Rural Fuelwood Exploitation in Mbo Local Government Area – A Nigerian Coastal Settlement

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Abstract

The exploitation of fuelwood among the rural and coastal fishing communities in Nigeria has been an inevitable consequence of human existence. This has been intensified by the inhabitant's inaccessibility to other sources of energy. The major consequence of this has been the depletion of major forest resource as well as environmental degradation. Through the use of Geographic Information Systems (GIS) and empirical surveys, investigations were carried out in eighteen out of sixty rural communities of Mbo LGA of Akwa Ibom State, Nigeria. Several variables of socio economic activities such as occupation, household size, quantity of fuel wood used, level of income and total number employed in fuelwood business were measured and correlated with volumes of fuelwoods production in those settlements. Four hundred adults including men, women and youths involved in fishing, farming, and trading and river transportation were interviewed. The questions centred on fuelwood use, trade and how it affects the local economy. Result show that 90% of the total local energy requirement is from fuelwood, the average per capita production rate of fuelwood in the local area is 0.38m^3 and the average per capita consumption rate is 0.36m^3. Major areas of local consumption include domestic energy, fish smoking and canoe making.

Keywords: *Exploitation, of, Fuelwood, Rural Fishing Communities Environmental Degradation.*

Introduction

The exploitation of fuelwood by the inhabitants of any area is an inevitable consequence of human existence. This is because fuelwood is a vegetal resource which provides the main source of domestic fuel for both the rural and urban house holds. Its u as a source of fuel is as old as man's inventions of the use of fire and the development of the art of cultivation. In the past, the source of fuel wood was simple, and the environmental impacts arising from its exploitation were minimal due to decrease human population. However, as a result of population increase, man's dependence on wood as a source of fuel and energy started showing signs of inadequacy. Presently, this level of inadequacy is evident in the alarming rate at which deforestation is taking place due to man's attempt to have a steady supply of fuel wood and other vegetal resources.

The reckless exploitation, and in some cases, over exploitation of these resource, have often resulted in environmental degradation (UNEP, 1991a; 1994; UNEP/ISRC, 1990; UNECA, 1992; Thomas et al, 1973; SARDC, 1994). It has been estimated that about 50% of the world's population depend on fuel wood or other biomass fuel for cooking and other domestic uses, with a daily per capita consumption of about 0.5kg to 1.00kg of dry biomass (Twindel and Wier, 1986) and an average annual per capita consumption of 0.77m^3, or 0.18 in Africa (WEC/FAO, 1999). In Nigeria, fuel wood and charcoal account for over 80% of national energy consumption (Foley, 1986). In Mbo Local Government Area, fuel wood accounted for major part of the energy sources. As more and more people depend on the use of fuel wood as a source of energy and fuel, the demand for its exploitation has continued to increase. The rate of fuel wood exploitation in the LGA is so enormous that the LGA is almost reaching scarcity crisis situation. The search for fuel wood which was once a simple chore has turned to a day's labour.

Women, children, as well as the men are forced to search further a field for fuel wood. The shortage of fuel wood has undermined both the health and well-being of the households. It has also significantly altered the basis of life for the rural poor as other dangers of extensive biomass fuel use have been found to constitute a serious ecological threat. Added to this is the unaffordability of alternative energy sources induced by the exorbitant cost of stoves, cookers and utensils and cooking fuel such as kerosine, which manifest in a crisis of energy accessibility that the fuel wood users are trapped in. This, as observed by Macaulay, et al (1989) represents a problem of social equity for the poor.

While indiscriminate exploitation of fuelwood goes unabated in Mbo LGA, the exploiters seem not to be bothered by the effect of their activities on the environment. Fuelwood

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exploitation, has thus, gone beyond mere gathering of dead wood to deliberate and indiscriminate cutting of live trees with motorized saw. This rate of rising exploitation of fuelwood calls for serious and urgent concern at the global, national and local levels. Many of which must be based on the availability of facts and quantitative data which, in most cases, are generally lacking. The present paper is an attempt to fill this gap, the study will determine in precise terms the rate of fuel wood exploitation and examine the relationship between the socio-economic activities of the inhabitants and the rate of fuelwood use, as well as, predict the future status of fuel wood exploitation in the study area.

