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Analysis of Wood- Based Enterprise in Gboko Local Government Area of Benue State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author EDO designed and interpreted the manuscript. Author IMA analyzed and prepared the manuscript. Author TET managed the literature search. All authors read and approved the final manuscript.

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ABSTRACT

The research investigated wood-based enterprises found in Gboko Local Government Area (LGA) of Benue State, Nigeria. 10 Council Wards were purposively sampled from 17 Council Wards. In each of the Council Ward, 5 wood-based enterprises were selected using Simple Random Sampling Techniques (SRS). 3 copies of questionnaire were administered in each wood-based enterprise selected making 15 questionnaire administered in each of the Council Ward. A sum of 150 copies of questionnaire were used in this study. Data collected were analyzed using descriptive statistical tools. Results revealed that there were 439 wood-based enterprises in the ten sampled Council Wards. The wood-based enterprises were furniture (23.5%), charcoal (20.3%), casket making (11.8%), farm tools making (6.6%), timber sheds (0.5%), wooden drum making (2.3%), mortar/pestle carving (5.7%) and fuel wood (29.4%) respectively. Result also revealed that buying (81.8%) was the highest source of wood. Most respondents made no effort in conserving the utilized tree species. *Gmelina arborea* and *Tectona grandis* were highly used for furniture,

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casket, and timber sheds, while *Prosopis africana, Burkea africana,* and *Vitelleria paradoxa* were highly used for charcoal production. Species preferred for carving (farm tool, mortar/pestle and wooden drum) includes *Acacia nilotica, Prosopis africana* and *Khaya senegalensis*. Firewood sale (29.4%) was found to be the most common wood-based enterprise. The study therefore shows that wood-based enterprise ease unemployment and act as source of additional income to farmers in the study area. *Prosopis africana* was identified as the most promising forest species particularly for wood-charcoal making in Gboko LGA. However, effective measures are recommended for establishing large-scale forest plantation in order to promote sustainable consumption practices.

Keywords: Conservation; wood-based enterprise; firewood; charcoal; wood species.

1. INTRODUCTION

Over 800 million people worldwide live in or near tropical forests and savannas, and depend on e cosystems for fuel, food and income [1]. Forest has possibly played a bigger role in the development of human societies than any other resource. The major direct or marketable product of most forest is wood used as timber, fuel wood, pulp and paper [2]. The ever-present nature of wood has made it a valuable material in every stage of human development, thus man depends on wood right from cradle to the grave [3].

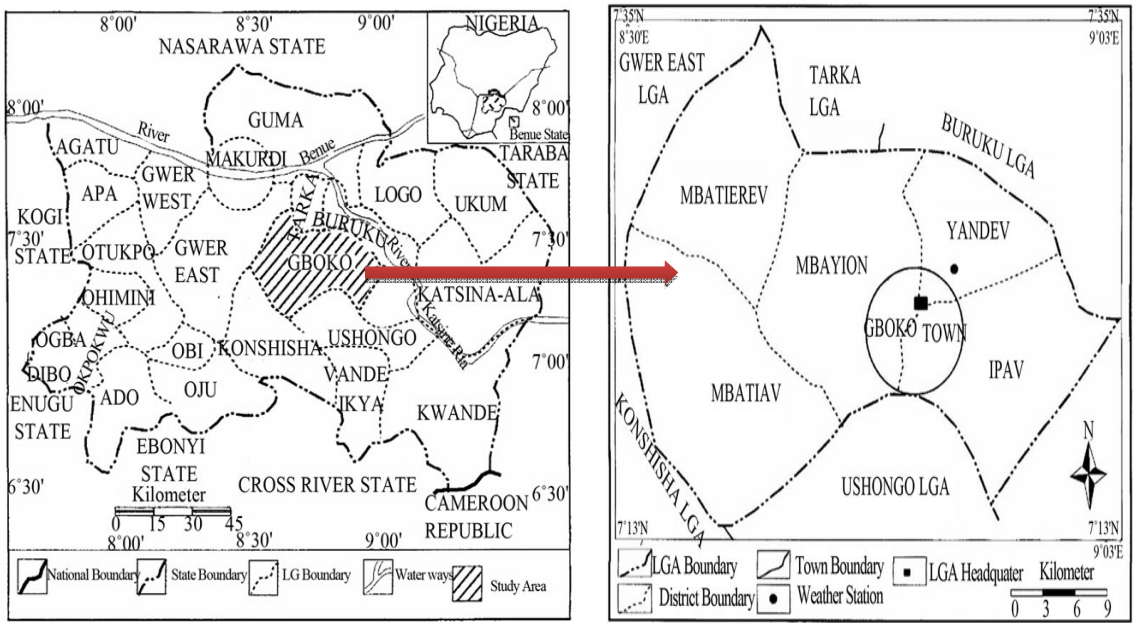
Wood-based enterprises in Nigeria can be classified into either formal or informal sector enterprises. The formal sector enterprise include the organized wood-based industries such as sawmill, plywood mill, particle board mill, matches mill, furniture factories etc. The informal wood-based enterprises are small-wood-based enterprises operating without corporate entity. The informal wood-based enterprises include enterprises that engage in the production of firewood items [4]. Wood-based enterprises are those small firms usually with small production capacity and few workers that utilized wood as their major raw material for the production of wood products for commercial purposes. They are categorized as organization that employs between 5-50 workers [5].

