GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT AND FORESTS

REPORT
ON
WOOD CONSUMPTION STUDY
IN
MANDYA DISTRICT
(KARNATAKA)

FOREST SURVEY OF INDIA
SOUTHERN ZONE
BANGALORE
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PREFACE

The wood consumption study in Mandya District was conducted by the Forest Survey of India, Southern Zone, Bangalore during January-February 1994. As per this study the total annual requirement of timber for Mandya district is 32,567 cu.m and that of firewood is 5,14,275 tonnes. The per capita timber consumption in rural and urban sectors are 0.685 cu.m and 0.624 cu.m per annum respectively. The per capita fuelwood consumption figures per annum in these sectors are 0.325 Tonnes and 0.168 Tonnes respectively. There exists a considerable gap between demand and supply of these commodities which needs to be solved by taking specific measures as suggested in the report. The study has also attempted to assess the future requirements of wood for 2001 A.D. and puts them at 1,26,096 cum of timber and 5,68,861 tonnes of firewood considering various components of presently prevalent consumption scenario.

The survey work was carried out by the field party consisting of Sri Thanasekhar, Fieldman and Sri H.P.Ranganath Fieldman led by Sri K.S.Reddy, Junior Technical Assistant under the overall supervision of Sri Devendra Kumar IFS , Deputy Director, and Sri M.Muni Reddy IFS, Joint Director, Southern Zone, Bangalore. The data processing was done by Sri S.Sampath, J.T.A in the office of Joint Director, at Bangalore.The report writing has

been done by Sri Devendra Kumar IFS, Deputy Director and Sri A.K.Jha IFS, Joint Director, Southern Zone, Bangalore.

We thankfully acknowledge the cooperation extended by the officers and staff of Karnataka Forest Department. It was extremely helpful in timely completion of field work.

It is hoped that this report will help in strengthening the interests of conservation and will be useful in future planning and development initiatives.

Date 16th Feb.1995

Dr.S.N.Rai,
Director,
Forest Survey of India,
Dehradun-248195

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1.1 Introduction

The wood consumption survey in Mandya District of Karnataka was carried out during the year 1993-94 by the Forest Survey of India, Southern Zone, Bangalore. It is based upon the methodology developed by the Forest Survey of India, Dehradun. The Forest Survey of India, Southern Zone, undertook the work of inventory of forest resources in Mandya District and completed the same in February 1994. The wood consumption study was carried out simultaneously from December 1993 to February 1994.

1.2 Objectives:

The objectives of the wood consumption survey in Mandya District were as follows:-

1. To study the wood consumption pattern in relation to uses such as for building-construction, furniture, agricultural implements, fuel etc for both rural and urban areas.

2. To study the effect of household size and income levels on the consumption of wood.

3. To study the variations in the wood consumption based upon the distance from the forests.

4. To assess the total present consumption of wood and bamboo in the district.

5. To study the gap between the present demand and supply position.

1,3 Methodology:

The village/town/city was the basic sampling unit. The entire survey area of the district was divided into three strata viz., A,B,& C. A & B form part of rural areas while C comprises of urban areas. Stratum "A" consists of village falling within the radius of 5 Km from the forests while Stratum 'B' consists of villages falling beyond 5 Km from the forests. 1.5% of the total villages in each stratum of the District was selected at random for data collection. Ten households representing different income groups in each selected village were picked up at random for data collection. In stratum 'C', the town/cities with population upto 50,000 and more than 50,000 were listed out. Five towns/Cities were selected randomly from the list. Since there was only one city 'Mandya' having population more than 50,000 it was selected for data collection. Out of 10 towns of another category existing in the district, 4 were selected at random. Twenty households in each town/city were selected for data collection.

1.4   Income-Groups:

Sampled households were classified into three income groups based upon their annual income. The families having annual income upto 10,000 were classified in lower income group while those having their annual income from 10,000 to Rs.15,000 and more than Rs.15,000 were grouped in middle and upper income-groups respectively

1.5   Growth Rate of Population:

To project the per capita consumption and future demand of wood the population growth was estimated by using the following formula: $A = P(1+r)^x$ where,

A = Population as per 1991 census.

P = Population as per 1981 census.

r = Annual rate of increase of population.

x = Time of interval in years between successive census of population as well as households.

1.6   Data Collection:

Field party led by Junior Technical Assistant and assisted by Fieldmen collected data from selected households in the selected villages. The data collected were in terms of quantity of timber utilised for building construction, furniture, agricultural implements, firewood consumption etc. The sample forms used for collection of data are given in the Appendix 'D'. Conversion factors as given in the manual were used for assessing the quantity of timber used for different purposes. The forms were checked up at Headquarters and processed by Personal Computer.

1.7   Estimation of Consumption Pattern:

Regression analysis was carried out for the data collected under each stratum taking the size of the household as the independent variable and per capita consumption of wood for various purposes as the dependent variable. Per capita consumption of wood in each stratum for different kinds of use was estimated by using the formula:

$Y = mx + c$, Where Y is the per capita wood consumption

in the sampled household

m and c are constants estimated by the

regression analysis.

average

x is the size of the sampled

household.

