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RURAL HOUSE HOLDS WOOD CONSUMPTION STUDY MEGHALAYA STATE

**FOREST SURVEY OF INDIA
NORTHERN ZONE
SHIMLA
1989**

P R E F A C E

Wood is the major forest produce and on its rational use depends the conservation of our forest resources. Wood consumption studies help in planning the developmental activities in the forestry sector at various levels.

The study of household wood consumption in rural Meghalaya was carried out during 1986-87 and 1987-8. The study indicates that in the house hold sector of the rural Meghalaya, the annual consumption of timber is 28 thousand cu m³ and of firewood, 964 thousand tonnes.

The staff of the Northern Zone of Forest Survey of India deserves commendation for the work.

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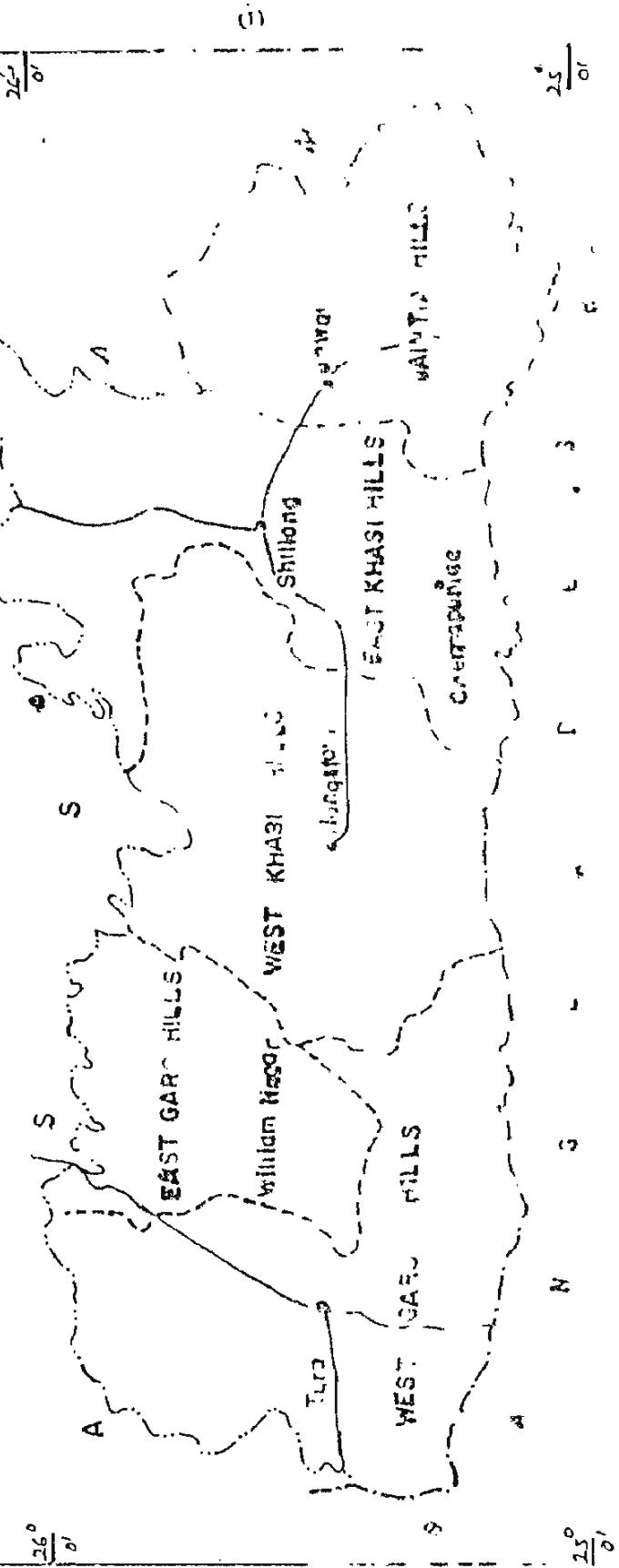
FOREST SURVEY OF INDIA

(NORTHERN ZONE)

LOCATION MAP OF MEGHALAYA STATE

SURVEYED DURING 1986-88

1:250,000



27°
N

26°
N

25°
N

91°
E

90°
E

E

N

S

E

1

Chapter I

1.1 Introduction

The Forest Survey of India, Port Blair Zone, took up the field work of forest inventory of Meghalaya in the year 1986 and 1987. As per the revised directives the 'special study' with particular reference to wood consumption was also to be taken up concurrently with the forest inventory work. Thus the Domestic rural household wood and bamboo consumption study was carried out in Meghalaya alongwith the inventory work. The data for this study was collected by the field crews in forest inventory work.

1.2 Objectives

The objectives of the survey are:

- i) To assess the existing usage of wood and bamboo for house construction and to estimate the annual consumption of wood and bamboo for all types of constructional purposes.
- ii) To estimate the domestic consumption of wood for furniture and agricultural implements.
- iii) To indicate the trend of domestic energy consumption (fuel) for cooking, lighting etc.
- iv) To indicate the future trend of usage of wood and bamboo in rural areas for construction of houses, furniture, agricultural implements, fuelwood, kerosene oil etc.