Wood-based enterprises are very important in improving livelihood and alleviating poverty in the country. Wood related businesses contribute to supporting the livelihood of approximately 90% of the world poorest [4].They are not only a source of employment but also a means against poverty by providing some of the basic needs of low income consumers [6]. This study is necessary because there is insufficient data on wood-based enterprise in Benue State of Nigeria, particularly in Gboko Local Government Area (LGA). In Gboko LGA, urbanization and economic development are bringing about changes in consumption pattern, which in turn are leading to major changes in wood-based enterprises. Inability of owners of wood-based enterprise to strike a balance between conservation and utilization of forest resources due to the pronounced shift of petroleum products to wood products in the area has raised concern. In Nigeria, information on management and exploitation of forest resources at local level is insufficient. However, most relevant national data are backdated and often based on estimation. In case of wood-based enterprises, data at local level is quite important since it represents cultural, social, ecological, and conditions of the area. The main objectives of this study are (i) to identify wood-based enterprise in Gboko LGA, (ii) to recognize most tree species utilized by the wood-based enterprises, and (iii) to determine the measures taken for conservation of tree resources in the study area.

2. MATERIALS AND METHODS

2.1 Study Area

Gboko Local Government Area (LGA) is located in the North-eastern part of Benue State between latitude 7°19'30"N and 7°25'00''N and longitude 9°0'18''E and 9°00'50''E. The LGA is bordered to the North by Tarka and Buruku LGAs, to the South by Konshisha LGA, to the West by Gwer LGA and to the South-east by Ushongo LGA. It comprises five Districts and seventeen Council Wards. Gboko LGA has a population of about 500,000 people according to National Population Census [7]. The climate of Gboko LGA is tropical humid type with high temperature between March and April. The minimum temperature ranges between 22.8℃ and minimum of 30.10℃ to 35℃ with an average annual rainfall of about 900 – 1000 mm. The predominant tree species are *Tectona grandis, Gmelina arborea, Acacia nilotica, Daniella oliveri, Prosopis africana and Parkia biglobosa* [8].



(a) **(b)**

Fig. 1. Map of Study area (a) - Map of Benue State showing LGA. (b) - Map of Gboko LGA showing Council Wards and Districts

2.2 Sampling Procedure

Ten Council Wards purposively sampled from the 17 Council Wards in the study area. From each Council Wards, 5 wood-based enterprises were selected using Simple Random Sampling Techniques (SRS). For convenience, 3 semi-structured questionnaire were administered to each selected wood-based enterprise; making 15 questionnaire administered in each of the Council Ward. The questionnaires were administered to the heads of each enterprise among others. Data generated from the study were analyzed using descriptive.

3. RESULTS

Demographic characteristics of the respondents in the study are presented in Table 1. Results showed that the highest respondents were male (69.3%), most of the respondents were married (60.7%) and were middle aged (41-50 classed (28.6%). The maximum educational attainment of the respondents was secondary education (42.9%) and their dominant profession was farming (42.9%).

