>Borassus flabellifer</i> | 0.0477 |
| 7 | <i>Tectona grandis</i> | 0.0277 | 7 | <i>Anacardium occidentale</i> | 0.0369 |
| 8 | <i>Samanea saman</i> | 0.0263 | 8 | <i>Borassus flabellisformis</i> | 0.0318 |
| 9 | <i>Bombax religiosum</i> | 0.0129 | 9 | <i>Eucalyptus tereticomis</i> | 0.0295 |
| 10 | <i>Diospyros montana</i> | 0.0053 | 10 | <i>Samanea saman</i> | 0.0181 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **6873.87** m³. Total number of stems estimated to be **11190**. The unit volume (per ha) is **9.177** m³ and stems per ha are 15.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------------|--------------------------|-----------------------|---------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Tamarindus Indica</i> | 2115.23 | 1 | <i>Azadirachta Indica</i> | 3142 |
| 2 | <i>Azadirachta Indica</i> | 1745.15 | 2 | <i>Tamarindus Indica</i> | 2300 |
| 3 | <i>Ficus religiosa</i> | 583.52 | 3 | <i>Tectona grandis</i> | 777 |
| 4 | <i>Borassus flabellifer</i> | 269.71 | 4 | <i>Leucaena leucocephala</i> | 507 |
| 5 | <i>Borassus flabellisformis</i> | 253.98 | 5 | <i>Borassus flabellifer</i> | 486 |
| 6 | <i>Pongamia pinnata</i> | 234.7 | 6 | <i>Borassus flabellisformis</i> | 421 |
| 7 | <i>Mangifera indica</i> | 201.36 | 7 | <i>Mangifera indica</i> | 356 |

| | | | | | |
|----|-------------------------|--------|----|----------------------------|-----|
| 8 | <i>Syzygium cumini</i> | 152.83 | 8 | <i>Pongamia pinnata</i> | 345 |
| 9 | <i>Tectona grandis</i> | 149.73 | 9 | <i>Pithacolibium dulce</i> | 259 |
| 10 | <i>Helecteres isora</i> | 92.86 | 10 | <i>Grewia rothi</i> | 259 |

iv. Urban Habitations:

The total GS of this Stratum is estimated to be **3259.659** m³. Total number of stems estimated to be **4320**. The unit volume (per ha) is **12.301** m³ and stems per ha are **16**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|----------------------------|--------------------------|-----------------------|-----------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 1307.10 | 1 | <i>Azadirachta Indica</i> | 1247 |
| 2 | <i>Tectona grandis</i> | 362.67 | 2 | <i>Mangifera indica</i> | 551 |
| 3 | <i>Mangifera indica</i> | 306.07 | 3 | <i>Tectona grandis</i> | 374 |
| 4 | <i>Pongamia pinnata</i> | 258.36 | 4 | <i>Pongamia pinnata</i> | 274 |
| 5 | <i>Ficus religiosa</i> | 224.20 | 5 | <i>Grewia rothi</i> | 268 |
| 6 | <i>Albizia lebbeck</i> | 200.56 | 6 | <i>Cocos nucifera</i> | 215 |
| 7 | <i>Tamarindus Indica</i> | 112.05 | 7 | <i>Tamarindus Indica</i> | 200 |
| 8 | <i>Syzygium cumini</i> | 97.11 | 8 | <i>Annona squamosa</i> | 135 |
| 9 | <i>Cocos nucifera</i> | 70.41 | 9 | <i>Syzygium cumini</i> | 97 |
| 10 | <i>Pithacolibium dulce</i> | 25.49 | 10 | <i>Borassus flabellifer</i> | 79 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.1366** Mm³. Total number of stems estimated to be **0.1452 Million**. The unit volume (per ha) is **6.712** m³ and stems per ha are **7**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------------|---------------------------|-----------------------|---------------------------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |
| 1 | <i>Borassus flabellisformis</i> | 0.0380 | 1 | <i>Borassus flabellisformis</i> | 54070 |
| 2 | <i>Madhuca Indica</i> | 0.0297 | 2 | <i>Bombax religiosum</i> | 26281 |
| 3 | <i>Bombax religiosum</i> | 0.0186 | 3 | <i>Borassus flabellifer</i> | 12710 |
| 4 | <i>Borassus flabellifer</i> | 0.0093 | 4 | <i>Azadirachta Indica</i> | 10771 |
| 5 | <i>Azadirachta Indica</i> | 0.0090 | 5 | <i>Madhuca Indica</i> | 4524 |

| | | | | | |
|----|-----------------------------|--------|----|-----------------------------|------|
| 6 | <i>Ficus benghalensis</i> | 0.0084 | 6 | <i>Acacia nilotica</i> | 3339 |
| 7 | <i>Tamarindus Indica</i> | 0.0070 | 7 | <i>Tamarindus Indica</i> | 3231 |
| 8 | <i>Sapindus emarginatus</i> | 0.0024 | 8 | <i>Mollugu disticha</i> | 2693 |
| 9 | <i>Mangifera indica</i> | 0.0015 | 9 | <i>Sapindus emarginatus</i> | 2262 |
| 10 | <i>Mollugu disticha</i> | 0.0015 | 10 | <i>Grewia tiliaefolia</i> | 1831 |

4.3.3. OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. National High Way:** NH 365 is passing through this district with a length of **24.3** km. However, it is observed that only **3.2** km length is covered with trees along the road, which comes only to 13.17% of the NH. Balance **21.1** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. State High Way:** The length of the state highway is **553.7** km, out of which only **49.8** km length is covered with the trees along the road, which comes to 8.99% of SH. Balance **503.9** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. Other Roads:** The length of these roads is **14476** km, out of which only **504** km length is with the trees, which comes to 3.48% of other road network. Balance **13972** km length could be taken up for planting if free found to be from encroachments and encumbrances, in a phased manner.

b. Railway Tracks having Potential for taking up plantations: The length of the railway track is estimated as **90** km; however, only **3.2** km length is covered trees, which comes to 3.56% of the length of the railway track. Balance **86.8** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

c. Canals: The length of the canals is estimated as **341.7** km; however, only **3.73** km length is covered trees, which comes to 1.09% of the length of the canals. There is good scope for taking up planting along the canals, if suitable.

d. Streams/ Rivers: The length of the streams/ rivers is estimated as **3951** km; however, only **59.4** km length is covered trees, which comes to 1.50% of the length of the canals. There is good scope for taking up planting, if suitable.

4.4 MAHABUBNGAR DISTRICT

4.4.1 Introduction:

The Mahabubnagar district is located in Southern west part of Telangana. The total geographical area of the district is **18432** km², out of this notified forest area is **3042.85** km². There are one territorial forest division and one wildlife management division in the district. The District has Amrabad Tiger Reserve with an area of **2166.37** km²

4.4.2 Assessment of resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **823.88** km², which comes to 4.47% of the geographical area and details as follows:

| | | | |
|-------------------|---|---------------|-----------------------|
| Natural Forests | - | 98.28 | km² |
| Plantations | - | 231.79 | km² |
| Rural Habitations | - | 9.31 | km² |
| Urban Habitations | - | 2.27 | km² |
| Scattered Trees | - | 482.23 | km² |

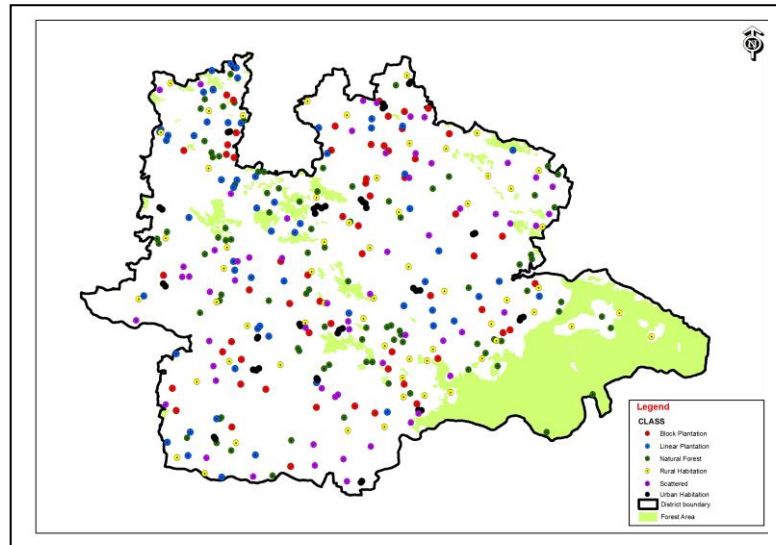
The natural forests, plantations and habitations constitute **11.93%**, **28.13%** and **59.94%** of the total ToF Area respectively.

The stratum wise points and extent of area shown below:

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 0 | 0 |
| | | | OF | 20 | 22.95 |
| | | | Scrub | 70 | 69.61 |
| | | Linear | 32 | 5.72 | |
| | | Total | | | 98.28 |
| 2 | Plantations | Block | | 60 | 228.05 |
| | | Linear | | 28 | 3.74 |
| | | Total | | | 231.79 |
| 3 | Habitations | Rural | | 60 | 9.31 |

| | | | | | |
|---|------------------------|--------------------|--|------------|---------------|
| | | Urban | | 46 | 2.27 |
| | | Total | | | 11.58 |
| 4 | Scattered Trees | | | 63 | 482.23 |
| | | Grand Total | | 379 | 823.88 |

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **2.2929 Mm³**. Breakup is as follows:

- Natural Forests - **0.5628Mm³**
- Plantations - **1.5026Mm³**
- Rural Habitations - **0.0277Mm³**
- Urban Habitations - **0.0033Mm³**
- Scattered Trees - **0.1965 Million**

Number of Stems is **2.4554 Million**. Breakup is as follows:

- Natural Forests - **0.7254 Million**
- Plantations - **1.5925Million**
- Rural Habitations - **0.0107Million**
- Urban Habitations - **0.0028 Million**
- Scattered Trees - **0.1240Million**

C. THE STRATUM WISE DETAILS ARE AS FOLLOWS:

i. Natural forests:

The total GS of this Stratum is estimated to be **0.4508** Mm³. Total number of stems estimated to be **1.6579** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| 1 | Block | MDF | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | | OF | 22.954 | 0.1206 | 52.535 | 0.1572 | 68 |
| 3 | | Scrub | 69.616 | 0.3242 | 46.576 | 0.4883 | 70 |
| 4 | Linear | | 5.720 | 0.1180 | 206.000 | 0.0799 | 139 |
| Total | | | 98.280 | 0.5628 | | 0.7254 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|--------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Azadirachta Indica</i> | 0.1130 | 1 | <i>Albizia amara</i> | 0.1973 |
| 2 | <i>Holoptelea integrifolia</i> | 0.0659 | 2 | <i>Chloroxylon swietenia</i> | 0.0639 |
| 3 | <i>Albizia amara</i> | 0.0567 | 3 | <i>Azadirachta Indica</i> | 0.0564 |
| 4 | <i>Acacia nilotica</i> | 0.0507 | 4 | <i>Holoptelea integrifolia</i> | 0.0536 |
| 5 | <i>Butea monosperma</i> | 0.0443 | 5 | <i>Wrightia tinctoria</i> | 0.0431 |
| 6 | <i>Phoenix sylvestris</i> | 0.0345 | 6 | <i>Phoenix sylvestris</i> | 0.0422 |
| 7 | <i>Tamarindus Indica</i> | 0.0297 | 7 | <i>Acacia nilotica</i> | 0.0338 |
| 8 | <i>Pongamia pinnata</i> | 0.0289 | 8 | <i>Pongamia pinnata</i> | 0.0196 |
| 9 | <i>Wrightia tinctoria</i> | 0.0205 | 9 | <i>Butea monosperma</i> | 0.0178 |
| 10 | <i>Dalbergia paniculata</i> | 0.0188 | 10 | <i>Leucaena leucocephala</i> | 0.0172 |

ii. Plantations

The total GS of this Stratum is estimated to be **1.5026** Mm³. Total number of stems estimated to be **1.5625** Million.

| Stratum | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|---------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
|---------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|

| | | | | | |
|--------------|--------|---------------|---------|---------------|-----|
| Block | 22.804 | 1.4006 | 61.415 | 1.5431 | 67 |
| Linear | 3.740 | 0.1020 | 272.863 | 0.0494 | 132 |
| Total | 26.544 | 1.5026 | | 1.5925 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|-------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 0.7693 | 1 | <i>Mangifera indica</i> | 1.0343 |
| 2 | <i>Tectona grandis</i> | 0.3158 | 2 | <i>Tectona grandis</i> | 0.2141 |
| 3 | <i>Azadirachta Indica</i> | 0.1067 | 3 | <i>Citrus Pseudolimon</i> | 0.1710 |
| 4 | <i>Citrus Pseudolimon</i> | 0.0965 | 4 | <i>Azadirachta Indica</i> | 0.0657 |
| 5 | <i>Butea monosperma</i> | 0.0772 | 5 | <i>Pongamia pinnata</i> | 0.0180 |
| 6 | <i>Ficus racemosa</i> | 0.0270 | 6 | <i>Butea monosperma</i> | 0.0122 |
| 7 | <i>Eucalyptus tereticomis</i> | 0.0262 | 7 | <i>Eucalyptus tereticomis</i> | 0.0114 |
| 8 | <i>Pongamia pinnata</i> | 0.0191 | 8 | <i>Cocos nucifera</i> | 0.0077 |
| 9 | <i>Peltophorum pterocarpum</i> | 0.0141 | 9 | <i>Acacia planifrons</i> | 0.0077 |
| 10 | <i>Tamarindus Indica</i> | 0.0103 | 10 | <i>Phoenix sylvestris</i> | 0.0077 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **27706.19** m³. Total number of stems estimated to be **10748**. The unit volume (per ha) is **29.760** m³ and stems per ha are 11.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|--------------------------|-----------------------|--------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 19092.73 | 1 | <i>Azadirachta Indica</i> | 4500 |
| 2 | <i>Pongamia pinnata</i> | 1392.72 | 2 | <i>Pongamia pinnata</i> | 1077 |
| 3 | <i>Cocos nucifera</i> | 1184.05 | 3 | <i>Cocos nucifera</i> | 962 |
| 4 | <i>Tamarindus Indica</i> | 954.96 | 4 | <i>Acacia nilotica</i> | 635 |
| 5 | <i>Holoptelea integrifolia</i> | 716.37 | 5 | <i>Leucaena leucocephala</i> | 596 |
| 6 | <i>Eucalyptus tereticomis</i> | 530.17 | 6 | <i>Holoptelea integrifolia</i> | 346 |
| 7 | <i>Leucaena</i> | 451.76 | 7 | <i>Grewia rothi</i> | 346 |

| | | | | | | |
|----|-------------------------|--------|--|----|---------------------------|-----|
| | <i>leucocephala</i> | | | 8 | <i>Prosopis juliflora</i> | 288 |
| 8 | <i>Saraca asoka</i> | 417.03 | | 9 | <i>Tamarindus Indica</i> | 269 |
| 9 | <i>Mangifera indica</i> | 403.33 | | 10 | <i>Saraca asoka</i> | 269 |
| 10 | <i>Acacia nilotica</i> | 381.43 | | | | |

iv. Urban Habitations:

The total GS of this Stratum is estimated to be **3264.533** m³. Total number of stems estimated to be **4320**. The unit volume (per ha) is **14.981** m³ and stems per ha are **14**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|--------------------------|-----------------------|--------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 1139.13 | 1 | <i>Azadirachta Indica</i> | 703 |
| 2 | <i>Pongamia pinnata</i> | 344.95 | 2 | <i>Cocos nucifera</i> | 415 |
| 3 | <i>Cocos nucifera</i> | 301.18 | 3 | <i>Pongamia pinnata</i> | 326 |
| 4 | <i>Tectona grandis</i> | 284.27 | 4 | <i>Tectona grandis</i> | 253 |
| 5 | <i>Ficus religiosa</i> | 190.50 | 5 | <i>Prunus dulcis</i> | 154 |
| 6 | <i>Prunus dulcis</i> | 78.50 | 6 | <i>Syzygium cumini</i> | 115 |
| 7 | <i>Holoptelea integrifolia</i> | 74.07 | 7 | <i>Mangifera indica</i> | 77 |
| 8 | <i>Dalbergia sissoo</i> | 73.34 | 8 | <i>Holoptelea integrifolia</i> | 58 |
| 9 | <i>Madhuca Indica</i> | 72.25 | 9 | <i>Leucaena leucocephala</i> | 58 |
| 10 | <i>Peltophorum pterocarpum</i> | 68.88 | 10 | <i>Acacia nilotica</i> | 58 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.1965** Mm³. Total number of stems estimated to be **0.1240 Million**. The unit volume (per ha) is **4.075** m³ and stems per ha are **2.57**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|---------------------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 0.0682 | 1 | <i>Azadirachta Indica</i> | 30006 |
| 2 | <i>Peltophorum pterocarpum</i> | 0.0214 | 2 | <i>Acacia nilotica</i> | 11520 |
| 3 | <i>Phoenix sylvestris</i> | 0.0153 | 3 | <i>Mangifera indica</i> | 9109 |

| | | | | | |
|----|--------------------------------|--------|----|--------------------------------|------|
| 4 | <i>Acacia nilotica</i> | 0.0150 | 4 | <i>Phoenix sylvestris</i> | 8305 |
| 5 | <i>Melia azedarach</i> | 0.0111 | 5 | <i>Albizia amara</i> | 6698 |
| 6 | <i>Butea monosperma</i> | 0.0076 | 6 | <i>Butea monosperma</i> | 6162 |
| 7 | <i>Wrightia tinctoria</i> | 0.0068 | 7 | <i>Borassus flabellifer</i> | 4822 |
| 8 | <i>Tamarindus Indica</i> | 0.0059 | 8 | <i>Prosopis spicigera</i> | 4287 |
| 9 | <i>Holoptelea integrifolia</i> | 0.0050 | 9 | <i>Holoptelea integrifolia</i> | 3751 |
| 10 | <i>Tectona grandis</i> | 0.0050 | 10 | <i>Wrightia tinctoria</i> | 3215 |

4.4.3. OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. **National High Way:** NH 44 is passing through this district with a length of **162** km. However, it is observed that only **1.9** km length is covered with trees along the road, which comes only to 1.17% of the NH. Balance **160.1** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. **State High Way:** The length of the state highway is **714.7** km, out of which only **33.3** km length is covered with the trees along the road, which comes to 4.66% of SH. Balance **681.4** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. **Other Roads:** The length of these roads is **27582** km, out of which only **1314** km length is with the trees, which comes to 4.76% of other road network. Balance **26268** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

b. **Railway Tracks having Potential for taking up plantations:** The length of the railway track is estimated as **207** km; however, only **1.6** km length is covered trees, which comes to 0.77% of the length of the railway track. Balance **205.4** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

c. **Canals:** The length of the canals is estimated as **114.6** km; however, only **0.1** km length is covered trees, which comes to 0.09% of the length of the canals. There is good scope for taking up planting along the canals, if suitable.

d. **Streams/ Rivers:** The length of the streams/ rivers is estimated as **1454.9** km; however, only **10.5** km length is covered trees, which comes to 0.75% of the length of the canals. There is good scope for taking up planting, if suitable.

4.5 MEDAK DISTRICT

4.5.1 Introduction:

The Medak district is located in Central west part of Telangana. The total geographical area of the district is **9710.56** km², out of this notified forest area is **963.12** km². There are one territorial forest division and one wildlife management division in the district.

4.5.2 Assessment of resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **817.53** km², which comes to 8.42% of the geographical area and details as follows:

| | | | |
|--------------------------------|---|---------------|-----------------------|
| Natural Forests | - | 500.06 | km² |
| Plantations (Block and Linear) | - | 49.39 | km² |
| Rural Habitations | - | 6.28 | km² |
| Urban Habitations | - | 2.13 | km² |
| Scattered Trees | - | 259.67 | km² |

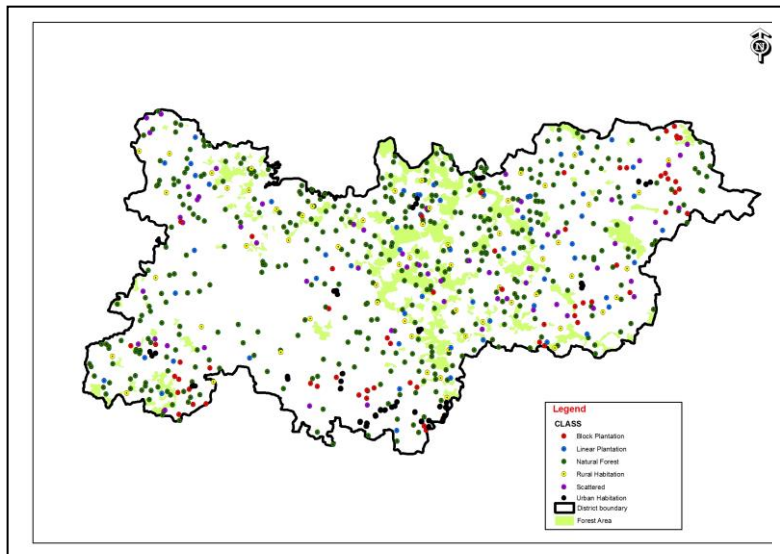
The natural forests, plantations and habitations constitute **61.17%**, **6.04%** and **32.79%** of the total ToF Area respectively.

The stratum wise points and extent of area shown below:

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 0 | 3.55 |
| | | | OF | 67 | 71.94 |
| | | | Scrub | 388 | 381.11 |
| | | Linear | | 45 | 43.46 |
| | | Total | | | |
| 2 | Plantations | Block | | 60 | 44.69 |
| | | Linear | | 15 | 4.7 |
| | | Total | | | |
| 3 | Habitations | Rural | | 60 | 6.28 |

| | | | | | |
|---|------------------------|--------------------|--|------------|---------------|
| | | Urban | | 49 | 2.13 |
| | | Total | | | 8.41 |
| 4 | Scattered Trees | | | 60 | 259.67 |
| | | Grand Total | | 744 | 817.53 |

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **2.0324 Mm³**. Breakup is as follows:

- Natural Forests - **1.4782 Mm³**
- Plantations - **0.4931 Mm³**
- Rural Habitations - **0.0017 Mm³**
- Urban Habitations - **0.0009 Mm³**
- Scattered Trees - **0.0585 Mm³**

Number of Stems is estimated to be **3.6781 Million**. Breakup is as follows:

- Natural Forests - **2.9822 Million**
- Plantations - **0.5974 Million**
- Rural Habitations - **0.0021 Million**
- Urban Habitations - **0.0009 Million**
- Scattered Trees - **0.0955 Million**

c. The stratum wise details are as follows:

i. Natural forests:

The total GS of this Stratum is estimated to be **1.478** Mm³. Total number of stems estimated to be **2.982** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| 1 | Block | MDF | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| 2 | | OF | 75.499 | 0.561 | 74.346 | 1.347 | 178 |
| 3 | | Scrub | 381.105 | 0.679 | 17.820 | 1.332 | 35 |
| 4 | Linear | | 43.464 | 0.238 | 54.762 | 0.303 | 70 |
| Total | | | 500.068 | 1.478 | | 2.982 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|---------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Butea monosperma</i> | 0.2701 | 1 | <i>Azadirachta Indica</i> | 0.5799 |
| 2 | <i>Azadirachta Indica</i> | 0.2390 | 2 | <i>Butea monosperma</i> | 0.2721 |
| 3 | <i>Tamarindus Indica</i> | 0.1319 | 3 | <i>Tectona grandis</i> | 0.2595 |
| 4 | <i>Madhuca Indica</i> | 0.0997 | 4 | <i>Mangifera indica</i> | 0.2523 |
| 5 | <i>Mangifera indica</i> | 0.0803 | 5 | <i>Others(Unknown)</i> | 0.1124 |
| 6 | <i>Tectona grandis</i> | 0.0697 | 6 | <i>Albizia amara</i> | 0.1080 |
| 7 | <i>Borassus flabelliformis</i> | 0.0689 | 7 | <i>Phoenix sylvestris</i> | 0.0928 |
| 8 | <i>Eucalyptus tereticomis</i> | 0.0510 | 8 | <i>Pongamia pinnata</i> | 0.0917 |
| 9 | <i>Phoenix Loureirri</i> | 0.0429 | 9 | <i>Acacia nilotica</i> | 0.0839 |
| 10 | <i>Ficus benghalensis</i> | 0.0385 | 10 | <i>Tamarindus indica</i> | 0.0822 |

ii. Plantations:

The total GS of this Stratum is estimated to be **0.493** Mm³. Total number of stems estimated to be **0.597** Million.

| Stratum | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|---------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| Block | 443692 | 0.467 | 104.490 | 0.576 | 128 |

| | | | | | |
|--------------|---------|--------------|--------|--------------|-----|
| Linear | 4.704 | 0.026 | 55.392 | 0.021 | 108 |
| Total | 448.396 | 0.493 | | 0.597 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|--------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Syzygium jambos</i> | 0.1766 | 1 | <i>Mangifera indica</i> | 0.3993 |
| 2 | <i>Mangifera indica</i> | 0.1423 | 2 | <i>Peltophorum pterocarpum</i> | 0.0390 |
| 3 | <i>Peltophorum pterocarpum</i> | 0.0422 | 3 | <i>Tectona grandis</i> | 0.0380 |
| 4 | <i>Tectona grandis</i> | 0.0256 | 4 | <i>Azadirachta Indica</i> | 0.0256 |
| 5 | <i>Ficus benghalensis</i> | 0.0215 | 5 | <i>Grewia rothi</i> | 0.0149 |
| 6 | <i>Cocos nucifera</i> | 0.0203 | 6 | <i>Cocos nucifera</i> | 0.0119 |
| 7 | <i>Ficus religiosa</i> | 0.0191 | 7 | <i>Cassia siamea</i> | 0.0119 |
| 8 | <i>Cassia siamea</i> | 0.0168 | 8 | <i>Syzygium jambos</i> | 0.0112 |
| 9 | <i>Azadirachta Indica</i> | 0.0143 | 9 | <i>Ficus religiosa</i> | 0.0104 |
| 10 | <i>Dalbergia sissoo</i> | 0.0035 | 10 | <i>Dalbergia sissoo</i> | 0.0065 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **1691.86** m³. Total number of stems estimated to be **2090.66**. The unit volume (per ha) is **2.694** m³ and stems per ha are 3.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|--------------------------|-----------------------|--------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 19092.73 | 1 | <i>Azadirachta Indica</i> | 4500 |
| 2 | <i>Pongamia pinnata</i> | 1392.72 | 2 | <i>Pongamia pinnata</i> | 1077 |
| 3 | <i>Cocos nucifera</i> | 1184.05 | 3 | <i>Cocos nucifera</i> | 962 |
| 4 | <i>Tamarindus Indica</i> | 954.96 | 4 | <i>Acacia nilotica</i> | 635 |
| 5 | <i>Holoptelea integrifolia</i> | 716.37 | 5 | <i>Leucaena leucocephala</i> | 596 |
| 6 | <i>Eucalyptus tereticomis</i> | 530.17 | 6 | <i>Holoptelea integrifolia</i> | 346 |
| 7 | <i>Leucaena leucocephala</i> | 451.76 | 7 | <i>Grewia rothi</i> | 346 |
| 8 | <i>Saraca asoka</i> | 417.03 | 8 | <i>Prosopis juliflora</i> | 288 |
| 9 | <i>Mangifera indica</i> | 403.33 | 9 | <i>Tamarindus Indica</i> | 269 |
| | | | 10 | <i>Saraca asoka</i> | 269 |

| | | | |
|----|------------------------|--------|--|
| 10 | <i>Acacia nilotica</i> | 381.43 | |
|----|------------------------|--------|--|

iv. Urban Habitations:

The total GS of this Stratum is estimated to be **920.878** m³. Total number of stems estimated to be **947**. The unit volume (per ha) is **4.342** m³ and stems per ha are **4**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|--------------------------|-----------------------|---------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 1139.13 | 1 | <i>Azadirachta Indica</i> | 703 |
| 2 | <i>Pongamia pinnata</i> | 344.95 | 2 | <i>Cocos nucifera</i> | 415 |
| 3 | <i>Cocos nucifera</i> | 301.18 | 3 | <i>Pongamia pinnata</i> | 326 |
| 4 | <i>Tectona grandis</i> | 284.27 | 4 | <i>Tectona grandis</i> | 253 |
| 5 | <i>Ficus religiosa</i> | 190.50 | 5 | <i>Prunus dulcis</i> | 154 |
| 6 | <i>Prunus dulcis</i> | 78.50 | 6 | <i>Syzygium cumini</i> | 115 |
| 7 | <i>Holoptelea integrifolia</i> | 74.07 | 7 | <i>Mangifera indica</i> | 77 |
| 8 | <i>Dalbergia sissoo</i> | 73.34 | 8 | <i>Azadirachta Indica</i> | 703 |
| 9 | <i>Madhuca Indica</i> | 72.25 | 9 | <i>Cocos nucifera</i> | 415 |
| 10 | <i>Peltophorum pterocarpum</i> | 68.88 | 10 | <i>Pongamia pinnata</i> | 326 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.0585** Mm³. Total number of stems estimated to be **0.0955** Million. The unit volume (per ha) is **2.254** m³ and stems per ha are **4**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|---------------------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |
| 1 | <i>Madhuca indica</i> | 0.0969 | 1 | <i>Azadirachta Indica</i> | 33613 |
| 2 | <i>Azadirachta indica</i> | 0.0293 | 2 | <i>Butea monosperma</i> | 18177 |
| 3 | <i>Borassus flabelliformis</i> | 0.0244 | 3 | <i>Acacia nilotica</i> | 7502 |
| 4 | <i>Butea monospema</i> | 0.0184 | 4 | <i>Tamarindus Indica</i> | 5482 |
| 5 | <i>Tectona grandis</i> | 0.0099 | 5 | <i>Mangifera indica</i> | 4905 |

| | | | | | |
|----|-------------------------|--------|----|---------------------------------|------|
| 6 | <i>Delonix regia</i> | 0.0085 | 6 | <i>Pongamia pinnata</i> | 3318 |
| 7 | <i>Mangifera indica</i> | 0.0073 | 7 | <i>Ficus benghalensis</i> | 2164 |
| 8 | <i>Ficus racemosa</i> | 0.0057 | 8 | <i>Ficus religiosa</i> | 1731 |
| 9 | <i>Ficus religiosa</i> | 0.0052 | 9 | <i>Lagerstroemia parviflora</i> | 1443 |
| 10 | <i>Ficus mollis</i> | 0.0045 | 10 | <i>Madhuca indica</i> | 1298 |

4.5.3. OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. National High Way:** NH 44 and 65 are passing through this district with a length of **178.3** km. However, it is observed that only **28.6** km length is covered with trees along the road, which comes only to 16.04% of the NH. Balance **149.1** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. State High Way:** The length of the state highway is **354.5** km, out of which only **120.7** km length is covered with the trees along the road, which comes to 34.05% of SH. Balance **233.8** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. Other Roads:** The length of these roads is **16089** km, out of which only **1872** km length is with the trees, which comes to 11.64% of other road network. Balance **14217** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

b. Railway Tracks having Potential for taking up plantations: The length of the railway track is estimated as **118.5** km; however, only **13.4** km length is covered trees, which comes to 11.31% of the length of the railway track. Balance **105.1** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

c. Canals: The length of the canals is estimated as **52.2** km; however, only **1.6** km length is covered trees, which comes to 3.07% of the length of the canals. There is good scope for taking up planting along the canals, if suitable.

d. Streams/ Rivers: The length of the streams/ rivers is estimated as **203.9** km; however, only **1.7** km length is covered trees, which

comes to 0.83% of the length of the canals. There is good scope for taking up planting, if suitable.

4.6 NALGONDA DISTRICT

4.6.1 Introduction:

The Nalgonda district is located in southern east part of Telangana. The total geographical area of the district is **7718.52** km², out of this notified forest area is **758.87** km². There are one territorial forest division and one wildlife management division (Nagarjunasagar WLM division, part of Amrabad Tiger Reserve with an area of **386.64** km²) in the district.