1.3

General Description of the Area

The survey area consists of all the five districts of Meghalaya. The location map is given on page ii). The survey area lies between $89^{\circ}50'$ to $92^{\circ}50'$ East longitudes and $25^{\circ}0'$ to $26^{\circ}10'$ North latitudes. Plateaus form the main physical features of this region with rolling grass lands interspersed by river valleys. The whole area of the State is full of scenic beauty. The climate of the area is mostly tropical or sub-tropical with a prolonged rainy season which extends over more than six months. The average annual rainfall at Shillong, the capital of Meghalaya, is above 2000 mm. The area receiving world's heaviest rainfall is also located in this State near Cherapunjee with an annual average of 12,163 mm. At Shillong the monthly average of maximum temperature in summers is around 25°C and the monthly average of minimum temperatures in winters is about 9° C . The area and population statistics of the region are given in appendix I.

1.4

Socio-economic conditions of the people

While the total geographical area of the State is $22,429\text{ km}^2$, the total population as per 1981 census is 13,35,819. The average density of human population in the State is 60 per sq. km. Meghalaya is the homeland of India's three ancient hill communities. The Khasis and Jaintias are held to be remnants of the first Mongolian overflow into India, while Garos are believed to have migrated into Garo hills from Tora province of Tibet.

Agriculture is the mainstay of the people of Meghalaya. Eighty five percent of the State's population lives in rural areas and depends on agricultural produce for their livelihood. Jhumming or shifting cultivation is practised on a large scale especially in Garo hills and is one of the biggest problems to be tackled.

Transport is the main bottleneck in Meghalaya and the State is not connected by railways. Industrially the area is not yet developed. The State is rich in natural resources.

CHAPTER II

2.1 Methodology

The assessment of "rural household wood consumption" covers the consumption of wood used by the households, for the following purposes:-

- (a) House construction: New houses, maintenance as well as extension/additions in the existing houses.
- (b) Domestic furniture.
- (c) Agricultural implements.
- (d) Firewood:- For cooking, heating etc. (the consumption of other fuels like kerosene, agricultural waste and cow dung has also been assessed, alongwith firewood consumption.)

2.2 Strata

The survey region consists of all the five districts of Meghalaya. The proportion of area under the forests is high and most of the villages are quite near forests. Moreover the major chunks of forests are owned by tribals/villagers. Keeping these considerations in mind no stratification of villages, with respect to the distance from the forests, has been done.

2.3 First stage sampling Unit

The villages form the first stage sampling units. To achieve a spatial distribution of villages over the entire region, it was decided to take up 3 villages per toposheet (1:50,000 scale S.O.I.maps). Subsequently however deviations from this had to be allowed in view of the frequent unwillingness of the local tribals to allow survey parties to enter their villages and houses for collection of data.

Finally the survey teams were able to collect data from 52 villages spread over all the districts of Meghalaya.

2.4 Second Stage Sampling Units.

The households form the second stage sampling units. 5 to 10 residential houses were randomly sampled in each of the villages taken up for survey work.

2.5 Maps

The following survey of India topographical sheets on 1:50,000 scale were used to identify the locations of the villages taken up for sampling:-

78 G/14, 78 K/1, 2, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15,
& 16.

78 O/2, 3, 4, 5, 7, 8, 11, 13, 14, 15, & 16.

83 C/1, 2, 3, 6, 11, & 12.

2.6 Field Data Collection

Field data collection is done by questioning the householders. The forms given in the appendix II are filled up by the investigator. The assessment of the wood consumption as told by the 'house holders' is quantified by the investigator and entered in the forms. A Junior Technical Assistant or a Deputy Ranger works as investigator. A total of 503 households in 52 villages were taken up for the survey.

Note: As per the census figures of 1981, the total rural houses in Meghalaya were 2,09,528 and the total rural households were 2,09,618 i.e. a difference of only 0.04%. Therefore the houses and households have been treated as one for calculation purposes.

CHAPTER III
DATA PROCESSING

3.1 Method of Computation of Field Data.

The data collected in the field, in the prescribed field forms, consisted of number and sizes of various forms of wood used in construction of houses, furniture and agricultural implements. The data on quantity of fire wood were also collected from each unit i.e. house holds. The number and sizes were converted into volume or weight by applying appropriate conversion factors. Similarly, the data was converted to give annual consumption figures.

The village wise information with respect to the houses sampled, number of households in these sampled houses, population of the sampled households as well as the volume of wood used in construction of houses, furniture, agricultural implements and average monthly consumption of fuel in these sampled households is given in table 3.1.1. Table 3.1.2 tabulates the compilation of collected sample data districtwise. The per capita figures of usage of wood and consumption of fuels have been worked out from the data tabulated in 3.1.2 and have been compiled districtwise as well as for the state in table 3.1.3. & 3.1.4.

3.2 Calculation of present usage of wood for house construction.

The grand total of the quantities of wood found to have been used in the house construction of all the households/houses sampled, divided by the total population of the sampled households gives the figure of per capita usage of wood for house construction. This figure multiplied by the total rural population of the region (1981 Census) gives the present (1981) usage of wood, for house construction, in the region.

