
**FUELWOOD HARVESTING AS MEANS OF INCOME IN GORA AND ZUTURUNG
DISTRICTS IN ZANGON KATAF LOCAL GOVERNMENT AREA,
KADUNA STATE, NIGERIA**

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Abstract: Fuelwood apart from meeting domestic energy need of the people in the rural areas provide a means of livelihood as a source of income. The income of fuelwood harvesting in Gora and Zuturung districts in Zangon Kataf Local Government Area, Kaduna State, Nigeria, was investigated with a view to determine its potentials and impact on the income of the communities. Data for the study were obtained from a total sample of 150 randomly selected respondents through interview schedules, application of structured questionnaires and personal observations. Descriptive statistical tools such as frequencies, percentages and tables were used to analyze the data obtained from the questionnaire. The study indicated that the major uses of the fuelwood by the respondents for sales and cooking, The fuelwood are sold in pickups and the income generated from the fuelwood sales by each respondent within the period of study ranges is between ~~₦2,000~~ to ~~₦6,000~~ in a month and the money realized from the sales of the fuelwood is use for paying school fees, buying cloths, buying farm inputs, and other domestic functions and the effects of the fuelwood harvesting include: reduction of plant species, reduction in vegetation, occurrences of drought, disappearances of animal species, rises in temperature and others environmental problems. The study also confirmed that harvesting of the fuelwood by communities is illegal as government is against any person(s) who engage in fuelwood harvesting from the bush. It is therefore recommended that the State Forestry Department should educate the collectors on the importance of rational exploitation, tree planting, and the value of maintaining the existing trees on their farm plots.

Keywords: Forest Products, Fuelwood, Economic Assessment, Livelihood, Biodiversity.

INTRODUCTION

Fuelwood is a vital source of livelihood for a large proportion of the poor living in or close to the forest in most tropical countries. Wood harvesting for fuelwood is the third most important economic activity for the inhabitants of forest dependent area, after farming and animal husbandry (FAO, 2008). Moreover, local processing of Non-timber Forest increases off-farm rural employment opportunities. Small-scale forest-based enterprises, many of them based on forest, provide up to 50 percent of income for 20 to 30 percent of the rural labour force in India (Campbell, 2006). In addition to subsistence and income-generating potential, forest also provides food security to large low-income populations, their cattle and other domestic animals, particularly during droughts or famines (FAO,

2008). There are diverse technical, environmental, social, cultural and economic reasons for choosing fuelwood as a source of energy (Horgan, 2001). These factors make fuelwood use a site and situation-specific energy option. There are diverse reasons for choosing wood as a source of energy. For many users, the choice depends on the availability and affordability of other energy options (Horgan, 2000). In the past, wood harvesting in developing countries was mainly for domestic consumption, and it was mostly women who gathered the dry branches and trunks of trees and shrubs for fuelwood (Awah 2005). Today the situation has changed, as increased commercialization of the sector has led to the widespread harvest of both dead and live branches and trunks by men and women (Awah 2005). Fuelwood is harvested, processed, marketed and consumed exclusively by forest dependent communities, moving from collectors through wholesalers and retailers to consumers. Fuelwood is forest product with little sophistication in length of processing and marketing, the products reach the final consumers more or less directly. The fuelwood sector employs many men, women, and children in both rural and urban areas, offering both temporary and permanent employment opportunities. It is important economically because it offers an immediate source of income to the exploiters (Larinde and Kehinde, 2004). Fuelwood is obtained by splitting logs and big branches into halves and smaller pieces. Most of the wood harvested in the villages for household use are harvested by women and younger children and transported on head, animal, truck and bicycle. Apart from its increasing commercial value, factors encouraging the use of fuelwood include cooking habits, purpose of cooking, family size, social rank and food type (Montalembert and Clement 2007; Munslow *et al.*, 2005). For centuries fuelwood has remained an affordable and reliable source of domestic energy for the rural populations of the developing countries (FAO. 2001). Rural population in oil rich developing countries will continue to depend on wood because bringing oil, gas and electricity within their reach would require very high capital expenditure on roads and on electric transmission lines. A large number of rural households are becoming more involved in producing of fuelwood for the market; hence it is necessary to shift the focus of study from subsistence to income generation.