Table 2 revealed that Mbakper Council Ward had the highest (88) number of wood-based enterprise in Gboko LGA. Out of this number, casket making (35) was the highest. The Gboko Central Market Council Ward had the second height with 56 wood-based enterprise. Out of this number, fire wood sales were the highest (27). The Council Ward with the least number of wood-based enterprises was Mbatyu with 30 wood-based enterprises of which charcoal sales was the highest (10).

Table 3 shows the sources of wood in each of the Council Ward. The result obtained revealed buying and natural forest as the two main sources of wood in the study area. Buying was highest (91,7%) in Gboko south and least (13%) in Yandev south. While natural forest as wood source was highest (73.3%) in Mbatyu and least (8.3%) in Gboko south. However, Mbadim, Yandev south and Igyorov obtained 6.7% of their wood from forest plantation respectively, while only Yandev south acquired their 6.7% of their wood from forest reserved.

Table 4 shows the measures of conservation adopted by respondents in each Council Ward. Respondents that make no effort to conservation was highest (100%) in Gboko central market, Mbatyu, and Igyorov respectively. This was followed by 93.3% in Gboko north, 83.3% in Gboko south and only 41.7% in Gboko south.

Nevertheless, 33.3% of respondents in Gboko south was involved in agroforestry, 26.7% of them in Mbadim used home garden as a means of conservation while 13.3% in Mbadim and Yandev south practiced forest plantation as a conservation measure.

Table 1. Demographic characteristics of the respondents in the study area

Variables	Frequency	Percentage (%)
Sex		
Male	97	69.3
Female	43	30.7
Marital status		
Married	85	60.7
Single	24	17.1
Divorce	12	8.6
Widow	5	3.6
Widower	14	10.0
Age		
21 and below	8	5.7
21-30	24	17.1
31-40	30	21.4
41-50	40	28.6
51-60	22	15.7
61 and above	16	11.4
Religion		
Christianity	90	64.3
Islam	6	4.3
Pagan	40	28.6
Others	4	2.9
Education		
Informal	34	24.3
Primary	24	17.1
Secondary	60	42.9
Tertiary	22	15.7
Occupation		
Farming	60	42.9
Fishing	0	0.0
Trading	57	40.7
Others	23	16.4

Table 5 shows how often wood-based business owners made their earning. It was observed that most of the wood-based owners earned their income on daily bases and very few on yearly based. Considering income earning on daily bases, Gboko south was highest (100%) followed by 93.3%, 80.0% and 66.7% in Gboko north west, Mbakper and Gboko east respectively. Mbadim (13.3%), Gboko east (8.3%) and 6.7% in Yandev south and Mbatyu respectively made their earnings yearly. However, earning on yearly observed in few wood-based enterprises in Mbadim (13.3%), Gboko east (8.3%), Yandev south (6.7%) and in Mbatyu (6.7%).

Table 6 shows how often respondents procured wood species for their businesses. The results indicated that most respondents in Gboko south (83.3%), Gboko central market (81.8%) and 73.3% in Yandev south, Igyorov and Mbaanku obtained their wood species regularly. Conversely, Mbatyu (26.7%) Mbakper (13.3%), Gboko east (8.3%), and 6.7% in Yandev south and Mbaanku scarcely obtained their wood species.

Table 7 shows most preferred wood species for various wood-based enterprises in the study area. The most preferred wood species for furniture and making casket was *Gmelina arborea* where as *Prosopis africana* was mostly preferred for charcoal production. The second most preferred wood species were *Millicia excelsa* for furniture making, *Burkea africana* for charcoal production, *Khaya senegalensis* for casket (Coffin) making, *Acacia nilotica* for farm tools making, and *Vitelliria paradoxa* for carving mortar and wooden drum making. Nonetheless, the respondents also preferred other wood species for different purposes for instances, *Mansonia altissma* for furniture and making casket, *Hymenocardi acida* for charcoal production and *Crossopteryx fabrifuga* for tools making, carving mortar and wooden drum.