3.3 Calculation of present usage of wood for furniture construction.

The grand total of the consumption of wood for furniture construction, of all the sampled households of the region, divided by the total population of the sampled households gives the per capita usage of wood for construction of furniture. This figure multiplied by the total rural population of the region (1981 Census) gives the present (1981) usage of wood, for furniture construction in the region.

3.4 Calculation Present usage of Wood for Agricultural implements.

This calculation is also done on the same lines as detailed in parae 3.2 & 3.3 above to obtain the total present (1981) usage of wood, for agricultural implements in the region.

3.5 Calculation of the present usage of bamboo for house construction.

The grand total of bamboo (Nos) found to have been used in the house construction, of all the household/houses sampled, divided by the total population of the sampled households gives the assessment of per capita consumption (present usage) of bamboos for house construction. This multiplied by the total rural population (1981 Census) gives the present (1981) usage of bamboo for house construction in the region.

Note: Usage of bamboo has been assessed in Nos of standard size bamboos (i.e. 5 cm girth and 8 metre length).

3.6 Calculation of the annual consumption of Firewood, Agricultural residue, Kerosene and Cow dung.

For assessing the consumption of these fuels, data was collected from all the sampled

1971 - Popn.

Meghalaya

Rural popn. 864529

1981 - Popn.

Rural popn. 1094486

$$\frac{\text{Decadal growth rate}}{\text{date}} = \frac{(1094486 - 864529)}{864529} \times 100 = 26.6\%$$

households. The collected data was then reduced to annual per capita figures on the basis of total population of the sampled households, and finally these per capita figures multiplied by the total rural population (1981 census) provided the assessment of total annual consumption figures of each of these fuels.

3.7 Annual Consumption of wood in house construction.

The annual consumption figures have been obtained, from the figures of present usage calculated on the basis explained in para 3.2, on the basis of following assumptions:

- (a) The percentage of annual increase in rural houses is same as the percentage of annual increase of the rural population over the decade 1971 to 1981.
- (b) The annual consumption of wood for maintenance and repairs of the existing rural houses is one percent of the total present usage of wood in house construction.

Since there was 26.6 percent decadal increase in the rural population of the region for the period 1971 to 1981, the annual increase in number of houses, as per assumption (a) is 2.66 percent per year. Therefore 5,573 houses are expected to be built every year (base figure 2,09,528 for 1981).

3.7.1 New Construction:

Present usage of wood (1981) per house.	Total present usage (1981)
	= _____ Total houses in the rural area (1981).
Annual usage of wood for new houses.	= Usage per house X es- timated No. of new houses constructed annually.

3.7.2 For Maintenance

Annual requirement = One percent of the
of wood for maintenance total present (1981)
of existing rural usage of wood for
houses. construction of houses
in the region.

3.8 Annual consumption of wood for making Agricultural
implements.

Following assumptions have been used to arrive at
the annual consumption figures:

- (a) The average life spans of various agricultural implements like plough, cart etc. are assumed to be varying between 2 years and 10 years and for the purpose of replacement of agricultural implements average life span of 5 years has been assumed for our calculations.
- (b) Increase in the total number of agricultural implements in use is not envisaged as it is assumed that expected increase due to population growth will be offset by the reduction due to the substitution by machines etc.

Annual consumption Total estimated present
of wood for agri- usage of wood for
cultural implements. = agricultural implements
= $\frac{\text{Total estimated present usage of wood for agricultural implements}}{\text{Average life span of agricultural implement}}$
(5 years)

3.9 Annual consumption of wood for furniture

The assumptions used to arrive at the annual consumption figures are as under:

- (a) Average life of the furniture is assumed to be 20 years.
- (b) The annual per capita consumption of wood for furniture is assumed to remain constant and therefore the total annual consumption

of wood in the region is assumed to rise proportionately with the population growth.

Present annual consumption of wood for furniture.	Total present usage of wood for furniture.
	= wood for furniture.
	Average life span of furniture(20 years).

3.10 Electricity Consumption in Survey Area.

Villagewise details of houses sampled and the monthly consumption of electricity in KWH, recorded for these sampled houses/households, are available in table 3.1.1. The average per capita annual consumption, worked out from this data, when multiplied by the total rural population (1981 census) gives an estimate of the total annual consumption in the region (1981).

As per the statistical hand book of Meghalaya 1982, 868 villages were recorded as electrified in 1981-82 out of a total of 5048 villages (1981 census).

3.11 Annual Consumption of Bamboos in house Construction.

The annual consumption figures have been obtained on the basis of assumptions and calculations explained in para 3.7 (in respect of wood).

3.12. Future projections of Wood and Bamboo Consumptions in the rural households.

Though the usage of wood and bamboo has been assessed in the survey carried out during 1986 to 1988, the figures relating to the total consumption in the region have been arrived at by using population figures of 1981 census. Therefore the future projections have been made for the year 1991 and 2001 assuming that the decadal growth rate of population at 26.6% (for 1971 to 1981) will be applicable for the decades 1981 to 1991 as well as 1991 to 2001, and a proportionate rise in total consumption of wood and bamboo and fuels will take place except in case of wood consumption for agricultural implements (refer para 3.8).

