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ASSESSMENT AND UTILIZATION OF FUEL WOOD SPECIES IN WARAWA LOCAL GOVERNMENT AREA OF KANO STATE, NIGERIA.

[1]Ilu, K. J., [1,2]Salami, K. D., [1]Jibo, A.U., [2]Moshood, F. J. and [1]Karage, M. Y.
[1]Department of Forestry and Wildlife Management, Federal University Dutse, Jigawa State
[2]Department of Forest Production and Products, University of Ibadan, Ibadan, Nigeria
Correspondent: foristsalam@yahoo.com; salami.d@fud.edu.ng/+2347034294371

ABSTRACT:
Fuel wood gathering is one of the major economic resources in rural communities especially in the Northern Nigeria which could lead todevastation of the forest. The research focused on the assessment and utilization of the fuelwood species in Warawa Local Government, Kano State. Purposive random sampling was the technique used and one hundred and twenty (120) structured questionnaires were administered to the respondents. Four major markets sampled were: Warawa, Garindau, Tangar and Amarawa fuel wood markets. Descriptive statisticswere used such as frequency and percentage. Results showed that majority of the respondents(42.5%) were within the age brackets of 41 and above, 72.5% were married, 40% had secondary school education while 58% of the respondents' occupation were farming. *Parkia biglobosa* tree species were found to be the most predominant with 27% followed by *Azadirachta indica* (21%) while *Ziziphus spinochristi* and *Khaya senegalensis* were the trees species 8% respectively. *Anogeissus leiocarpus* was the most expensive tree species, while, the species with less price was *Parkia biglobosa*. The economic tree species were used for fossil fuel in the study area; which may lead to loss of the important species. Therefore, it is important to identify and prescribed specific tree species for fuel wood utilization and do the proper monitoring of both the forest guide and forest users respectively.

Keywords: assessment, utilization, fuel wood species and Warawa Local Government.

INTRODUCTION

Fuel wood is a renewable resource whichis gathered and used for fossil fuel. Generally, fuel wood is not highly processed and is in form of recognizable log or branch (Ogunjimi *et al*., 2008). However, demand for fuel can out face the ability of trees to regenerate on local and regional level. For example, in some place in the world and through history, the demand has led to desertification. High-quality forestry practices and improvement are devices that can improve wood supplies. As a bio fuel, some consider fuel wood to be a form of energy and to be relatively carbon neutral. Hence, it is important to asses fuel wood supply and sub-urban forest in the study area to understand the deforestation problems of the sub-urban areas general forest degradation; it is necessary to understand the urban demand system for firewood. It has been reported that Warawa fuel distribution is organized hierarchically (Abdulkadir, 2001). Human activities such as fuel wood gathering, selective logging, industrial uses, grazing, land clearing, bush burning, deforestation and urbanization lead to degrading of forest (Salami *et al.*, 2020). Deforestation results from a mixture of economic, political and social causes that vary from geographical area to another. The main causes of deforestation in the tropics are logging and its change to agricultural production (Salami *et al.*, 2018; Salami *et al*., 2020). Dependency of forests, particularly in the tropical world is to provide economic resources which have been increasing rapidly as a result of geometric increase of human population in the region (Salami and Lawal, 2018; Salami *et al*., 2020; Ilu *et al.*, 2020). Most fuel wood moved by farm machines and animals ata central depot which is usually the famous Warawa market which holds periodically, every Sunday of the week, before being split, bundled and distributed through a chain of local wood piles, smaller neighborhood piles operator and itinerant retailers. The organization and cost of local fuel wood piles operators and barrowmen show that the entire system fall into the urban formal sector, it is uncontrolled, but competitive and cost-efficient from the customer's point of view, and effecting in meeting the spatial and temporal distribution of demand. Consumption of fuelwood trees and demand varies daily, weekly and between seasons (Osei, 2007).

The mainly rural people depend primarily on fuel wood to meet basic energy needs for domestic uses. Current studies show that Nigeria produces about one million tons of charcoal yearly of which 80% is consumed in the cities ((FOSA, 2001). 50% of national energy consumption is from both Charcoal and firewood. Household and Industrial sectorsin all ecological zones are demanded for fuel wood (FOSA, 2001). It is predictable that about 90% of the rural households in Southern Nigeria and up-to 98% in the Northern Nigeria depend on fuel wood as their source of domestic energy. Industrial uses include those by institutions, food and craft industries. Fuel wood is very essential in local eating place, bakeries, local breweries, pottery, blacksmith and burnt brick factories. Institutions such as hospitals, prisons and schools also require fuel wood for cooking. The per capita consumption of fuel wood in rural area is 393.43 kg/annum while the urban households consume 255.75 kg/ annum (FOSA, 2001).