4.6.2 Assessment of resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **1067.98** km², which comes to 13.84% of the geographical area and details as follows:

| | | |
|--------------------------------|---|------------------------------|
| Natural Forests | - | 98.34 km² |
| Plantations (Block and Linear) | - | 554.55 km² |
| Rural Habitations | - | 9.92 km² |
| Urban Habitations | - | 2.57 km² |
| Scattered Trees | - | 402.6 km² |

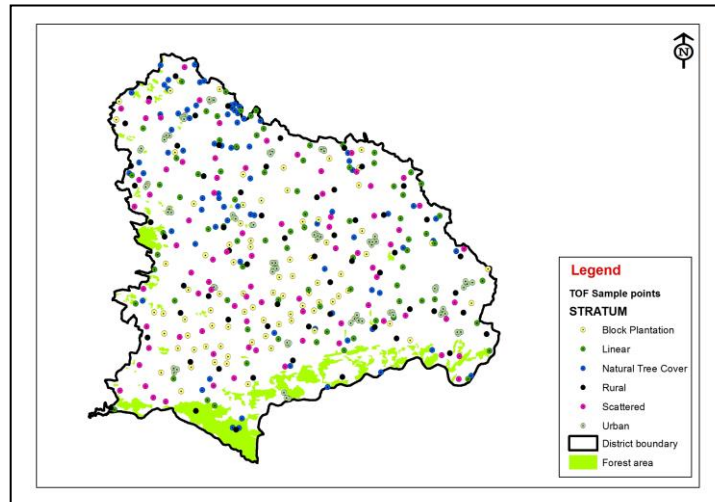
The natural forests, plantations and habitations constitute **9.21%**, **51.93%** and **38.87%** of the total ToF Area respectively.

The stratum wise points and extent of area shown below:

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 0 | 0.046 |
| | | | OF | 15 | 16.17 |
| | | | Scrub | 65 | 72.37 |
| | | Linear | 14 | 9.75 | |
| | | Total | | | 98.34 |
| 2 | Plantations | Block | | 80 | 545.41 |
| | | Linear | | 66 | 9.14 |
| | | Total | | | 554.55 |
| 3 | Habitations | Rural | | 60 | 9.92 |

| | | | | | |
|---|------------------------|--------------------|--|------------|----------------|
| | | Urban | | 80 | 2.57 |
| | | Total | | | 12.49 |
| 4 | Scattered Trees | | | 80 | 402.6 |
| | | Grand Total | | 460 | 1067.98 |

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **2.0487 Mm³**. Breakup is as follows:

- Natural Forests - **0.3720 Mm³**
- Plantations - **1.5765Mm³**
- Rural Habitations - **0.0081 Mm³**
- Urban Habitations - **0.0024 Mm³**
- Scattered Trees - **0.0897 Mm³**

Number of Stems is **5.5882 Million**. Breakup is as follows:

- Natural Forests - **1.1730 Million**
- Plantations - **4.2209 Million**
- Rural Habitations - **0.0114 Million**
- Urban Habitations - **0.0037 Million**
- Scattered Trees - **0.0792 Million**

c. The stratum wise details are as follows:

- i. Natural forests:

The total GS of this Stratum is estimated to be **0.372** Mm³. Total number of stems is estimated to be **1.173** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| 1 | Block | MDF | 0.004 | 0.000 | 0.00 | 0.000 | 0 |
| 2 | | OF | 16.174 | 0.094 | 58.060 | 0.210 | 130 |
| 3 | | Scrub | 72.367 | 0.219 | 30.231 | 0.794 | 109 |
| 4 | Linear | | 9.746 | 0.059 | 60.783 | 0.169 | 173 |
| Total | | | 98.291 | 0.372 | | 1.173 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------|---------------------------|-----------------------|----------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Azadirachta Indica</i> | 0.1321 | 1 | <i>Azadirachta Indica</i> | 0.1921 |
| 2 | <i>Bombax religiosum</i> | 0.0461 | 2 | <i>Prosopis juliflora</i> | 0.1703 |
| 3 | <i>Prosopis juliflora</i> | 0.0380 | 3 | <i>Acacia nilotica</i> | 0.1539 |
| 4 | <i>Acacia nilotica</i> | 0.0345 | 4 | <i>Bombax religiosum</i> | 0.1177 |
| 5 | <i>Phoenix sylvestris</i> | 0.0164 | 5 | <i>Albizia amara</i> | 0.1131 |
| 6 | <i>Butea monosperma</i> | 0.0139 | 6 | <i>Grewia rotundifolia</i> | 0.0534 |
| 7 | <i>Mundulea suberosa</i> | 0.0099 | 7 | <i>Phoenix sylvestris</i> | 0.0489 |
| 8 | <i>Tamarindus Indica</i> | 0.0096 | 8 | <i>Butea monosperma</i> | 0.0392 |
| 9 | <i>Ficus benghalensis</i> | 0.0094 | 9 | <i>Mundulea suberosa</i> | 0.0334 |
| 10 | <i>Albizia lebbek</i> | 0.0076 | 10 | <i>Albizia procera</i> | 0.0329 |

ii. Plantations

The total GS of this Stratum is estimated to be **1.576**Mm³. Total number of stems estimated to be **4.220** Million.

| Stratum | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| Block | 545.411 | 1.477 | 27.086 | 4.117 | 75 |
| Linear | 9.143 | 0.099 | 108.560 | 0.103 | 112 |
| Total | 554.554 | 1.576 | | 4.220 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|----------------------------|---------------------------|-----------------------|----------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Azadirachta Indica</i> | 0.7771 | 1 | <i>Azadirachta Indica</i> | 0.7739 |
| 2 | <i>Bombax religiosum</i> | 0.2703 | 2 | <i>Bombax religiosum</i> | 0.7226 |
| 3 | <i>Citrus limon</i> | 0.1657 | 3 | <i>Citrus Pseudolimon</i> | 0.6340 |
| 4 | <i>Mangifera indica</i> | 0.0995 | 4 | <i>Citrus limon</i> | 0.5659 |
| 5 | <i>Acacia nilotica</i> | 0.0509 | 5 | <i>Mangifera indica</i> | 0.4024 |
| 6 | <i>Citrus Pseudolimon</i> | 0.0492 | 6 | <i>Tectona grandis</i> | 0.3692 |
| 7 | <i>Tectona grandis</i> | 0.0398 | 7 | <i>Acacia nilotica</i> | 0.2247 |
| 8 | <i>Cocos nucifera</i> | 0.0242 | 8 | <i>Cocos nucifera</i> | 0.0886 |
| 9 | <i>Zizyphus mauritiana</i> | 0.0163 | 9 | <i>Prosopis juliflora</i> | 0.0836 |
| 10 | <i>Helecteres isora</i> | 0.0130 | 10 | <i>Zizyphus mauritiana</i> | 0.0682 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **8111.39** m³. Total number of stems estimated to be **2090.66**. The unit volume (per ha) is **11** m³ and stems per ha are **11**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------|--------------------------|-----------------------|------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 4473.13 | 1 | <i>Azadirachta Indica</i> | 4405 |
| 2 | <i>Cocos nucifera</i> | 1212.90 | 2 | <i>Cocos nucifera</i> | 1776 |
| 3 | <i>Tamarindus Indica</i> | 411.84 | 3 | <i>Prosopis juliflora</i> | 697 |
| 4 | <i>Syzygium cumini</i> | 167.00 | 4 | <i>Leucaena leucocephala</i> | 669 |
| 5 | <i>Albizia lebbeck</i> | 147.74 | 5 | <i>Tamarindus Indica</i> | 608 |
| 6 | <i>Pongamia pinnata</i> | 124.57 | 6 | <i>Grewia rothi</i> | 355 |
| 7 | <i>Acacia nilotica</i> | 112.12 | 7 | <i>Pongamia pinnata</i> | 294 |
| 8 | <i>Acacia leucophloea</i> | 106.48 | 8 | <i>Tectona grandis</i> | 294 |
| 9 | <i>Ficus mollis</i> | 104.30 | 9 | <i>Acacia nilotica</i> | 253 |
| 10 | <i>Prosopis juliflora</i> | 98.19 | 10 | <i>Bombax religiosum</i> | 171 |

iv. Urban Habitations:

The total GS of this Stratum is estimated to be **2368.317 m³**. Total number of stems estimated to be **3685**. The unit volume (per ha) **9.215 m³** and stems per ha are **14**

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------|--------------------------|-----------------------|---------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 1161.64 | 1 | <i>Azadirachta Indica</i> | 1311 |
| 2 | <i>Cocos nucifera</i> | 195.63 | 2 | <i>Cocos nucifera</i> | 509 |
| 3 | <i>Pongamia pinnata</i> | 151.34 | 3 | <i>Pongamia pinnata</i> | 294 |
| 4 | <i>Mangifera indica</i> | 112.24 | 4 | <i>Tectona grandis</i> | 215 |
| 5 | <i>Delonix regia</i> | 102.77 | 5 | <i>Grewia rothi</i> | 142 |
| 6 | <i>Azadirachta Indica</i> | 1161.64 | 6 | <i>Azadirachta Indica</i> | 1311 |
| 7 | <i>Cocos nucifera</i> | 195.63 | 7 | <i>Cocos nucifera</i> | 509 |
| 8 | <i>Pongamia pinnata</i> | 151.34 | 8 | <i>Pongamia pinnata</i> | 294 |
| 9 | <i>Mangifera indica</i> | 112.24 | 9 | <i>Tectona grandis</i> | 215 |
| 10 | <i>Delonix regia</i> | 102.77 | 10 | <i>Grewia rothi</i> | 142 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.016 Mm³**. Total number of stems estimated to be **0.011 Million**. The unit volume (per ha) is **8.918 m³** and stems per ha are **6**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------|---------------------------|-----------------------|------------------------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 0.0211 | 1 | <i>Azadirachta Indica</i> | 1311 |
| 2 | <i>Bombax religiosum</i> | 0.0384 | 2 | <i>Cocos nucifera</i> | 509 |
| 3 | <i>Acacia nilotica</i> | 0.0042 | 3 | <i>Pongamia pinnata</i> | 294 |
| 4 | <i>Mangifera indica</i> | 0.0078 | 4 | <i>Tectona grandis</i> | 215 |
| 5 | <i>Citrus limon</i> | 0.0008 | 5 | <i>Grewia rothi</i> | 142 |
| 6 | <i>Tamarindus Indica</i> | 0.0031 | 6 | <i>Mangifera indica</i> | 124 |
| 7 | <i>Acacia chundra</i> | 0.0045 | 7 | <i>Tamarindus Indica</i> | 105 |
| 8 | <i>Albizia lebbeck</i> | 0.0007 | 8 | <i>Acacia nilotica</i> | 104 |
| 9 | <i>Ficus mollis</i> | 0.0019 | 9 | <i>Saraca asoka</i> | 92 |
| 10 | <i>Tectona grandis</i> | 0.0001 | 10 | <i>Leucaena leucocephala</i> | 75 |

4.6.3 OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. National High Way:** NH 65 are passing through this district with a length of **201** km. However, it is observed that only **23.9** km length is covered with trees along the road, which comes only to 11.89% of the NH. Balance **177.1** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. State High Way:** The length of the state highway is **508.5** km, out of which only **52.9** km length is covered with the trees along the road, which comes to 10.40% of SH. Balance **455.6** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. Other Roads:** The length of these roads is **24422** km, out of which only **1026** km length is with the trees, which comes to 4.20% of other road network. Balance **23396** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

b. Railway Tracks having Potential for taking up plantations: The length of the railway track is estimated as **228.9** km; however, only **2.6** km length is covered trees, which comes to 1.14% of the length of the railway track. Balance **226.3** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

c. Canals: The length of the canals is estimated as **149** km; however, only **4.2** km length is covered trees, which comes to 2.82% of the length of the canals. There is good scope for taking up planting along the canals, if suitable.

d. Streams/ Rivers: The length of the streams/ rivers is estimated as **1459.9** km; however, only **10.5** km length is covered trees, which comes to 0.72% of the length of the canals. There is good scope for taking up planting, if suitable.

4.7 NIZAMABAD DISTRICT

4.7.1 Introduction:

The Nizamabad district is located in Northern west part of Telangana. The total geographical area of the district is **7968.35** km², out of this notified forest area is **1768.42** km². There are two (2) forest divisions in the district.

4.7.2 Assessment of resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **388.08** km², which comes to 4.87% of the geographical area and details as follows:

| | | |
|--------------------------------|---|-------------------------------|
| Natural Forests | - | 176.79 km ² |
| Plantations (Block and Linear) | - | 14.82 km ² |
| Rural Habitations | - | 5.61 km ² |
| Urban Habitations | - | 2.04 km ² |
| Scattered Trees | - | 188.82 km ² |

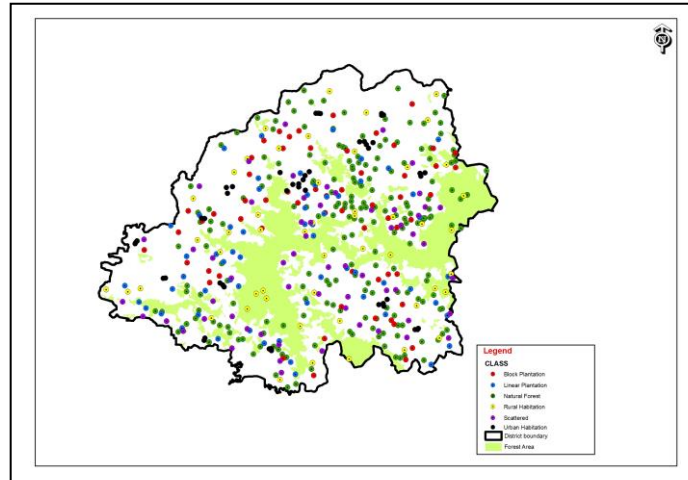
The natural forests, plantations and habitations constitute **45.55%**, **3.82%** and **50.63%** of the total ToF Area respectively.

The stratum wise points and extent of area shown below:

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 15 | 14.256 |
| | | | OF | 65 | 47.66 |
| | | | Scrub | 120 | 105.87 |
| | | Linear | 24 | 9.00 | |
| | | Total | | | 176.79 |
| 2 | Plantations | Block | | 60 | 8.59 |
| | | Linear | | 36 | 6.23 |
| | | Total | | | 14.82 |
| 3 | Habitations | Rural | | 50 | 5.61 |

| | | | | | |
|---|------------------------|--------------------|--|------------|---------------|
| | | Urban | | 48 | 2.04 |
| | | Total | | | 7.65 |
| 4 | Scattered Trees | | | 60 | 188.82 |
| | | Grand Total | | 478 | 388.08 |

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **1.7254 Mm³**. Breakup is as follows:

- Natural Forests - **1.4008 Mm³**
- Plantations - **0.2950 Mm³**
- Rural Habitations - **0.0119 Mm³**
- Urban Habitations - **0.0009 Mm³**
- Scattered Trees - **0.0168 Mm³**

Number of Stems is estimated to be **2.7461 Million**. Breakup is as follows:

- Natural Forests - **2.4975 Million**
- Plantations - **0.2259 Million**
- Rural Habitations - **0.0107 Million**
- Urban Habitations - **0.0007 Million**
- Scattered Trees - **0.0113 Million**

C. THE STRATUM WISE DETAILS ARE AS FOLLOWS:

i. Natural forests:

The total GS of this Stratum is estimated to be **1.4008** Mm³. Total number of stems estimated to be **2.4975** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|------------------|
| 1 | Block | MDF | 14.250 | 0.149 | 105.087 | 0.225 | 158 |
| 2 | | OF | 47.661 | 0.286 | 60.046 | 0.777 | 163 |
| 3 | | Scrub | 105.868 | 0.913 | 86.290 | 1.442 | 136 |
| 4 | Linear | | 9.002 | 0.059 | 60.783 | 0.053 | 59 |
| Total | | | 176.781 | 1.407 | | 2.497 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|---------------------------------|---------------------------|-----------------------|-----------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Azadirachta Indica</i> | 0.2494 | 1 | <i>Tectona grandis</i> | 0.4002 |
| 2 | <i>Butea monosperma</i> | 0.2209 | 2 | <i>Butea monosperma</i> | 0.2969 |
| 3 | <i>Mangifera indica</i> | 0.1449 | 3 | <i>Azadirachta Indica</i> | 0.2741 |
| 4 | <i>Lagerstroemia parviflora</i> | 0.0961 | 4 | <i>Lagerstroemia parviflora</i> | 0.2549 |
| 5 | <i>Phoenix sylvestris</i> | 0.0929 | 5 | <i>Mangifera indica</i> | 0.1921 |
| 6 | <i>Tectona grandis</i> | 0.0901 | 6 | <i>Acacia nilotica</i> | 0.1512 |
| 7 | <i>Madhuca Indica</i> | 0.0649 | 7 | <i>Holarrhena antidysenterica</i> | 0.0808 |
| 8 | <i>Semecarpus anacardium</i> | 0.0593 | 8 | <i>Chloroxylon swietenia</i> | 0.0801 |
| 9 | <i>Acacia nilotica</i> | 0.0314 | 9 | <i>Diospyros melanoxylon</i> | 0.0634 |
| 10 | <i>Pongamia pinnata</i> | 0.0229 | 10 | <i>Cassia fistula</i> | 0.0582 |

ii. Plantations

The total GS of this Stratum is estimated to be **0.295** Mm³. Total number of stems estimated to be **0.226** Million.

