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Assessment Of Fuelwood Exploitation Activities in Nasarawa Local Government Area, Nasarawa State Nigeria

[1]Ahmed Enogela JOHN, *[2]Peter OYELERE and [2]Joseph IGHARO
[1]*Department of Urban and Regional Planning, Federal University Oye-Ekiti, Nigeria*
[2]*Department of Urban and Regional Planning, ObafemiAwolowo University Ile-Ife,Nigeria*

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Abstract
The study assesses fuelwood exploitation activities in Nasarawa Local Government Area, the specific objective is to identify the major or source of domestic energy in study area, examining the species of wood mostly exploited in the area, assess the extent of the exploitation and its effect on the environment. The study used well-structured questionnaire and research survey option of 150 respondents using random sample techniques. The findings of the study highlights fuelwood as the major source of energy in the households with people greater than six (>6) use more fuel wood, majority of the respondents are unemployed.Due to the low income of the people, the relied wholly on fuelwood for household cooking since is cheap and easily assessable, the finding also highlight fuelwood procurement is through family labour and sometimes buying from fuelwood vendors, and this activities show vegetation loss, soil erosion, and loss of habitats of some insects and animals. The study also showed that respondent's income level is the determining factor for the choice of cooking fuelwood used for households cooking. Furthermore, the research shows that the respondents have multiple choices of wood use for cooking. It also high light the ignorance of people on the awareness of forestry laws.Appropriate recommendations were suggested base on the findings.

Keyword: Fuel, Wood Exploitation, Nasarawa, Nigeria

I. Introduction

The continuous dependence of most population and a major portion of the urban inhabitant completely on firewood result in serious environmental degradation India Praised and Per Christer Oden(2008).Fire wood gathered from the forest is an important source of domestic energy in the rural areas of poor countries (Ceccelski et al., 1979;Heltberg et al., 2000). It has been estimated that more than 2.4 billion people rely directly on traditional biomass for cooking and heating and in poor countries biomass use represent half of the residential energy consumption (International Energy Agency 2005).

Fuel wood is a source of energy derived by burning wood material like logs and twigs and is common among the rural dwellers. It is a traditional source of energy, which has remained the major fuel for over half of the world's population (Food and Agriculture Organization, 1981;Fuluwape, 1996;Ajala, 2002; Adeniyi et al., 2023).However, the consumption of firewood has a complex interrelationship with deforestation (Heltberg et al., 2000, Rudel,2005; Yakubu et al. 2024). In addition to deforestation, it has numerous other harmful consequences such as loss of biodiversity and soil erosion (Defies et al., 2010).

Fire wood is currently being consumed at rate higher than sustainable causing forest encroachment and local environmental degradation (Metz et al., 1990). The heavy demand for fire wood and other forest resource produce has already had high cost in terms of decreasing plant density and surrounding forest (Dhital et al., 2002.) Although the exploitation of fuel wood by the inhabitant of any area is an inevitable consequence of human existence. This is because fuel wood is a vegetal source which provides the main source of domestic fuel for both rural and urban households. Its use as a source of fuel is as old as man's inventions of the use of fire and the development of the acts of cultivation (Ikurekong, et al., 2009).

In the past, the source of fuel wood was simple, and the environmental impacts arising from its exploitation were minimal due to 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 in adequacy, this level of inadequacy is evident on the alarming effect of deforestation on the environment due to man's attempt to have a steady supply of fuel wood.

The reckless exploitation, and in some cases, over-exploitation of these resources has often

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resulted in the environmental degradation (United Nation Environmental Program 1994). In developing countries there is energy poverty according to Modi (2006) Energy poverty described the situation where people suffer for poverty and do not have access to modern energy,these people must rely on traditional energy to meet their basic needs, and are consequently locked into livelihood unnecessarily time consuming,unhealthy,and harmful to the environment (Howels et al., 2010). Over and above health implication wood harvest concerns environmental sustainability because it potentiallycontributes to land degradation,air pollution and climate change (Modi, 2006).

On the global basis it has been estimated that more than 2.4 billion people rely directly on traditional biomass for their cooking and heating(International Energy Agency, 2005). In Liberia, (Energy Initiative for Africa, 1986), reported that 30% of rural energy requirement and 50% of urban energy is provided by fuel wood. In Nigeria the daily consumption of fuel wood by rural communities is estimated at 2.7million kilogram per day (Aider-Memorie, 2002).