Nigeria is known to be the giant of Africa and richly endowed with oil exploration and exportation; although it

has other means of major energy sources both renewable and non-renewable. The renewable energy sources include solar, wind, hydro and biomass energy while the non-renewable sources make up fossil fuel. However, fuel wood account for about a quarter of total commercial energy and over 90 percent of traditional fuels, especially fuel wood (Evans, 2003). Biomass fuel has been the commonest sources of household energy in Nigeria. In 1992 alone, fuel wood and charcoal production were established at 55 million tones. More than half of the 9.6 million hectares of rain forest belt in the south of Nigeria has been used to meet the demand of fuel wood in the rural and urban areas (Ogunjimi *et al*., 2008). Some agricultural residues are used to provide household energy at the expense of livestock feeding and soil fertility, for example in Nepal, it is estimated that each ton of animal excrement burnt deprives the country of 50kg of cereals (Olobumi, 1986).

Inventory of the fuel wood trees in Warawa area often lack of scope and specificity needed by wood-suing industries to set-up an effective utilization program with few extra data point collected in the cause of a regular tree inventory, a community can have much stronger understanding of the potential markets for the trees they remove. Inventories also provide long-term, ongoing data for utilization of "baseline" tree removals, and give immediate and needed information when communities are push into crisis mode for a particular forest health threat (Bratkovich, 2001).

The main problem of using tree resources, especially, the highly economic tree species for fuel wood in Warawa Local Government because they are causing serious environmental degradation (e.g., soil erosion and deforestation) and threatening the endangered species such as *A. leiocarpus* (chewing stick), Acacia species, *Z. spinochristi* (Christ thorn), Desert date, among others.

In Warawa Local Government Area of Kano State, majority of the household are generally using fuel wood as their source of energy for cooking and other purpose; which increase the rate of deforestation and aggravate various environmental challenges facing the globe. Therefore, this study focused on examining the assessment and utilization of fuel wood species in Warawa Local Government Area of Kano state, Nigeriain view of assessing the rate of this damage.

MATERIALS AND METHODS

Study area

The area of study is Warawa Local Government Area in Kano State Nigeria. It is one of the 44 Local Government Areas in Kano State between Latitude $11^0 53'$ $N8^0 41'$ E and longitude 11^0 88'N $8^0$68'E (NIPOST, 2009). It's headquarter is in the town of Warawa on the A237 highway. It is bordered to the South by Wudil Local Government Area and to the West by Dawakin Kudu Local Government Area, to the North by Gezawa Local Government Area and to the East by Ajingi Local Government Area. It is one of the biggest Local Government areas of Kano State with very large population. The area is falls under the land from unit of Kano region known as the plain of Hausa land (Olofin, 2008).The 2006 population census puts the population of the area 128,787 people with an estimated land mass of 360km^2 (NPC, 2006).It was created out of Dawakin Kudu Local Government in the early 90s.In the study area there are four periodic markets namely Warawa market, Garindau market, Tangar market and Amarawa market, observation showed that both market holds on a weekly cycle with Warawa holding on Sunday while Garindau is on Monday, Tangar market on Wednesday, and Amarawa market on Saturday and Monday. Commercial transactions are carried out under stalls constructed by the traders and under trees.

