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ORIGINAL RESEARCH ARTICLE

Rate of Fuel Wood Consumption in Selected Communities around Borgu Sector of Kainji Lake National Park, Nigeria

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ABSTRACT

This study assesses rate of fuel wood consumption preferences in selected communities around Borgu sector of Kainji Lake National Park. The study population for this research consists of households of four selected communities (Leshegbe, Malale, Kali and Baburasa) which were selected in Borgu sector of Kainji Lake National Park. Purposive sampling techniques were used to select the communities while Simple random sampling was adopted in selecting household members. Data collected were analyzed and interpreted using frequency distribution and simple percentage. The sources of domestic energy revealed that firewood is the major source of domestic energy with 72 observations, followed by Charcoal with 32 observations while electrical cooker recorded the least with 2 observations. The tree species use as fuel wood show that *Vitalaria paradoxa* recorded the highest with 22.5%, followed by *Diospyros mespiliformis* and *Tamarindus indica* with 15.0% each while *Parkia biglobosa* recorded the least with 1.6%. The source of fuel wood in the study area indicated that nearby farm/bush recorded the highest with 51 observations while around houses recorded the least with 7 observations. The level of fuel wood consumption in the study area showed that very high recorded the highest with 57.5%, followed by high with 25.8% while very low is the least with 0.0%. The factors responsible for the preference of fuel wood revealed that availability and accessibility recorded the highest with 32.5%, followed by Fast in cooking with 25.8% while it gives food special aroma and taste recorded the least with 2.5%. The study concludes that fuelwood is one of the significant products of the forest of which the resident communities rely on for their livelihood and energy for domestic use.

Introduction

Fuelwood is a source of energy derived by burning wood materials like logs and twigs and is common among the rural dwellers (Ogunsanwo and Ajala, 2002). It is a traditional source of energy, which has remained the major source of fuel for over half of the world's population (FAO, 2010: Fuwape, 1995). The demand for fuelwood and charcoal by the city dwellers has led to rings of deforested land round the cities stretching as far as 100km (FAO, 2010). At rural level, traditional agricultural activities have left thousands of hectares of land bare. Similar activities include harmful logging for construction; wood gathering for fuel destroys at least 16,000 square kilometers of tropical forests annually (Aigbe, 2000). The implication of such unabated exploitation of forest resources is already manifesting in terms of deterioration of natural environment. Many scientists and conservationists are of the view that deterioration of natural environment is a result of world's population growth (NOVA, 2005) hence the argument of Intergovernmental Panel on Climate Change (IPCC, 2007) that in every second, a parcel of rainforest, the size of a football field disappears among other threats.

According to the Aide (2002), the share of various energy sources in the total primary energy supply in Nigeria is made up of oil, 10.4%; gas, 6%; hydro, 0.6%; and commercial renewable energy, 83%. The greater portion of the commercial renewable energy is wood, while other agricultural wastes constitute the remaining smaller portion (Aide, 2002).

The over-dependence on fuel-wood for energy is chiefly because of its relatively low prices and easy accessibility (Adedayo *et al*., 2008). Other reasons are constraints in the supply of the conventional fuels and the growing population with a larger segment still falling below incomes that can afford the cost of conventional fuels (Aide, 2002). In South Asia where there is a large poor population, poverty is the most significant parameter that drives extensive traditional use of fuel-wood and residues (Aide , 2002).

Fuelwood is consumed in diverse ways and at different levels and the life of the majority of rural dwellers depends either directly or indirectly on fuelwood. However, meeting rural household fuelwood energy needs in the country has become a herculean task due to the enormous quantity of wood required. Daily consumption of firewood by the rural communities in Nigeria is estimated at 27.5 million kilogram per day (Aide Memo- ire, 2002). In the drive to satisfy fuelwood requirements, most lands have been stripped bare of vegetation cover. This has resulted in soil exposure and erosion thereby placing a heavy burden on the environment and on the resources base. The scramble for fuelwood has resulted in massive destruction of many wood resources leading to deforestation and increasing desertification in parts of Nigeria and other parts of sub-Saharan Africa (Adedayo, 2005).

Globally, the high demand for fuel-wood and other forest products has resulted in the high level of forest encroachment, high rate of deforestation and forest degradation (Anijah-Obi, 2001). Human activities of local communities around protected area, impact positively or otherwise on the success of biodiversity conservation. There is paucity of information on the rate of fuel-wood consumption in Kainji Lake National Park, Nigeria. This lack of information therefore hindered the successful implementation of Park policies in relation to the general park management in this regard.