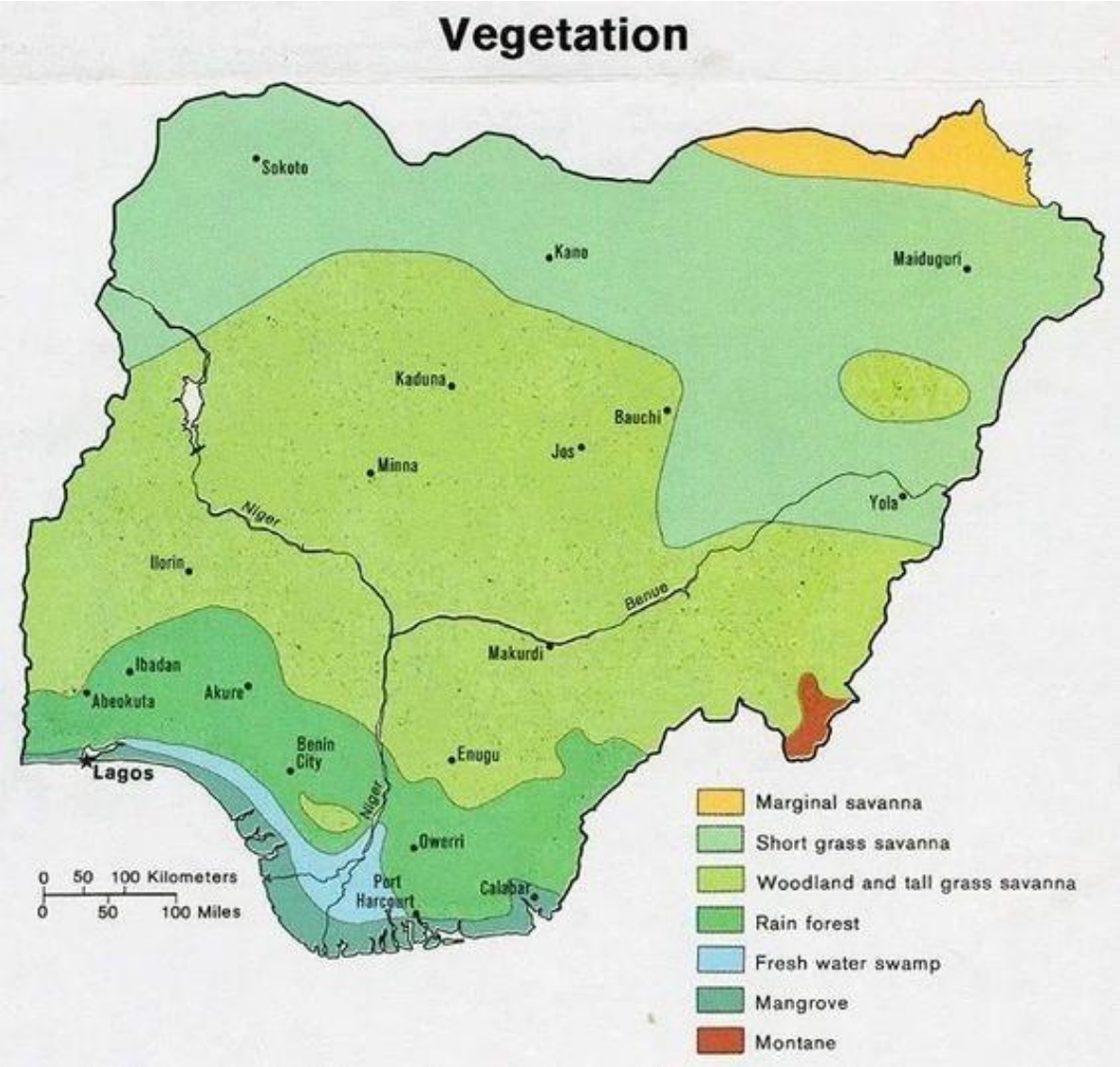
In Nasarawa Local Government Area, fuel wood accounted for major part of the energy sources.As more and more people depend on the use of fuel wood as source of energy and fuel. The rate of fuel wood exploitation activities in Nasarawa Local Government Area is so enormous that the area has been stripped bare of its vegetal cover in many areas (Olatunji et al., 2024).This has resulted in soil exposure and erosion thereby putting threat on the environment and the resources.

Fuel wood exploitation, has gone more beyond mere gathering of dead wood to deliberate indiscriminate cutting of live trees with motor saw. This rate of rising exploitation of fuel wood calls for serious and urgent concern at global national and local level.If no measures are put in place to check this threat, the environment might not be able to support life after few years, particularly in the savannah ecological zone which is more relatively fragile than rain forest. Therefore, from the above facts the utilization of wood resources in the savannah land should be done with caution.