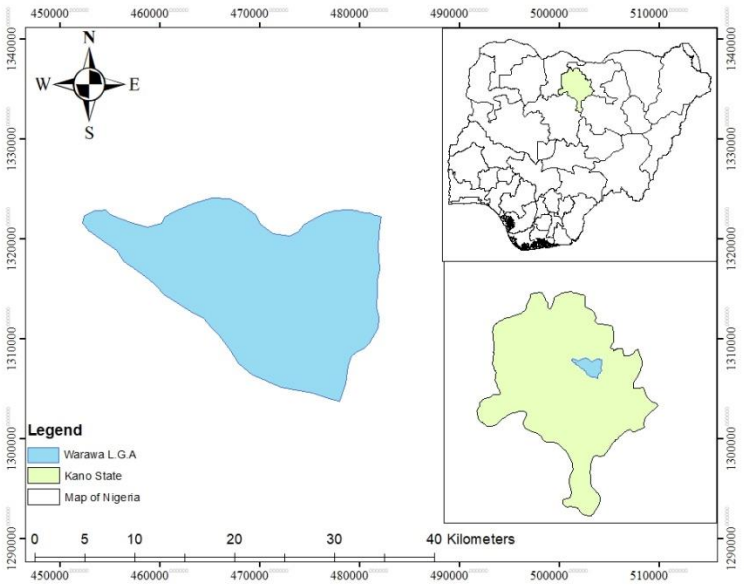

Fig 1: Showing map of Warawa Local Government in Kano State

Data collection

Primary data was collected through the use of well-structured questionnaire. Data were collected purposively from selected fuel wood users which are domestic users, bakery users and dealers. Previous works on fuel wood and other materials were consulted as secondary sources of data which include books, journal, periodicals as well as internetsources.

Sampling Techniques and Sample Size

Purposive random sampling technique was used at the selected sample areas based on marketing of the fuel wood products within Warawa Local Government Area. A total of thirty (30) assessmentquestionnairewere administered to the respondents at each sampling area making a total of one hundred and twenty (120) respondents. The sample areas were Warawa fuel wood market, Garindau fuel wood market, Tangar fuel wood market and Amarawa fuel wood market.

Data analysis

Descriptive statistics was used in analyzing the data collected with the aid of frequency, percentage and distribution

Results

Table1 shows that 51 respondents accounting for 42.5% of the respondents were in the 41 and above age bracket. 30.0% of the respondents were in the age bracket of 36-40, 15.83% were in the age bracket of 26-35, while 11.6% were in the age bracket of 18-25. Majority of the respondents (72.5%) were married, (5.0%) were single, (7.5%) were widowed while (15.0%) were divorced. 29.0% of the respondents had Quranic education, 25.0 % had tertiary education, 33.0% had secondary education and 13.0% had primary education. Majority (58.0%) of the respondents'occupation were farmers, while 8.0% were self-employed. However, 13.0% and 21.0% were students and civil servants respectively.

Table 1: Demographic characteristics of the respondents

Variables		**Frequency**	**Percentage (%)**
Age			
	18-25	14	11.67
	26-35	19	15.83
	36-40	26	30.00
	41 and above	51	42.50
	Total	**120**	**100.00**
Marital status			
	Married	87	72.50
	Single	06	5.00
	Widow	09	7.50
	Divorced	18	15.00
	Total	**120**	**100.00**
Level of education			
	Primary	15	13.00
	Secondary	40	33.00
	Tertiary	30	25.00
	Qur'anic education	35	29.00
	Total	**120**	**100.00**
Occupation			
	Civil servants	25	21.00
	Students	15	13.00
	Farming	70	58.00
	Self-employment	10	8.00
	Total	**120**	**100.00**

Table 2 shows the dominant tree species in the study area. *Parkia biglobosa* (locus bean) was the predominant tree species (27.0%) are followed by *Azadirachta indica* (Neem) (21.0%), while *Khaya senegalensis* and *Ziziphus spinochristi* were the least tree species in the area with 8% each.

Table 2: Predominant tree species in the study area

Scientific name	English name	Local name	Frequency	Percentage (%)
Azadirachta indica	Neem	Maina	25	21.00
Parkia biglobosa	Locust beans	durawa	31	27.00
Diospyros mespiliformis	Jackal berry	Kanya	15	12.00
Ziziphus spinochristi	Chris thorn	Kurna	10	8.00
Khaya senegalensis	Mahogany	madaci	10	8.00
Anogeissus leiocarpus	Chewing stick	Marke	14	12.00
Tamarindus indica	Tamarind	tsamiya	15	12.00
Total			**120**	**100.00**

Table 3 shows that *A. leiocarpus* (chewing stick) was the most preferred (22%) fuel wood trees while *P. reticulatum* was the least chosen (2%) fuel wood tree species in the study area.Other species such as *D. mespiliformis* (15.0%), *A. indica* (14.0%) and *P. biglobosa* (15.0%) were also relatively highly preferred.