| Stratum | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| Block | 8.590 | 0.176 | 204.485 | 0.166 | 193 |
| Linear | 6.236 | 0.119 | 191.327 | 0.060 | 96 |
| Total | 14.826 | 0.295 | | 0.226 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-----------------------------|---------------------------|-----------------------|-------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 0.1967 | 1 | <i>Mangifera indica</i> | 0.1385 |
| 2 | <i>Azadirachta Indica</i> | 0.0330 | 2 | <i>Azadirachta Indica</i> | 0.0262 |
| 3 | <i>Madhuca Indica</i> | 0.0113 | 3 | <i>Tectona grandis</i> | 0.0173 |
| 4 | <i>Tectona grandis</i> | 0.0093 | 4 | <i>Acacia nilotica</i> | 0.0071 |
| 5 | <i>Samanea saman</i> | 0.0076 | 5 | <i>Butea monosperma</i> | 0.0056 |
| 6 | <i>Butea monosperma</i> | 0.0072 | 6 | <i>Madhuca Indica</i> | 0.0053 |
| 7 | <i>Tamarindus Indica</i> | 0.0057 | 7 | <i>Tamarindus Indica</i> | 0.0024 |
| 8 | <i>Acacia nilotica</i> | 0.0038 | 8 | <i>Pongamia pinnata</i> | 0.0018 |
| 9 | <i>Syzygium jambos</i> | 0.0028 | 9 | <i>Dendrocalamus strictus</i> | 0.0017 |
| 10 | <i>Borassus flabellifer</i> | 0.0020 | 10 | <i>Samanea saman</i> | 0.0017 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **11586.12** m³. Total number of stems estimated to be **10669**. The unit volume (per ha) is **21.134** m³ and stems per ha are **19**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-------------------------------|--------------------------|-----------------------|-------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta Indica</i> | 4411.14 | 1 | <i>Azadirachta Indica</i> | 3478 |
| 2 | <i>Mangifera indica</i> | 1350.50 | 2 | <i>Tamarindus Indica</i> | 951 |
| 3 | <i>Eucalyptus tereticomis</i> | 1158.88 | 3 | <i>Mangifera indica</i> | 888 |
| 4 | <i>Tamarindus Indica</i> | 860.43 | 4 | <i>Eucalyptus tereticomis</i> | 705 |

| | | | | | |
|----|------------------------------|--------|----|------------------------------|-----|
| 5 | <i>Tectona grandis</i> | 723.37 | 5 | <i>Tectona grandis</i> | 676 |
| 6 | <i>Lannea coromandelica</i> | 347.26 | 6 | <i>Grewia rothi</i> | 487 |
| 7 | <i>Madhuca Indica</i> | 242.33 | 7 | <i>Cocos nucifera</i> | 344 |
| 8 | <i>Leucaena leucocephala</i> | 234.57 | 8 | <i>Pongamia pinnata</i> | 344 |
| 9 | <i>Cocos nucifera</i> | 206.48 | 9 | <i>Leucaena leucocephala</i> | 287 |
| 10 | <i>Grewia rothi</i> | 190.26 | 10 | <i>Dalbergia sissoo</i> | 218 |

iv. Urban Habitations

The total GS of this Stratum is estimated to be **887.97** m³. Total number of stems is estimated to be **736**. The unit volume (per ha) **4.353** m³ and stems per ha are **4**

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-------------------------------|--------------------------|-----------------------|-------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta indica</i> | 252.00 | 1 | <i>Azadirachta indica</i> | 252 |
| 2 | <i>Albizia lebbeck</i> | 25.20 | 2 | <i>Pongamia pinnata</i> | 58 |
| 3 | <i>Grewia rothi</i> | 40.32 | 3 | <i>Acacia nilotica</i> | 53 |
| 4 | <i>Pongamia pinnata</i> | 57.96 | 4 | <i>Mangifera indica</i> | 43 |
| 5 | <i>Syzygium jambos</i> | 22.68 | 5 | <i>Grewia rothi</i> | 40 |
| 6 | <i>Eucalyptus tereticomis</i> | 25.20 | 6 | <i>Leucaena leucocephala</i> | 35 |
| 7 | <i>Mangifera indica</i> | 42.84 | 7 | <i>Albizia lebbeck</i> | 25 |
| 8 | <i>Ficus religiosa</i> | 12.60 | 8 | <i>Eucalyptus tereticomis</i> | 25 |
| 9 | <i>Leucaena leucocephala</i> | 35.28 | 9 | <i>Dalbergia sissoo</i> | 25 |
| 10 | <i>Prunus dulcis</i> | 5.04 | 10 | <i>Syzygium jambos</i> | 23 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.016M**m³. Total number of stems estimated to be **0.179 Million**. The unit volume (per ha) is **5.956** m³ and stems per ha are **6**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------|---------------------------|-----------------------|--------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |

| | | | | | |
|----|-------------------------------|--------|----|-------------------------------|------|
| 1 | <i>Azadirachta indica</i> | 0.0054 | 1 | <i>Azadirachta indica</i> | 2636 |
| 2 | <i>Mangifera indica</i> | 0.0040 | 2 | <i>Butea monosperma</i> | 1569 |
| 3 | <i>Butea monosperma</i> | 0.0014 | 3 | <i>Mangifera indica</i> | 1548 |
| 4 | <i>Eucalyptus tereticomis</i> | 0.0010 | 4 | <i>Tectona grandis</i> | 868 |
| 5 | <i>Madhuca indica</i> | 0.0009 | 5 | <i>Eucalyptus tereticomis</i> | 533 |
| 6 | <i>Tectona grandis</i> | 0.0008 | 6 | <i>Alangium salvifolium</i> | 450 |
| 7 | <i>Tamarindus Indica</i> | 0.0006 | 7 | <i>Tamarindus Indica</i> | 397 |
| 8 | <i>Acacia nilotica</i> | 0.0003 | 8 | <i>Acacia nilotica</i> | 387 |
| 9 | <i>Lannea coromandelica</i> | 0.0003 | 9 | <i>Grewia rothi</i> | 251 |
| 10 | <i>Albizia lebbek</i> | 0.0002 | 10 | <i>Cassia fistula</i> | 199 |

4.7.3 OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. **National High Way:** NH 44 and 65 are passing through this district with a length of **177.6** km. However, it is observed that only **27.4** km length is covered with trees along the road, which comes only to 15.43% of the NH. Balance **150.2** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. **State High Way:** The length of the state highway is **272.9** km, out of which only **48.4** km length is covered with the trees along the road, which comes to 17.74% of SH. Balance **224.5** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. **Other Roads:** The length of these roads is **9744.2** km, out of which only **652.4** km length is with the trees, which comes to 6.70% of other road network. Balance **9091.9** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

b. Railway Tracks having Potential for taking up plantations: The length of the railway track is estimated as **102.7** km; however, only **2.5** km length is covered trees, which comes to 2.43% of the length of the railway track. Balance **100.2** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

c. Canals: The length of the canals is estimated as **139.2** km; however, only **7.2** km length is covered trees, which comes to 5.17% of the

length of the canals. There is good scope for taking up planting along the canals, if suitable.

- d. **Streams/ Rivers:** The length of the streams/ rivers is estimated as **255.6** km; however, only **7.8** km length is covered trees, which comes to 3.05% of the length of the canals. There is good scope for taking up planting, if suitable.

4.8 RANGAREDDY AND HYDERABAD DISTRICTS

4.8.1 Introduction:

Rangareddy & Hyderabad districts are located in Southwest part of Telangana. The total geographical area of the district is **7718.52** km², out of which notified forest area is **758.87** km². The Hyderabad metro district located within this district.

4.8.2 Assessment of resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **493.16** km², which comes to 6.39% of the geographical area and details as follows:

| | | |
|--------------------------------|---|------------------------------|
| Natural Forests | - | 125.37 km² |
| Plantations (Block and Linear) | - | 149.18 km² |
| Rural Habitations | - | 4.13 km² |
| Urban Habitations | - | 20.48 km² |
| Scattered Trees | - | 194 km² |

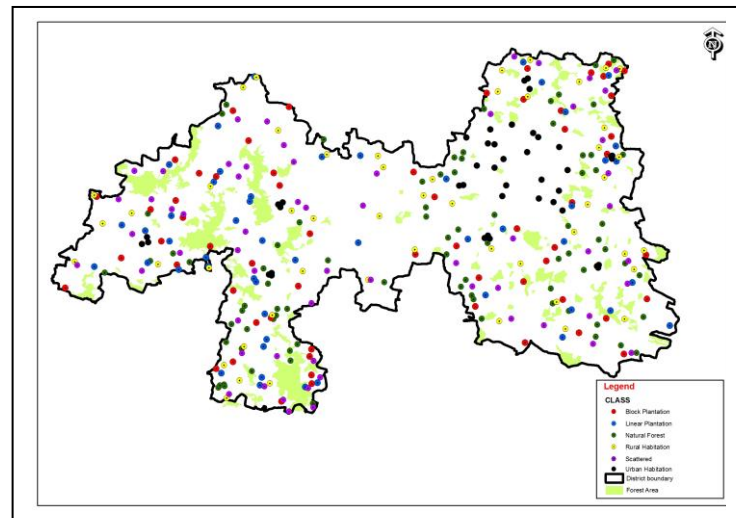
The natural forests, plantations and habitations constitute **25.42%**, **30.25%** and **44.33%** of the total ToF Area respectively.

The stratum wise points and extent of area shown below:

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 3 | 2.82 |
| | | | OF | 20 | 31.88 |
| | | | Scrub | 57 | 82.86 |
| | | Linear | 19 | 7.81 | |
| | | Total | | | 125.37 |
| 2 | Plantations | Block | | 80 | 134.21 |

| | | | | | |
|---|------------------------|--------------------|--|------------|---------------|
| | | Linear | | 31 | 14.97 |
| | | Total | | | 149.18 |
| 3 | Habitations | Rural | | 50 | 4.13 |
| | | Urban | | 43 | 20.48 |
| | | Total | | | 24.61 |
| 4 | Scattered Trees | | | 60 | 194 |
| | | Grand Total | | 363 | 493.16 |

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **1.5657 Mm³**. Breakup is as follows:

- Natural Forests - **0.7800 Mm³**
- Plantations - **0.5962 Mm³**
- Rural Habitations - **0.0094 Mm³**
- Urban Habitations - **0.0291 Mm³**
- Scattered Trees - **0.1510 Mm³**

Number of Stems is estimated to be **3.5199 Million**. Breakup is as follows:

- Natural Forests - **1.5797 Million**
- Plantations - **1.6676 Million**
- Rural Habitations - **0.0146 Million**
- Urban Habitations - **0.0416 Million**

- Scattered Trees – **0.2164** Million

C. THE STRATUM WISE DETAILS ARE AS FOLLOWS:

i. Natural forests:

The total GS of this Stratum is estimated to be **0.7800** Mm³. Total number of stems is estimated to be **1.5797** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|------------------|
| 1 | Block | MDF | 2.81 | 0.014 | 44.254 | 0.154 | 110 |
| 2 | | OF | 31.88 | 0.059 | 18.692 | 0.298 | 108 |
| 3 | | Scrub | 82.85 | 0.360 | 43.405 | 1.642 | 77 |
| 4 | Linear | | 14.97 | 0.347 | 231.427 | 0.485 | 323 |
| Total | | | 132.51 | 0.780 | | 1.579 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|--------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Eucalyptus camaldulenss</i> | 0.1429 | 1 | <i>Azadirachta indica</i> | 0.2003 |
| 2 | <i>Azadirachta indica</i> | 0.1409 | 2 | <i>Eucalyptus camaldulensi</i> | 0.1744 |
| 3 | <i>Tamarindus indica</i> | 0.0957 | 3 | <i>Eucalyptus tereticomis</i> | 0.1253 |
| 4 | <i>Pongamia pinnata</i> | 0.0833 | 4 | <i>Acacia nilotica</i> | 0.0955 |
| 5 | <i>Phoenix sylvestris</i> | 0.0384 | 5 | <i>Peltophorum pterocarpum</i> | 0.0839 |
| 6 | <i>Acacia nilotica</i> | 0.0302 | 6 | <i>Pongamia pinnata</i> | 0.0799 |
| 7 | <i>Peltophorum pterocarpum</i> | 0.0298 | 7 | <i>Albizia amara</i> | 0.0780 |
| 8 | <i>Butea monosperma</i> | 0.0281 | 8 | <i>Tamarindus Indica</i> | 0.0751 |
| 9 | <i>Holoptelea integrifolia</i> | 0.0229 | 9 | <i>Phoenix sylvestris</i> | 0.0654 |
| 10 | <i>Acacia chundra</i> | 0.0156 | 10 | <i>Chloroxylon swietenia</i> | 0.0618 |

ii. Plantations:

The total GS of this Stratum is estimated to be **0.601** Mm³. Total number of stems is estimated to be **1.574** Million.

| Stratum | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| Block | 134.211 | 0.522 | 38.861 | 1.547 | 115 |
| Linear | 7.815 | 0.074 | 95.556 | 0.120 | 154 |
| Total | 142.026 | 0.596 | | 1.667 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|--------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Mangifera indica</i> | 0.3092 | 1 | <i>Mangifera indica</i> | 1.1666 |
| 2 | <i>Eucalyptus tereticomis</i> | 0.0760 | 2 | <i>Grewia rothi</i> | 0.1141 |
| 3 | <i>Tectona grandis</i> | 0.0596 | 3 | <i>Tectona grandis</i> | 0.0775 |
| 4 | <i>Azadirachta Indica</i> | 0.0357 | 4 | <i>Eucalyptus tereticomis</i> | 0.0598 |
| 5 | <i>Eucalyptus camaldulensi</i> | 0.0289 | 5 | <i>Azadirachta Indica</i> | 0.0581 |
| 6 | <i>Grewia rothi</i> | 0.0156 | 6 | <i>Eucalyptus camaldulensi</i> | 0.0285 |
| 7 | <i>Tamarindus indica</i> | 0.0101 | 7 | <i>Cocos nucifera</i> | 0.0235 |
| 8 | <i>Phyllanthus emblica</i> | 0.0073 | 8 | <i>Moringa oleifera</i> | 0.0185 |
| 9 | <i>Butea monosperma</i> | 0.0068 | 9 | <i>Tamarindus Indica</i> | 0.0161 |
| 10 | <i>Peltophorum pterocarpum</i> | 0.0065 | 10 | <i>Prosopis juliflora</i> | 0.0143 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **9449.98** m³. Total number of stems is estimated to be **14639**. The unit volume (per ha) is **22.881** m³ and stems per ha is **35**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | Based on No. of Stems |
|--------------------------------|-----------------------|
|--------------------------------|-----------------------|

| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
|-------|--------------------------------|--------------------------|-------|--------------------------------|--------------|
| 1 | <i>Azadirachta indica</i> | 4738.15 | 1 | <i>Azadirachta indica</i> | 5030 |
| 2 | <i>Eucalyptus tereticomis</i> | 583.58 | 2 | <i>Cocos nucifera</i> | 1265 |
| 3 | <i>Tamarindus indica</i> | 537.90 | 3 | <i>Eucalyptus tereticomis</i> | 989 |
| 4 | <i>Pongamia pinnata</i> | 342.12 | 4 | <i>Tamarindus indica</i> | 792 |
| 5 | <i>Cocos nucifera</i> | 297.96 | 5 | <i>Leucaena leucocephala</i> | 646 |
| 6 | <i>Peltophorum pterocarpum</i> | 276.89 | 6 | <i>Pongamia pinnata</i> | 641 |
| 7 | <i>Leucaena leucocephala</i> | 251.73 | 7 | <i>Tectona grandis</i> | 624 |
| 8 | <i>Tectona grandis</i> | 245.15 | 8 | <i>Acacia nilotica</i> | 596 |
| 9 | <i>Saraca asoka</i> | 217.72 | 9 | <i>Saraca asoka</i> | 433 |
| 10 | <i>Acacia nilotica</i> | 199.47 | 10 | <i>Holoptelea integrifolia</i> | 371 |

iv. Urban Habitations:

The total GS of this Stratum is estimated to be **29100m³**. Total number of stems is estimated to be **41553**. The unit volume (per ha) is **14.209 m³** and stems per ha is **20**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|--------------------------|-----------------------|--------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Peltophorum pterocarpum</i> | 6497.89 | 1 | <i>Azadirachta indica</i> | 6566 |
| 2 | <i>Azadirachta indica</i> | 5738.65 | 2 | <i>Peltophorum pterocarpum</i> | 4487 |
| 3 | <i>Eucalyptus camaldulensi</i> | 2800.92 | 3 | <i>Cocos nucifera</i> | 4056 |
| 4 | <i>Pongamia pinnata</i> | 1496.11 | 4 | <i>Mangifera indica</i> | 3143 |
| 5 | <i>Cocos nucifera</i> | 1333.38 | 5 | <i>Eucalyptus camaldulensi</i> | 3042 |
| 6 | <i>Mangifera indica</i> | 937.27 | 6 | <i>Pongamia pinnata</i> | 2459 |
| 7 | <i>Alstonia scholaris</i> | 902.86 | 7 | <i>Leucaena leucocephala</i> | 1698 |
| 8 | <i>Millingtonia hortensis</i> | 885.26 | 8 | <i>Millingtonia hortensis</i> | 1470 |
| 9 | <i>Eucalyptus tereticomis</i> | 881.00 | 9 | <i>Saraca asoka</i> | 1344 |
| 10 | <i>Ficus religiosa</i> | 834.41 | 10 | <i>Cassia siamea</i> | 1293 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.151 Mm³**. Total number of stems is estimated to be **0.216 Million**. The unit volume (per ha) is **7.782 m³** and stems per ha is **11**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-----------------------------|---------------------------|-----------------------|--------------------------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta indica</i> | 0.0554 | 1 | <i>Azadirachta indica</i> | 70611 |
| 2 | <i>Butea monosperma</i> | 0.0141 | 2 | <i>Borassus flabellifer</i> | 22422 |
| 3 | <i>Grewia tiliaefolia</i> | 0.0115 | 3 | <i>Acacia nilotica</i> | 11490 |
| 4 | <i>Tectona grandis</i> | 0.0088 | 4 | <i>Butea monosperma</i> | 9816 |
| 5 | <i>Tamarindus indica</i> | 0.0087 | 5 | <i>Bombax religiosum</i> | 9259 |
| 6 | <i>Acacia nilotica</i> | 0.0068 | 6 | <i>Tectona grandis</i> | 8366 |
| 7 | <i>Acacia leucophloea</i> | 0.0042 | 7 | <i>Eluodendrum monogynum</i> | 6805 |
| 8 | <i>Zizyphus mauritiana</i> | 0.0041 | 8 | <i>Holoptelea integrifolia</i> | 6247 |
| 9 | <i>Lannea coromandelica</i> | 0.0036 | 9 | <i>Tamarindus indica</i> | 6024 |
| 10 | <i>Pongamia pinnata</i> | 0.0031 | 10 | <i>Acacia chundra</i> | 4462 |

4.8.3 OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. **National High Way:** NH 44 and 65 are passing through this district with a length of **59.7** km. However, it is observed that only **5.9** km length is covered with trees along the road, which comes only to 9.88% of the NH. Balance **53.8** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. **State High Way:** The length of the state highway is **329.7** km, out of which only **55.9** km length is covered with the trees along the road, which comes to 16.95% of SH. Balance **273.8** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. **Other Roads:** The length of these roads is **13957** km, out of which only **1000.8** km length is with the trees, which comes to 7.17% of other road network. Balance **12956.2** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

- b. Railway Tracks having Potential for taking up plantations:** The length of the railway track is estimated as **297.4** km; however, only **3.6** km length is covered trees, which comes to 1.21% of the length of the railway track. Balance **293.8** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- c. Canals:** The length of the canals is estimated as **114.6** km; however, only **0.1** km length is covered trees, which comes to 0.09% of the length of the canals. There is good scope for taking up planting along the canals, if suitable.
- d. Streams/ Rivers:** The length of the streams/ rivers is estimated as **1454.9** km; however, only **10.5** km length is covered trees, which comes to 0.72% of the length of the canals. There is good scope for taking up planting, if suitable.

4.9 WARANGAL DISTRICT

4.9.1 Introduction:

The Warangal district is located in Northern east part of Telangana. The total geographical area of the district is **12831.92** km², out of which notified forest area is **4023.45** km². There are two territorial forest divisions and one wildlife management division in this district.

4.9.2 Assessment of resources under Trees Outside notified Forests:

A. TREE COVER:

Extent of tree cover under various classes is **529.10** km², which comes to 4.12% of the geographical area and details as follows:

| | | |
|--------------------------------|---|-------------------------------|
| Natural Forests | - | 134.44 km ² |
| Plantations (Block and Linear) | - | 114.78 km ² |
| Rural Habitations | - | 8.88 km ² |
| Urban Habitations | - | 3.29 km ² |
| Scattered Trees | - | 267.71 km ² |

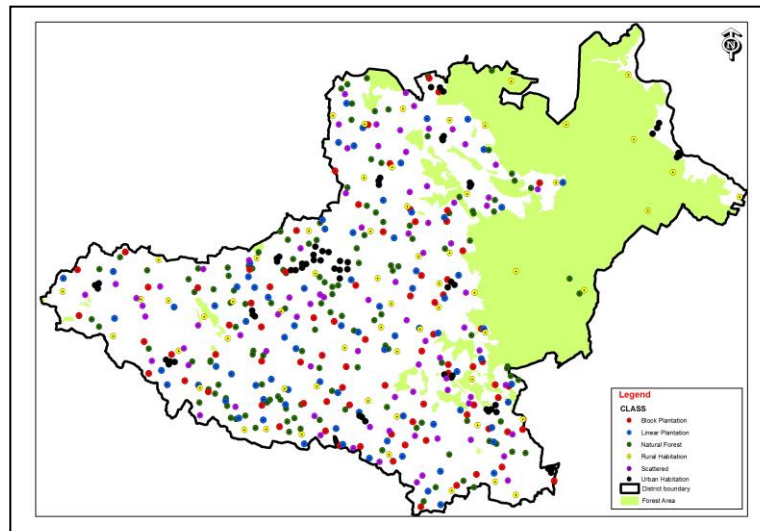
The natural forests, plantations and habitations constitute **25.41%**, **21.69%** and **52.90%** of the total ToF Area respectively.

The stratum wise points and extent of area shown below:

| S.No | Stratum | Sub stratum | Canopy Class | No. of sample plots | Area in Km ² |
|------|------------------------|--------------|--------------|---------------------|-------------------------|
| 1 | Natural Forests | Block | MDF | 3 | 5.18 |
| | | | OF | 20 | 23.78 |
| | | | Scrub | 57 | 100.23 |
| | | Linear | 19 | 5.25 | |
| | | Total | | | 134.44 |
| 2 | Plantations | Block | | 80 | 104.95 |
| | | Linear | | 31 | 9.83 |
| | | Total | | | 114.78 |
| 3 | Habitations | Rural | | 50 | 8.88 |

| | | | | | |
|---|------------------------|--------------------|--|------------|---------------|
| | | Urban | | 43 | 3.29 |
| | | Total | | | 12.17 |
| 4 | Scattered Trees | | | 60 | 267.71 |
| | | Grand Total | | 363 | 529.10 |

Distribution of TOF points in the district



B. GROWING STOCK AND NUMBER OF STEMS:

Overall Growing stock is estimated to be **1.3902 Mm³**. Breakup is as follows:

- Natural Forests - **0.3655 Mm³**
- Plantations - **0.9276 Mm³**
- Rural Habitations - **0.0095 Mm³**
- Urban Habitations - **0.0026 Mm³**
- Scattered Trees - **0.0850 Mm³**

Number of Stems is estimated to be **4.3333 Million**. Breakup is as follows:

- Natural Forests - **1.4086 Million**
- Plantations - **2.7189 Million**
- Rural Habitations - **0.0185 Million**
- Urban Habitations - **0.0061 Million**
- Scattered Trees - **0.1812 Million**

C. THE STRATUM WISE DETAILS ARE AS FOLLOWS:

i. Natural forests:

The total GS of this Stratum is estimated to be **0.3655** Mm³. Total number of stems estimated to be **1.4086** Million.

| S.no | Sub Stratum | Class | Area in Km ² | Total GS (Mm ³) | Unit volume (m ³ /ha) | No. of Stems in Million | Stems/ ha in No's |
|--------------|-------------|-------|-------------------------|-----------------------------|----------------------------------|-------------------------|-------------------|
| 1 | Block | MDF | 5.176 | 0.010 | 18.467 | 0.072 | 138 |
| 2 | | OF | 237.75 | 0.130 | 54.88 | 0.356 | 150 |
| 3 | | Scrub | 100.231 | 0.165 | 16.419 | 0.843 | 84 |
| 4 | Linear | | 5.254 | 0.060 | 61.899 | 0.137 | 139 |
| Total | | | 348.411 | 0.365 | | 1.408 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|--------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | <i>Borassus flabellifer</i> | 0.0845 | 1 | <i>Acacia nilotica</i> | 0.3361 |
| 2 | <i>Azadirachta Indica</i> | 0.0744 | 2 | <i>Azadirachta Indica</i> | 0.2990 |
| 3 | <i>Bombax religiosum</i> | 0.0523 | 3 | <i>Borassus flabellifer</i> | 0.1655 |
| 4 | <i>Acacia nilotica</i> | 0.0236 | 4 | <i>Butea monosperma</i> | 0.1374 |
| 5 | <i>Butea monosperma</i> | 0.0212 | 5 | <i>Bombax religiosum</i> | 0.0527 |
| 6 | <i>Albizia lebbeck</i> | 0.0140 | 6 | <i>Holoptelea integrifolia</i> | 0.0455 |
| 7 | <i>Holoptelea integrifolia</i> | 0.0106 | 7 | <i>Phoenix sylvestris</i> | 0.0393 |
| 8 | <i>Ficus benghalensis</i> | 0.0106 | 8 | <i>Eluodendrum monogynum</i> | 0.0302 |
| 9 | <i>Phoenix sylvestris</i> | 0.0082 | 9 | <i>Chloroxylon swietenia</i> | 0.0222 |
| 10 | <i>Madhuca indica</i> | 0.0053 | 10 | <i>Tamarindus indica</i> | 0.0141 |

ii. Plantations

The total GS of this Stratum is estimated to be **0.927** Mm³. Total number of stems estimated to be **2.718** Million.

| | Area in | Total GS | Unit volume | No. of Stems | Stems/ ha |
|--|---------|----------|-------------|--------------|-----------|
|--|---------|----------|-------------|--------------|-----------|

| Stratum | Km ² | (Mm ³) | (m ³ /ha) | in Million | in No's |
|--------------|-----------------|--------------------|----------------------|--------------|---------|
| Block | 104.947 | 0.903 | 86.095 | 2.657 | 253 |
| Linear | 9.834 | 0.024 | 45.746 | 0.061 | 116 |
| Total | 114.781 | 0.927 | | 2.718 | |

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|-----------------------------|---------------------------|-----------------------|--------------------------------|------------------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems (Million) |
| 1 | Mangifera indica | 0.8559 | 1 | <i>Mangifera indica</i> | 2.2997 |
| 2 | Eucalyptus camaldulensi | 0.0200 | 2 | <i>Eucalyptus camaldulensi</i> | 0.2454 |
| 3 | Tectona grandis | 0.0100 | 3 | <i>Tectona grandis</i> | 0.0355 |
| 4 | <i>Azadirachta indica</i> | 0.0083 | 4 | <i>Azadirachta Indica</i> | 0.0350 |
| 5 | <i>Borassus flabellifer</i> | 0.0051 | 5 | <i>Others(Unknown)</i> | 0.0223 |
| 6 | <i>Hardwickia binata</i> | 0.0047 | 6 | <i>Acacia nilotica</i> | 0.0082 |
| 7 | <i>Albizia lebbeck</i> | 0.0034 | 7 | <i>Butea monosperma</i> | 0.0077 |
| 8 | <i>Tamarindus Indica</i> | 0.0019 | 8 | <i>Borassus flabellifer</i> | 0.0056 |
| 9 | <i>Others(Unknown)</i> | 0.0019 | 9 | <i>Phoenix sylvestris</i> | 0.0056 |
| 10 | <i>Cocos nucifera</i> | 0.0017 | 10 | <i>Hardwickia binata</i> | 0.0053 |

iii. Rural Habitations:

The total GS of this Stratum is estimated to be **9548.99** m³. Total number of stems estimated to be **18485**. The unit volume (per ha) is **10.753** m³ and stems per ha is **21**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | Based on No. of Stems |
|--------------------------------|-----------------------|
|--------------------------------|-----------------------|

| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
|-------|-----------------------------|--------------------------|-------|------------------------------|--------------|
| 1 | <i>Tamarindus indica</i> | 3245.05 | 1 | <i>Azadirachta indica</i> | 6194 |
| 2 | <i>Azadirachta Indica</i> | 3201.62 | 2 | <i>Tamarindus Indica</i> | 3613 |
| 3 | <i>Borassus flabellifer</i> | 791.11 | 3 | <i>Acacia nilotica</i> | 1914 |
| 4 | <i>Cocos nucifera</i> | 375.96 | 4 | <i>Cocos nucifera</i> | 1121 |
| 5 | <i>Bombax religiosum</i> | 308.91 | 5 | <i>Tectona grandis</i> | 755 |
| 6 | <i>Acacia nilotica</i> | 237.05 | 6 | <i>Borassus flabellifer</i> | 743 |
| 7 | <i>Merremia vitifolia</i> | 154.41 | 7 | <i>Leucaena leucocephala</i> | 441 |
| 8 | <i>Mangifera indica</i> | 153.28 | 8 | <i>Grewia rothi</i> | 441 |
| 9 | <i>Tectona grandis</i> | 87.22 | 9 | <i>Bombax religiosum</i> | 302 |
| 10 | <i>Samanea saman</i> | 79.01 | 10 | <i>Mangifera indica</i> | 277 |

iv. Urban Habitations:

The total GS of this Stratum is estimated to be **2637** m³. Total number of stems estimated to be **6089**. The unit volume (per ha) is **8.018** m³ and stems per ha are **18**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|------------------------------|--------------------------|-----------------------|------------------------------|--------------|
| S. No | Species name | Volume in m ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta indica</i> | 1174.57 | 1 | <i>Azadirachta indica</i> | 1980 |
| 2 | <i>Tamarindus indica</i> | 271.96 | 2 | <i>Tamarindus indica</i> | 544 |
| 3 | <i>Borassus flabellifer</i> | 202.22 | 3 | <i>Tectona grandis</i> | 513 |
| 4 | <i>Mangifera indica</i> | 154.17 | 4 | <i>Pongamia pinnata</i> | 380 |
| 5 | <i>Cocos nucifera</i> | 109.65 | 5 | <i>Mangifera indica</i> | 349 |
| 6 | <i>Pongamia pinnata</i> | 80.95 | 6 | <i>Cocos nucifera</i> | 325 |
| 7 | <i>Albizia lebbeck</i> | 65.72 | 7 | <i>Grewia rothi</i> | 291 |
| 8 | <i>Tectona grandis</i> | 62.24 | 8 | <i>Borassus flabellifer</i> | 280 |
| 9 | <i>Samanea saman</i> | 61.88 | 9 | <i>Acacia nilotica</i> | 209 |
| 10 | <i>Leucaena leucocephala</i> | 39.56 | 10 | <i>Leucaena leucocephala</i> | 178 |

v. Scattered Trees:

The total GS of this Stratum is estimated to be **0.085** Mm³. Total number of stems estimated to be **0.181 Million**. The unit volume (per ha) is **3.177**m³ and stems per ha are **7**.