CHAPTER-II

GENERAL DESCRIPTION OF THE SURVEY AREA

2.1   Location

Mandya district is located in the central belt of the southern sector of Karnataka State. It lies between 12° 13'N and 13° 04'N latitudes and 76° 19'E and 77°20'E longtitudes. It is bounded by Hassan District on the north-west, Tumkur district on the north and north-east, Bangalore district on the east and Mysore district on the south and south-west.

2.2   Topography

The district has been physiographically classified as the Southern maidan (plains) regions of Karnataka. The land of the district forms an undulating plain situated at an average elevation of 750 to 900 metres above mean sea-level. There are a few sporadic outcrops of rocky hills and a few fertile, but shallow valleys. The Biligiri Rangan Betta Range hills of the adjoining Mysore district extend over the south-eastern parts of this district as well and taper off into the plains. The Melukote Range of hills form a broken series of conspicuous peaks which reach the altitude of 1159 M, 1064 M, 1050 M and 1046 M above the MSL.

The drainage is towards the east and comprises of three river basins: the Shimsha, the Lokapavani, and the Cavery.

2.3   Area and population

The total geographical area of the district is 4961 Km². It contains 7 taluks, 1478 villages and 11 towns as per 1991 census, the total population of the district is 16,44,374; out of which 83.77% is rural. It has population density of 331 per sq.km, sex ratio 963 and literacy 48.15%. In the total population of the district, 38.65% are main-workers, 5.85% are marginal-workers and remaining 55.50% are non workers. Out of main-workers, 53.22% are cultivators, 24.96% are agricultural labourers and 21.82% are other workers.

2.4   Forests

The total area under forest in the district is about 258 sq.km. which amounts to 5.2% of the geographical area. Out of 258 sq.km. of forest area, only 6 sq.km. forest is the dense forest, rest of the area being open forest.

The forests of the district is mainly Dry Deciduous and Scrub type.

2.5   Climate

The district is endowed with an agreeable climate all through the year. April is generally the hottest month with maximum day temperature around 35°C. December is the coldest month with mean maximum and minimum temperatures of 28°C and 16°C respectively. The rainfall is generally uniform throughout the district with an average of 690 mm with 45 rainy days in an year. The district receives rainfall both in the south-west monsoon season and the retreating monsoon season which together cover the period from mid-June to mid-November. In all parts of the district the heaviest rainfall occurs between mid-September and mid-October.

CHAPTER-III

WOOD CONSUMPTION IN RURAL AREAS -STRATUM'A'

3.1   At a sampling intensity of 1.5 per cent, altogether 24 villages were selected, 9 in stratum 'A' and 15 in stratum 'B' for collecting data from the individual households. Villages falling within a radius of 5 km from the forest area were classified as stratum 'A' and villages which are beyond the radius of 5 km from the forest area were put in stratum 'B' Ten households representing different income-groups were selected in each village for data collection and the data were collected in the format given in Appendix 'D'.

3.2   Wood consumption Pattern in Stratum 'A'

Wood consumption pattern was studied in 90 households in 9 villages of stratum 'A'. The list of villages has been given in Appendix 'A'. The data were analysed by using regression analysis taking the average size of the household as independent variable and per capita consumption of wood as dependent variable. Taking average size of the household for the district as 5.27 based upon the census data, the per capita consumption of wood for different purposes such as building, construction, furniture, agricultural implements were studied. The following table shows the per capita consumption of wood in Stratum 'A'.

Table No.1

PER CAPITA CONSUMPTION OF WOOD IN STRATUM-A

S.No	Item	Unit	Quantity
1.	Building Construction	M³	0.387
2.	Furniture	M³	0.023
3.	Agricultural implements	M³	0.028
4.	Total Timber	M³	0.434
5.	Firewod	Tonnes/annum	0.571

3.3   The pattern of wood consumption was also studied by sub-dividing the sampled households into three income groups viz. upper, middle and low as classified in para 1.4.   For the average size of the household ie., 5.27, different per capita wood consumption pattern is noticed for different income groups as shown in Table-2.

Table No.2

PER CAPITA CONSUMPTION OF WOOD IN STRATUM-A

(INCOME GROUPWISE)

S.No.	Item	Unit	Income groups		
			Low	Middle	Upper
1.	Building Construction	M³	0.321	0.492	0.942
2.	Furniture	M³	0.004	0.009	0.049
3.	Agricultural Implements	M³	0.010	0.008	0.060
4.	Total Timber	M³	0.335	0.512	1.042
5.	Firewood	Tonnes/ annum	0.399	0.455	0.388
6.	Bamboo	No	9.3	51.6	4.6

The consumption pattern of timber shows increasing trend from low income level to middle and further to upper level indicating that in this stratum the income level and availability of wood decides the consumption pattern. Annual firewood consumption also increases from 0.359 tonnes/annum to 0.455 tonnes/annum from low to middle income group but decreases to 0.388 in the upper income group which indicates that the upper income group people have gone for alternative sources of energy.

From the analysis of data on use of agricultural waste as fuel it is found that per capita annual consumption for low, middle and upper income groups are 0.989, 0.759 and 1.74 M.Tonnes respectively.

Per capita Bamboo consumption pattern does not show any correlation with respect to income. The middle income group seems to be using much more number of bamboo than others.

The total timber consumption in upper income group is much high (roughly twice of middle income group and thrice of low income group) as compared to other income groups which is contrary to the general hypothesis that with the improved level of economy, alternate material or wood substitutes will be used.