Materials and Methods

Study Area

Kainji Lake National Park was established in 1979 by the amalgamation of two formal game reserves Borgu and Zugurma under decree 46 of 29th July 1997, thereby making Kainji Lake National Park the premier National Park in Nigeria (Ayeni, 2007). Kainji Lake National Park is located in the North West central part of the country between latitudes $9^0$45'N and $10^0$23'N of the Equator and between longitudes $3^0$40'E and $5^0$47'E of the Prime Meridian. It is made up of two sectors (Borgu and Zugurma) situated in Borgu and Kaima/Baruten Local Government Areas of Niger and Kwara State respectively. It covers a total land area of 5,340.825q (Ayeni, 2007). The major features of the climate of the park are the wet and dry seasons which varies from year to year. The wet season extends from May to November while the dry season extends from December to April. The mean annual rainfall of the Borgu Sector varies from 1,100mm in the trends surface analyses of the mean annual rainfall in the sector indicated a decrease in rain from the south to the north, an increase rainfall towards the west and east, and generally low condition in the central and northern region, stretches from the north through the central regions, to the south. The parks vegetation is that of Northern Guinea savannah, displaying a variety of vegetation type with distinct complex: Burkea/Detarium woodland, Afzelia/Isoberlinia wood land, Acacia/Anogeissus/Detarium woodland which is interspersed with patches of riparian forests along its major water courses namely Oil, Timo, Menai and Doro in Borgu sector.

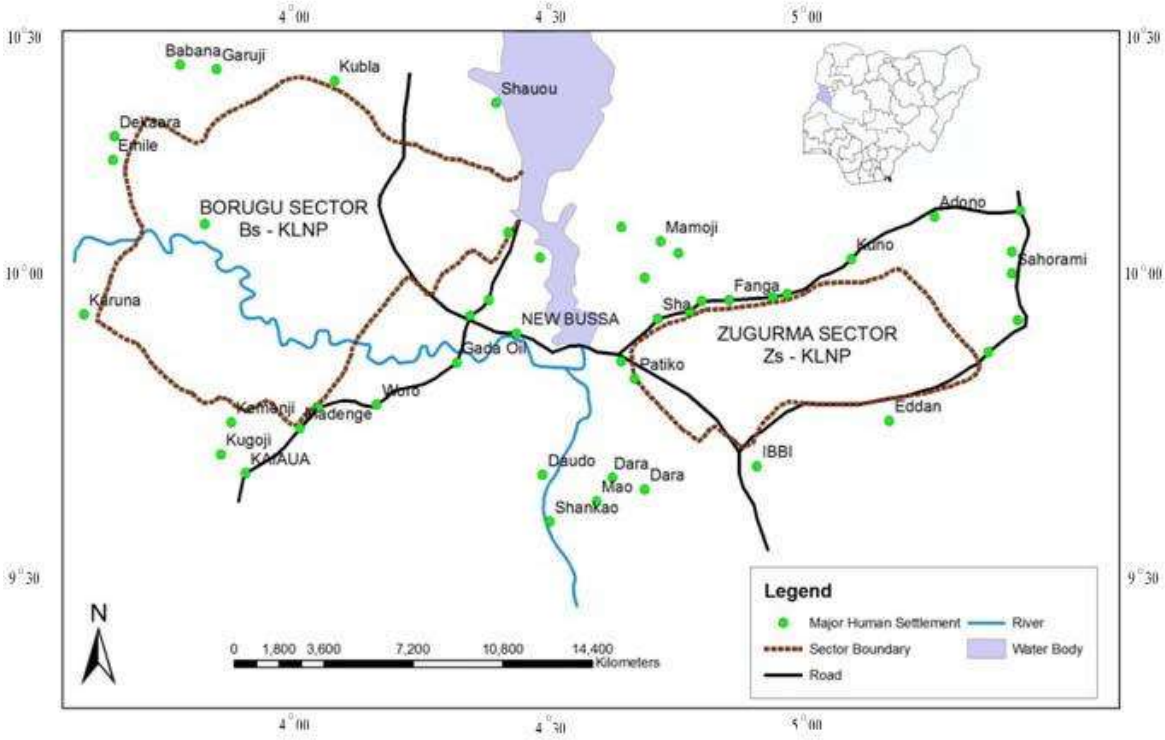

Figure 1: Map of Kainji Lake National Park
Source: Ayeni, (2007).