Top 10 species based on volume and Stems are shown below:

| Top 10 species Based on Volume | | | Based on No. of Stems | | |
|--------------------------------|--------------------------------|---------------------------|-----------------------|--------------------------------|--------------|
| S. No | Species name | Volume in Mm ³ | S. No | Species name | No. of Stems |
| 1 | <i>Azadirachta indica</i> | 0.0278 | 1 | <i>Azadirachta indica</i> | 70611 |
| 2 | <i>Borassus flabellifer</i> | 0.0220 | 2 | <i>Borassus flabellifer</i> | 22422 |
| 3 | <i>Bombax religiosum</i> | 0.0065 | 3 | <i>Acacia nilotica</i> | 11490 |
| 4 | <i>Holoptelea integrifolia</i> | 0.0038 | 4 | <i>Butea monosperma</i> | 9816 |
| 5 | <i>Tamarindus indica</i> | 0.0029 | 5 | <i>Bombax religiosum</i> | 9259 |
| 6 | <i>Acacia chundra</i> | 0.0020 | 6 | <i>Tectona grandis</i> | 8366 |
| 7 | <i>Terminalia arjuna</i> | 0.0019 | 7 | <i>Eluodendrum monogynum</i> | 6805 |
| 8 | <i>Butea monosperma</i> | 0.0019 | 8 | <i>Holoptelea integrifolia</i> | 6247 |
| 9 | <i>Acacia nilotica</i> | 0.0018 | 9 | <i>Tamarindus indica</i> | 6024 |
| 10 | <i>Azadirachta indica</i> | 0.0278 | 10 | <i>Acacia chundra</i> | 4462 |

4.9.3 OTHER FINDINGS:

a. Roads having Potential for taking up plantations:

- i. **National High Way:** NH 163 is passing through this district with a length of **179** km. However, it is observed that only **22.8** km length is covered with trees along the road, which comes only to 12.74% of the NH. Balance **156.2** km length of road network is devoid of Avenue Plantation; where planting could be taken up if found to be free from encroachments and encumbrances, in a phased manner.
- ii. **State High Way:** The length of the state highway is **145.7** km, out of which only **51** km length is covered with the trees along the road, which comes to 35.00% of SH. Balance **94.7** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.
- iii. **Other Roads:** The length of these roads is **17824** km, out of which only **773.9** km length is with the trees, which comes to 4.34% of other road network. Balance **17050.1** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

- b. **Railway Tracks having Potential for taking up plantations:** The length of the railway track is estimated as **219.6** km; however, only **0.9** km length is covered trees, which comes to 0.41% of the length of

the railway track. Balance **218.7** km length could be taken up for planting if found to be free from encroachments and encumbrances, in a phased manner.

- c. **Canals:** The length of the canals is estimated as **91.8** km; however, only **4.8** km length is covered trees, which comes to 5.23% of the length of the canals. There is good scope for taking up planting along the canals, if suitable.
- d. **Streams/ Rivers:** The length of the streams/ rivers is estimated as **5387.1** km; however, only **121.3** km length is covered trees, which comes to 2.25% of the length of the canals. There is good scope for taking up planting, if suitable.

CHAPTER-V ESTIMATION OF ANNUAL YIELD FROM TREES OUTSIDE FORESTS

The Hon'ble Supreme Court of India in a series of its orders in Writ Petition (civil) 202 of 1995 and IAs filed therein directed State Governments to constitute, an Expert Committee to assess

- *the sustainable capacity of the Forests of the State vis-a-vis saw mills and timber based industry*
- *the number of existing saw mills which can safely be sustained in the State.*
- *the optimum distance from the forest qua that State at which the saw mill should be located.*

The Hon'ble Supreme Court of India in a series of judgements ordered that

"No State or Union Territory shall permit any unlicensed saw-mills, veneer, plywood industry to operate and they are directed to close all such unlicensed unit forthwith. No State Government or Union Territory will permit the opening of any sawmills, veneer or plywood industry without prior permission of the Central Empowered Committee. It shall be open to apply to this court for relaxation and or appropriate modification of orders qua plantation or grant of licences. No saw mills should be established within a radius of 5 km from the boundary of the forest area".

The orders of the Hon'ble Supreme Court of India explicitly reminded the States of their prime obligation of legal supervision over the saw mills and the veneer and plywood mills. It also laid sufficient emphasis over the sustainability of Forests. In addition to the two it made it obligatory upon the States to assess availability of legal timber and the capacity of saw mills and veneer and plywood units.

Further, the Hon'ble Supreme Court of India directed that

- *The State Level Committees for Wood-Based Industries ("SLCs") are, subject to the compliance of the prescribed guidelines and procedure, authorized to take decisions regarding the grant of license/permission to the wood-based industries;*
- *In each State/UT for which the SLC has so far not been constituted, the SLC under the Chairmanship of the Principal*

Chief Conservator of Forests with a representative of the MoEF & CC and an officer of the State Forest Department/Industries Department not below the rank of the Chief Conservator of Forests/ equivalent rank will immediately be constituted;

- The MoEF is authorized to issue appropriate guidelines in conformation with the orders and directions issued by this Court and also the existing guidelines to the SLCs relating to assessment of timber availability for wood-based industries and grant of license/permission to the wood-based industries including addition of new machineries and also utilization of amounts recovered from the wood-based industries and connected matters;*
- Any person aggrieved by the decision taken by the SLC may file an appeal before the MoEF & CC seeking appropriate relief within 60 days' time. If, for any reason, any person is aggrieved by the orders so passed in the appeal, he may prefer an appropriate petition/application/appeal before the appropriate forum/Court for grant of appropriate relief(s).*

Therefore, the assessment of timber and wood products and their annual yields has become necessary in order to link with the sustenance of wood based industries.

Calculation of Yield:

Yield calculation involves determination of quantum of yield i.e., the quantity of forest produce which will be available annually or periodically from a forest over a stated period of time.

It involves (i) Estimation of the productive capacity of an area (ii) Deciding as to how much of this could be removed (iii) How much re-invested in the wood capital of the area (iv) How much and from what portion of the growing stock the felling should be made

Though several methods are available for calculating the annual yield, **Von Mantel's formula** is used in the present study. It considers that the annual yield for any forest must bear the same proportion to the actual growing stock as normal increment bears to normal growing stock. The formula for annual yield is $2*GS/r$ where 'GS' is the Growing Stock and 'r' is the rotation of the crop. This formula is known as formula of 'glorious simplicity'.

In all there are **363** species of trees outside the notified forests. Of which **57** are Timber species, **Six** Pulpwood species and **300** Fuel wood species. The rotation period for each species is obtained. The **annual yield**

from the ToF is estimated to be **0.4982** Mcum of Timber, **0.1517** Mcum of Pulp and **0.2198** Mcum of Fuel. The details are as follows:

Abstract of Annual Yield from different Classes of Species

| Sl. No. | Name of the Class | No. of Species | Annual Yield (Mcum) |
|---------|-------------------|----------------|---------------------|
| 1 | Timber | 57 | 0.4982 |
| 2 | Pulp | 6 | 0.1517 |
| 3 | Fuel | 300 | 0.2198 |
| | Total | 363 | 0.8698 |

5.1: DIA-METER CLASS WISE ESTIMATED TIMBER ANNUAL YEILD

| S.no | Name of the Class | 10-20cm | 21-30cm | 31-40cm | 41-50cm | 51-60cm | 61-70cm | >70cm | SUM | Rotation Age(yrs) | Annual Yeild (m. cum) |
|------|-------------------|---------|---------|---------|---------|---------|---------|--------|--------|-------------------|-----------------------|
| 1 | TIMBER | 1.3262 | 1.7289 | 1.4956 | 1.3483 | 0.6464 | 0.5187 | 1.3314 | 8.3956 | 60 | 0.2799 |
| 2 | TIMBER | 0.2584 | 0.1826 | 0.1344 | 0.1003 | 0.1737 | 0.0743 | 0.1925 | 1.1161 | 40 | 0.0558 |
| 3 | TIMBER | 0.2166 | 0.2905 | 0.3784 | 0.2780 | 0.2457 | 0.2125 | 0.9495 | 2.5712 | 100 | 0.0514 |
| 4 | TIMBER | 0.0234 | 0.0814 | 0.0879 | 0.0437 | 0.0196 | 0.0268 | 0.0743 | 0.3570 | 25 | 0.0286 |
| 5 | TIMBER | 0.0033 | 0.0342 | 0.1459 | 0.1977 | 0.0654 | 0.0069 | 0.0782 | 0.5316 | 80 | 0.0133 |
| 6 | TIMBER | 0.0088 | 0.0138 | 0.0244 | 0.0491 | 0.0337 | 0.0617 | 0.3996 | 0.5910 | 100 | 0.0118 |
| 7 | TIMBER | 0.0334 | 0.0034 | 0.0165 | 0.0366 | 0.0453 | 0.0401 | 0.0552 | 0.2303 | 50 | 0.0092 |
| 8 | TIMBER | 0.0017 | 0.0030 | 0.0025 | 0.0075 | 0.0042 | 0.0087 | 0.1650 | 0.1927 | 50 | 0.0077 |
| 9 | TIMBER | 0.0276 | 0.0339 | 0.0457 | 0.0236 | 0.0080 | 0.0113 | 0.0215 | 0.1716 | 50 | 0.0069 |
| 10 | TIMBER | 0.0026 | 0.0110 | 0.0191 | 0.0317 | 0.0427 | 0.0220 | 0.0598 | 0.1889 | 60 | 0.0063 |
| 11 | TIMBER | 0.0058 | 0.0130 | 0.0284 | 0.0161 | 0.0043 | 0.0105 | 0.0136 | 0.0917 | 40 | 0.0046 |
| 12 | TIMBER | 0.0061 | 0.0059 | 0.0078 | 0.0194 | 0.0340 | 0.0310 | 0.0888 | 0.1930 | 100 | 0.0039 |
| 13 | TIMBER | 0.0153 | 0.0076 | 0.0081 | 0.0051 | 0.0053 | 0.0003 | 0.0150 | 0.0566 | 50 | 0.0023 |
| 14 | TIMBER | 0.0087 | 0.0099 | 0.0076 | 0.0073 | 0.0081 | 0.0050 | 0.0073 | 0.0539 | 50 | 0.0022 |
| 15 | TIMBER | 0.0008 | 0.0170 | 0.0079 | 0.0145 | 0.0056 | 0.0113 | 0.0169 | 0.0740 | 80 | 0.0019 |
| 16 | TIMBER | 0.0097 | 0.0088 | 0.0077 | 0.0021 | 0.0033 | 0.0018 | 0.0035 | 0.0368 | 50 | 0.0015 |
| 17 | TIMBER | 0.0042 | 0.0042 | 0.0054 | 0.0080 | 0.0012 | 0.0115 | 0.0001 | 0.0346 | 50 | 0.0014 |
| 18 | Timber | 0.0030 | 0.0043 | 0.0106 | 0.0024 | 0.0019 | 0.0027 | 0.0037 | 0.0286 | 50 | 0.0011 |
| 19 | TIMBER | 0.0034 | 0.0060 | 0.0082 | 0.0070 | 0.0100 | 0.0026 | 0.0080 | 0.0451 | 80 | 0.0011 |
| 20 | TIMBER | 0.0007 | 0.0004 | 0.0011 | 0.0017 | 0.0168 | 0.0064 | 0.0000 | 0.0270 | 50 | 0.0011 |
| 21 | TIMBER | 0.0031 | 0.0022 | 0.0028 | 0.0041 | 0.0000 | 0.0003 | 0.0086 | 0.0210 | 50 | 0.0008 |
| 22 | TIMBER | 0.0012 | 0.0023 | 0.0058 | 0.0005 | 0.0004 | 0.0046 | 0.0026 | 0.0175 | 50 | 0.0007 |
| 23 | TIMBER | 0.0026 | 0.0024 | 0.0020 | 0.0036 | 0.0052 | 0.0001 | 0.0013 | 0.0171 | 50 | 0.0007 |
| 24 | TIMBER | 0.0002 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0029 | 0.0113 | 0.0150 | 50 | 0.0006 |
| 25 | TIMBER | 0.0004 | 0.0014 | 0.0023 | 0.0010 | 0.0018 | 0.0000 | 0.0042 | 0.0110 | 50 | 0.0004 |
| 26 | TIMBER | 0.0026 | 0.0033 | 0.0024 | 0.0014 | 0.0008 | 0.0000 | 0.0000 | 0.0104 | 50 | 0.0004 |
| 27 | TIMBER | 0.0021 | 0.0015 | 0.0004 | 0.0008 | 0.0001 | 0.0000 | 0.0062 | 0.0110 | 60 | 0.0004 |
| 28 | TIMBER | 0.0007 | 0.0021 | 0.0008 | 0.0011 | 0.0000 | 0.0023 | 0.0000 | 0.0070 | 50 | 0.0003 |
| 29 | TIMBER | 0.0011 | 0.0030 | 0.0039 | 0.0022 | 0.0000 | 0.0000 | 0.0001 | 0.0102 | 80 | 0.0003 |

| | | | | | | | | | | | |
|----|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|----|--------|
| 30 | TIMBER | 0.0000 | 0.0000 | 0.0001 | 0.0053 | 0.0000 | 0.0000 | 0.0000 | 0.0054 | 50 | 0.0002 |
| 31 | TIMBER | 0.0009 | 0.0022 | 0.0018 | 0.0003 | 0.0000 | 0.0000 | 0.0001 | 0.0053 | 50 | 0.0002 |
| 32 | TIMBER | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 0.0051 | 50 | 0.0002 |
| 33 | TIMBER | 0.0011 | 0.0011 | 0.0001 | 0.0012 | 0.0007 | 0.0000 | 0.0000 | 0.0042 | 50 | 0.0002 |
| 34 | TIMBER | 0.0032 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0038 | 50 | 0.0002 |
| 35 | TIMBER | 0.0003 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0027 | 0.0000 | 0.0032 | 50 | 0.0001 |
| 36 | TIMBER | 0.0013 | 0.0016 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0029 | 50 | 0.0001 |
| 37 | TIMBER | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 0.0000 | 0.0028 | 50 | 0.0001 |
| 38 | TIMBER | 0.0021 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0025 | 50 | 0.0001 |
| 39 | TIMBER | 0.0000 | 0.0000 | 0.0002 | 0.0010 | 0.0007 | 0.0000 | 0.0000 | 0.0019 | 50 | 0.0001 |
| 40 | TIMBER | 0.0002 | 0.0002 | 0.0000 | 0.0011 | 0.0000 | 0.0000 | 0.0002 | 0.0018 | 50 | 0.0001 |
| 41 | TIMBER | 0.0000 | 0.0004 | 0.0008 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0011 | 50 | 0.0000 |
| 42 | TIMBER | 0.0006 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 50 | 0.0000 |
| 43 | TIMBER | 0.0000 | 0.0000 | 0.0009 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0009 | 50 | 0.0000 |
| 44 | TIMBER | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0004 | 0.0000 | 0.0009 | 50 | 0.0000 |
| 45 | TIMBER | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0009 | 0.0009 | 50 | 0.0000 |
| 46 | TIMBER | 0.0006 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 47 | TIMBER | 0.0001 | 0.0006 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 48 | TIMBER | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 0.0000 | 0.0003 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 49 | TIMBER | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 50 | 0.0000 |
| 50 | TIMBER | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 50 | 0.0000 |
| 51 | Timber | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 52 | TIMBER | 0.0001 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 53 | TIMBER | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 54 | TIMBER | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 55 | TIMBER | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 56 | TIMBER | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 57 | TIMBER | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| | | 1.9848 | 2.4858 | 2.4680 | 2.2238 | 1.3851 | 1.0826 | 3.5241 | 15.1541 | | 0.4982 |

5.2: DIAMETER CLASS WISE ESTIMATED PULP WOOD ANNUAL YEILD

| S.No. | Scientific Name | Name of the Class | 10-20cm | 21-30cm | 31-40cm | 41-50cm | 51-60cm | 61-70cm | >70cm | SUM | Rotation Age(yrs) | Annual Yeild (m. cum) |
|-------|---------------------------------|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------------------|-----------------------|
| 1 | <i>Eucalyptus camaldulensis</i> | PULP | 0.0420 | 0.0418 | 0.1111 | 0.1064 | 0.0872 | 0.0568 | 0.0278 | 0.4730 | 7 | 0.1351 |
| 2 | <i>Leucaena leucocephala</i> | PULP | 0.0091 | 0.0062 | 0.0087 | 0.0102 | 0.0043 | 0.0087 | 0.0034 | 0.0507 | 7 | 0.0145 |
| 3 | <i>Bombax ceiba</i> | PULP | 0.0050 | 0.0054 | 0.0067 | 0.0088 | 0.0007 | 0.0000 | 0.0092 | 0.0357 | 40 | 0.0018 |
| 4 | <i>Chukrasia tabularis</i> | PULP | 0.0002 | 0.0030 | 0.0032 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0064 | 50 | 0.0003 |
| 5 | <i>Ailanthus excelsa</i> | PULP | 0.0001 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 20 | 0.0000 |
| 6 | <i>Acacia auriculiformis</i> | PULP | 0.0000 | 0.0000 | 0.0008 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| | Total | | 0.0563 | 0.0566 | 0.1305 | 0.1254 | 0.0922 | 0.0655 | 0.0405 | 0.5670 | | 0.1517 |