A consumer contemplating switching fuels may need to factor in the possible impacts on existing equipment and may have to assign economic values to known or perceived externalities which may differ with the energy or fuel source. In the commercial and industrial sector, a large number of prepared-food vendors such as restaurants, vendors of barbecue, bakeries, makers of Agidi (maize steamed in leaves) and palm oil producers depend on wood fuel. Institutions such as hospitals, schools and prisons and industries such as blacksmiths are among the highest consumers of scrap wood, coconut wood and charcoal.

Livelihoods connote the means, activities, entitlements, assets by which people do make a living through natural or biological means (i.e. land, water, common property resources, flora, fauna), social (i.e. community, family, social methods, participation, empowerment) and human (i.e. knowledge, creation of skills) and are therefore paramount to the debate on sustainable development. Fuelwood no doubt provides a means of livelihood as a cheap source of domestic energy and income to supplement farming for the forest dwellers

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throughout the year. Social impact assessment is an integral part of environmental impact assessment which aims to widen the focus and integration of the social and economic implications of a development programme on the life, economy, culture and existence of the host or beneficiary communities.

STUDY PROBLEM STATEMENT

Due to the lack of electricity, high cost of kerosene and gas, the rural households in Gora and Zuturung Districts is highly dependent on natural free forest resources for fuel and as a source of income, these, coupled with open access and high levels of poverty. In Zangon Kataf Local Government area, only few of all the households located in the area have access to electricity. The typical farmer in Gora and Zuturung Districts is characterized by poor in social and physical infrastructure and low income levels. These, like in other rural areas of the local government, have led to over-reliance on local open areas vegetation resources for their source of income and consequent deforestation related problems. No work on the related topic has been carried out in the study area. Therefore, the need for this study can not be over ever emphasized.

OBJECTIVES

The study aim at assessing the fuelwood harvesting as means of income in Gora and Zuturung Districts in Zangon Kataf Local Government Area, Kaduna State. Nigeria. To achieve the aim the following objectives were observed:

- To examine the uses of fuelwood in Gora District and Zuturung
- To examine the market of the fuelwood in the Gora District and Zuturung.
- To determined the income of the fuelwood harvesting in Gora District and Zuturung.
- To examine the effects of the fuelwood harvesting on the environment.

STUDY AREA

The study was conducted in Gora and Zuturung Districts in Zangon Kataf Local Government Area (LGA) of Kaduna state. These are districts in the local government that have free and large forest. The area is located between Latitudes 10⁰ 18' and 10⁰ 30'N and Longitudes 7⁰ 15' and 7⁰ 45' and has a total area of 35km². In 2006, the population of the study area was estimated to be 4,767 people. The major occupation of Gora and Zuturung Districts is farming. The climate of the area is part of the tropical wet and dry climate of Nigeria. It is characterized by wet and dry seasons. The wet season begins in April and ends in October, though; there is fluctuation in the beginning and the ending of the wet season from year to year. In some years, it begins early May (Ajayi, 2007). The wet season which is characterized by high humidity throughout last for six to seven months with its maximum rainfall in the month of August (Ajayi, 2007)? The study area is dominated by the dry dusty cool hamattan wind, migrating from the Sahara desert in November to March. The average annual rainfall is about 1140mm to 1204 and has the average annual temperature of about 26.4⁰C (80⁰F). The area is located in the slightly thicker wooded vegetation of the north guinea savannah zone, the activities such as

overgrazing, bush burning, over cropping, tree felling for fire wood have generally modified the vegetation to wooded shrub like-vegetation. The vegetation of the area is dominated by grasses and trees like *Mansonia altissima*, *Triplochiton scleroxylon*, *Terminalia superba*, *Celtis zenkeri*, *Sterculia spp*, *Terminalia ivorensis* and *Cola spp*. The area is noted for having large quantities of fuelwood and consumers of wood almost all year round.

METHODOLOGY

Gora and Zuturung Districts were purposively selected because high fuelwood harvesting and marketing in Zangon Kataf Local Government Area, Kaduna State. Data collected include; socio economic characteristics of households, and their fuelwood harvesting, types of fuelwood, market and income of fuelwood and the effects of fuelwood harvesting on the environment data. Data for the study were obtained from a total sample of 150 randomly selected respondents through interviews schedules, application of structured questionnaires and personal observations. To overcome language problem, lost of questionnaire and for appropriate understanding of the questions and responses, the questionnaire was read and interpreted to the illiterate respondents. Descriptive statistical tools such as frequencies, tables and percentages were used to analyze the variables used for the study.