Table 3: Most preferred tree species in the study area

Scientific name	English name	Local name	Frequency	Percentage (%)
Anogeissus leiocarpus	Chewing stick	Marke	27	22.00
Khaya senegalensis	Mahogany	Madaci	11	9.00
Tamarindus indica	Tamarinds	Tsamiya	14	12.00
Ziziphus spinochristi	Chris thorn	Kurna	09	8.00
Diospyros mespiliformis	Jackal berry	Kanya	18	15.00
Azadirachta indica	Neem	Maina	17	14.00
Parkia biglobosa	Locust beans	Durawa	18	15.00
Pilostigma reticulate	Camel's foot	Kalgo	02	2.00
Viltellaria paradoxa	Shea tree	Danya	04	3.00
Total			**120**	**100.00**

Table 4 indicates that *A. Leiocarpus* (chewing stick) was the most expensive (36.0%) fuel wood in the market while *P. biglobosa* (locus bean) was the least expensive (14.0%) fuel wood in the study area.

Table 4: Most expensive fuel wood in the study area

Scientific name	English name	Local name	Frequency	Percentage (%)
Parkia biglobosa	Locust bean	Dorawa	17	14.00
Diaspyros mespiliformis	Jackal berry	Kanya	20	17.00
Khaya senegalensis	Mahogany	Madaci	19	16.00
Anogeissus leiocarpus	Chewing stick	Marke	44	36.00
Tamarindus indica	Tamarinds	Tsamiya	20	17.00
Total			**120**	**100.00**

The sources of fuel wood presented in table 5 revealed that (56.67 %) of the respondents obtained fuel wood from the local market, (22.50%) obtained fuel wood from nearby bush/farm, while, (20.8 %) acquired fuel wood within their quarters.

Table 5: Sources of fuel wood in the study area

Sources	Frequency	percentage (%)
Nearby bush/farm	27	22.50
Local market	68	56.67
Within quarters	25	20.83
Total	**120**	**100.00**

Table 6 shows respondents spending (₦) on fuel wood monthly. (33.33%)spent₦5, 000 and above on fuel wood, while, only (13.3 %) spent less than ₦2,000 on fuel wood monthly. (23.3% and 30.0%) spent ₦2,000-3,000 and ₦3,000-4,000, respectively on fuel wood monthly.

Table 6: Amount spent on fuel wood monthly

Variable (₦)	Frequency	Percentage (%)
Less than 2,000	16	13.33
2,000- 3,000	28	23.33
3,000-4,000	36	30.00
5,000 and above	40	33.33
Total	**120**	**100.00**

DISCUSSION

The finding of this research revealed that the most predominant tree species in the study area are *P. biglobosa* and *A. indica* while *K. senegalensis*, *Z. spinochristi* were the least tree species in the area which implies that, most of the indigenous tree species have been over exploited and have becoming extinct/threatened. This agrees with the findings of Salami and Lawal, (2018) who observed that apart from cash tree crops such as *C. sinensis and M. indica*, *A. indica was* next prominent tree species in the study site. The implication of the extinction of certain biota that are intricately and ecologically associated would mean that, the population of wildlife species which feeds on the fruits of destroyed tree species is bound to decline drastically and even becoming endangered in the absence of immediate substitute. Awake (2012) reported that the extinction of a single plant species from Amazon rainforest can eventually contribute to the death of as many as 30 animal species.

It is of interest to note that, the most preferred fuel wood species are the most expensive fuel wood product, the *A. leiocarpus* (chewing stick) while *P. reticulatum* was the least chosen as fuel wood and *P. biglobosa* is the least pricey fuel wood products in the study area. The choice of the *A. leiocarpus* as the most preferred fuel wood species might not be unconnected with its being hard wood. However, the heating potential of firewood per cubic meter or per log varies widely, depending upon the species of tree from which the wood is felled and thus the density of the log (Alan-kin et al., 2017). Generally, the harder the wood (which results from slower growth), the denser it is and the greater the amount of biomass per unit volume. Such woods, when well-seasoned, produce hot, long-burning fires with relatively little particulate emissions (Alan-kin et al., 2017). Varieties of wood such as Oak, Hard Maple, Hickory, and most of the fruit woods (apple, cherry, etc.) have the hardest, most dense wood, and are most desirable for firewood. Broad-leafed varieties such as willow, aspen, or poplar have less-dense wood and require a greater volume of wood to produce the same amount of heat.