Adding the figures of firewood and agricultural waste used as per capita fuel material, one finds that the figures for lower, middle and higher income groups come to 1.388, 1.214 and 2.128 M.T. respectively. The components of agricultural waste for higher and lower income groups are 1.74 and .989 MT which is significantly higher than for the middle income group which is .759 MT. These figures on one side indicate the net availability of fuel material, higher dependence of middle income group on firewood, shifting of pressure of higher income group onto relatively easily available and cheaper material like agricultural waste as also the difference in life styles between higher and lower income groups and related fuel consumption levels.

The consumption of bamboo reflects the differences in the house types of people at different income levels. The low income group in Mandya can hardly afford expensive bamboo material and hence depend mostly on coconut leaves etc for roofing while the higher income group goes for 'pucca' or 'semi pucca' house. It is the middle income group which consumes maximum bamboo per capita per year and maintains an appropriate type of dwelling. For the totality of the stratum, however, the bamboo consumption derivation being inconclusive is not reported.

CHAPTER-IV

WOOD CONSUMPTION IN RURAL AREA IN STRATUM 'B'

4.1   Stratum 'B' consists of villages situated beyond 5 km distance from the nearest forest areas. Fifteen villages were selected in this category for collection of household data regarding wood consumption. In each villages, 10 households of various income groups were studied. The list of villages is given in Appendix 'B'.

4.2   Per capita wood consumption for various uses was estimated by taking the average size of the household as 5.27. The following table gives the pattern of wood consumption:--

Table No.3

PER CAPITA WOOD CONSUMPTION IN STRATUM-'B'

S.No	Item	Unit	Quantity
1.	Buidling construction	M^3	0.700
2.	Furniture	M^3	0.030
3.	Agricultural Implements	M^3	0.020
4.	Total Timber	M^3	0.749
5.	Firewood	T/Annum	0.252
6.	Bamboo	No.	39.7

4.3   After carrying out the regression analysis of the data
of households subdivided into different income groups, it is seen
that for the same average size of the household, different pat-
tern of per capita wood consumption appears.   The table No.4
indicates the consumption pattern in different income groups:-

Table No.4

PER CAPITA WOOD CONSUMPTION IN STRATUM -B (INCOME GROUP WISE)

S.No	Item	Unit	Income Groups		
			Low	Middle	Upper
1	2	3	4	5	6
1.	Building Construction	M^3	0.272	0.776	1.089
2.	Furniture	M^3	0.001	0.023	0.051
3.	Agricultural Implements	M^3	0.011	0.026	0.036
4.	Total Timber	M^3	0.282	0.825	1.176
5.	Firewood	Tonnes/ annum	0.217	0.279	0.243
6.	Bamboo	NO	18.700	18.000	44.900

From the above data it is evident that per capita consumption of wood increases with rise of income in all the items viz. Building construction, furniture and agricultural implements. The consumption of timber in upper income groups is approximately 4 times that of low income groups indicating that it is the economy level which decides the consumption pattern.

The annual consumption of firewood is also varying considerably from 0.217 MT from low income to 0.279 MT to middle income group and 0.243 MT to upper income group. The per capita annual consumption of agricultural waste which is used as alternate source of firewood in three income groups are 0.953, 1.111 and 0.995 MT respectively.

4.4   Per capita consumption of wood in rural area (Stratum A+B)

The following table shows the consumption pattern of wood in rural areas when anaysed the data of strata (A+B) in combined manner.

Table No.5

PER CAPITA CONSUMPTION OF WOOD IN STRATUM A+B

S.No	Item	Unit	Quantity
1.	Building Construction	M^3	0.638
2.	Furniture	M^3	0.028
3.	Agricultural Implements	M^3	0.019
4.	Total Timber	M^3	0.685
5.	Firewood	Tonnes/annum	0.325
6.	Bamboo	No.	31.400

The per capita consumption of firewood is 0.325 MT per annum which is still considerable, although this district contains 5.2% of forest areas. The economy of the district is based upon agriculture and that is why per capita consumption of agriculture waste as fuel is roughly about 0.956 MT which is 3 times more than forest material used as firewood.

After comparing the data of Stratum A & B (Table 1 & 3) it is seen that consumption pattern of timber is not directly correlable to the factor of distance from the forest area. On the contrary the per capita consumption of timber for various purposes is more in stratum-B than Stratum-A. This indicates

that it is only economy level and not just nearness of a forest which decides the consumption pattern in regard to timber. But consumption pattern of firewood is affected by nearness of the forest area. Availability of firewood material plays significant role in deciding the pattern. The consumption of firewood in the area nearer to the forest is more than the double of that in the area situated far off from the forest area.

As regards per capita firewood consumption, there is a decrease for all income groups as compared to the figures for stratum 'A'. Combining the figures of firewood and agricultural waste, one finds that the per capita consumption for higher income group of strata B covers down to 1.138 MT. In fact a manned reduction in the contribution of agricultural waste to consumption figures indicates that there is a shift in favour of use of alternatives like kerosene, LPG etc. The lower and middle income groups, however cannot afford these and are still depend-ent on traditional resources. A reduction in consumption for lower income group may also indicate a more careful use as a result of resource crunch.