This studyattempts to examine the effects of fuel wood exploitation activities on the environment in Nasarawalocal government area.The specific objectives is to identify the major sources of domestic energy in the study area, the species of wood mostly exploited and also to assess the rate or extent of fuelwood exploitation and its effect on the environment.

The study area situated in the North central Nigeria Fig 1. And the vegetation cover is of guinea savannah with interception of ticket, fringe in wood lands or gallery of forest along the streams and valley Iloje (1985) in Akwa et al 2007. The mean annual rainfall is between 11000mm-16,000mm, while the dominant wood species in the area include, Kyaya, (Senegaleneses, prosopis Africa tarmaridaindica, just to mention a few. The grasses of the area are monocymbiumcresseforsme, hyperrhennia, arisder, bacteria and lots of others Akina et al, 2007. Animals such as antelope, buffaloes, monkeys, grasscutter, wilde pigs are among the natural endowment in the study area.

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II. Methodology

2.1 Data Collection

In order to acquire information from the respondents, primary source data was adopted. The primary source data were obtained with the help of interviews which is inform of questionnaires administration with both open and closest format. In selecting the number of questionnaires to be administer. Seven political wards are drowned randomly. The study area according to 2006 National population census, the study area has a total population of 189,835. The sample size of 150 was selected from the population of 14211 using sampling which is 2% of the total population. The study aimed at selecting a sample which is sufficiently large enough to be confident that the characteristics of the sample in terms of its mean (x) and standard deviation (σ) are the equivalent to those of the items of the population. In order to assess accurately the size of the sample require. The standard error of the sample mean which was used is the willingness to accept as reasonable was determined using the following relation.

$$\sum \frac{\frac{za}{2}}{\sqrt{n}}$$

……
……eqn 1

i.e. the extent to which the sample mean varies from true mean of the entire population:

The study stated a confidence level of (95% CL) at which the study is willing to accept the estimate of the population mean from the sample mean. It is a

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measure of accuracy with which a population mean is known with respect to sample mean. Since we have a small sample (n<30), we assume the population is normally distributed with a standard deviation of about 1088.97 and the following relation was applies in constructing the 95% confidence interval about μ with the degree of freedom of 14

$$x - \frac{ta}{2}\frac{a}{\sqrt{n}} < \mu < x + \frac{ta}{2}\frac{a}{\sqrt{n}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots eqn\ 2$$

Consequently the 95%CL on the mean of the study area is (1215.01-3605.93), thus the upper limit of the 95% CL was selected (3606) as the required sample size, this was assigned proportionally to the wards using equation 3 below.

$$\frac{upperlimitofthecomputed\ 95\%\ CL}{sumofk} xk \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots eqn\ 3$$

Where k = number of households in each zone.

Finally, systematic random sampling was used in administering the questionnaire for the household in this study area. An unbiased starting point was chosen calling at addresses along the street of the zone at fixed interval (at very 10th house). The essence of this procedure is to ensure that houses are represented on the sample.

A face-to-face questionnaire method was adopted because of the assertion that is the most appropriate in the kind of study as against other survey method such as internet, postal and other self-administered survey that may result to a low response rate Table 1, Table 2 should be table 3 in project.

Table 2. Response rate for face to face interview

Response Rate for face-to-face interview

	Number	Percentages (%)
Total administered	200	100
Total Responses	120	80
Total Decline responses	25	16.6
Total Invalid	5	3.3
Total Valid Reponses	120	80

2.3 Data Storage and Processing for the House holds Survey

Initial data source involves the use of micro soft office, excel where all responses were recorded and handled. The software statistical Package for social Sciences (SPSS) version 18.0 was used for data analysis. The analysis uses cross tabulation of descriptive analysis where chi-square analysis is used in testing the statistical significance of association between dependent and independent variables of households' population and households use of fuelwood. The cross tabulation investigates the association of the responses under the following headings. Fuel wood and households influenced, fuel wood and households' accessibility, vegetation change, awareness and householdfuelwood usage.