Pattern Fuelwood Exploitation in Humid Tropical Area of West Africa

Fuelwood exploitation provides a source of employment to many rural inhabitants in the humid tropical areas of West Africa. A study by Kamara (1986) indicates that fuelwood exploitation in Bo and Makeni regions of Sierra Leone provides an important source of income to many rural farmers, women and urban traders. The study further shows that about 50% of fuelwood collected by households is sold. The table 1 below indicates the pattern of fuelwood business in Bo and Makeni region of Sierra Leone. About 72% of the total energy consumed by all sectors is provided by fuelwood. In Cameroon, Njomgang (1987) reports that fuelwood is the primary source of energy for rural households and a major source of cooking fuel in urban areas. The estimated rate of use is 1.6kg/day/person and 0.0025 to $0.25m^3$/day/household. It further shows that an estimate of 200,000-300,000m^3/year is used in the litoral regions of Cameroon. In Nigeria, Moss and Morgan (1981) report that fuelwood provides energy for rural household, employment and income for rural farmers as well as part of the energy requirement for cooking in urban areas throughout the country. It is generally assumed that rural households in the humid forest zone of Nigeria do not suffer from fuelwood scarcities. (Oguntala, 1986). However the recent trend of exploitation shows that this assumption has been overtaken. About 1.9 to 4.0kg/day/capita is estimated as the usage rate in Nigeria. In Liberia, (Energy Initiatives for Africa, 1986) reports that 30% of rural energy requirement and 50% of urban requirements respectively is provided by fuelwood. In Cote D' Ivoire, 84% of the country's total household energy requirement is provided by fuelwood.

The Study Area

Mbo Local Government Area is one of the coastal communities in Akwa Ibom State. It is located in the South-South geographical region of Nigeria extending from Latitudes $4^0 32^1$-$4^0 45^1$ North and longitudes $8^0 12^1$ - $8^0 20^1$ East with a land area of about 372.13km^2 and population of 67,302 (NPC, 1991). The LGA consists of 60 villages/fishing ports. Being predominantly fishing settlements, the Local Government Area is bounded on the East by the Cross River estuaries, on the South by Ibeno LGA (another fishing settlement) on the west by Esit Eket and on the North by Urue Offong/Oruko Local Government Area. The entire Mbo LGA is covered by beach ridge sands and mangrove swamps and floodplains with recent alluvial accumulations (AKS, 1989). Geologically, the area consists of sedimentary rock formation. The area is marked with double maxima of rainfall, with the heaviest rainfall in May, June and July and the driest period in November – February. The LGA experiences an annual rainfall of over 2,000mm with the dominant vegetation being the fresh and salt water mangrove swamp forests.

The major economic activities of the inhabitants are fishing, fuelwood exploitation and processing and subsistence farming. Fuelwood exploitation is mainly the exclusive preserve of men while farming and trading are mainly carried out by women. Besides, the wives and children of the fishermen, several families in the area are engaged wholly in fish processing-drying. An estimated 70% of the fuel woods consumed in this area are spent on fish drying.

Materials and Methods

A total of 60 villages exist in the LGA. These villages were grouped into coastal and upland regions. Through the aid of the Table of Random Sampling Numbers 18 settlements were selected from the 60 settlements (9 settlements from the upland region and 9 from the coasted region). In open and semi-structured interviews with key persons such as the fuel wood collectors/suppliers, fishermen and village heads, heads of households and through the administration of 421 questionnaire information on the source of fuel

wood, the quantity supplied and consumed, the amount spent on fuel wood by the consumers and socio-economic characteristics and activities in the study area, level of involvement in fuel wood exploitation, fishing, fish drying and fish marketing, trade union involvement, legislations and enforcement, period of involvement in fuel wood exploitation, tools used, means of transportation and the uses of the fuel wood were obtained.