CHAPTER IV

4.1 Results and Analysis.

Using the methods of calculations shown in paras 3.2, 3.3, 3.4 and 3.5, the per capita usage of wood and bamboo and the total present usage for various purposes, worked out for the rural regions of the state of Meghalaya are tabulated below:

Purpose	Per capita usage of wood (m^3) and Bamboos (Nos.).	Total present (1981) usage of wood (m^3) and bamboos (nos.)
House constructions	0.649 m^3 of wood (round equivalent and 69.78 Bamboos	710.847 thousand m^3 (RE) of wood and 76.37 million bamboos
Furniture	0.015 m^3 of wood (RE)	16,563 thousand m^3 of wood (RE)
Agricultural Implements	0.005 m^3 of wood (RE)	5.792 thousand m^3 of wood (RE)

Grand total = 733.202 thousand m^3 (round equivalent)
and 76.37 million bamboos.

Note: The total rural population of the region is 1094486 (1981 census). To convert sawn wood volume into round wood volume, 25% has been added to the sawn volume.

4.2 Annual consumption of wood in house constructions

Present usage of wood per house = Total present usage (rural).

No. of houses in rural area of Meghalaya,

$$= \frac{710847}{209520} \text{ (177 houses)}$$

$$= 3.39 \text{ } m^3 \text{ of wood}$$

Estimated consumption = Expected decadal growth in
of wood for construction number of houses \times 3.39
of new houses every 10
year.

$$\frac{26.6 \text{ (decadal}}{\text{growth 1971 to 1981)}} \times \frac{209528}{100} \times \frac{3.39}{10}$$

$$= 18894 \text{ m}^3 \text{ (round wood)} \dots\dots \text{(A)}$$

[New houses expected to be built every year = $\frac{209528}{10} \times \frac{26.6}{100} = 5573$]

Estimated consumption of wood in the rural region of Meghalaya State for maintenance of existing houses. = 1% of present usage (in house construction)

$$= 7108 \text{ m}^3 \text{ (RE)} \dots\dots \text{(B)}$$

Estimated total annual consumption of wood for house construction and maintenance. = $18894 + 7108 \text{ (A + B)}$
= $26002 \text{ m}^3 \text{ (RE)}$

4.3 Annual consumption of Bamboo in house construction

On the basis of similar calculations as in para 4.2, the estimated annual consumption of bamboos for construction of new houses =

$$\frac{\text{New houses expected } \times \text{Total present(1981) usage}}{\text{to be built every year of bamboos}} \\ \text{Total rural houses (1981)}$$

$$= 5573 \times \frac{7637000}{209528}$$

$$= 5573 \times 364$$

$$= 2031280 \text{ bamboos}$$

$$= 2031.28 \text{ thousand bamboos}$$

Again for maintenance, the estimated consumption of bamboos. = 1% of total present usage
= 763.70 thousand bamboos

$$\text{Grand Total} = 2,795 \text{ million bamboos.}$$

4.4 Annual consumption of wood for agricultural implements

As per para 3.8 the estimated annual consumption of wood for agricultural implements

Total present usage of wood for agricultural implements (Para 4.1)

= -----
Estimated average life of implements (para 3.8)
(Taken as 5 years) -----

$$= \frac{5792 \text{ m}^3 (\text{RE})}{5} = 1158.4 \text{ m}^3 (\text{RE})$$

4.5 Annual consumption of wood for furniture

As per para 3.9 the annual consumption of wood, for furniture, is estimated as

Total present usage of wood for furniture (Para 4.1)

= -----
Estimated average life span of furniture - 20 years (Para 3.9)

$$= \frac{16563}{20} = 828.15 \text{ m}^3 (\text{RE})$$

4.6 Annual consumption of fuel wood and Kerosene

As per the calculations given in para 3.6, the annual per capita consumption and total annual consumption (based on 1981 census figures) have been worked out for fuel wood and kerosene and are tabulated below;

Type of fuel	Annual per capita consumption	Total annual consumption (1981)
Firewood	0.712×12 quintals for cooking $= 8.54 \text{ Q}$ $+ 0.091 \times 3$ for heating $= 0.27 \text{ Q}$	$\sim 9347264 \text{ Qts for cooking}$ $+ 297312 \text{ Qts for heating}$
Total	$= 8.81 \text{ Quintals}$	Total 96445760 Qts
Kerosene	0.720×12 litres for lighting $= 8.63 \text{ litres}$	9450559 litres for lighting

Kerosene is mainly used for lighting purpose only. Use of cowdung or/and agricultural waste as fuels has not been recorded in any of the samples drawn from the rural region of Meghalaya.

4.7 Domestic electricity consumption in the rural region of Meghalaya.

Out of the 52 villages sampled in Meghalaya only 4 were found to be such where domestic consumption of electricity was recorded. The total electricity consumption recorded in the sampled households, in these villages was 527 units (KWH) per month (Table 3.1.1) thus giving an average per capita annual consumption of

$$\frac{527 \times 12}{2899} = 2.18 \text{ KWH for the region}$$

(Total population of sampled households = 2899)

The total annual consumption on this basis is estimated at 2387558 units (2.18 x rural population (1981)) i.e. 2.388 million KWH (Units) - for 1981

4.8 Districtwise abstract of per capita usage/ Consumption.

The districtwise abstract of per capita consumption of wood (including bamboo) and fuels is given in table 3.1.3 . These figures for the district may be considered indicative only. From this district wise abstract of figures it can be seen that the per capita usage of wood (round equivalent) for house construction varies from 0.365 m^3 in East Garo to 1.15 m^3 in Jaintia district.