RESULTS AND DISCUSSION

Socio – Economic Characteristics of the Respondents

Demographic analysis of respondents shows that age groups of 30-40 years had the highest number of respondents (44.7%). This was followed by the age group of 20-30 years (27.3%). This shows that majority of the respondents are in their active periods and are bread winners for their respective family within their communities. According to Amaza (2004), the respondents' age is at a stage at which marginal productivity and productive efficiency, physical energy to work, managerial ability and interest are assumed to increase with age. From the above table, the youths appear uninterested in forest product activities. However, the proportion of people engaged in these forest product activities (gathering, processing and marketing) with respect to age should favour income generation.

The majority of the respondents (82.7%) were females while 17.3% were males, which means that fuelwood collection is more exclusive preserve of the females even though males are involved in harvesting of fuelwood in the study area. This might also be due to the fact that women are involved in domestic cooking and supplementing farm income in off season periods. This supports the finding of Ani (2004) and Fidelia (2005) that generally women have greater access to the cash economy from forest product activities. This can be agreed upon because from the result shown in the table, more females have access to forest products than males.

The majority (76.7%) of the respondents were married, 10% of the respondents are widows, 6.7% are singles, and 6% of the respondents are widowers. This result is in line with the findings of Jande (2005) who reported that married people have more

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responsibilities such as the provision of foods, education and health and well-being of their spouses and children. This may be the reason why the business is dominated by the married people unlike the case for the singles, who may not likely have other people to take care of beside themselves.

Most of the respondents (56%) completed secondary school education, 34.7% primary education 8% had no formal education, and 1.3% had tertiary education, this depicts that educational level of the people is inversely proportional to the number in the business of fuelwood harvesting, implying that those that are well educated are not many in the business. This is not surprising since a great percentage of rural dwellers have little education and tertiary education institutions qualifications are not prerequisites. Most of the respondents interviewed were married, which shows that family labour is a strong in generating more output.

This result shows that literacy level among the marketers is low. The preponderance of non-literates in high labour demanding livelihood labour was reported by Amaza (2000), who stressed that practitioners' level of level of education is inversely proportionate to involvement in labour demanding livelihood. This may be for the fact education helps to liberate the mind, could expose practitioners to several alternatives and helps in efficient use of information which could lead to better output and income.

The result also indicates that majority (89.3%) of the respondents were farmers by primary occupation, 6.7% of the respondents are civil servant, 3.3% of them are business men and women, and 0.7 of the respondents are craftsmen and women. Since this is dominated by farmers, it means that firewood business will be markedly affected by season due to the attention and time it would receive. Farmers spend substantial part of their time on their farms during raining season, and are more likely to concentrate on fire wood harvesting activities during the dry season.

The distribution of household size revealed that the largest household have between 5 –10 people and 58.7%, 15 – 20 have 17.3%, 10 -15 have 16% and 1-5 and 20 and above have 4% each.

Table1: Socio – Economic Characteristics of the Respondents

Age	No. of Respondents	Percentage (%)
10 – 20	15	10
20 – 30	65	43.3
30 – 40	54	36
40 and above	16	10.7
Total	150	100
Gender		
Male	22	14.7
Female	128	85.3
Total	150	100
Marital Status		
Single	10	6.7
Married	115	76.7
Widow	15	10.0
Widower	10	6.0
Total	150	100
Level of Education		
No formal education	37	24.7
Primary education	48	32
Secondary education	60	40
Tertiary education	05	3.3
Total	150	100
Occupation		
Civil servant	10	6.7
Public servant	0	0
Business men/women	5	3.3
Farmer	134	89.3
Craftsmen/women	1	0.7
Total	150	100

Various Uses of Fuelwood in Gora and Zuturung Households

The frequency distribution in this table gives the various uses of fuelwood in the study area. The results indicate that fuelwood is utilized mainly for sales (89.3 %), followed by cooking (13 %).

That majority of the fuelwood harvesters used the product as a source of income and cooking energy, also affirmed the earlier observation by Chukwu (2001) who indicated that over 70 percent of the total population of Nigeria relies on fuelwood as their major source of income to take care of their needs and energy for cooking and heating purposes.

Table 2: Respondents Reason(s) for Harvesting Fuelwood

Reason(s) for Harvesting Fuelwood	No. of Respondents	Percentage (%)
For cooking	16	10.7
For sale	134	89.3
Baking	0	0
Hotel/restaurant	0	0
Total	150	100

Location Where Respondents Harvest Fuelwood

The table below shows that 87.3% of the respondents harvest the fuelwood in the free areas while 12.7% harvest the fuelwood in their farmlands. It is clear that the respondents harvest their fuelwood in the open areas without restrictions despite the government regulation on deforestation.