The number of questionnaire administered was determined by expressing the 2005 projected population (95,871) of each of the villages based on the 1991 population figure (67,305) at a growth rate of 2.83% as a percentage of the total population of the study area.

Retrospective information an the landuse pattern and the entire land area was obtained from landsat Imagery (1984) of the study area from Cross River Basin (which was modified with information from the internet) and the arthophoto (2003) of the study area from the survey department, Akwa Ibom State Ministry of Lands. This information was subjected to series of analysis to obtain land-use maps of the study area for 1984 and 2003. Both years were compared to elicit information on the extent of forest destruction within the period of 19 years. The cartographic production of the land use maps was carried out using ESRI'S Arc view GIS 3.2a, ILWIS 3.3 and Adobe Photoshop. The principal components analysis was employed in collapsing the socio-economic activities data of the inhabitants and the rate of fuelwood exploitations data in the study area.

The principal components analysis is a multivariate statistical method, which enables a researcher to achieve a parsimonious description of data by converting a set of variables X_1, X_2, X_3, ….X_n into a new set of fewer factors or components which as much as possible, are capable of representing the first set of variable (Udofia, 2005). The technique may be used under many situations generally as an explanatory instrument to enable the researcher see what could be the effective number of dimensions in a variable set or how dominant certain linear combinations of the variables are. In practice, the computation of the principal components analysis is equivalent to extracting the eigen values and eigenvectors of an intercorrelation matrix of the variables such that:

$$Z_1 = C_{11}X_1 + C_{21} + C_{31}X_3 + C_nX_n$$
$$Z_2 = C_{12}X_1 + C_{22}X_2 + C_{32}X_3 + C_nX_n$$
$$Z_3 = C_{11}X_1 + C_{21}X_2 + C_{3i}X_3 + C_{n2}X_n$$

Where:

Z_1, Z_2 and Z_i = first, second, etc principal components

Cij = the coefficient of the Ci^{th} variable for the j^{th} component.

For the present study, the principal components technique was used to collapse the socio-economic activities data matrix and obtaining components. The same technique was also used to collapse the volume of fuelwood factors data matrix and obtaining components. After that, the two sets of principal components obtained were then intercorrelated and the model extracted. The socio-economic activities variables are population X_1, No. of fishing occupation X_2, Other occupations X_3 fuel number of wood producers X_4, quantity of fuelwood used in fish drying X_5, quantity of fuelwood used in non-fishing activities X_6, size of the households X_7, quantity of fish dried per given, period X_8.

The Multiple Correlation/Regression Model was further used to establish the relationship between the components of socio-economic activities and the level of fuelwood exploitation in the study area. The multiple correlation/regression model is a multivariate statistical technique used in predicting and establishing the relationship between a dependent variable (y) and some independent variables (X_s). The model is statistically expressed thus:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 \ldots\ldots b_nX_n$$

Where:

Y= dependent variable

a= y – intercept

$b_1, b_2, b_3 \ldots b_n$ = regression plan

$X_1, X_2, X_3 \ldots X_n$= independent variables

The y - dependent variables are: total forest area cleared (y_1) and total vulnerable wood species (y_2).

Result and Discussion

Table 2 shows the educational level, occupational characteristics, family sizes and the general levels of income of the respondents in the study area.

The occupational distribution of the households as shown in Table 2reveals that

greater percentage (71%) of the inhabitants are engaged in fishing and fuel wood supply while 26.7% and 12.1% are engaged in farming and petty trading respectively. The higher percentage of the inhabitants who are involved in fishing and farming are predominantly the coastal dwellers.

Also, greater percentage (66%) of the annual earnings of the households lies between ₦5, 000 – ₦10, 000, per annum. Majority of the very low income earners are found in the upland region, these are mostly households who are engaged in farming and petty trading. The higher income earners are predominantly the fisher folks and fuel wood producers who reside in the coastal area.