The per capita usage of wood (RE) for furniture varies from 0.007 m^3 in East Garo to 0.036 m^3 in Jaintia and that for agricultural implements, etc., varies from 0.001 m^3 in West Khasi to 0.011 m^3 in 'Jaintia' and 'West Garo'.

4.9 Future projections of wood, bamboo and fuel consumptions.

The estimates of total projected consumption of wood, bamboo and fuels in the rural region of Meghalaya are based upon the census figures of 1981

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and these are summarised below:-

WOOD

<u>S.No.</u>	<u>Purpose</u>	<u>Annual Consumption (Round Equivalent)</u>
1.	New house construction	18894 m ³
2.	House Maintenance	7108 m ³
3.	Agricultural implements	1158 m ³
4.	Furniture	828 m ³
Total (round equivalent)		

Annual wood consumption in the rural households 27,988 m³ say 28000 m³

BAMBOO

<u>S.No.</u>	<u>Purpose</u>	<u>Annual consumption of Bamboos (Nos-standard size)</u>
1.	New house construction	2031280 Nos
2.	House maintenance	763700 Nos.
Total (Bamboos)		2794980 Nos.

FUELS/ELECTRICAL ENERGY

<u>S.No.</u>	<u>Type of Fuel/ Energy.</u>	Estimated current (1981)
		Annual consumption.
1.	Firewood	96,44,576 Quintals
2.	Kerosene	94,50,559 Litres
3.	Electricity	23,87,558 KWH.

The projections for the year 1991 and 2001 have been worked out on the basis explained in para 3.12 and are as under:-

<u>S.No.</u>	<u>Item</u>	<u>Purpose</u>	<u>Estimated Annual consumption</u>	
			<u>1991</u>	<u>2001</u>
1.	WOOD	(a) New house construction	23920 m ³	30203 m ³
		(b) House maintenance	8999 m ³	11393 m ³
		(c) Agricultural implements	1158 m ³	1158 m ³
		(d) Furniture	1048 m ³	1327 m ³
Total Round Wood			35125 m ³	44161 m ³

S.No.	Item	Purpose	Estimated Annual Consumption	
			1991	2001
II.	Bamboo	(a) New house construction	25,71,600 Nos	3255646 Nos
		(b) House maintenance	9,66,844 "	122402 "
		Total Bamboos	35,38,444 Nos	4479671 Nos
III.	Fire wood	Heating and Cooking	1,22,10,033 Qt ls	15457002 Qtls
IV.	Kerosene	Lighting	1,19,64,408 Ltr.	15146000 Ltrs
V.	Electricity	Lighting	30,22,648 KWH	38,26672 KWH

The above figures can be rounded off and tabulated as under:

S.No.	Items	Estimated annual consumption		
		1981	1991	2001
1.	Total round wood (in 000m ³)	28	35	44
2.	Total Bamboos (in 000 Nos)	2795	3538	4480
3.	Fire wood (in 000 tonnes)	964	1221	1546
4.	Kerosene (in 000 Kilolitres)	9	12	15
5.	Electricity (in 000 KWH)	2388	3023	3827

CONVERSION FACTORS

1. One cubic metre (m^3) = 35.3 cubic ft.
 2. One truck load = $10 m^3$ = 7 Tonnes
 3. One tonne = $1.45 m^3$
 4. One metre = 39 inches
 5. To convert Sawn material into logs = add 25%
 6. To convert pulp into logs = add 60%
 7. To convert ply wood into logs = add 50%
 8. To convert re-constituted wood = add 60% into logs.
-

B I B L I O G R A P H Y

1. F.S.I. Dehradun - Operational Manual on wood consumption Survey- March, 1986
 2. N.C.A.E.R. - Domestic fuels in India- 1959
 3. Director of Census - District Census Hand book, Operations East Khasi Hills Census 1981.
-

Table No. 3.1.01

Villagewise sampled data for wood and bamboo usage as well as
consumption of fuels, in the rural region of Meghalaya.