Study Population and Sample Size

The study population for this research consists of households of the selected communities. Four communities (Leshegbe, Malale, Kali and Baburasa) were selected in Borgu sector Kainji Lake National Park. The sample size was put at one hundred and twenty (120) respondents.

Method of Data Collection

This involves the use of questionnaire administration to the communities selected.

Sampling Techniques

Purposive sampling techniques were used to selects the communities while Simple random sampling was adopted in selecting household members.

Data Analysis

Data collected were analyzed and interpreted using frequency distribution figures and simple percentages

Results

Table 1 revealed the demographic characteristic of the respondents; male respondents recorded the highest with 62.5%. Age group 26-35 years recorded the highest with 27.5%. Majority (59.2%) of the respondents were married. The level of education of the respondents indicated that majority of the respondents had secondary school certificate with 35.8% while tertiary recorded the least with 13.3%. The sources of domestic energy are revealed in fig 2 firewood is the major source of domestic energy with 72 observations, followed by Charcoal with 32 observations while electrical cooker recorded the least with 2 observations.The tree species use as fuel wood are revealed in table 2, *Vitalaria paradoxa* recorded the highest with 22.5%, followed by *Diospyros mespiliformis* and *Tamarindus indica* with 15.0% each while *Parkia biglobosa* recorded the least with 1.6%.

Fig 3 shows the Uses of fuelwood in the study area, in which majority of the respondets uses fuel wood for cooking and charcoal production. Table 3 shows the level of fuel wood consumption in the study area, in which very high recorded the highest with 57.5%, followed by high with 25.8% while very low is the least with 0.0%.

The factors responsible for the preference of fuel wood in the study area are revealed in table 4, Availability and Accessibility recorded the highest with 32.5%, followed by Fast in cooking with 25.8% while it gives food special aroma and taste recorded the least with 2.5%.

Table 1: Demographic Characteristic of The Respondents

DEMOGRAPHIC	Variables	FREQUENCY	PERCENTAGE (%)
Gender	Male	75	62.5
	Female	45	37.5
Age Group (Years)	16-25	15	12.5
	26-35	33	27.5
	36-45	20	16.7
	46-55	25	20.8
	56-65	29	24.2
	65 and above	5	4.2
Marital status	Married	71	59.2

	Single	26	21.7
	Widow	15	12.5
	Divorce	8	6.7
Level of education	No formal education	28	23.3
	Primary	33	27.5
	Secondary	43	35.8
	Tertiary	16	13.3
Religion	Christianity	43	35.8
	Islam	71	59.2
	Traditional	6	5.0
Major Occupation	Civil Servant	27	22.5
	Farmer	59	49.2
	Trader	19	15.8
	Artisan	15	12.5
Size of Household	1-3	21	17.5
	4-6	57	47.5
	7-9	33	27.5
	10 and Above	9	7.5
	Total	120	100.0