Table 2 further showed that, while 29% of the households did not have any formal education, about 43% had only primary education, with 28% having secondary education and above, the implication of these levels of education is that considerable percentage (72%) of the households' struggle to earn a living by looking unto the sea and forest resources for a living. The age distribution in the table shows a preponderance of young adults (31-40) and old adults (41 above) who are principally engaged in both fishing and fuel wood exploitation.

Most of the fuelwood supplies in Mbo LGA as shown in Table 3 are exploited in large quantity in the following settlements: Ata Akpa Erek Ebughu, Ibaka, Mkpang Utong, Ine Ekpo, and Ibok Utang Village. Within these settlements, most of the fuelwood are exploited by women, children and men who go into the farmland to extract fuelwood within the range of two to five kilometers. In most cases, the inhabitants were trekking less than two kilometers to exploit fuelwood for their domestic needs.

Fuel wood production is carried out as a full time business, and it is usually done in communal and government owned land, but not in reserved land. When compared with what obtains in Northern Nigeria (Kano), it is noted that the wood is generally cut from other people farms on payment of fees. The commercial suppliers collect both dry and live wood (the live woods are felled and allowed to dry). The producers largely employed manual and hand axe and cutlasses in exploiting the wood while the women and children concentrate more on cutting and, picking the fallen dead woods. Tree species such as Mahogany (Khaya ivorensis), Red Mangrove (Rhizophora racemosa), Black/white aphera (Terminalia ivorensis/superba), camp/red wood (Baphia nitida), cedar (Cordilia mellinia), Ebony (Diospyros erycoma), Abura (Mitragyna ciliata), Pandanus/raffia palms (Raphia hokeri), are exploited for fuelwood. These fuelwood are usually indiscriminately exploited by the fuelwood merchants, with no conscious efforts for re-planting or reforestation exercise in mind. The trees are not usually allowed to regenerate before further premature harvesting. Usually, the fuelwood exploited are transported through a combination of modes. Transportation of the fuelwood at the source region is done by land routes and waterways. Canoes and flying boats are used to move fuelwood from the creeks to the beaches. They are also used for intra and inter ports/settlements movement of the fuelwood. Non-commercial fuel woods (domestic) are transported by head porterage and by bicycle and motorcycle. Commercial suppliers use pick-up van, lorry, motorcycle, bicycles and in some cases, head porterage. The volume of fuelwood exploited per annum in Mbo LGA is 10,419.9m^3 with a per capital production of 5.97m^3.

There are seasonal variations in the prices of fuel wood at the source regions and the markets' (within the administrative headquarter and the suburbs) as shown in Table 4. However, in the face of Kerosene scarcity, the price of fuel wood could be higher. From the table, it is shown that in the wet season a 25kg bundle of fuel wood which sells at ₦30- ₦50 in the villages, sells at about ₦65- ₦70 in Mbo administrative headquarters, with a sharp decline in the price at the wet season. It was also found that while the price of a pick-up and lorry vans cost between ₦15,000, ₦20,000 and ₦50,000 – ₦55,000 at the source region in the wet season, they're sold at ₦20,000 – ₦25,000 and ₦60,000 – ₦70,000 at the market, with a decreasing price at the dry season.

While about 10,419.9m^3 of fuelwood is produced annually with a per capita production of 5.97m^3, the total annual fuel wood utilized is 9009.72m^3 with a per capita consumption of 6.61m^3 (Table 5). Of these, about 5182.8m3 are used for fish drying, while about 3826.92m^3 are used for domestic purposes (cooking). There is therefore, a direct

relationship between the rate of fuel wood exploitation and fish drying in the study area, as an estimated 70% of the fuel wood consumed are spent on fish drying. The volumetric value for the per capita household consumption of fuel wood obtained in some settlements (Ine Ekpo, Ibuot Utan and Ibaka) conforms with the estimated per capita consumption of 360kg or 1.03 steers or $0.52m^3$ per annum obtained by Cline-cole et al (1987) in Kano.