S.No.	Name of Village	No. of houses	No. of sampled holds	Population in sampled holds	Total existing usage of wood in sampled house	Consumption of Fuel:		
						Fire wood	K.C.I	Charcoal
1.	Gokgulgiri	10	10	63	8.336	3162	0.630	1.278
2.	Rengmatchugiri	10	10	47	54.963	6893	-	1.299
3.	Gimgirl	10	10	84	26.851	2745	1.840	1.704
4.	Nauggakgiri	10	10	42	56.638	6056	-	0.630
5.	Ronsakgiri	10	10	40	20.417	3811	0.771	2.166
6.	Rongsaigiri	10	10	46	54.553	5167	0.218	1.795
7.	Thongbolgiri	10	10	44	20.749	2963	0.085	0.044
8.	Dcbu	10	63	22.681	5152	0.083	-	42.90
9.	Bawegirl	10	10	49	9.167	21500	-	0.394
10.	Astladinngiri	10	10	50	5.095	13354	0.136	-
11.	Neugset	10	10	68	3.871	11652	-	32.10
12.	Garobadha	10	10	57	7.369	16800	0.994	0.012
13.	Cherangiri	10	10	46	24.509	2890	1.670	0.055
14.	Watagitthan	10	12	60	12.413	3800	0.105	0.069
15.	Daukipara	10	10	54	48.061	5850	0.545	0.115
16.	Rewak songmong	10	10	66	16.009	7250	0.618	0.113

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
17. Renigiri	10	10	85	79.327	5965	0.495	1.481	32.95	-	55	-	-	-	-
18. Durbandagiri	10	10	62	37.275	4755	0.140	0.188	35.50	-	79	-	-	-	-
19. Baugsi	10	10	56	18.965	7535	0.944	0.026	28.50	12.90	20	-	-	-	-
20. Baugsi Dogru	10	10	45	12.347	-	0.568	0.011	25.80	-	41	-	-	-	-
21. Mahadeo	10	10	45	12.812	-	1.961	0.041	43.30	-	50	-	-	-	-
22. Rajasimla	05	05	30	4.867	13200	0.134	0.094	15.50	05.50	30	-	-	-	-
23. Matrang	10	10	44	20.067	6900	0.491	0.082	36.00	06.90	28	-	-	-	-
24. Chidragiri	10	10	65	20.476	6633	3.158	-	54.50	-	44	-	30	-	-
25. Bansangiri	10	10	50	25.869	5963	-	0.525	29.75	-	35	-	-	-	-
26. Maheskholia	10	10	46	10.664	-	1.553	-	33.30	-	42	-	-	-	-
27. Bansali	10	10	42	4.027	5971	0.285	-	39.00	-	40.5	-	-	-	-
28. Rambatgiri	10	10	44	22.357	3783	0.467	-	32.00	-	42	-	-	-	-
29. Rongmil	05	05	37	11.015	1014	0.168	-	17.00	14.00	60	-	22	-	-
30. Nongfri	09	09	49	14.802	1920	0.401	0.052	29.50	-	33	-	-	-	-
31. Mawliel	09	09	33	26.754	40	0.054	0.055	29.00	29.00	14.5	-	-	-	-
32. Phlang Kijnshi	10	10	73	60.817	46	-	-	-	-	-	-	-	-	-
33. Pokchara	09	09	58	32.709	1700	3.886	0.024	31.00	6.00	41.5	-	-	-	-
34. Mariem	09	09	50	53.872	85	1.053	0.046	31.50	-	26	-	-	-	-
35. Nongmawairang	09	11	68	40.992	20	2.727	0.049	42.50	-	5	-	185	-	-
36. Lungunshieh	10	10	88	17.901	2068	-	-	31.00	38.00	245	-	-	-	-
37. Jalang	10	10	54	50.630	1379	0.200	-	29.00	24.00	68	-	-	-	-
38. Rengdim Rongwa	10	10	55	17.029	728	0.046	0.240	29.60	-	11.5	-	-	-	-

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
39. Mawden		10	10	55	19.937	2118	0.215	0.231	36.00	25	20	-	-	-
40. Nongtynglaw	10	10	60	35.212	123	1.355	0.021	45.25	-	23	-	-	-	-
41. Khoingol	09	09	59	63.524	1106	2.895	0.852	115.50	-	26	-	-	-	-
42. Situng	05	05	32	17.280	1854	0.065	-	66.00	-	10	-	-	-	-
43. Jungria	09	09	76	111.198	1675	3.131	0.948	63.00	49.50	12	-	-	-	-
44. Kawlyndep	10	10	57	106.575	2646	5.783	0.012	49.50	18.00	44	-	-	-	-
45. N.Mawlyndep	10	10	62	129.302	199	-	-	47.30	-	-	-	-	-	-
46. Lairduh	10	10	70	118.916	-	0.049	-	40.40	-	27	-	-	-	-
47. Syntung	10	10	66	77.308	40	0.740	0.473	55.50	-	25	-	-	-	-
48. Kawlyndiar	10	10	53	27.202	-	0.806	0.017	72.60	-	67	-	-	-	-
49. Umtasor	10	11	49	14.336	516	0.027	0.040	35.00	4.60	45	-	-	-	-
50. Mawstntai	10	10	71	18.229	539	0.272	0.140	45.90	7.40	47	-	-	-	-
51. Pomshutee	10	12	54	125.547	1155	1.845	-	28.00	-	27	3040	290	-	-
52. Mawlong	08	08	57	21.019	1573	0.262	0.019	52.00	-	-	-	-	-	-
Grand Total	496	503	2899	1882.842	202294	43.871	15.341	2063.20	262.50	2086	3.40	527	-	-