The per capita consumption of bamboo indicates a higher consumption by higher income group of stratum B. This may indicate varied use of the same for different purposes including cattle shed etc. The increased use of bamboo by lower and middle income group people indicates relatively better housing. Fur-ther, some middle income group people might have gone for 'pucca' or 'semi pucca' consuming lesser number.

CHAPTER —V

WOOD CONSUMPTION IN URBAN AREAS AND IN ENTIRE DISTRICT

5.1   As per 1991 census there are 11 towns/cities in the district. For selection of sample towns/cities for the study, towns/cities were listed into two categories — those having population less than 50,000 and those having population more than 50,000. Mandya city has population exceeding 50,000 and this was selected for data collection. Out of the remaining towns of another category Malavalli, Shrirangapatnam, Pandavapura and Maddur were selected. Twenty households in each town/cities were chosen for data collection.

As per 1991 census, the urban population of the district rose to 2,66,804 from 2,20,025 in 1981 with an annual growth rate of 1.95% as compared to growth rate of 1.4% for the same period of rural population. With this growth rate the urban population would be around 2,82,718 in 1994 and 3,23,641 in 2001. Average size of household has decreased from 5.59 in 1981 to 5.18 in 1991. As per the prevalent trend of growth of population and that of urban household, it it estimated that the average size of household in both the years i.e., 1994 and 2001 would be 4.8 only.

5.2   Result and Discussions

The data collected from 20 households from each se-
lected town were analysed statistically by carrying out regres-
sion analysis as was done for the stratum A & B.

By taking the average size of household as 4.8 based
upon census data, the per capita consumption of wood for various
purposes were estimated. The table No.6 indicates the consump-
tion pattern in this stratum.

Table No.6

PER CAPITA CONSUMPTION OF WOOD IN STRATUM - C

S.No.	Item	Unit	Quantity
1.	Building construction	M^3	0.489
2.	Furniture	M^3	0.134
3.	Agricultural Implements	M^3	0.007
4.	Total Timber	.M^3	0.624
5.	Firewood	Tonnes/ annum	0.168
6.	Bamboo	Nos.	1.700

Per capita wood consumption for furniture in stratum 'C' is higher than that in Stratum 'A' & 'B' indicating more furniture usage in towns/cities than in villages. It also indicates that the wood is still the favoured items for furniture.

In Stratum 'C' still some wood is used as agricultural implements indicating that in this district still some portion of urban population depends upon agriculture for their livelihood.

Per capita consumption of firewood in the stratum is lowest being 0.168 MT/annum as compared to 0.591 MT/annum, 0.252 MT/annum in Stratum A & B respectively. It indicates that increasing trend of use of alternative source of energy like electricity, L.P.G as fuel.

5.3   Comparision of Wood Consumption Pattern in different strata

The table No.7 shows per capita wood consumption in three different strata irrespective of the income of the household.

Table No.7

TABLE SHOWING PER CAPITA CONSUMPTION IN VARIOUS STRATA ie.,

STRATUM A, B & C

S.No	Item	Unit	Stratum		
			A	B	C
1	2	3	4	5	6
1.	Building Construction	M³	0.387	0.700	0.489
2.	Furniture	M³	0.023	0.030	0.134
3.	Agricultural Implements	M³	0.028	0.020	0.007
4.	Total Timber	M³	0.434	0.749	0.624
5.	Firewood	Tonnes/ annum	0.591	0.252	0.168
6.	Bamboo	Nos.	-	39.7	1.7

The consumption pattern is indicated as under:-

1. The nearness to the forest area does not play significant role in deciding the consumption pattern. This is because the district has forest cover over 5.2% of its geographical area only. Therefore, it is the economy level and not just the proximity of resources which plays an important role in deciding the consumption pattern. This also indicates commodification of forest produce under question.

2. Per capita consumption of wood for furniture is higher in towns/cities than that in rural area and shows that furniture usage is more in urban areas than in villages.

3. Per capita firewood consumption is less in urban areas since alternative sources of energy such as electricity L.P.G. are available and widely consumed here.

4. In urban areas also wood is still consumed for making agricultural implements. This is due to the reason that still the urban economy of the district is primarily rural-based.

5.4 Present and Furture Requirement Scenario of Mandya District

The present requirement of wood has been estimated on the basis of per capita consumption and estimated population of the district at the time of survey work. The population estimation has been made for both rural and urban areas by taking into account the census data of Mandya district for the years 1981 and 1991. The growth rate of population 'r' has been calculated by using the formula $A = P (1 + r)^x$ where, A and P are population as per 1771 and 1981 census respectively and x is the time interval in years between successive census operations.

The following table shows the population figures for rural (Stratum A & B) and urban (Stratum C) for 1981, 1991 and projected figures for 1974 and 2001.