Table 6A shows that 61.52% of the households in Mbo LGA use fuel wood as a major source of energy. The dominant fuel combination are fuel wood and Kerosene which are used by 88.12% of the rural households-with annual per capita and average per capita consumption of $6.61m^3$ and $0.55m^3$ respectively (Table 5). While 4.75% and 7.13% of the households, predominantly households in upland region utilize sawdust and gas as their source of energy, non of the households use electricity.

The amount spent on fuelwood ranges between ₦50-₦100 in the coastal regions and ₦100-₦150 in the upland regions. Thus, 88.59% of the households in the study area spent between ₦50-₦150 per income on fuel wood, given an average monthly income of ₦1250 per month in the upland region and ₦2500 in the coastal region. There is, therefore, an inverse relationship between fuelwood consumption and the level of household income (Table 6B). This indicates that higher income does not significantly attract more fuel wood consumption, all things being equal. This conforms to the findings of Ehiemere (1996) in his study of fuel wood supply and use in Bama Local Government Area of Borno State, Nigeria.

With respect to the determining factors of fuelwood use, the price of Kerosene and gas was ranked the highest with 27.32%. This is followed by household size (19.00%), No of times cooking is done (14.73%). The types of food cooked (12.35%), fuel wood availability (9.50%), cost of fuel wood (8.55%) the quality of the fuel wood (3.80%) and the season of the year (4.75%). Thus, there is a significant positive relationship between the cost of Kerosene/gas, household size and the quantity of fuelwood consumed in Mbo LGA (Table 6C).

Table 7 shows that collapsing the factors of socio-economic activities (variables) data matrix yielded two significant eigen values with a cumulative percentage of 78.16%. The orthogonal matrix of component loadings indicated that component 1 highly loaded with all the variables-applied. Component 1 was, therefore, identified as population component. This component accounted for 42.45% of the total variations of all the variables. The variables that make up this component are the population of household engaged in fishing and number employed in fuel wood exploitation. This result agrees with Nyang (1978) reported in FAO (2000) that fuel wood production and use is driven by population dynamics. Also, component 2 (fish drying component) significantly loaded positively with all the variables. These components accounted for 25.71% of the variation of all the socio-economic activities variables applied. The variable is named because of its high loading on the quantity of fish dried, volume of fuel wood used in fish drying, and the population of household engaged in fishing.

The level of fuel wood exploitation in the study area was expressed by two major dependent variables –total forest area cleared (y_1) and total vulnerable wood species. The relationship between the components of socio-economic activities and the level of fuel wood exploitation as shown in Table 8 reveals that 63.4% of the forest area cleared is associated with the level of socio-economic activities prevalent in the area. The coefficient of determination (r^2) of 40.1% further establishes the significance of this relationship at 0.05-confidence level. With respect to the vulnerable wood species (y_2), the Correlation Coefficients (r) of 36.7% and a Coefficient of determination (r^2) of 13.5% shows that the relationship is not significant. The indiscriminate and uncontrolled exploitation of fuel wood by the merchants in the LGA as observed during the fieldwork confirms this result.

Table 9 shows that deforested area increased by 43.80% from 7463955.86sqm in 1984 to 11420474.36sqm in 2003. The area cleared within the space of nineteen years under review is $3956518.5m^2$. This amounts to $208237.86m^2$ per annum or $570.51m^2$ per day. At this rate of destruction of the natural vegetation, there was no doubt that the loss of biodiversity (both fauna and flora) is enormous. Habitat destruction/modification