Table No. 3-1-2

Districtwise sampled data for wood and bamboo usage as well as consumption of fuels, in the rural region of Meghalaya.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
7.	Untasor	10	11	49	14.336	516	0.027	0.040	35.00	4.60	45	-	-	-
8.	Mawsytaik	10	10	71	18.229	539	0.272	0.140	45.90	7.40	47	-	-	-
9.	Pomshutai	10	12	54	135.547	1155	1.845	-	28.00	-	27	3.40	290	-
10.	Mawlong	08	08	57	21.019	1573	0.262	0.019	52.00	-	-	-	-	-
	Total	98	101	614	668.371	8786	9.999	0.932	459.20	55.00	299	3.40	290	-

III. Distt. WEST KHASI

														27
1.	Nongiri	09	09	49	14.802	1920	0.401	0.052	29.50	-	33	-	-	-
2.	Mawlieh	09	09	33	26.754	40	0.054	0.055	29.00	29.00	14.5	-	-	-
3.	Phlang Kynshi	10	10	73	60.817	46	-	-	-	-	-	-	-	-
4.	Pochara	09	09	58	32.709	1700	3.886	0.024	31.00	6.20	41.5	-	-	-
5.	Meriem	09	09	50	53.872	85	1.053	0.046	31.50	-	26	-	-	-
6.	Mongmowinairang	09	11	68	40.992	20	2.727	0.049	42.50	-	5	-	185	-
7.	Longumshie	10	10	88	17.901	2068	-	-	31.00	38.00	245	-	-	-
8.	Jalong	10	10	54	50.630	1379	0.200	-	29.00	24.00	68	-	-	-
9.	Rengdim Rongia	10	10	55	17.029	728	0.046	0.240	29.60	-	11.5	-	-	-
10.	Nongtyngiaw	10	10	60	35.212	123	1.355	0.021	45.25	-	23	-	-	-
	Total	95	97	588	350.718	8109	9.722	0.487	298.35	97.20	467.5	-	185	-

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
	IV. Distt. EAST GARO													
1.	Gokgulgiri	10	10	63	8.336	31162	0.630	1.278	22.35	1.50	91	-	-	-
2.	Thongbolgiri	10	10	44	20.749	2963	0.085	0.044	44.50	-	32	-	-	-
3.	Dobu	10	10	63	22.681	5152	0.083	-	42.90	-	41	-	-	-
4.	Chirangiri	10	10	46	24.509	2890	1.670	0.055	44.50	-	30	-	-	-
5.	Watgedithim	10	12	60	12.413	3800	0.105	0.069	51.15	-	32	-	-	-
6.	Rangiri	10	10	85	79.327	5965	0.495	1.481	32.95	-	55	-	-	-
7.	Bangsii	10	10	56	18.965	7535	0.944	0.026	28.50	12.90	20	-	-	-
8.	Bansi Dogru	10	10	45	12.347	-	0.568	0.011	25.80	-	41	-	-	-
9.	Raja Simla	05	05	30	4.867	13200	0.134	0.094	15.50	5.50	30	-	-	-
10.	Matrang	10	10	44	20.067	6900	0.491	0.082	36.00	6.90	28	-	-	-
11.	Rangmii	05	05	37	11.015	1014	0.168	-	17.00	14.00	60	-	-	22
12.	Bansumgiri	10	10	50	25.869	5963	-	0.525	29.75	-	35	-	-	-
13.	Negsat	10	10	68	3.871	11652	-	-	34.40	-	43	-	-	-
14.	Asiledgiri	10	10	50	5.095	13354	0.136	-	32.10	20.00	31	-	-	-
Total		130	132	741	270.111	83550	5.509	3.665	457.40	60.80	569	-	22	

No. of Sampled Villages		3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
I.													
II.													
GRAND TOTAL													
I.	3	23	23	167	192.002	4635	6.091	1.800	244.50	49.50	48	-	-
II.	10	98	101	614	668.371	8786	9.999	0.932	459.20	55.00	299	3.40	290
III.	10	95	97	588	350.718	8109	9.722	0.487	298.35	97.20	467.5	-	185
IV.	14	130	132	741	270.111	83550	5.509	3.665	457.40	60.80	569	-	22
V.	15	150	150	789	401.640	97214	12.550	8.457	603.75	-	702.5	-	30
Total	52	496	503	2899	1882.842	202294	43.871	15.341	2063.20	262.50	2086	3.40	527

Table No. 3.1.3

Districtwise - and for the State - abstract of estimated per capita domestic usage of Wood/Bamboo and estimated per capita domestic consumption of fuels in the rural areas of Meghalaya.

Items	Jaintia	East Khasi	West Khasi	East Garo	West Garo	State of Meghalaya m ³
I. Usage of Wood:						
(a) House construction (in m ³) - round equivalent	1.150	1.089	0.596	0.365	0.509	0.649
(b) Furniture (in m ³ -R.E.)	0.036	0.016	0.017	0.007	0.016	0.015
(c) Agricultural Implements (m ³ -R.E.)	0.011	0.002	0.001	0.005	0.011	0.005
Total domestic usage of wood (m ³)-R.E.	1.197	1.107	0.614	0.377	0.536	0.669
II. Usage of Bamboos:						
(a) House construction	27.75	14.31	13.79	112.75	123.21	69.78
III. Consumption of Fuels:						
(a) Firewood for cooking (Qts. per year).	17.57	8.97	6.09	7.41	9.18	8.54
(b) Firewood for heating (Qts p.year)	0.89	0.27	0.50	0.25	-	0.27
(c) Kerosene oil (Ltrs P.year) (Mainly for lighting).	3.45	5.84	9.54	9.21	10.68	8.63

Table 3.1.7

Compilation of the sample data of wood and Bamboo usage and consumption of fuels, Districtwise as well, for the State (Meghalaya) - for the rural areas.