Table No.8

POPULATION FIGURES, GROWTH RATE AND ESTIMATION OF POPULATION BY 2001

S.No.	Item	1981 Census	1991 Census	Annual rate of growth	Estimate for 1994	Estimate for 2001
1.	Rural Population	1198084	1377570	1.4	1436241	1583044
2.	Rural Household	208853	256425	2.07	272680	314732
3.	Average size of rural household	5.74	5.37	-	5.27	5.03
4.	Urban population	220025	266804	1.95	282718	323641
5.	Urban Household	5.59	5.18	-	4.80	4.80

The present per capita consumption of total timber, firewood and bamboo based on this study is summarised below:-

Table No.9

PER CAPITA WOOD CONSUMPTION BY RURAL & URBAN POPULATION

S.No	item	Unit	Rural	Urban
1.	Total Timber	M^3	0.685	0.624
2.	Firewood	Tonnes/annum	0.325	0.168
3.	Bamboo	No.	31.400	1.700

The total timber and firewood requirement for 1974 and 2001 are arrived after taking into account the population growth and is summarised as below:

TABLE NO.10

PRESENT TIMBER UTILITY IN M^3 AND PROJECTION OF FUTURE REQUIREMENT

Item	1994	2001	Additional requirement in 7 years
Rural area	983825	1084385	1,00,560
Urban area	176416	201952	25,536
Total	1160241	1286337	1,26,096

TABLE NO.11

PRESENT FIREWOOD CONSUMPTION AND FUTURE FIREWOOD REQUIREMENT IN TONNES/ANNUM

Item	1994	2001
Rural area	466778	514489
Urban area	47497	54372
Total	514275	568861

TABLE NO.12

PRESENT BAMBOO CONSUMPTION AND FUTURE REQUIREMENT OF BAMBOO IN NUMBERS

ITEM	1994	2001
Rural area	4,50,97,967	4,97,07,581
Urban area	4,80,620	5,50,190
Total	4,55,78,587	5,02,57,771

In addition to the requirement for rural and urban areas as shown in the above tables, consumption for repairs/replacement to house, furniture, agricultural implements are to be taken into account. The following assumption has been made in this connection on the basis of study carried out by this zone in Kolar district:-

i) About 1.3% of timber is replaced annually for construction purposes.

ii) Assuming the life of furniture to be 50 years, 2% timber is replaced every year.

iii) The average life of agricultural implements is about 10-12 years. Thus about 8% timber is re placed every year.

The data collected in Mandya district shows that in rural areas about 93% of the total timber used are utilised for construction purposes, 4% for furniture and 3% for agricultural implements. In urban areas approximately 78% of the timber is used for building construction, 21% for furniture and 1% for agricultural implements.

Being on the conservative side if one percent timber is replaced anunally for house construction, the total quantity required will be about 9,150 M^3 in the rural area and 1,376 M^3 in the urban areas. At the rate of 2% annual replacement in case of furniture the total quantity of wood required will be 787 M^3 in

rural area and 741 M³ in urban areas. Similarly at the rate of 8% replacement for agricultural implements, the total quantity required will be 2,361 M³ for rural sector and 141 M³ for urban sector. The following table shows the estimated quantity required annually for repairs and replacements for various items:

TABLE NO.13

QUANTITY OF WOOD ANNUALLY REQUIRED FOR REPAIRS AND REPLACEMENTS.

S.No	Item	Unit	Rural	Urban	Total
1.	Building Construction	M³	9,150	1,376	10,526
2.	Furniture	M³	787	741	1,528
3.	Agricultural Implements	M³	2,361	141	2,502
	Total	M³	12,298	2,258	14,556

In addition to the quantity required for repairs and replacement about 18,013 M³ will be required annually for house construction, furniture and agricultural implements due to population growth.

Total requirement of timber thus comes to the tune of 32,569 M³ per annum. Annual consumption of firewood at the present rate would be 5,14,275 MT which would increase to 5,68,861 MT in 2001.

5.5   Production of wood in the District

The details of production of wood in the District was collected from the Deputy Conservator of Forests, Mandya. The production statistics of last five years is as follows:--

TABLE NO.14

PRODUCTION STATISTICS

S. no.	Item	Unit of measure	1988-89	1989-90	1990-91	1991-92	1992-93	Average of last 5 years
1.	Timber	M^3	2.549	4.895	nil	208.053	99.0	62.90
2.	Firewood	Tonne						
	a)from Govt.Forests	-		1078.54	1695.68	5335.0	6000.0	2821.84
	b)Private land		2000	2200	3000	4000	5000	3240
3.	Poles (from social forestry plantation in public land).	Nos	8000	8000	10000	15000	20000	12200

Thus against the annual requirement of 32,569 cu.m of timber, production in the district is only 63 cu.m from Government forests. The firewood production is 6062 MT only as against the requirement of 5,14,275 M.T. creating the huge gap between

the demand and supply.

The data regarding the movement of wood going out of
the Mandya district and coming into the District was not avail-
able with Deputy Conservator of Foreests, Mandya because no check
posts exist within his jurisdiction ie., in the entire district.
There are 124 saw/mills in this district but saw/mill owners are
said to be not furnishing any details/records to the District
Forest officials. Thus conversion and movement of the timber and
firewood within the district could not be assessed. Further as
per the discussion held with the Deputy Conservator of Forests,
Mandya, sufficient number of Eucalyptus, Casuarina, coconut and
other trees are grown in private areas by the local people which
are converted for their use with the help of saw mill installed
in the village itself. It was learnt that the local people use
Ficus species as well as branches of Casuarina and Agricultural
waste to the extent that the district is self-sufficient in
respect of fuel material requirement.

Conclusions

As per the wood consumption studies, the annual re-quirement of timber for various purposes such as building con-struction, agricultural implements, and furniture comes to ap-prox. 32,569 cubic metre. As against this the production from the government forest is a meagre 63 cubic metre. The gap of 32,500 cubic metre is not explained because of the fact that the import and export data is not available. It is likely that the gap is bridged partly from the timber and other trees grown on private lands and partly from import of the same from other areas by general public as well as saw mill owners.