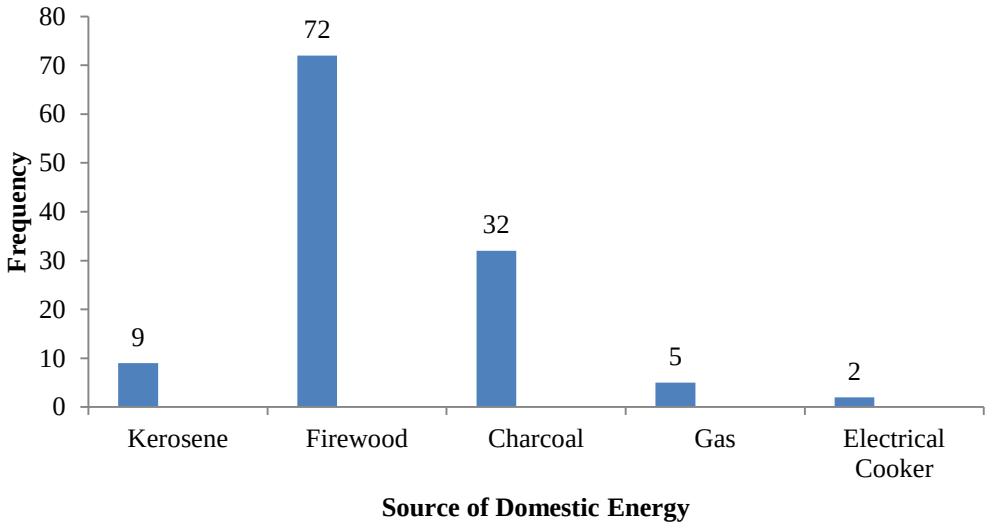

Figure 2: Source of Domestic Energy

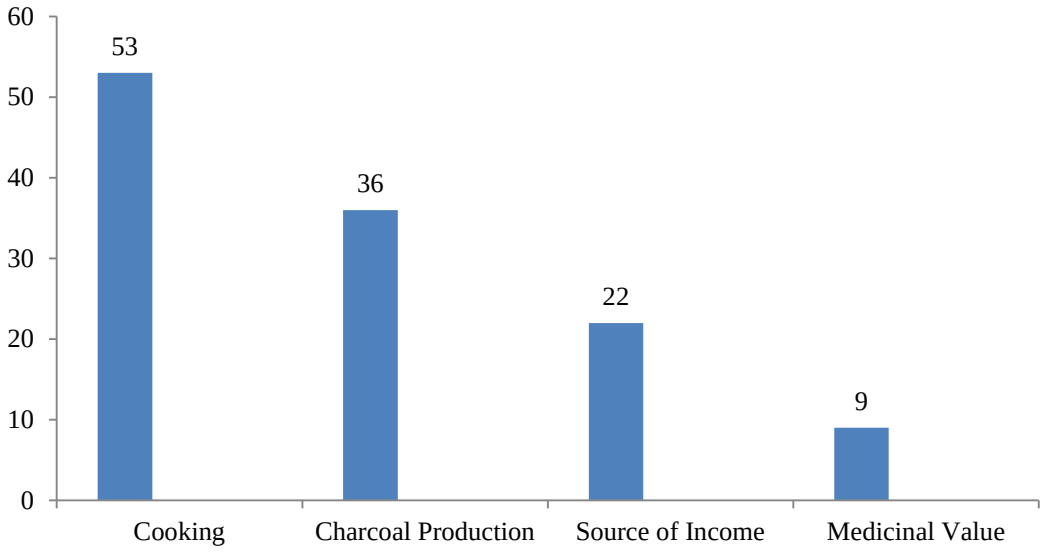

Figure 3: Uses of Fuel Wood in the Study Area

Table 2: Tree Species Used as Fuel Wood in the Study Area

Botanical Names	Common Name	Frequency	Percentage (%)
Azadirachta indica	Neem	11	9.2
Daniella oliveri	Balsam Tree	14	11.7
Vitalaria paradoxa	Shea butter tree	27	22.5
Diospyros mespiliformis	Jackal berry	18	15.0
Anogeisus leiocarpus	Chewing Stick	9	7.5
Khaya senegalensis	Mahogany	17	14.2
Tamarindus indica	Tamarinds	18	15.0
Parkia biglobosa	Locust bean tree	2	1.6
Mangnifera indica	Mango tree	4	3.3