5.3: DIAMETER CLASS WISE ESTIMATED FUELWOOD ANNUAL YEILD

| S.No. | Scientific Name | Name of the Class | 10-20cm | 21-30cm | 31-40cm | 41-50cm | 51-60cm | 61-70cm | >70cm | SUM | Rotation Age(yrs) | Annual Yeild (m. cum) |
|-------|---------------------------|-------------------|---------|---------|---------|---------|---------|---------|--------|--------|-------------------|-----------------------|
| 1 | <i>Butea monosperma</i> | FUEL | 0.1044 | 0.0898 | 0.0813 | 0.0899 | 0.1056 | 0.0811 | 0.9213 | 1.4733 | 50 | 0.0589 |
| 2 | <i>Prosopis juliferra</i> | FUEL | 0.0068 | 0.0109 | 0.0117 | 0.0153 | 0.0038 | 0.0053 | 0.0319 | 0.0858 | 7 | 0.0245 |

| | | | | | | | | | | | | |
|----|----------------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|-----|--------|
| 3 | Bombax religiosum | FUEL | 0.0067 | 0.0206 | 0.1520 | 0.1610 | 0.1340 | 0.0033 | 0.0274 | 0.5048 | 80 | 0.0126 |
| 4 | Pongamia pinnata | FUEL | 0.0155 | 0.0292 | 0.0464 | 0.0327 | 0.0504 | 0.0448 | 0.0304 | 0.2494 | 50 | 0.0100 |
| 5 | Tamarindus Indica | FUEL | 0.0063 | 0.0290 | 0.0488 | 0.0858 | 0.0947 | 0.0474 | 0.1570 | 0.4691 | 100 | 0.0094 |
| 6 | Others(Not identified) | FUEL | 0.0192 | 0.0203 | 0.0322 | 0.0359 | 0.0179 | 0.0257 | 0.0440 | 0.1952 | 50 | 0.0078 |
| 7 | Citrus limon | FUEL | 0.0052 | 0.0450 | 0.0110 | 0.1087 | 0.0000 | 0.0000 | 0.0000 | 0.1699 | 50 | 0.0068 |
| 8 | Phoenix sylvestris | FUEL | 0.0145 | 0.0489 | 0.0485 | 0.0405 | 0.0243 | 0.0334 | 0.1164 | 0.3265 | 100 | 0.0065 |
| 9 | Citrus Pseudolimon | FUEL | 0.0420 | 0.0030 | 0.0182 | 0.0328 | 0.0312 | 0.0186 | 0.0000 | 0.1457 | 50 | 0.0058 |
| 10 | Elaeis guineensis | FUEL | 0.0011 | 0.0688 | 0.0151 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0850 | 30 | 0.0057 |
| 11 | Peltophorum pterocarpum | FUEL | 0.0094 | 0.0180 | 0.0334 | 0.0207 | 0.0052 | 0.0075 | 0.0425 | 0.1367 | 50 | 0.0055 |
| 12 | Albizia amara | FUEL | 0.0100 | 0.0081 | 0.0344 | 0.0250 | 0.0107 | 0.0036 | 0.0069 | 0.0987 | 50 | 0.0039 |
| 13 | Ficus benghalensis | FUEL | 0.0029 | 0.0025 | 0.0081 | 0.0178 | 0.0106 | 0.0121 | 0.1194 | 0.1735 | 100 | 0.0035 |
| 14 | Dalbergia paniculata | FUEL | 0.0047 | 0.0055 | 0.0084 | 0.0104 | 0.0103 | 0.0045 | 0.0473 | 0.0911 | 60 | 0.0030 |
| 15 | Semecarpus anacardium | FUEL | 0.0014 | 0.0056 | 0.0093 | 0.0080 | 0.0094 | 0.0154 | 0.0231 | 0.0722 | 50 | 0.0029 |
| 16 | Acacia chundra | FUEL | 0.0076 | 0.0062 | 0.0224 | 0.0130 | 0.0024 | 0.0034 | 0.0149 | 0.0699 | 50 | 0.0028 |
| 17 | Delonix regia | FUEL | 0.0019 | 0.0040 | 0.0045 | 0.0029 | 0.0024 | 0.0056 | 0.0058 | 0.0271 | 20 | 0.0027 |
| 18 | Holarrhena antidysenteric | FUEL | 0.0212 | 0.0121 | 0.0130 | 0.0064 | 0.0038 | 0.0002 | 0.0066 | 0.0633 | 50 | 0.0025 |
| 19 | Samanea saman | FUEL | 0.0005 | 0.0037 | 0.0317 | 0.0172 | 0.0189 | 0.0215 | 0.0226 | 0.1161 | 100 | 0.0023 |
| 20 | Anogeisus latifolia | FUEL | 0.0092 | 0.0097 | 0.0125 | 0.0196 | 0.0073 | 0.0081 | 0.0000 | 0.0663 | 60 | 0.0022 |
| 21 | Zizyphus mauritiana | FUEL | 0.0122 | 0.0092 | 0.0060 | 0.0009 | 0.0015 | 0.0005 | 0.0114 | 0.0417 | 40 | 0.0021 |
| 22 | Phoenix Loueirri | FUEL | 0.0012 | 0.0040 | 0.0015 | 0.0000 | 0.0029 | 0.0016 | 0.0392 | 0.0505 | 50 | 0.0020 |
| 23 | Ficus religiosa | FUEL | 0.0011 | 0.0034 | 0.0095 | 0.0166 | 0.0131 | 0.0054 | 0.0418 | 0.0911 | 100 | 0.0018 |
| 24 | Wrightia tinctoria | FUEL | 0.0103 | 0.0095 | 0.0111 | 0.0073 | 0.0076 | 0.0004 | 0.0052 | 0.0512 | 60 | 0.0017 |
| 25 | Cassia siamea | FUEL | 0.0014 | 0.0015 | 0.0066 | 0.0078 | 0.0093 | 0.0017 | 0.0068 | 0.0352 | 50 | 0.0014 |
| 26 | Eucalyptus cama | FUEL | 0.0053 | 0.0059 | 0.0163 | 0.0046 | 0.0022 | 0.0000 | 0.0009 | 0.0352 | 50 | 0.0014 |
| 27 | Boswellia glabra | FUEL | 0.0009 | 0.0020 | 0.0044 | 0.0169 | 0.0046 | 0.0049 | 0.0008 | 0.0344 | 50 | 0.0014 |
| 28 | Cleistanthus collinus | FUEL | 0.0131 | 0.0084 | 0.0034 | 0.0073 | 0.0011 | 0.0000 | 0.0000 | 0.0333 | 50 | 0.0013 |
| 29 | Annona squamosa | FUEL | 0.0064 | 0.0068 | 0.0039 | 0.0000 | 0.0020 | 0.0000 | 0.0122 | 0.0314 | 50 | 0.0013 |
| 30 | Ficus racemosa | FUEL | 0.0019 | 0.0031 | 0.0041 | 0.0029 | 0.0071 | 0.0043 | 0.0383 | 0.0618 | 100 | 0.0012 |
| 31 | Grewia rothi | FUEL | 0.0102 | 0.0049 | 0.0093 | 0.0019 | 0.0019 | 0.0009 | 0.0007 | 0.0299 | 50 | 0.0012 |
| 32 | Cassia fistula | FUEL | 0.0189 | 0.0040 | 0.0020 | 0.0003 | 0.0003 | 0.0001 | 0.0000 | 0.0257 | 50 | 0.0010 |
| 33 | Aegle marmelos | FUEL | 0.0007 | 0.0007 | 0.0000 | 0.0021 | 0.0000 | 0.0001 | 0.0152 | 0.0187 | 50 | 0.0007 |
| 34 | Diospyros chloroxylon | FUEL | 0.0066 | 0.0047 | 0.0025 | 0.0009 | 0.0000 | 0.0028 | 0.0000 | 0.0175 | 50 | 0.0007 |
| 35 | Pithacolobium dulce | FUEL | 0.0010 | 0.0033 | 0.0014 | 0.0007 | 0.0008 | 0.0004 | 0.0085 | 0.0161 | 50 | 0.0006 |
| 36 | Helecteres isora | FUEL | 0.0007 | 0.0002 | 0.0001 | 0.0082 | 0.0065 | 0.0000 | 0.0000 | 0.0157 | 50 | 0.0006 |
| 37 | Grewia tiliaefolia | FUEL | 0.0004 | 0.0007 | 0.0043 | 0.0023 | 0.0012 | 0.0064 | 0.0000 | 0.0153 | 50 | 0.0006 |
| 38 | Butea Frondosa | FUEL | 0.0037 | 0.0036 | 0.0016 | 0.0051 | 0.0011 | 0.0000 | 0.0002 | 0.0153 | 50 | 0.0006 |
| 39 | Avicennia officinalis | FUEL | 0.0001 | 0.0013 | 0.0046 | 0.0032 | 0.0036 | 0.0023 | 0.0000 | 0.0152 | 50 | 0.0006 |
| 40 | Phyllanthus emblica | FUEL | 0.0040 | 0.0036 | 0.0004 | 0.0030 | 0.0001 | 0.0041 | 0.0000 | 0.0152 | 50 | 0.0006 |
| 41 | Dendrocalamas strictus | FUEL | 0.0013 | 0.0013 | 0.0014 | 0.0001 | 0.0002 | 0.0008 | 0.0101 | 0.0150 | 50 | 0.0006 |

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|----|----------------------------------|------|--------|--------|--------|--------|--------|--------|--------|--------|-----|--------|
| 42 | <i>Buchanania lanzan</i> | FUEL | 0.0019 | 0.0025 | 0.0014 | 0.0013 | 0.0000 | 0.0076 | 0.0000 | 0.0147 | 50 | 0.0006 |
| 43 | <i>Alangium salvifolium</i> | FUEL | 0.0059 | 0.0038 | 0.0016 | 0.0016 | 0.0011 | 0.0000 | 0.0000 | 0.0140 | 50 | 0.0006 |
| 44 | <i>Naringi crenulata /Limoni</i> | FUEL | 0.0001 | 0.0006 | 0.0005 | 0.0020 | 0.0000 | 0.0035 | 0.0066 | 0.0133 | 50 | 0.0005 |
| 45 | <i>Mundulea suberosa</i> | FUEL | 0.0017 | 0.0042 | 0.0048 | 0.0003 | 0.0002 | 0.0006 | 0.0008 | 0.0126 | 50 | 0.0005 |
| 46 | <i>Baringtonia acutangula</i> | FUEL | 0.0004 | 0.0009 | 0.0000 | 0.0004 | 0.0006 | 0.0002 | 0.0097 | 0.0123 | 50 | 0.0005 |
| 47 | <i>Ficus heterophylla</i> | FUEL | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0022 | 0.0099 | 0.0122 | 50 | 0.0005 |
| 48 | <i>Anacardium occidentale</i> | FUEL | 0.0041 | 0.0049 | 0.0028 | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0121 | 50 | 0.0005 |
| 49 | <i>Moringa oleifera</i> | FUEL | 0.0024 | 0.0017 | 0.0019 | 0.0001 | 0.0057 | 0.0000 | 0.0001 | 0.0118 | 50 | 0.0005 |
| 50 | <i>Buchnanan laanania</i> | FUEL | 0.0036 | 0.0029 | 0.0025 | 0.0009 | 0.0009 | 0.0005 | 0.0000 | 0.0112 | 50 | 0.0004 |
| 51 | <i>Ficus mollis</i> | FUEL | 0.0004 | 0.0010 | 0.0008 | 0.0009 | 0.0037 | 0.0006 | 0.0136 | 0.0211 | 100 | 0.0004 |
| 52 | <i>Polyalthia cerasoides</i> | FUEL | 0.0020 | 0.0030 | 0.0004 | 0.0009 | 0.0007 | 0.0022 | 0.0000 | 0.0092 | 50 | 0.0004 |
| 53 | <i>Dalbergia volubilis</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0092 | 0.0092 | 50 | 0.0004 |
| 54 | <i>Pterocarpus marsupium</i> | FUEL | 0.0009 | 0.0032 | 0.0013 | 0.0020 | 0.0010 | 0.0000 | 0.0000 | 0.0083 | 50 | 0.0003 |
| 55 | <i>Prosopis spicigera</i> | FUEL | 0.0002 | 0.0002 | 0.0008 | 0.0003 | 0.0019 | 0.0014 | 0.0000 | 0.0048 | 30 | 0.0003 |
| 56 | <i>Sapindus emarginatus</i> | FUEL | 0.0005 | 0.0028 | 0.0016 | 0.0011 | 0.0009 | 0.0006 | 0.0003 | 0.0078 | 50 | 0.0003 |
| 57 | <i>Ficus hispida</i> | FUEL | 0.0012 | 0.0003 | 0.0025 | 0.0011 | 0.0000 | 0.0026 | 0.0000 | 0.0077 | 50 | 0.0003 |
| 58 | <i>Morinda citrifolia</i> | FUEL | 0.0020 | 0.0016 | 0.0028 | 0.0011 | 0.0000 | 0.0000 | 0.0000 | 0.0075 | 50 | 0.0003 |
| 59 | <i>Manilkara hexandra</i> | FUEL | 0.0022 | 0.0008 | 0.0021 | 0.0022 | 0.0000 | 0.0000 | 0.0002 | 0.0075 | 50 | 0.0003 |
| 60 | <i>Anogeissus acuminata</i> | FUEL | 0.0007 | 0.0003 | 0.0000 | 0.0013 | 0.0000 | 0.0000 | 0.0051 | 0.0075 | 50 | 0.0003 |
| 61 | <i>Strebulus asper</i> | FUEL | 0.0003 | 0.0002 | 0.0032 | 0.0035 | 0.0000 | 0.0000 | 0.0000 | 0.0073 | 50 | 0.0003 |
| 62 | <i>Givotia rottleriformis</i> | FUEL | 0.0002 | 0.0000 | 0.0033 | 0.0000 | 0.0036 | 0.0000 | 0.0000 | 0.0071 | 50 | 0.0003 |
| 63 | <i>Acacia planifrons</i> | FUEL | 0.0003 | 0.0004 | 0.0040 | 0.0000 | 0.0002 | 0.0000 | 0.0016 | 0.0065 | 50 | 0.0003 |
| 64 | <i>Sterculia urens</i> | FUEL | 0.0019 | 0.0042 | 0.0012 | 0.0032 | 0.0024 | 0.0000 | 0.0000 | 0.0130 | 100 | 0.0003 |
| 65 | <i>Premna tomentosa</i> | FUEL | 0.0007 | 0.0032 | 0.0023 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0062 | 50 | 0.0002 |
| 66 | <i>Strychnos nuxvomica</i> | FUEL | 0.0044 | 0.0028 | 0.0019 | 0.0019 | 0.0001 | 0.0000 | 0.0002 | 0.0113 | 100 | 0.0002 |
| 67 | <i>Calophyllum inophyllum</i> | FUEL | 0.0008 | 0.0013 | 0.0020 | 0.0013 | 0.0000 | 0.0000 | 0.0000 | 0.0055 | 50 | 0.0002 |
| 68 | <i>Eluodendrum monogynum</i> | FUEL | 0.0018 | 0.0012 | 0.0000 | 0.0005 | 0.0018 | 0.0000 | 0.0000 | 0.0053 | 50 | 0.0002 |
| 69 | <i>Morinda tinctoria</i> | FUEL | 0.0023 | 0.0030 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0053 | 50 | 0.0002 |
| 70 | <i>Pamburus missionis</i> | FUEL | 0.0035 | 0.0017 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0051 | 50 | 0.0002 |
| 71 | <i>Ballospermum montanum</i> | FUEL | 0.0001 | 0.0000 | 0.0049 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 50 | 0.0002 |
| 72 | <i>Ceiba pentandra</i> | FUEL | 0.0000 | 0.0003 | 0.0011 | 0.0003 | 0.0030 | 0.0000 | 0.0000 | 0.0048 | 50 | 0.0002 |
| 73 | <i>Gyrocarpus americanus</i> | FUEL | 0.0001 | 0.0011 | 0.0006 | 0.0009 | 0.0000 | 0.0000 | 0.0021 | 0.0048 | 50 | 0.0002 |
| 74 | <i>Gymnosporia spinosa</i> | FUEL | 0.0030 | 0.0016 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0046 | 50 | 0.0002 |
| 75 | <i>Acacia latronum</i> | FUEL | 0.0002 | 0.0005 | 0.0012 | 0.0016 | 0.0000 | 0.0000 | 0.0011 | 0.0046 | 50 | 0.0002 |
| 76 | <i>Cucurbita maxima</i> | FUEL | 0.0009 | 0.0024 | 0.0012 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0045 | 50 | 0.0002 |
| 77 | <i>Aylosia lineata</i> | FUEL | 0.0012 | 0.0003 | 0.0013 | 0.0018 | 0.0000 | 0.0000 | 0.0000 | 0.0045 | 50 | 0.0002 |
| 78 | <i>Diosporus melodubia</i> | FUEL | 0.0006 | 0.0017 | 0.0006 | 0.0013 | 0.0000 | 0.0000 | 0.0000 | 0.0043 | 50 | 0.0002 |
| 79 | <i>Breynia-vitis-idaea</i> | FUEL | 0.0023 | 0.0007 | 0.0007 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0040 | 50 | 0.0002 |
| 80 | <i>Palaquium ellipticum</i> | FUEL | 0.0020 | 0.0014 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 0.0000 | 0.0038 | 50 | 0.0002 |