The net annual consumption of wood for fuel in Mandya district is about 5,14,275 MT. The annual consumption of agri-cultural waste, however, is 14,43,160 MT. Based upon Deputy Commissioner, Mandya's report the average annual consumption of kerosene and LPG in the district for the last 5 years comes to about 14,389 kilolitre and 58,688 cylinders respectively. Local enquiries reveal that the demand of firewood is met partly from lops and tops of mainly Casuarina and other trees species also grown by the local people on their own land and partly by use of Ficus species which are common in the district. Interestingly, all the above make Mandya self-sufficient in respect of fuel material requirement although this district is having only 5.2%

of its area under forest cover. To have self-sufficiency on sustained basis there is need to popularise tree plantation Programmes in the rural areas on an increased scale under the

social forestry schemes and propogate the use of non-conventional energy systems for cooking and efficient methods of fuel use since as a simultaneous activity in the district the availability of alternative fuel material will have to be increased many fold. The Forest Department should undertake detailed study about the quantity of wood and fuelwood produced from private areas that are being utilized by the people for their consumption so that the consumption pattern does not grow to the disadvantage of the existing forests of this district in particular and that of Karnataka in general.

APPENDIX--A

Sampled villages for Data Collection in Rural Sector

STRATUM--A

S.No.	Name of Village	No. of House-holds selected	Total No. of persons in the households selected
1.	Gorakahalli	10	76
2.	Doddenahalli	10	64
3.	Thilur	10	62
4.	Dakabakatte	10	54
5.	Chikkanahalli	10	64
6.	Juttanahalli	10	74
7.	Harappanahalli	10	67
8.	Goravale	10	63
9.	Sundahalli	10	75

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APPENDIX-B

Sampled Villages for Data Collection in Rural Sector

STRATUM 'B'

S.No.	Name of Village	No. of House-holds selected	Total No. of persons in the households selected
1.	Chikkakothegere	10	72
2.	Somanahalli	10	83
3.	Pura	10	71
4.	Basavanahalli-I	10	101
5.	Hadli	10	50
6.	Hampapura	10	58
7.	Kennala	10	57
8.	Haravu	10	62
9.	Rudrakshipura	10	65
10.	Devarahalli	10	56
11.	Kotahalli	10	60
12.	Basavanahalli-II	10	57
13.	Mannahalli	10	76
14.	Gamanahalli	10	68
15.	Kudukottanahalli	10	59

APPENDIX 'C'

Sampled villages for Data Collection in Urban Sector

STRATUM 'C'

S.No.	Name of Village	No. of House-holds selected	Total No. of persons in the households selected
1.	Mandya	20	118
2.	Malavalli	20	143
3.	S.R.Patna	20	113
4.	Pandavapura	20	111
5.	Maddur	20	119

APPENDIX-'D'

DOMESTIC WOOD CONSUMPTION
(DATA COLLECTION FORM)

SCHEDULE-A   District:

                                                        Division:

Name of the owner of the house:

1.   S.No. of the Stratum/Town.

2.   Name of village/S.No. of Block

3.   S.No. of Households.

4.   Type of Building actually visited
      as a sample unit.
      Kuchha/Pucca/Multi-storeyed.

5.   No. of storeys total and used
      for living only (to be filled
      in if more than one storey).

6.   Serial No. of the Building out of
      the total building to be visited
      in the village.

7.   Ward No. House No. in Municipal
      area and cities wherever available.

8.   No. of households living in the building.

9.   Total number of persons living
      in the household.

10.   Averagve annual income of the
      family. Nature of occupation
      (Service/cultivation/Business).

11.   Average plinth area occupied by
      each house includes verandah
      covered by roof and floor.

12.   (a) No. of living rooms.

      (b) No. of storage rooms.

      (c) No. of common rooms.

      (d) Other category viz., bath roms,
          latrines, Kitchen, cow-shed etc.

Camp: Signature...............
Date: Name of Surveyor: ....
                              Designation: ....

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FORM 1(A)

EXISTING USE OF WOOD FOR HOUSE CONSTRUCTION
YEAR OF CONSTRUCTION:

S.No	Item	Size LxWx Thick- ness (Mtr.)	Quantity of wood used in m3 sawn wood.	Source forest/ Market	species used.
1.	Door				
2.	Windows				
3.	Roof				
	Poles				
	Ballies				
	Beams				
	Rafters				
	purlin				
	Parata				
	Plankings				
	Reapers				
	Supporters				
4.	Ventilators				
5.	Floorings				
6.	Others (Bamboos etc.)				

Note: Doors and Windows include the frame and panels.

FORM 1(b)

EXISTING FURNITURE ITEMS

YEAR OF MANUFACTURE:

S.No	Item	Nos.	Size	Approximate quantity of Sawn wood in m3	Spp. used	Sources of Supply
1.	Chairs					
2.	Tables					
3.	Wooden Almirah.					
4.	Cots					
5.	Others (Specify)*					
	(a)					
	(b)					
	(c)					

*Such as Cane, Bamboo, Reed etc.

