Journal of Research in Forestry, Wildlife & Environment Vol. 16(2) June, 2024
E-mail: jrfwe2019@gmail.com
http://www.ajol.info/index.php/jrfwe

ISBN: 2141 – 1778
Uloko et al., 2024

EFFECTS OF FUEL WOOD UTILIZATION ON PANDAM WILDLIFE PARK, PLATEAU STATE, NIGERIA

Uloko, I. J.[1], Hangeior, I. S[2]. and Lameed, G. A.[3]

[1,2]Department of Wildlife and Range Management Joseph Sarwuan Tarka University (formerly Federal University of Agriculture, Makurdi)
[3]Department of Wildlife and ecotourism, University of Ibadan, Nigeria.
***Corresponding Author:** *juluko4u@yahoo.com*

ABSTRACT

This study investigates the impact of fuel wood utilization on the Pandam Wildlife Park, employing a multi-stage sampling technique to administer 3,305 questionnaires across four surrounding communities. Descriptive statistics and one-way ANOVA were utilized for data analysis. Findings indicate a predominance of male fuel wood collectors, with 80% of respondents relying on firewood as their primary energy source. Approximately 83,000 metric tons of firewood are harvested and sold weekly in the study area, posing a substantial threat to the park's ecosystem integrity. Poverty and rapid population growth are identified as major drivers of unsustainable fuel wood harvesting. Addressing this issue necessitates comprehensive rural development policies and the provision of alternative energy sources. The study highlights the importance of mitigating fuel wood dependency to conserve biodiversity and foster sustainable development in protected areas.

Keywords: Fuel wood, Consumption, Pandam Wildlife Park, Protected areas, Biodiversity conservation.

Correct Citation of this Publication
Uloko, I. J., Hangeior, I. S. and Lameed, G. A. (2024). Effects of fuel wood utilization on Pandam Wildlife Park, Plateau State, Nigeria. *Journal of Research in Forestry, Wildlife & Environment*, 16(1): 117 - 122

INTRODUCTION

The requirements to satisfy humans' basic needs of food and shelter place a huge challenge on the environment. One of the key challenges facing the world today is how to meet the need for sufficient, safe, and nutritious food without exhausting the resources available. In the process of acquiring these needs, the destruction of the bio-resources has taken place in most of Africa and Nigeria in particular. It might accelerate more as the population increases and the demand for fuel wood and timber grows rapidly over the years.

Rapid deforestation, resulting from unsustainable uses of forest resources for human Survival is a major contributing factor to land degradation (Pyles *et al.*, 2022). Globally, millions of people rely on protected areas as a means of subsistence living. In some cases, they benefit directly, through the consumption of products produced or obtained in or around protected areas (Keenan *et al*.,2015). In others, employment and income provide indirect benefits that contribute to sustaining livelihoods. Direct benefits however are becoming a serious threat to the diversity and efficiency of protected areas. (Madaki and Sayok, 2019) The problem started when men got greedy instead of taking what they needed, they wanted extra. Over utilization of natural resources by individuals and groups living around the Park/Reserve boundaries is now one of the major obstacles facing the Management of protected areas in Nigeria. Most protected areas are without adequate and holistic plans for host communities from the onset of the planning phase. Although Government and Non-governmental

organizations have tried to provide alternative means of livelihood for the local people most of which failed to achieve their objectives (Lateef *et al*., 2017). A Protected Area like Pandam Wildlife Park (PWP) when designed and managed appropriately, not only conserves biodiversity but maintains sustainable tourism values and benefits to society and tends to play a control role in the economic development of the rural environment. Fuel wood consumption by local people may be a serious problem for protected areas and biodiversity cannot be sustained if harvested in an unsustainable manner. Fuel wood harvesting has been linked to deforestation (Idris *et al*., 2018)), but critics argue that most wood collected for fuel is dead and therefore, does not exacerbate (increase) rates of deforestation (Arnold and Person, 2003). It has also been discovered by the FAD (Food and Agricultural Organization) that the main source of fuel in both urban and rural areas within developing countries is biomass. This is commonly available in two forms, namely charcoal and fuel wood. Charcoal is energy that is made from wood, while fuel wood is collected and used directly from the forest. The demand for fuel wood or charcoal is likely to increase as the price of kerosene or gas increases, hence more forest will be degraded in the quest for more fuel wood. In addition, the demand for fuel wood and timber (including non-timber products) may grow rapidly especially because of the burgeoning population growth. The gathering of fuel wood from forests for a long period with an increasing quantity on a daily or weekly basis causes degradation. Forest degradation in turn leads to fuel wood scarcity and a variety of adverse consequences including loss of biodiversity, deterioration of watershed functions, release of carbon dioxide into the atmosphere, and soil erosion. (Gajic *et al*., 2018). It has therefore become necessary to examine the effects of fuel wood utilization on Pandam Wildlife Park.