caused by this level of time goes into extinct. Although, the entire cause of deforestation may not be credited to fuel wood exploitation, there is strong evidence that it is a major contributing factor. For instance, secondary forest increased by 17.40% from 96738798.22m^2 in 1984 to 115283031.93m^2 in 2003. This suggests clearly that farming activities and other causes of deforestation contribute little to the vast deforestation noticed in the area. It is noteworthy that farmlands decreased by 52.89% from 12740898.23m^2 to 7159392.64m^2 within the space of 19 years. If farming activities were to be of great importance, secondary forest would have decreased over the years in favour of farmlands since farming operations can be carried out on same land over a number of years. Rather than decrease, secondary forest increased by 17.40%. Where shifting cultivation is practiced, the fallow period may not be more than two to three years. Conversely, fuel wood regeneration takes several years. For trees to mature into good fuel wood, about 15 to 20 years are required. This therefore suggests strongly that the major cause of deforestation in the area is fuel wood exploitation. The decrease in farmlands from 12740898.23m2 in 1984 to 7159392.64m^2 in 2003 suggests clearly that less number of the population were engaged in farming. The youths migrate to the urban areas to look for white collar jobs thereby leaving farming for young and old adults who are more interested in fuel wood production.

Conclusion

The study has revealed that fuelwood exploitation in Mbo LGA is predominantly influenced by the level of socio-economic activities and the population of households who are engaged in fishing and fish drying activities. The pattern and quantity of fuelwood harvested and consumed in the study area has also been examined. The research has shown that the coastal dwellers exploit more fuelwood than the upland dwellers.

To avert the ecological impact of fuelwood exploitation in the study area, it is recommended that there is need for the introduction of an acceptable and accessible alternative technology for the preservation of fish or a means by which all fishes caught by the fishermen are preserved. The introduction of mobile cold room network for the purchase of all fishes in the LGA will considerably limit the use of fuelwood in preservation. This should be followed up with a local legislation to control the methods of drying of commercial fish in the LGA. Conscious and sustained reforestation programmes be embarked upon in order to avoid the total collapse of the ecological system.

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Table 1:Quantities of Firewood Collected, Consumed and Sold By Rural Households in Sierra Leone

Percent Distribution of Annual Quantities of Firewood Collected, Consumed and Sold per Household According to Category of Labour							
Labour Category	Annual Average ME-day per Household	Total Qty Collected per Household	Percent of Total Qty Consumed	Total Qty Consumed per Household	Percent of Total Qty Consumed	Total Qty Sold per Household	Percent of Total Qty Sold
		(kg)	(%)	(kg)	(%)	(kg)	(%)
1. Rural Bo							
Male Adult	9.5	1 283.7	16.8	274.4	7.4	1 009.4	24.7
Male Child	2.0	186.5	2.4	60.4	1.7	126.1	3.1
Female Adult	35.2	5 566.1	72.7	2 809.7	78.9	2 756.5	67.3
Female Child	5.7	619.5	8.1	418.5	11.7	201.0	4.9
All Groups	52.4	7 655.8	100.0	3 562.9	100.0	4 092.9	100.0
2. Rural Makeni							
Male Adult	10.3	1 282.5	16.2	225.8	6.5	1 056.7	23.9
Male Child	2.0	261.3	3.3	228.8	6.6	32.5	0.8
Female Adult	40.2	5 497.3	69.6	2 296.3	65.9	3 201.0	72.5
Female Child	6.7	858.3	10.9	734.4	21.0	123.8	2.8
All Groups	59.3	7 899.3	100.0	3 485.3	100.0	4 414.1	100.0

Source: Kamara, 1986.