Table 8 shows reasons for most utilized wood species. Respondents reported that *Prosopis africana, Burkea africana, Vitellaria paradoxa* and *Khaya senegalensis* wood species were used as fire wood and for charcoal production because according to respondents, they are hard, produce low quantity of ash, burns well and produce bigger pieces of charcoal. *Tectona grandis, Gmelina arborea, Khaya sengelensis, Daniella oliveri* were common in timber sheds since they were readily available in the forest and command high demand from customers. *Acacia nilotica, Prosopis africana, Burkea africana* were used for farm tools making because they do not break easily during service. Consequently, respondents had specific reasons for using each wood species in their business. The reasons were seen to be dependent on the expected wood products.

Table 2. Number of wood-based enterprises according to council wards

Sampled council ward	Furniture making	Charcoal sales	Casket making	Farm tools making	Timber shed	Wooden drum carving	Fuel wood sales	Mortar/pestle carving	Total
Gboko central market	14	8	7	0	0	0	27	0	56
Gboko East	15	8	5	0	0	0	13	0	41
Gboko South	10	13	5	0	0	0	15	0	43
Gboko North West	10	13	0	5	1	0	16	0	45
Mbakper	16	17	35	0	0	0	10	10	88
Mbatyu	4	10	0	6	1	0	9	0	30
Mbadim	8	4	0	6	0	0	10	4	32
Yandev South	11	6	0	5	0	3	16	0	41
Igyorov	8	6	0	0	0	7	7	5	33
Mbaanku	7	4	0	7	0	0	6	6	30
Total	**103**	**89**	**52**	**29**	**2**	**10**	**129**	**25**	**439**
(%)	**23.5**	**20.3**	**11.8**	**6.6**	**0.5**	**2.3**	**29.4**	**5.7**	**100.0**

Table 3. Sources of wood in each council ward in the study area

Council ward	Buying		Natural forest		Forest plantation		Forest reserved		Total%
	F	%	F	%	F	%	F	%	
Gboko central market	9	81.8	2	18.2	0	0.0	0	0.0	100
Gboko east	8	66.7	4	33.3	0	0.0	0	0.0	100
Gboko south	11	91.7	1	8.3	0	0.0	0	0.0	100
Gboko north west	9	60	3	20.0	0	0.0	0	0.0	100
Mbakper	8	53.3	7	46.7	0	0.0	0	0.0	100
Mbatyu	4	26.7	11	73.3	0	0.0	0	0.0	100
Mbadim	11	73.3	3	20.0	1	6.7	0	0.0	100
Yandev south	2	13.3	11	73.3	1	6.7	1	6.7	100
Igyorov	8	53.3	6	40.0	1	6.7	0.0	0.0	100
Mbaanku	8	53.3	7	46.7	0.0	0.0	0.0	0.0	100

Table 4. Methods of forest conservation adopted by respondents in the study area

Council ward	Agro forestry		Home garden		Natural forest		Forest plantation		No effort at all		Total %
	F	%	F	%	F	%	F	%	F	%	
Gboko central mkt	0	0.0	0	0.0	0	0.0	0	0.0	11	100.0	100.0
Gboko East	2	16.7	0	0.0	0	0.0	0	0.0	10	83.3	100.0
Gboko South	4	33.3	2	16.7	1	8.3	0	0.0	5	41.7	100.0
Gboko North West	0	0.0	0	0.0	0	0.0	1	6.7	14	93.3	100.0
Mbakper	2	13.3	0	0.0	0	0.0	0	0.0	13	86.7	100.0
Mbatyu	0	0.0	0	0.0	0	0.0	0	0.0	15	100.0	100.0
Mbadim	1	6.7	4	26.7	1	6.7	2	13.3	7	46.7	100.0
Yandev South	1	6.7	1	6.7	1	6.7	2	13.3	10	66.7	100.0
Igyorov	0	0.0	0	0.0	0	0.0	0	0.0	15	100.0	100.0
Mbaanku	0	0.0	0	0.0	0	0.0	3	20.0	12	80.0	100.0