Table 3: Location Where Respondents Harvest Fuelwood

Harvesting Location	No. of Respondents	Percentage (%)
Reserved areas	0	0
Farmland	19	12.7
Free areas	131	87.3
Total	150	100

Distance to the Fuelwood Source

Table 6 indicates that the respondents treks more than 3km to harvest the fuelwood representing 76%, follow by 13.3% of the respondents who treks 2 – 3km, 6% treks less than 1km and 4% of the respondents treks 1 – 2km. These distance covers by the respondents to harvest fuelwood is due to the intensive destruction of the fuel that has extended to that distance

Table 4: Distance to the Fuelwood Source

Distance to Source	No. of Respondents	Percentage (%)
Less than 1km	10	6.7
1 – 2km	6	4
2 – 3km	20	13.3
3km and above	114	76
Total	150	100

Wood Species Utilized by Fuelwood Producers

Most of the fuelwood production in the study area originates from a handful of species: *Gmelina aborea* 93.2%, *Mitryana inermis* 90%, *Prosopis africana*, (88%), *Combretum spp.* 86%, *Khaya sengalensis* 81.3%, *Daniella olivera* (67.3%), *Parkia biglobosa* 66%, *Burkia africana* (64.7%), *Pterocarpus eminascerus* 63.3, *Terminalia macroptera* (62.7%), *Terminalia superb* 59.3%, *Vitex doniana* 56.7% and *Vitellaria paradoxa* (56.7%).

Findings from the study show that, supplies from preferred species are inadequate and selectivity in terms of species has declined significantly. Harvesters noted that species which in the past were not utilized, owing to less than optimal characteristics, are now being burnt for fuel.

Table 5: List of Tree Species Utilized for Fuelwood in Gora District

S/N	Species Name	Used more	%	Use less	%
1	<i>Prosopis Africana</i>	132	88	18	18
2	<i>Terminalia macroptera</i>	94	62.7	56	37.3
3	<i>Burkra Africana</i>	97	64.7	53	35.3
4	<i>Daniella oliveri</i>	101	67.3	49	32.7
5	<i>Vitellaria paradoxa</i>	65	43.3	85	56.7
6	<i>Parkia biglobosa</i>	99	66	51	34
7	<i>Khaya sengalensis</i>	122	81.3	28	18.7
8	<i>Gmelina aborea</i>	140	93.3	10	6.7
9	<i>Mitryana inermis</i>	135	90	15	10
10	<i>Acacia spp.</i>	69	46	81	54
11	<i>Terminalia superb</i>	89	59.3	61	40.7
12	<i>Combretum spp.</i>	129	86	21	14
13	<i>Vitex doniana</i>	78	52	72	48
14	<i>Pterocarpus eminascerus</i>	95	63.3	55	36.7

Marketing of Products by the Respondents

The table indicates that 63% of the respondents' sale the fuelwood in pickup van, 30% sales in heaps and 7% sale from house to house. Marketing of fuelwood in the study area is basically from Harvesters to consumers in pickups van. In most cases, urban fuelwood sellers come to buy in bulk. Large number of prepared-food vendors such as restaurants, vendors of barbecue (Suya) and party event outfit that served at celebrations, and bakeries are regular customers of fuelwood harvesters. Institutions such as hospitals, schools and prisons and industries such as blacksmiths are among the highest consumers of fuelwood. The respondents, during the interview confirmed that even the government officials come to buy fuelwood for occasions like wedding, Christmas/Sallah celebrations countless time.

Table 6: Marketing of the Firewood by the Respondents

Marketing of Fuelwood	No. of Respondents	Percentage (%)
House to House	11	7
Placing in Heaps for customers	45	30
Selling in pickup (s)	94	63
Total	150	100

Income from Fuelwood Harvesting

The table indicated that 62.7% of respondents realizes between ₦6,000 – ₦9,000.00, 24% realizes ₦3,000 – ₦6,000, 8% of the respondents realizes above ₦9,000 and above and

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5.3% realizes ₦1,000 – ₦3,000. From the income levels of the respondents, it could be seen in that majority of the fuelwood harvesters realizes between ₦6000.00 – ₦9000.00 monthly. This indicates that fuelwood contribute positively to the livelihood of the community. This confirmed the study of (Larinde and Kehinde, 2004). There is strong evidence that the poor in the community engage in fuelwood extraction because it is less capital intensive. Farm implement such as cutlass can easily be adapted as a working tool. The respondents confirmed that this income from fuelwood harvesting are used to pay school fees of their children, buy cloths, use for farming, build houses and meeting other needs of theirs. The fuelwood business employs many men, women, and children in the study areas, offering both temporary and permanent employment opportunities. It is important economically because it offers an immediate source of income to the harvesters.