Table 2: Socio-Economic Characteristics of Respondents

	Total No. of Respondent	Age Group			Level of Education			Occupation				Level of Income Units Naira		
		Year 20-30	Year 20-30	>41	No formal	Prim. Sch.	Sec. Sch.	Farming	Trading	Fuel wood	Fishing			
Ine Ekpo	18	5	3	10	2	14	2	3	3	5	7	6	10	2
Mbe Ndoro	21	5	5	11	8	10	3	2	2	7	10	5	8	8
Akwa Obio Effiat	42	20	10	12	22	15	5	10	5	15	12	10	14	18
Utan Iyata	30	10	5	15	10	15	5	5	5	8	12	5	10	5
Mkpang Utong	13	4	3	6	1	11	1	2	-	6	5	3	4	6
Inua Abasi	25	8	5	12	2	20	3	10	-	2	13	5	10	10
Esuk Enwang	27	10	10	7	7	8	12	12	5	2	8	7	10	10
Utan Effiong	19	6	3	10	3	10	6	3	4	6	6	5	4	10
Erek Ebughu	11	4	3	4	5	5	1	3	-	5	3	4	3	4
Brama	37	10	17	10	10	10	17	7	3	10	17	6	10	21
Ibuot Utan	17	2	7	8	7	9	1	4	4	6	3	3	3	11
Asiak Obufa	19	4	5	10	10	4	5	4	4	3	8	4	10	5
Ibaka	18	3	5	10	8	2	8	2	3	8	5	8	5	5
Offi	20	3	10	7	5	5	10	7	3	7	3	6	5	9
Okobo Ebughu	34	8	20	6	6	10	18	15	-	10	9	14	12	8
Udensi Uko Itak	19	10	6	3	7	2	10	10	2	4	3	5	4	10
Orukim	33	12	18	3	6	20	7	10	5	15	3	10	13	10
Enwang (Eyo-Ukut)	18	4	10	4	5	10	3	3	3	10	2	8	7	3
Total	421	128	145	148	124	180	117	112	51	129	129	115	135	173
Percent		30.4%	34.4	35.5%	29.1%	42.3%	27.5%	26.7%	12.1%	30.6	129	27.%	32%	40%

Source: Authors Fieldwork (2007)

Table 3: Rate of fuelwood Exploitation/supply in Mbo LGA.

Village	Population	Fuelwood production per annum in m^3	Fuelwood production per capita m^3
Ine Ekpo	1198	809.4	0.67
Mbe Ndoro	1833	164.0	0.09
Akwa Obio Effiat	5678	81.4	0.12
Utan Iyata	2759	550.4	0.12
Mkpang Utong	714	521.2	0.73
Inua Abasi	2182	844.7	0.89
Esuk Ewang	2547	344.8	0.14
Utang Effiong	1563	621.1	0.40
Ata Apa Erek Ebughu	506	724.4	0.43
Brama	3805	482	0.13
Ibuot Utan	1192	641.8	0.54
Asiak Obufa	1316	444	0.34
Ibaka	999	734.1	0.73
Offi	1777	481	0.27
Okobo Ebughu	3659	894	0.24
Udensi Uko Itak	1491	523.4	0.35
Orukim	3624	284.1	0.08
Enwang	2547	514.1	0.20
Total	39290	10,419.9	

Source: Authors Field Work (2007)

Table 4: Various Units and Prices of Fuelwood at Source Regions and Markets During Wet and Dry Season in Mbo LGA.

	SEASONS (WET)		SEASON (DRY)	
LOAD UNITS	PRICE AT SOURCE	PRICE AT MARKET	PRICE AT SOURCE	PRICE AT MARKET
25Kg PICK-UP-VAN LORRY VAN (MERCEDES 911)	₦30 - ₦50 ₦15,000–₦20,000 ₦50,000–₦55,000	₦ 65- ₦ 70 ₦20,000 – ₦25,000 ₦50,000 – ₦55,000	₦ 20 ₦13,000 ₦50,000	₦25 ₦15,000 ₦53,000

Source: Authors Fieldwork 2007

Table 5: Annual Fuelwood Use in Mbo LGA, Akwa Ibom State, Nigeria.