On the other hand, *P. reticulatum* was the least chosen as fuel wood and *P. biglobosa* (locus bean) from experience, possibly owing to the fact that, the former produce disturbing smoke while the former back fires while burning. About 90% of the respondents acquired their wood from within Metropolitan Kano. Only the educational institutions and a bakery send vehicles directly to buy wood from rural producers (Cline-Cole, 1988). The wood supply market covers a mixture of sources which ensures that it cannot be controlled by a small group of distributors who can fix prices and profit from periods of scarcity

CONCLUSION

A finding from the study shows that most available tree species in the Local Government were used for fossil fuel without considering the major uses of some species. *Parkia biglobosa and Azadirachta indica* were found to be the most predominant tree while *Anogeissus leiocarpus* was the most economically valued tree species used. This implies that economic tree species were used for fossil fuel in the study area, which may lead to endangerment of loss of species with economic value

RECOMMENDATIONS

From the results of the research work, it could be imperative and extrapolate that rapid growth in human population could indisputably pose threat to the ecological environment of the study area. Hence, incite attention of the Government and all stakeholders should draw to the following areas:

a. the provision of affordable, available and sustainable alternative fuel source of limited menace of environmental pollution will prove efficacious.
b. more studies need to be conducted to meet the challenges by environmental degradation as it relates fuel wood cutting.
c. serious community participatory approach should be employed to help communities in getting awareness in the dangers pose by environmental degradation as evidence by the rate of destruction of trees for fuel.

REFERENCES

Abdulkadir , K. 2013. Global plant. National History Museum

Alankin, T. and Ada-Pui, H. (2017). Natural fibre - reinforced Biodegradaable and Bioresordable polymer composite. Direct science pp 21-96

Awake, B. 2012. The Amazon Rainforest: Myths Realitiea. Awake! March 22, 2012, *Semi*

monthly publication Magazine of Jehovah witnesses, pp. 4-9

Bratkovich, S. S. 2018. Estimates of CO_2 withheld from the atmosphere by hand-wood products Technical report, pp2-40

Cline-Cole, R.A., Falola, J.A., Main, H.A.C., Mortimore, M. J. Nichol, J.E. and O'Reilly F.D. (1988): Social Forestry Network, Wood Fuel in Kano, Nigeria: The Urban-Rural ConflictNetwork Paper 7b Winter

Evans, J.2003. Plantation Forestry in the Tropics pp 286

FDF 1986: The Assessment of Vegetation and Land use Changes in Nigeria. Federal Department of Forestry Abuja

Forestry Outlook Studies in Africa.(2001). Ministry of Natural Resources and Tourism pp1-31

Ilu, K. J., Salami, K.D., Gidado, A. H., Muhammad, Y. K. and Bello Ahmed 2020.Household's Responses to the Roles Of Trees As Wind Breaker in Dutse LocalGovernment Area of Jigawa State, Nigeria*Fudma Journal of Sciences* (FJS) 4 (3): 162-169

National Population Commission 2006.Projected data on national population.Retrieved on 2/5/2018. Available at *https//census.jigawa.dutse.ndb*

NIPOST 2009. Retrieved 2009-10-20, https://tukool.com/know-Nigeria/know-about-kano-state/know-about-warawa

Ogunjimi, A.A. Osunsinna, I. O.O, Jayeola, O. A, and Ogunjimi K. O. 2008.Perception of environmental issues by fuelwood sellers in Borgu Local Government Area of Niger State, Nigeria. *Journal of Environmental Extension* (7) 43-47

Olofin, E. A. (2008) Some aspect of physical Geography of Kano Region and Related Human Response: Debis Press Kano

Rowe, W.B, Del-Genio, A.D. and Eichler, T. 1992. Cloud-tracked winds from pioneer Venus OCPP images. *Journal.theAtmospheric Science.*, 47(17): 2053–2084

Salami, K. D and Lawal, A.A (2018).Tree species Diversity and Composition in the Orchard of Federal University Dutse, Jigawa State.*Journal of Forestry Research and Managemen*t. ISSN 0189-8418, *www.jfrm.org.ng*, 15(2):112-122

Salami, K. D, Ibeh K.G and Jibo A. U. 2020.The impact of Human activities on Litterfall production, Tree Diversity and Structural Changes in tropical rain forest.*FUW Trend in science and Technology*. V5(3):705-710

Salami, K. D, Nurudeen, T.A andRingim, A.S. 2018. Status of Forest Ecosystem and It's Conservation in Nigeria. World Environmental Conservation Conference held Theodore Idibiye Francis Auditorium, The Federal University of Technology, Akure, Ondo State, Nigeria, pp. 93-99.