Table 7: Respondents Income Realized from Fuelwood Harvesting

Income Realized Per Month(Naira)	No. of Respondents	Percentage (%)
1,000 – 3,000	8	5.3
3,000 – 6,000	36	24
6,000 – 9,000	94	62.7
9,000 and above	12	8
Total	150	100

Environmental Effects of Fuelwood Harvesting:

The finding revealed that there has been considerable decrease in the vegetal (tree) cover in terms of number and species diversity. Over 90% of the respondents accede to the fact that this decrease was due to removal of trees for fuelwood, construction and agricultural purposes. Consequently, deforestation and its attendant effects; desertification, soil erosion, flooding, drought, and temperature rises were being experienced in the area and at a threatening rate. At least 17.3% of the respondents attested that there has been serious disappearance of many tree species within their surroundings in the last 10 years. This finding agrees with that of Jande (2005) that over 50% of the forest covers in southern part of Kaduna environs and suburbs have been deforested for fuelwood and timber production. Other activities that affected the environment negatively were the release of smoke or green-house gases (Carbon monoxide and Carbon dioxide) into the atmosphere from bush burning, car exhaust and other activities.

Table 8: Environmental Effects of Fuelwood Harvesting in the Study Area

Effects of Fuelwood Harvesting	No. of Respondents	Percentage (%)
Reduction in vegetation cover	26	17.3
Reduction in plant species	28	18.7
Appearance of soil erosion	7	4.7
Rises in temperatures	22	14.7
Appearances of desert like condition	6	4
Occurrences of flood	10	6.7
Disappearance of animal species	25	16.6
Occurrences of drought	26	17.3
Total	150	100

CONCLUSION AND RECOMMENDATION

Fuelwood harvesting in Gora and Zuturung Districts is a profitable business. Aside from its potential role for domestic cooking and agricultural processing, it also has significant potential of providing reliable income for rural households and other forest dependent people in the area. The bulk of the fuelwood supplied to the market has zero stumpage value, this does not reflect the social cost or true value of the wood, this create a disincentive for farmers and private entrepreneur who want to grow trees for fuelwood because production cost will reduce profit margin.

More women harvesting have lead to over-exploitation of forest resources and degradation of the land. Several species including *Vitellaria paradoxa*, *Prosopis africana*, *Terminalia macroptera*, *Terminalia superba*, *Azelia africana*, and *Pilliosigma thonningii* are under threat of extinction. Adoption of improved harvesting techniques, reduced exploitation pressures, extensive silvicultural research and planting of these species in plantations as well as proper enforcement of forest regulations will protect these trees from extinction.

To ensure fuelwood supply and environmental sustainability, sustainable harvesting of existing fuelwood stands, education, and the creation of fuelwood plantations are the surest way to combat the growing trend of deforestation and pressure on available trees. Thus, there should be regular inventory of fuelwood stands for the resource to be managed on sustainable basis.

Efforts should also be geared towards the protection and conservation of rich biodiversity associated with natural forests and fuelwood growth areas, sustainable development, and utilization of forest resources through scientific management, promotion of coppice management. The renewable nature of the forest also offers potential for sustained output of wood for fuel, provided appropriate harvesting and management can be instituted before destruction reaches an irreversible point.

Fuelwood collection definitely exert some pressure on forest resources through deforestation which has effect on the environment and the people, hence there is a clear need for the development of integrated management approaches to this forest resource such as establishment of fuelwood plantations or village woodlots; otherwise, with increasing population pressure fuelwood will inevitably go the way of other non-timber resources.

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Reference to this paper should be made follows: Yunana Mba Abui *and Shat A.* (2013), Fuelwood Harvesting as Means of Income in Gora and Zuturung Districts in Zangon Kataf Local Government Area, Kaduna State, Nigeria. *J. of Sciences and Multidisciplinary Research*, Vol. 5, No. 2, Pp. 121 – 132.