Table 5. Frequency of earnings from enterprises in the study area

Council ward	Daily		Weekly		Monthly		Yearly		Total %
	F	%	F	%	F	%	F	%	
Gboko central market	6	54.5	5	45.5	0	0.0	0	0.0	100
Gboko East	8	66.7	2	16.7	1	8.3	1	8.3	100
Gboko South	12	100	0	0.0	0	0.0	0	0.0	100
Gboko North West	14	93.3	1	6.7	0	0.0	0	0.0	100
Mbakper	12	80.0	2	13.3	1	6.7	0	0.0	100
Mbatyu	9	60.0	2	13.3	3	20.0	1	6.7	100
Mbadim	6	40.0	5	33.3	2	13.3	2	13.3	100
Yandev South	2	13.3	5	33.3	7	46.7	1	6.7	100
Igyorov	9	60.0	2	13.3	4	26.7	0	0.0	100
Mbaanku	2	13.3	3	20.0	10	66.7	0	0.0	100

Table 6. Availability of wood species for wood-based enterprise

Council ward	Regular		Irregular		Scarce		Very scarce		Total
	F	%	F	%	F	%	F	%	%
Gboko central market	9	81.8	0	0.0	2	18.2	0	0.0	100.0
Gboko East	7	58.3	3	25.0	1	8.3	1	8.3	100.0
Gboko South	10	83.3	1	8.3	1	8.3	0	0.0	100.0
Gboko North West	10	66.7	4	26.7	1	6.7	0	0.0	100.0
Mbakper	9	60.0	3	20.0	1	6.7	2	13.3	100.0
Mbatyu	7	46.7	2	13.3	2	13.3	4	26.7	100.0
Mbadim	3	20.0	5	33.3	5	33.3	2	13.3	100.0
Yandev South	11	73.3	1	6.7	2	13.3	1	6.7	100.0
Igyorov	11	73.3	4	26.7	0	0.0	0	0.0	100.0
Mbaanku	11	73.3	2	13.3	1	6.7	1	6.7	100.0

Table 7. Wood species used in the various wood-based enterprises in the study area

Scientific names	English names	Native names (Tiv)	Ranking
Wood species used for furniture making			
Gmelina arborea	Melina	Malina	1
Millicia excelsa	Iroko	Leke	2
Tectona grandis	Teak	Kpaghkuuke	3
Khaya senegalensis	Mahogany	Haa	4
Daniellaoliveri	Daniella	Chiha	5
Vitex doniana	Black plum	Hulugh	6
Bombax costatum	Bombax	Genger	7
Mansonia altissma	Makores	-	8
Wood species used for charcoal production			
Prosopis africana	Iron tree	Gbaye	1
Burkea africana	Wild syringe	Gbagbongom	2
Vitellaria paradoxa	Shear buter tree	Chamegh	3
Anogeissus leiocarpa	Nigeria axlewood	Maaki	4
Hymenocardia cida	Weeding heart	-	5
Wood species used for casket (Coffin) making			
Gmelina arborea	Melina	Malina	1
Khaya senegalensis	Mahogany	Haa	2
Tectona grandis	Teak	Kpagh	3
Daniella oliveri	Daniella	Chiha	5
Cieba pentandra	Ceiba	Vembe	6
Bombax costatum	Bombax	Genger	7
Millicia excelsa	Iroko	Leke	4
Wood species used for farm tools			
Prosopis africana	Iron tree	Gbaye	1
Acacia nilotica	Acacia	Ovaye	2
Burkea africana	Wild springe	Gbagbogom	3
Parkia biglobosa	Parkia	Nune	4
Erythrophelum suaveolens	Sasswood	Kor	5
Annona senegalensis	-	Hur	6
Crossopthoxylum fabrifuga	Cooling crossopteryx	-	7
Wood species used for carving mortar and wooden drum			
Prosopis africana	Iron tree	Gbaye	1
Vitelliria paradoxa	Shea butter	Chamegh	2
Khaya sengalensis	Mahogany	Haa	3
Ceiba pentandra	Ceiba	Vembe	4
Crossopteryx fabrifuga	Cooling Crossopteryx	-	5