S.No.	Name of the District.	Name of village.	No. of houses sampled.	Total No. of houses sampled.	Total population of households	Total existing usage of wood in sampled households (m ³)	Consumption of fuels per month.							
							of houses	Furni-	Agri-	usage of Bam-	Wood	Fire	Kero-	
							ture	ments	boos(Nos)	for	for	light-	ing	(Ltr.)
							(WRE)	(WRE)	(WRE)	in house	ing	heat-	ing	
							(WRE)	(WRE)	(WRE)	construction	(only	winter	months	
										in		months	(2tts)	
1.	Jaintia	3	23	167	192.002	6.091	1.800	4635	244.50	49.50	48	26-		
2.	East Khasi	10	98	101	614	668.371	9.999	0.932	8786	459.20	55.00	299		
3.	West Khasi	10	95	97	588	350.718	9.722	0.487	8109	298.35	97.20	467.5		
4.	East Garo	14	130	132	741	270.111	5.509	3.665	83550	457.40	60.80	569		
5.	West Garo.	15	150	150	789	401.640	12.550	8.457	97214	603.75	-	702.5		
Total (Meghalaya)		52	496	503	2899	1882.842	43.871	15.341	202294	2063.20	262.50	2086.		

Note: Consumption of fuels like Coal, Charcoal, Cowdung and agricultural waste has been recorded as nil in all the samples.

A P P E N D I C E S

APPENDIX - I

Districtwise area and human population/Density (1981)

Sl.No.	District	Area in (km ²)	Population	Density per (km ²)
1.	East Khasi Hills	5196	511414	98
2.	West Khasi Hills	5247	161576	31
3.	Jaintia Hills.	3819	156402	41
4.	East Garo Hills	2603	136550	52
5.	West Garo Hills	5564	369877	66
	Total	22429	1335819	60

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Source:- Statistical Hand Book of Meghalays 1962.

A P P E N D I X - II

(Field forms) .

DOMESTIC WOOD CONSUMPTION
(Data collection Form)

District -
Division -

Schedule -A

Name of the owner of the House:

1. S.No. of the stratum/town
2. Name of the village/S.No. of Block
3. S. No. of households
4. Type of Building actually visited as a sample unit. Katcha/Pucca/multi storeyed
5. No. of storeys - total and used for living only (to be filled in if more than one storey)
6. Sl. 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 household.
9. Total No. of persons living in the house-hold
10. Average 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 room, latrines, kitchen, cow shed etc.

Camp:

Signature

Date:

Name of surveyor
Designation

FORM VI

OTHER FOREST PRODUCE USED IN THE HOUSE - HOLD

Sl. No.	Item	Quantity kg/year	Source of Supply	Rate
1.	Thatch grass			
2.	Fencing Branch wood			
3.	Green manure			
4.	Fencing thorn			
5.	Fodder by lopping			
6.	Fodder grass			
7.	Others			

FORM - IEXISTING USE OF WOOD FOR HOUSE CONSTRUCTION

Year of construction :

ITEM	No.	Size L x W x Thickness (Mtrs.)	Quantity of wood used in Market	Source Spp. Forest/ used Market	Price unit
			M ³	sawn wood	
1. Doors					
2. Windows					
3. Roof					
Poles					
Batties					
Beams					
Rafters					
Purlin					
Parata					
Plankings					
Rippers					
Supporters					
4. Ventilators					
5. Flooring					
6. Others					

Note: Doors & windows include the frames and panels.

FORM - II

EXISTING FURNITURE ITEMS

Year of manufacture

Item	No.	Approximate quantity of sawn wood m ³	Spp. used	Source supply	Price Unit
1. CHAIRS					
2. TABLES					
3. Wooden Almirah					
4. COTS					
5. OTHERS(specify)					
a)					
b)					
c)					

FORM - III

ITEM	No.	Quantity of wood used	Source of supply	Spp. used	Price unit
		m ³			
1. Plough					
2. Yoke					
3. Bullock cart					
4. Leveller					
5. Tool handles (axes, scythe spal, etc.)					
6. Winnower					
7. Parson wheels					
8. Other specify					

FORM - IV

FORM- V

FUEL CONSUMPTION

Sl. No.	Category	Source of supply
------------	----------	------------------

1. Firewood

2. Agri. Waste

3. Animal dung

Schedule - B (General)

- | | |
|---------------------------------------|--|
| 1. Type of equipment used | - Ordinary/chula/smoke less chula/
Biogas |
| 2. Education level of the
village. | |
| 3. Approach facilities | - Katcha Road/Pucca Road |
| 4. Service facilities | - Hospital. School, etc. |

Camp

Signature

Date