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|-----|-------------------------|------|--------|--------|--------|--------|--------|--------|--------|--------|----|--------|
| 81 | Careya arborea | FUEL | 0.0004 | 0.0002 | 0.0005 | 0.0009 | 0.0016 | 0.0000 | 0.0000 | 0.0036 | 50 | 0.0001 |
| 82 | Zizyphus xylopyrus | FUEL | 0.0009 | 0.0003 | 0.0006 | 0.0000 | 0.0016 | 0.0000 | 0.0000 | 0.0033 | 50 | 0.0001 |
| 83 | Butea superba | FUEL | 0.0004 | 0.0000 | 0.0008 | 0.0000 | 0.0019 | 0.0000 | 0.0000 | 0.0031 | 50 | 0.0001 |
| 84 | Bauchinia racemosa | FUEL | 0.0005 | 0.0016 | 0.0009 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0030 | 50 | 0.0001 |
| 85 | Garuga pinnata | FUEL | 0.0002 | 0.0000 | 0.0015 | 0.0000 | 0.0012 | 0.0000 | 0.0000 | 0.0028 | 50 | 0.0001 |
| 86 | Gliricidia maculata | FUEL | 0.0003 | 0.0003 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0019 | 0.0026 | 50 | 0.0001 |
| 87 | Lumintzera racemosa | FUEL | 0.0002 | 0.0005 | 0.0012 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0026 | 50 | 0.0001 |
| 88 | Boswellia glabra | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0016 | 0.0009 | 0.0000 | 0.0000 | 0.0025 | 50 | 0.0001 |
| 89 | Alphonsea sclerocarpa | FUEL | 0.0000 | 0.0025 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0025 | 50 | 0.0001 |
| 90 | Strychnos patatorum | FUEL | 0.0013 | 0.0007 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0025 | 50 | 0.0001 |
| 91 | Zyzyphus regosa | FUEL | 0.0000 | 0.0002 | 0.0012 | 0.0003 | 0.0000 | 0.0008 | 0.0000 | 0.0025 | 50 | 0.0001 |
| 92 | Mollugu disticha | FUEL | 0.0003 | 0.0003 | 0.0004 | 0.0006 | 0.0004 | 0.0000 | 0.0004 | 0.0024 | 50 | 0.0001 |
| 93 | Wrightia tomentosa | FUEL | 0.0012 | 0.0010 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0022 | 50 | 0.0001 |
| 94 | Streblus asper | FUEL | 0.0004 | 0.0003 | 0.0014 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0022 | 50 | 0.0001 |
| 95 | Avicennia marina | FUEL | 0.0000 | 0.0008 | 0.0012 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0020 | 50 | 0.0001 |
| 96 | Garuga pinnata | FUEL | 0.0004 | 0.0011 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0020 | 50 | 0.0001 |
| 97 | Ixora palviflora | FUEL | 0.0003 | 0.0009 | 0.0008 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0020 | 50 | 0.0001 |
| 98 | Simarouba glauca | FUEL | 0.0019 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0020 | 50 | 0.0001 |
| 99 | Moringa concanensis | FUEL | 0.0002 | 0.0009 | 0.0000 | 0.0000 | 0.0000 | 0.0007 | 0.0000 | 0.0019 | 50 | 0.0001 |
| 100 | Thespesia populnea | FUEL | 0.0000 | 0.0002 | 0.0012 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0018 | 50 | 0.0001 |
| 101 | Vitex pinnata | FUEL | 0.0000 | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0011 | 0.0005 | 0.0018 | 50 | 0.0001 |
| 102 | Millingtonia hortensis | FUEL | 0.0001 | 0.0001 | 0.0005 | 0.0001 | 0.0006 | 0.0003 | 0.0000 | 0.0017 | 50 | 0.0001 |
| 103 | Terminalia catappa | FUEL | 0.0001 | 0.0001 | 0.0009 | 0.0000 | 0.0004 | 0.0001 | 0.0000 | 0.0017 | 50 | 0.0001 |
| 104 | Crotonseabiosus | FUEL | 0.0003 | 0.0002 | 0.0012 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0017 | 50 | 0.0001 |
| 105 | Erianthus arundinaccus | FUEL | 0.0003 | 0.0014 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0016 | 50 | 0.0001 |
| 106 | Diehrostachys cinerea | FUEL | 0.0002 | 0.0000 | 0.0015 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0016 | 50 | 0.0001 |
| 107 | Gymnostroreacmerta | FUEL | 0.0001 | 0.0001 | 0.0000 | 0.0011 | 0.0001 | 0.0001 | 0.0000 | 0.0016 | 50 | 0.0001 |
| 108 | Cardia obligua | FUEL | 0.0000 | 0.0000 | 0.0003 | 0.0000 | 0.0012 | 0.0000 | 0.0000 | 0.0015 | 50 | 0.0001 |
| 109 | Aphanostachys polyst | FUEL | 0.0000 | 0.0004 | 0.0000 | 0.0010 | 0.0000 | 0.0000 | 0.0000 | 0.0014 | 50 | 0.0001 |
| 110 | Bridella Montana | FUEL | 0.0010 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0013 | 50 | 0.0001 |
| 111 | Bridelia cinerascous | FUEL | 0.0006 | 0.0000 | 0.0007 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0013 | 50 | 0.0001 |
| 112 | Aylosia lineata | FUEL | 0.0007 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0013 | 50 | 0.0001 |
| 113 | Gardenia latifolia | FUEL | 0.0001 | 0.0000 | 0.0000 | 0.0012 | 0.0000 | 0.0000 | 0.0000 | 0.0013 | 50 | 0.0001 |
| 114 | Mundulea sericea | FUEL | 0.0011 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0013 | 50 | 0.0001 |
| 115 | Saraca asoka | FUEL | 0.0002 | 0.0003 | 0.0002 | 0.0002 | 0.0001 | 0.0003 | 0.0001 | 0.0013 | 50 | 0.0001 |
| 116 | Milium tomentosa | FUEL | 0.0010 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0012 | 50 | 0.0000 |
| 117 | Phyllanthus reticulatus | FUEL | 0.0003 | 0.0009 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0012 | 50 | 0.0000 |
| 118 | Morinda tomentosa | FUEL | 0.0003 | 0.0000 | 0.0000 | 0.0008 | 0.0000 | 0.0000 | 0.0000 | 0.0011 | 50 | 0.0000 |
| 119 | Dolichandrone falcata | FUEL | 0.0004 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0011 | 50 | 0.0000 |

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|-----|---------------------------------|------|--------|--------|--------|--------|--------|--------|--------|--------|----|--------|
| 120 | <i>Acacia ferruginea</i> | FUEL | 0.0000 | 0.0001 | 0.0002 | 0.0007 | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 50 | 0.0000 |
| 121 | <i>Memecylon umbellatum</i> | FUEL | 0.0000 | 0.0000 | 0.0010 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 50 | 0.0000 |
| 122 | <i>Drris indica</i> | FUEL | 0.0000 | 0.0003 | 0.0007 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 50 | 0.0000 |
| 123 | <i>Cassine glauca</i> | FUEL | 0.0001 | 0.0000 | 0.0009 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 50 | 0.0000 |
| 124 | <i>Zyzyphus nummu laria</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 50 | 0.0000 |
| 125 | <i>Bridella retusa</i> | FUEL | 0.0001 | 0.0005 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 50 | 0.0000 |
| 126 | <i>Randia uliginosa</i> | FUEL | 0.0001 | 0.0005 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0010 | 50 | 0.0000 |
| 127 | <i>Zizyphus oenoplea</i> | FUEL | 0.0004 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0009 | 50 | 0.0000 |
| 128 | <i>Persea macranth</i> | FUEL | 0.0000 | 0.0002 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0009 | 50 | 0.0000 |
| 129 | <i>Acacia farnesiana</i> | FUEL | 0.0002 | 0.0000 | 0.0000 | 0.0001 | 0.0002 | 0.0004 | 0.0000 | 0.0009 | 50 | 0.0000 |
| 130 | <i>Ficus benjamina</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 0.0004 | 0.0000 | 0.0001 | 0.0008 | 50 | 0.0000 |
| 131 | <i>Polyalthia serasoides</i> | FUEL | 0.0008 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 132 | <i>Canthium dicocum</i> | FUEL | 0.0002 | 0.0000 | 0.0000 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 133 | <i>Avicenia marina</i> | Fuel | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 134 | <i>Cochlospermum religiosum</i> | FUEL | 0.0005 | 0.0000 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 135 | <i>Holorina Antidecentrica</i> | FUEL | 0.0006 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 136 | <i>Hibisum Pentanifolia</i> | FUEL | 0.0000 | 0.0000 | 0.0001 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 137 | <i>Zanthoxylum rhetsa</i> | FUEL | 0.0000 | 0.0008 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 50 | 0.0000 |
| 138 | <i>Ixora pavetta</i> | FUEL | 0.0007 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0007 | 50 | 0.0000 |
| 139 | <i>Diospyros cordifolia</i> | FUEL | 0.0007 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0007 | 50 | 0.0000 |
| 140 | <i>Fievus mollis</i> | FUEL | 0.0000 | 0.0001 | 0.0000 | 0.0002 | 0.0000 | 0.0004 | 0.0001 | 0.0007 | 50 | 0.0000 |
| 141 | <i>Parviflorum lamk</i> | FUEL | 0.0005 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0007 | 50 | 0.0000 |
| 142 | <i>Euphorbia nivulia</i> | FUEL | 0.0003 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0007 | 50 | 0.0000 |
| 143 | <i>Firmiania colorata</i> | FUEL | 0.0001 | 0.0000 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0006 | 50 | 0.0000 |
| 144 | <i>Holarrhena pubescens</i> | FUEL | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0006 | 50 | 0.0000 |
| 145 | <i>Camellia thea</i> | FUEL | 0.0000 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0006 | 50 | 0.0000 |
| 146 | <i>Limonia alata</i> | FUEL | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0006 | 50 | 0.0000 |
| 147 | <i>Bauhinia purpurea</i> | FUEL | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0006 | 50 | 0.0000 |
| 148 | <i>Ixora arborea</i> | FUEL | 0.0000 | 0.0004 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0006 | 50 | 0.0000 |
| 149 | <i>Feronia limonia</i> | FUEL | 0.0000 | 0.0000 | 0.0003 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 150 | <i>Erythrina suberosa</i> | FUEL | 0.0000 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 151 | <i>Croton Oblogifolium</i> | FUEL | 0.0002 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 152 | <i>Dioscorea tomen</i> | FUEL | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 153 | <i>Desmodium hetrcarpus</i> | FUEL | 0.0000 | 0.0000 | 0.0004 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 154 | <i>Dhumpiti</i> | FUEL | 0.0000 | 0.0000 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 155 | <i>Sorghum halpense</i> | FUEL | 0.0001 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 156 | <i>Sapindus emargi</i> | FUEL | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0005 | 50 | 0.0000 |
| 157 | <i>Sulvadora persica</i> | FUEL | 0.0000 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |
| 158 | <i>Bridelia hamiltoniana</i> | FUEL | 0.0000 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |

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|-----|--------------------------------|------|--------|--------|--------|--------|--------|--------|--------|--------|----|--------|
| 159 | <i>Cluytia collina</i> | FUEL | 0.0001 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |
| 160 | <i>Chomelia asiatica</i> | FUEL | 0.0000 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |
| 161 | <i>Ficus carica</i> | FUEL | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |
| 162 | <i>Mangifera Sylva</i> | FUEL | 0.0000 | 0.0000 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |
| 163 | <i>Indigofera palchella</i> | FUEL | 0.0000 | 0.0000 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |
| 164 | <i>Prunus dulcis</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0004 | 50 | 0.0000 |
| 165 | <i>Cordia dichotoma</i> | FUEL | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |
| 166 | <i>Trichilla connaroides</i> | FUEL | 0.0001 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 50 | 0.0000 |
| 167 | <i>Dendrocalamus hamilton</i> | FUEL | 0.0000 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 168 | <i>Ougenia ojenencies</i> | FUEL | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 169 | <i>Acacia suma</i> | FUEL | 0.0000 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 170 | <i>Flacourtia indica</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 171 | <i>Carallia brachiata</i> | FUEL | 0.0000 | 0.0000 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 172 | <i>Limonia acidisima</i> | FUEL | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 173 | <i>Randia spinosa</i> | FUEL | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 174 | <i>Pasili gunna</i> | FUEL | 0.0000 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 175 | <i>Colycopteris floribunda</i> | FUEL | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 176 | <i>Casuarina equisetifolia</i> | FUEL | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 177 | <i>Boethavia chinesis</i> | FUEL | 0.0000 | 0.0000 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 50 | 0.0000 |
| 178 | <i>Bahuhinia malabarica</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0002 | 50 | 0.0000 |
| 179 | <i>Phoenix Loureirii</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 50 | 0.0000 |
| 180 | <i>Eragistielia bifarice</i> | FUEL | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 50 | 0.0000 |
| 181 | <i>Carica papaya</i> | FUEL | 0.0000 | 0.0001 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 50 | 0.0000 |
| 182 | <i>Elaeodendron roxburg</i> | FUEL | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 50 | 0.0000 |
| 183 | <i>Olx scandans</i> | FUEL | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 50 | 0.0000 |
| 184 | <i>Merremia vitifolia</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 0.0002 | 50 | 0.0000 |
| 185 | <i>Catularegum spinosa</i> | FUEL | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 186 | <i>Ochna jabotapit</i> | FUEL | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 187 | <i>Buchania latifolia</i> | FUEL | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 188 | <i>Cassia auriculata</i> | FUEL | 0.0001 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 189 | <i>Ficus mysorensis</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 190 | <i>Sindugu</i> | FUEL | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 191 | <i>Ehretia laevis</i> | FUEL | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 192 | <i>Bahuhinia racemosa</i> | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 193 | <i>paidi thangadi</i> | FUEL | 0.0000 | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 194 | <i>Pedalium murex</i> | FUEL | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 195 | <i>Aegiceras comiculatum</i> | FUEL | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 196 | <i>Jatropha curcas</i> | FUEL | 0.0000 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |
| 197 | <i>Ficus lucesens</i> | FUEL | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 50 | 0.0000 |

| | | | | | | | | | | | | |
|-----|----------------------------------|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----|---------------|
| 276 | Grewia damina | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 277 | Macaranga peltata | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 278 | Manisurus mtusus | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 279 | Combretum ovalifolium | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 280 | Hemidesmus indicus | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 281 | Commelina benghalensis | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 282 | Fluggea leucopyrus | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 283 | Elettaria cardamomum | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 284 | Tabernaemontana divaricat | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 285 | Caesalpinia pulcherrim | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 286 | Spondias pinnata | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 287 | Annona reticulata | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 288 | Pavetta candolleana | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 289 | Aristolochia grandiflora | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 290 | Cascuta | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 291 | Punica Granatum | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 292 | Manikara Zapota | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 293 | Rahadalla | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 294 | Cronton bonplandianus | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 295 | Citrus limon | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 296 | Linociera ramiflora | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 297 | Cassia glance | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 298 | Ricinus communis | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| 299 | Desmodium gangeticum | FUEL | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 50 | 0.0000 |
| | Total | FUEL | 0.4768 | 0.6134 | 0.8210 | 0.8844 | 0.6493 | 0.4053 | 1.8733 | 5.7235 | | 0.2198 |