MATERIALS METHODS

Study Area

The study was carried out in Pandam Wildlife Park in Quanpam Local Government Area of Plateau State, Nigeria. Pandam Wildlife Park is located in the southern part of the plateau state of Nigeria. It is bounded on the East by Namu and Kyarda Towns; and on the West and North by the Mangu Local Government Area. The Park lies within the land Area of Benue Valley between latitude 4^0 QI'N and 5^0 35'N and longitude 80 08'E and longitude 80 15'E in Qu'apan Local Government Area of Plateau State, Nigeria. The Park is one of the largest Protected Areas in Plateau State and covers an Area of about 224 km^2, mostly in the Guinea Savanna Zone. The lake alone covers an area of about 22 km^2 (Ministry of Tourism Plateau State, 2002).

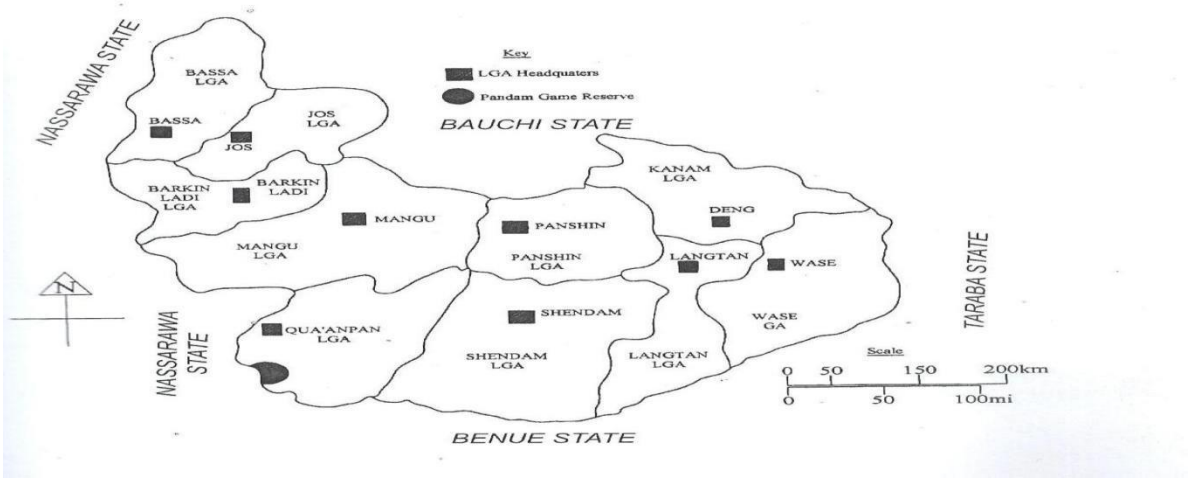

Figure 1: A Map of Quiapam Showing the Location of Pandam Wildlife Park.

Source: Plateau State Ministry of Land and Survey, 2010.

Data Collection Technique

The study utilized a combination of field surveys, direct observations at the park, and structured questionnaires to gather data. A multi-stage sampling method was employed to select participants from Pandam village, Kyarda, Aningo, and Nasukuuk. A total of 3,305 questionnaires were distributed among households in these communities, representing approximately 63.50% of the estimated 5,200 households over a period of two and a half years. The collected data was analyzed using simple descriptive statistics and one-way ANOVA techniques.

RESULTS

Table 1 shows the demographic results from the surrounding communities indicated by a predominance of male respondents, accounting for 69.50% of the total, while females constituted the minority at 30.99%.

Table 1: Gender distribution of household heads in land lock communities of PWP

Community	Distance to park(km)	Male	Female	Total
Pandam	(0-0.5)	1950(67.94)	920(32.05)	2,870(100.00)
Kyarda	(1)	195(75.87)	62(24.12)	257(100.00)
Aningo	(2)	92(89.32)	11(10.68)	103(100.00)
Nasuknuk	(3)	60(80.00)	15(20.00)	75(100.00)
Total	**2,297 (69.50)**	**1008 (30.99)**	**3305 (100)**	**3305 (100)**

In Table 2 below, the age composition showed that the majority (55.06%) of the respondents were between 21 and 40 years, followed by the respondents with ages ranging from 41 and 60 years (25.90%). The age range between 21 and 40 years constitutes the active segment of the population force (55.60%).