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TABLE 3.11 .12 HOUSEHOLD INTERVIEW CODING

COLUM HEADING	LABELS	CODES	Responses						Total	
			Valid		Missing					
			Count	Percent	Count	percent			Court	Percent
NP	Number of people in household	1="<6">6".=<6	150	100.0%	0	0%			150	100%
EMPS	Employment Status	1= Employed 0 = un	150	100.%	0	0.%			150	10.0%
JT	Job type	1= Civil Servant & Others0=employed	108	84.4%	20	15.6%			150	100%
HMOI	Household Monthly Income 1= below	₦50,000 2-N50,00-N100 3=N100-N200, 000	105	82.0%	23	18.0%			150	100%
HUF	Household using fuelwood	0 = "No" and 1= "Yes"	150	100.%	0	0%			150	100%
HFP	Household fueldwood procurement	1=Buying always 2=buying Sometimes 3= self-procurement	120	95%	16	12.5%			150	100%
MEFIPP	Money Expended on fuel purchase	1= < 1500 Naira 2=1500-300 Naira and > 3000 Naira	110	82%	23	18.0%			150	100%
SVFP	Seasonal variation in the price of fuelwood	1- Rainy season, 2= hamathan season, 3= No Difference	98	76.6%	32	23.4%			150	100%
DFPC	Distance fromfuel wood procure	1= Market <1km, 2=3km	105	70.0%	31	24.2%			150	100%
APFT	Access to preferred fuel wood type	1= yes and 0=No And 3=>5k	108	72.0%	19	14.1%			150	100%
HUC	Household using charcoal	1=yes and 0=No	150	98.4%	2	1.6%			150	100%
CP	Charcoal procurement	1= buying 2=self-making	62	48.4%	66	51.6%			150	100%
QFU	Quantity of fuel wood use	1=<100kg, 2=100 250kg 3=> 250kg.	95	74.3%	29	22.7%			150	100%
ACFT	Using Additional Cooking fuel type	1= yes and 0= No	114	75.0%	4	3.1%			150	100%
ALCF	Alternative cooking fuel type	1 = kerosene, 2 = Electricity, 3 = kerosene and Electricity, 4 = kerosene, Electricity and Gas.	75	66.5 %	59	44.5%			150	100%
DOCFT	House hold cooking fuel type	1= yes and 0=No	114	87.5%	16	12.5%			150	100%
HCFT	House hold cooking fuel type	1 = yes 0 = No	126	98.4%	4	1.8%			150	100%
HENA	Household Environmental awareness And forestry Laws.	1= yes and 0=No	128	87.5%	3	2.3%			150	100%

Table 2: In analyzing the data collected, fuelwood use (dependent variables and other responses of the interview obtained from the respondents (Independent variables or predicator) were analyzed. The resulting outcome from the analysis provide answers to the several questions raised earlier.

III. Result and Discussion

The result of the study shows that households with people greater (>6) had significance higher use of fuel wood than the house lesser than, this study also revealed that majority of the respondent were not employed or informally

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employed. Therefore, due to their low income earning depend mainly on the fuelwood for house hold cooking which is relatively cheap and more accessible. This result is in line with the findings of cline-cole (1987), Alade (1990), Maconachie (2009) and Arabatzis (2012), John et al. (2024), Akinosun et al. (2024) who asserted that majority of households relied on fuel wood for two main reasons 1). The economic situation in the country and 2) lack of access to modern cooking fuel. In addition, the result of this study indicated that most housed hold used family labour for fuel wood procurement and this contradict the finding of Cline-Cole (1987) in Kano who reported that only few households uses family labour for fuel wood procurement. Probably because Kano is an urban centre while the study area is dominantly rural set up.

Furthermore, the study revealed high exploitation activities and fuel wood consumption leading to vegetation change as a result of deforestation, vegetation fragmentation, or loss ofvegetation's, increase in soil erosion, loss of biodiversity and other environmental challenges (plate 1.)



On the preferred tress use for fuel, the study revealed that majority households have multiple choices of fuel wood type, the most preferred species of trees are vateconaparadoxa (sheer butter, Mohagany (KhayaSeneganlessis, false locust tree (prop-is Africana) and Piliostinareticutintum. These trees are preferred because of their high heat retention to output, good combustion and their potential to produce less smoke even when they are wet during rainy season (Alade, 1990) plate 2.

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IV. Conclusion

The study assessesfuel wood exploitation activities in the North Central Nigeria, the study was based on the concept of environmental degradation. Over dependence of people on the wood for domestic energy can cause forest degradation. People in this area blamed their low economic and financial status and poor standard of living to be the factor which led to the consistent and continuous consumption of fuel wood as the major source of household cooking fuels. This situation denied them the accessibility to use modern cooking fuels which is more environmentally friendly. In order to salvage our fragile guinea savanna from degradation, government should as a matter of urgency intervene by improving standard of living of the rural duelers.

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