Table 8. Reasons for most utilized wood species in the study area

S/No.	Wood-based enterprise	Most utilized wood species	Reason for use by respondents
1	Charcoal sales	*Prosopis africana, Burkea africana, Vitellaria paradoxa*	The wood are hard, have low ash, production of big pieces of charcoal.
2	Casket making	*Gmelina arborea*	Soft, smooth and ease to get in the study.
3	Furniture making	*Gmelina arborea, Tectona grandis*	Hard nature (Teak) for Gmelina soft, Smooth and ease for furniture designing.
4	Timber shade	*Tectona grandis, Gmelina arborea, Khaya sengelensis, Daniella oliveri*	They are always available and high demand from customers.
5	Farm tools making	*Acacia nilotica, Prosopis africana, Burkea africana*	They do not easily break and ease for carving.
6	Wooden drum carving	*Khaya senegalensis, Prosopis africana, Vitellaria paradoxa,*	They do not easily crack and ease for carving.
7	Mortal/pestle carving	*Prosopis africana, Vitellaria paradoxa*	They are hard and have ease of carving.
8	Fuel wood sales	*Prosopis africana, Daniella oliveri, Burkea africana, Khaya senegalensis*	They are hard, produce low ash and burn for longer time.

4. DISCUSSION

There were more male in the wood-based enterprise in Gboko LGA than female. The high number of male was observed in casket making, furniture making, timber shade, farm tools making, wooden drum carving, and mortal/pestle carving businesses. The low number of female respondents may be because the business requires physical strength found more in men than women. This finding is similar to [9] who reported that males are dominant in wood working processes. Married people were more in the business than the unmarried and the divorced. The reason could be because they need the job to take care of their families. Majority of the respondents attended only secondary school and had low level of awareness on conservation. This conforms to earlier findings on the survey of small-scale wood-based enterprise in Katsina- Ala LGA of Benue state that most of the natives found in the wood-based enterprises were people with secondary school experience [10].

[11] FAO observed that the study of small-scale rural forest-based enterprises was developed out of an enquiry to identify what contribution the forest sector makes to off-farm rural employment and income. Interestingly in this study, there were as much as 439 wood-based enterprises were found to be operating in Gboko LGA. This may have contributed immensely to economic development of Gboko. This finding is similar to the report of [12] who opined that employment and income from small-scale non-farm enterprise activities were becoming of growing importance in the rural economy of developing countries. [12] further reported that small forest-based enterprise activities constituted one of the largest sources of such income and also accounted for a large part of the total harvest from forests in many areas. Similarly, [13] also reported that forest related businesses were contributing to the support of livelihoods of approximately 90 % of the world's poorest.

Most respondents in wood-based enterprises in Gboko LGA were farmers. Farming may not have being enough to sustain their livelihood. As result, many of them depended on wood-based enterprise as alternative source of coping with economic challenges. This conformed to [14] who stated that rural areas of developing countries depend on biomass fuels such as wood fuel and dried dung for their energy consumption. The finding also support the report of [15] that informal wood-based sector has potential to contributing to rural economic development through increasing income and reducing rural poverty.

Fuelwood was the highest wood-based enterprise in Gboko. This may implies that

fuelwood was the predominant source of energy. This conforms to [16] on assessment of energy choice of household used in Mikang LGA of Plateau state that fuel wood was the most preferred energy source for domestic purposes among rural households. Furniture business was the second predominant wood-based enterprise in the study area. This agrees with the findings of [17] who stated that wooden furniture was one of the ten major wood-based enterprises currently recognized in Nigeria.

This study revealed that respondents relied essentially on purchase of wood for their businesses. It was observed that owners of wood-based enterprises made no efforts in replacing harvested trees. This suggests that there was utilization of trees without conservation. The findings conforms to [12] who reported that rural dwellers are ignorant of conservation of forest resource. Consequently, the entire wood-based enterprises in Gboko may not be sustainable in the coming years if no serious efforts is taken toward conservation.

5. CONCLUSION

The study indicates that wood-based enterprises play important role in everyday life among the people of Gboko LGA. *Prosopis africana* was found to be the most preferred wood fuel species in the area. The trend of these businesses in Gboko LGA should call to mind urgent need of establishing large-scale and on-farm plantation various tree species to meet the ever increasing demand of wood in the area. Establishment of *Prosopis africana* plantation in the area should be given urgent attention. Government of Benue State therefore, must need to develop policy frameworks for establishing woodfuel plantation at Gboko LGA in order to promote sustainable consumption practices.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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