FORM 1(c)

AGRICULTURAL IMPLEMENT

Item		No.	Size	Quantity of wood used m3	Source of Supply.	Species used.
1.	Plough					
2.	Yoke					
3.	Bullock cart					
4.	Leveller					
5.	Tool handles (Axes, sythe spal etc.)					
6.	Winnower					
7.	Persion Wheels					
8.	Others specify.					

FORM-1(d)

FUEL CONSUMPTION PER ANNUM

S.No	Item	Firewood (Qtl)	Agri.Waste (Qtl)	Cow-dung (Qtl.)	Gas (Ltr.)
1.	Cooking				
2.	Heating				
3.	Lighting				
Total					

S.No	Item	Charcoal (Qtl.)	Coal (Qtl.)	Kerosene (Ltr.)	Electricity (Unit)
1.	Cooking				
2.	Heating				
3.	Lighting				
Total:					

FORM NO.II

FUEL CONSUMPTION

S.No	Category	Source of supply
1.	Firewood	
2.	Agricultural Waste	
3.	Animal Dung	
	Schedule-B (General)	
1.	Type of equipment used	Ordinary Chula/Smokeless Chula/Bio gas.
2.	Education level of the village.	
3.	Approach facilities	
4.	Service facilities	Hospital, School etc.

Camp:
Date:

Signautre:

FORM NO. III

OTHER FOREST PRODUCE USED IN THE HOUSEHOLD

S.No	Item	Qty./Kg./Year	Source of supply
1.	Thatch Grass		
2.	Fencing Branch wood		
3.	Green manure		
4.	Fencing thorn		
5.	Fodder by lopping		
6.	Fodder Grass		
7.	Others		

VILLAGE-WISE REGRESSION ANALYSIS: RURAL POPULATION

INDEPENDENT VARIABLE: AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'A'

S N o	Dependent Variable	Constant	co-effi-cient of X	Standard Error of co-effi-cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	0.5643	0.18053	0.12522	0.25670	0.18050	0.22393	0.47347
2.	Furniture	0.04878	0.00492	0.00767	0.15742	0.00490	0.05552	-0.23562
3.	Agri imple-ments	0.06585	-0.00709	0.00926	0.01899	-0.00709	0.07725	-0.27794
4.	Total Timber	0.46241	0.17010	0.14016	0.27682	0.17021	0.17919	0.42330
5.	Firewood	1.39640	-0.15288	0.07854	0.16101	-1.52938	0.35116	-0.59259

REGRESSION ANALYSIS: RURAL POPULATION [HIGH INCOME GROUP]

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'A'

S N o	Dependent Variable	Constant	co-effi-cient of X	Standard Error of co-effi-cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	0.93750	0.00088	0.07931	0.40904	0.00108	0.00002	0.00455
2.	Furniture	0.07730	-0.00532	0.00707	0.36472	-0.00533	0.08638	-0.29391
3.	Agri imple-ments	0.10181	-0.00793	0.00900	0.04645	-0.00798	0.11444	-0.33829
4.	Total Timber	1.09996	-0.01094	0.08821	0.47652	-0.01094	0.00293	-0.05416
5.	Firewood	0.48170	-0.01781	0.02250	0.11608	-0.17803	0.09451	307435
6.	Bamboo	-68.4777	13.87572	13.10013	67.55785	-13.86569	0.15752	0.3969

REGRESSION ANALYSIS: RURAL POPULATION [MIDDLE INCOME GROUP]

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'A'

S N o	Dependent Variable	Constant	co-effi-cient of X	Standard Error of co-effi-cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	0.22999	0.04968	0.11286	0.40820	0.04979	0.02694	0.16414
2.	Furniture	0.00404	0.00102	0.00475	0.01721	0.00102	0.00663	0.08145
3.	Agri imple-ments	0.00405	0.00055	0.00259	0.00938	0.00061	0.00653	0.08084
4.	Total Timber	0.25820	0.04831	0.11649	0.41842	0.04944	0.02448	0.15647
5.	Firewood	0.72643	-0.05148	0.06566	0.23748	-0.51628	0.08074	-0.28415
6.	Bamboo	113.5355	-11.7411	25.7996	93.3155	-11.77185	0.02873	-0.16951

REGRESSION ANALYSIS: RURAL POPULATION [LOW INCOME GROUP]

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'A'

S N o	Dependent Variable	Constant	co-effi- cient of X	Standard Error of co-effi- cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	-0.17606	0.09426	0.10612	0.18381	0.09454	0.11621	0.34090
2.	Furniture	-0.00818	0.00228	0.00389	0.00673	0.00228	0.05441	0.23326
3.	Agri imple- ments	0.01588	-0.00111	0.00639	0.01107	-0.00110	0.00500	-0.07076
4.	Total Timber	-0.16837	0.09544	0.11587	0.19722	0.09544	0.109	0.33015
5.	Firewood	2.52433	-0.40333	0.13447	0.23292	-4.03363	0.59988	-0.77451
6.	Bamboo	4.3275	0.95000	4.88857	8.46726	0.93181	0.00625	0.07908

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VILLAGE WISE REGRESSION ANALYSIS: RURAL POPULATION

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'B'