Source: *Field Survey, 2024*

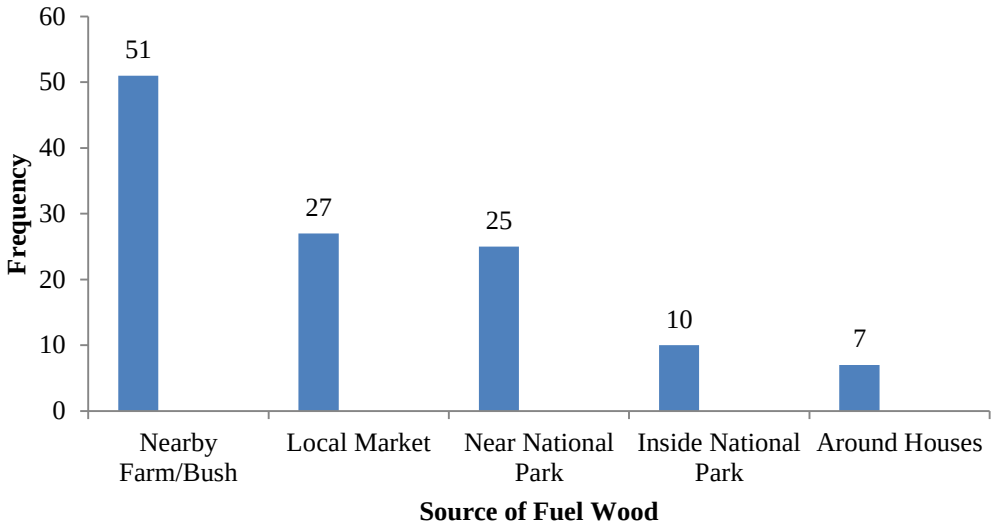

Figure 4: Source of Fuel Wood in the Study Area

Table 3: Level of Fuel Wood Consumption in the Study Area

Level	Frequency	Percentage (%)
Very High	69	57.5
High	31	25.8
Moderate	18	15.0
Low	1	0.8
Very Low	-	0.0
Total	**120**	**100.0**

Source: *Field Survey, 2024*

Table 4: Factors Responsible for the Preference of Fuel Wood in the Study Area

Factors	Frequency	Percentage (%)
Availability and Accessibility	39	32.5
Fast in cooking	31	25.8
Cheap source of energy	28	23.3
Convenient	19	15.8
It gives food special aroma and taste	3	2.5
Total	**120**	**100.0**

Source: *Field Survey, 2024*

Discussion

The results show that fuelwood was mostly consumed for cooking representing 53.0% of the fuelwood consumed by the different user groups and this was followed by charcoal production. This finding corroborates that of Fuwape (1985) and Adedayo *et al.* (2008), who reported that over 95% of the Nigerian

population in the savanna region, depend on fuelwood as the main source of domestic energy supply. The greater proportion of fuelwood utilized for household consumption could be explained by the fact that most homes depended on fuelwood for cooking since the cost of other fuels was higher (Sodimu *et al.*, 2003). Similarly, other user groups also preferred fuelwood to other energy sources because of easy availability, cheaper costs and its high heat production capacity. However, the mean distribution of fuelwood consumption level by the user groups revealed that consumption was essentially uniform. This corroborates the findings of Jande (2005) that the household, which was considered the greatest consumer of fuelwood for its energy need is no longer the major consumer of fuelwood. The industrial consumption such as brewing of liquor, cooking in hotels/restaurants, brick production, oven baking, rice milling, and smoking of fish are now closing up the gap to equal households in fuelwood consumption. The lesson from this result is that there is a widening demand for fuelwood with limited supply sources. Thus there is a massive exploitation of trees to meet the demand. The massive exploitation of the trees without replacement is causing rapid disappearance of tree (vegetal) cover. Consequently, there is environmental degradation leading to increased flood occurrences, soil erosion, drought, desertification and excessive heat and rising temperatures.

Sources of fuelwood showed that 51 of the respondents obtained their fuelwood from nearby farmlands and the reserved natural forest areas, respectively. This means the greater proportion of fuelwood consumption in the area comes from the farmland, for most fuelwood dealers submitted that they got it from the farmland. This finding agrees with that of Adedayo *et al* (2008) showing that intense deforestation occurs more in forests closer to human settlement. This rapid disappearance of the natural purifiers (trees) and the corresponding increase in the release of greenhouse gasses to the environment by fuelwood consumption can rendered the study area environmentally unfriendly. Tree species utilized as fuel by respondents in the study area showed that the most utilized are *Vitalaria paradoxa* recorded the highest with 22.5%, followed by *Diospyros mespiliformis* and *Tamarindus indica* with 15.0% each. The reasons adduced for this were that these tree species have high heat capacities with hot amber, high combustibility, and production of quality fuel and charcoal. The least used tree species were *Parkia biglobosa* recorded the least with 1.6%. The reasons advanced for this low utility were that some of the species were scarce and others possess poor burning characteristics.

Conclusion

Fuelwood is one of the significant products of the forest of which the resident communities around KLNP rely on for their livelihood and energy for domestic use. Fuelwood is the primary source of energy in the study communities and *Vitalaria paradoxa* was the most preffered choice species. The study concludes that there is very high level of fuel wood consumption in the study area.

Recommendations

- Provision of alternative source of domestic energy
- Conservation education and awareness should be created among the local residents

- Sustainable harvesting of forest resources should be encouraged by all relevant authorities

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