Village/Settlement	Vol. of fuelwood used/for cooking (m^3)	Vol. of fuelwood used/for fish drying (m^3)	Total Vol. m^3	Population	Per capita Consumption Vol. m^3
Ine Ekpo	230.4	374.4	604.8	1198	0.50
Mbe Ndoro	182.4	182.4	364.8	1833	0.20
Akwa Obio Effiat	189.6	382.8	572.4	5678	0.10
Utan Iyata	177.6	460.8	638.4	2759	0.23
Mkpang Utong	253.6	327.6	580.8	714	0.81
Inua Abasi	86.4	367.2	453.6	2182	0.21
Esuk Ewang	332.4	432	764.4	2547	0.30
Utang Effiong	226.8	283.2	510	1563	0.33
Ata Apa Erek Ebughu	378	463.2	841.2	506	1.66
Brama	151.2	378	529.2	3805	0.14
Ibuot Utan	291.6	451.2	742.8	1192	0.62
Asiak Obufa	189.6	265.2	454.8	1316	0.35
Ibaka	124.8	411.6	536.4	999	0.54
Offi	207.6	-	207.6	1777	0.12
Okobo Ebughu	223.2	403.2	626.4	3659	0.17
Udensi Uko Itak	204.12	-	204.12	1491	0.14
Orukim	151.2	-	151.2	3624	0.10
Ewang	226.8	-	226.8	2547	0.009
Total	3826.92	5182.8	9009.72	39390	6.61

Source: Authors Fieldwork 2007

Table 6A: Energy Sources in Mbo LGA

Energy Sources	Response Frequency	% Response
Wood	257	61.52
Kerosene	112	26.60
Charcoal	-	-
Saw dust	20	4.75
Gas	30	7.13
Electricity	-	-
Total	421	100
6B. Amount of household income spent on fuel wood per day.		
Amount per day (₦)	Response Frequency	% Response
<50	24	5.70
50-100	241	57.24
100-150	132	31.35
150-200	16	3.80
200 above	8	1.90
Total	421	100
6C. Factors Affecting Fuelwood Use in Mbo LGA		
Factors	Response Frequency	% Response
Household size	80	19.00
No. of times cooking is done	62	14.73
Quality of fuelwood	16	3.80
Fuelwood availability	40	9.50
Price of Kerosine/gas	115	27.32
Cost of fuelwood	36	8.55
Types of food cooked	52	12.35
Season of the year	20	4.75
Total	421	100

Source: Authors Field Work (2007)

Table 7: Result of Principal Component Analysis of the Eight Socio-Economic activities that influence Fuelwood Exploitation in Mbo LGA.

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.465	43.308	43.308	3.465	43.308	43.308
2	2.789	34.858	78.165	2.789	34.858	78.165
3	.953	11.911	90.076			
4	.382	4.780	94.856			
5	.217	2.707	97.563			
6	.104	1.303	98.866			
7	7.344E-02	9.18	99.784			
8	1.732E-02	.216	100.000			

Source: Author Data Analysis 2007

Table 8: Multiple Regression Model for the relationship between Socio-economic activities and the level of fuel wood exploitation in Mbo LGA

Model Summary for y_1

Model	R	R Square	Adjusted R Square	Standard Error of Estimate	Durbin Watson
1	.634[a]	.401	.322	1.0941	1.053
Model Summary for y_2					
1	.637	.135	.019	.69	1.928

Anova[b] Table for y_1

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	12.038	2	6.019	5.028	.021[a]
Residual	17.955	15	1.197		
Total	29.994	17			
Anova[b] Table for y_2					
1 Regression	1.114	2	.555	1.166	.338[a]
Residual	7.164	15	.478		
Total	8.278	17			

Source: Authors Data Analysis 2007

Table 9: Landuse Distribution in Mbo LGA as Interpreted from Aerial Photograph (2003) and Landsat Imagery (1984)

Land Area	Landsat Imagery 1984 M^2	Aerial Photography 2003 M^2	Difference M^2	% difference	Remarks
Deforested Area	7463955.86	11420474.36	3956518.5	43.8	Increase
Farmland	12740898.23	7159392.64	5581505.59	52.89	Decrease
Primary Forest	60278054.65	46806789.19	13471265.46	19.17	Decrease
Secondary forest	96738798.22	115283031.93	18544233.71	17.40	Increase
Settlement	4288301.85	3542162.86	746138.99	22.35	Decrease
Water body	39423285.42	36883697.75	2539587.67	6.44	Decrease

Source: Authors Data Analysis 2007