S N o	Dependent Variable	Constant	co-effi- cient of X	Standard Error of co-effi- cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	0.68404	0.00310	0.05693	0.27502	0.00308	0.00022	0.01512
2.	Furniture	0.06816	-0.00720	0.00431	0.02086	-0.00727	0.17632	-0.41991
3.	Agri impl- ments	-0.00623	0.00482	0.00307	0.01485	0.00485	0.15904	0.39882
4.	Total Timber	0.74597	0.00072	0.05962	0.29215	0.00722	0.00001	0.00344
5.	Firewood	0.21959	0.00488	0.03219	0.15553	0.04897	0.00176	0.04204
6.	Bamboo	84.7214	-8.53142	9.18911	44.38763	-8.55235	0.06218	-0.24936

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REGRESSION ANALYSIS: RURAL POPULATION [HIGH INCOME GROUP]

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'B'

S N o	Dependent Variable	Constant	co-effi- cient of X	Standard Error of co-effi- cient	Standard Error of Y estimate	t value	R*	R
1.	Building Construc	1.14078	-0.0098	0.06303	0.58247	-0.00980	0.00185	-0.04307
2.	Furniture	0.07851	-0.00519	0.00330	0.03051	-0.00522	0.16012	-0.40015
3.	Agri imple- ments	0.03398	0.00045	0.00228	0.02109	0.00045	0.00310	0.05576
4.	Total Timber	1.25327	-0.01454	0.06912	0.62142	-0.01457	0.00386	-0.06220
5.	Firewood	0.23474	0.00167	0.01251	0.11560	0.01666	0.00137	0.03701
6.	Bamboo	73.70601	-5.46072	5.84743	54.04742	-5.46405	0.06282	-0.25065

REGRESSION ANALYSIS: RURAL POPULATION [MIDDLE INCOME GROUP]

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'B'

S N o	Dependent Variable	Constant	co-effi-cient of X	Standard Error of co-effi-cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	1.02973	-0.04818	0.09185	0.46181	-0.04822	0.02241	-0.14972
2.	Furniture	0.06355	-0.00766	0.00446	0.02242	-0.00752	0.19729	-0.44417
3.	Agri imple-ments	0.04405	-0.00340	0.00598	0.03008	-0.00358	0.02625	-0.16203
4.	Total Timber	1.13732	-0.05922	0.09947	0.49998	-0.05915	0.03287	-0.18130
5.	Firewood	0.32826	0.00934	0.05017	0.02522	-0.09348	0.00288	-0.05369
6.	Bamboo	20.32146	-0.43065	7.65374	33.48023	-0.43022	0.00026	-0.01624

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REGRESSION ANALYSIS: RURAL POPULATION [LOW INCOME GROUP]

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'B'

S N o	Dependent Variable	Constant	co-effi-cient of X	Standard Error of co-effi-cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	1.01472	-0.14085	0.04621	0.21306	-0.13846	0.43637	-0.66058
2.	Furniture	0.00097	0.00007	0.00068	0.00314	0.00007	0.00109	0.03307
3.	Agri imple-ments	0.01543	-0.00075	0.00369	0.01705	-0.00074	0.00345	-0.05873
4.	Total Timber	1.01473	-0.13904	0.04938	0.22745	-0.13692	0.43190	-0.65719
5.	Firewood	0.27836	-0.01165	0.02718	0.12532	-0.11461	0.01508	-0.12281
6.	Bamboo	19.16330	-0.07728	9.13838	42.13295	-0.07692	0.000005	-0.00244

VILLAGE WISE REGRESSION ANALYSIS: RURAL POPULATION

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM A+B

S N o	Dependent Variable	Constant	co-effi-cient of X	Standard Error of co-effi-cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	0.48093	0.02987	0.05111	0.26822	0.03065	0.01528	0.12364
2.	Furniture	0.06440	-0.00687	0.00352	0.01847	-0.0069	0.14773	-0.38435
3.	Agri imple-ments	0.00335	0.00297	0.00319	0.01676	0.00278	0.03780	0.19444
4.	Total Timber	0.54868	0.02597	0.05360	0.28131	0.02600	0.01055	0.10273
5.	Firewood	0.42320	-0.01861	0.03339	0.17526	-0.18640	0.01392	-0.11799
6.	Bamboo	45.58170	-2.69109	8.82388	46.30507	-2.70072	0.00421	-0.06488

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REGRESSION ANALYSIS: TOWN PEOPULATION

INDEPENDENT VARIABLE : AVERAGE SIZE OF THE HOUSEHOLD

STRATUM 'C'

S N o	Dependent Variable	Constant	co-effi-cient of X	Standard Error of co-effi-cient	Standard Error of Y estimate	t value	R²	R
1.	Building Construc	0.82922	-0.07078	0.06932	0.08953	-0.07031	0.25786	-0.50780
2.	Furniture	0.20571	-0.01493	0.03959	0.05114	-0.01484	0.04525	-0.21272
3.	Agri imple-ments	-0.00596	0.00139	0.00330	0.00427	0.00139	0.05626	0.23720
4.	Total Timber	1.02897	-0.08431	0.09982	0.12749	-0.08437	0.23042	-0.48002
5.	Firewood	0.07225	0.02002	0.06577	0.08495	0.20078	0.02996	0.17310
6.	Bamboo	3.07673	-0.27577	1.00688	1.30040	-0.27343	0.02439	-0.15619

MAP OF MANDYA DISTRICT

SCALE I : 5,00000

REFERENCE

District boundary	— . . — . . —
Road	————
Railway line	+++++++
River / Reservoir	
Habitation	⊕