Table 2: Age Composition of Respondents

Community	<20years	21-40years	41-60years	>60years	Total
Pandam	400(13.92)	1,640(57.14)	750(26.13)	80(2.78)	2,870(100)
Kyarda	68(26.46)	102(39.68)	71(27.62)	16(6.22)	257(100)
Aningo	25(24.27)	48946.60)	20(19.41)	10(9.70)	103(100)
Nasuknuk	10(13.33)	30(40.00)	15(20.00)	20(26.66)	75(100)
Total		**1820 (55.06)**	**856 (25.90)**	**126 (3.80)**	**3303 (100)**

From Table 3 as shown below, 20.27%, 44.23%, 24.44%, and 11.04% of the respondents had 0-2; 3-5, 6-8, and or more children respectively. Table 4 indicates that a total of 83,000 metric tons of firewood (about 2 ½ trailer loads) were harvested and sold weekly in the study area by 48 firewood sellers. The total amount sold was N339, 000 only as revenue.

Table 3: Household Size per Community

Community	0-2	3-4	6-8	>9	Total
Pandam	600(20.90	280(44.59)	700(24.39)	290(10.10)	2,870(100)
Kyarda	40(15.56)	102(38.68)	68(26.45)	47(18.28)	257(100)
Aningo	20(19.41)	50(48.54)	20(19.41)	13(12.62)	103(100)
Nasuknuk	10(13.33)	30(40.00)	20(26.66)	15(20.00)	75(100.00)
Total	**670 (20.27)**	**1462 (44.23)**	**808 (24.44)**	**365 (11.04)**	**3305 (100)**

Table 4: Average Weekly Tree Consumption Rate in the Study Areas.

Community	No. of trees	Metric ton	No. of days	No of fuel Wood Sellers	Amount (N)
Pandam	20	30,000(A trailer load)	7	16	105,000
Kyarda	15	20,000(2 pickup vans)	7	12	97000
Aningo	10	15,000(half trailer load)	7	8	65000
Nasuknuk	12	18,000(almost 2 pickup van)	7	12	72000
Total	57	**83,000**	28	48	**339,000**

Table 5 shows the percentage respondent on the type of cooking energy/ fuel in the study area. The majority (about 80%) of the respondents used firewood as their energy source while twenty percent (20%) used kerosene. Table 6 revealed that there was a significant difference between the use of firewood and kerosene since the p-value (7.38) was greater than the significant level (0.05)

Table 5: Percentage of Respondents on Type of Cooking Energy/Fuel Used in the Study area.

Community	Firewood (%)	Kerosene (%)
Pandam	84	16
Kyarda	79	27
Aningo	80	2
Nasuknuk	76	24
Total	79.75	20.25

Table 6: One-way ANOVA on the use of fuel Wood and kerosene in the Study Area

	Sum of squares	df	Mean square	F	Sig
Between groups	2.678	1	2.678	7.383	0.05
Within groups	1198.101	3303	363		
Total	**1200.779**	**3304**			

DISCUSSION

Wood was commonly used as the primary energy source in the majority of households throughout the surrounding communities of PWP. Residents living near the protected areas of PWP depended heavily on fuelwood for their livelihoods. Therefore, the unsustainable extraction of forest products like firewood and fodder can impact wildlife habitat and the forest ecosystem. Increasing demands for forest products, driven by demographic and market pressures, often accelerate the extraction of forest resources, leading to habitat degradation (Akash and Product, 2013). There is a pressing need for holistic conservation initiatives to comprehensively describe the region, understand socio-economic factors, forest resource production, use, and dependence, and their interrelation. Recently, the state of protected areas like Pandam Wildlife Park has been questioned, especially with the increased rate of habitat degradation due to population growth. While subsistence fuelwood harvesting in natural forests may not be detrimental, commercial-scale extraction becomes a threat. Even if habitats in core PAs are fully protected, the

long-term survival of flora and fauna cannot be guaranteed (Jafari, 2006). Anthropogenic pressures on adjacent lands and wildlife migratory corridors progressively transform PAs into ecological islands. Habitat destruction due to excessive fuelwood harvesting can severely impact the continuous regeneration and sustainability of Pandam Wildlife Park. This is evident as many species of flora and fauna may disappear or become locally extinct, as seen in the Pandam Wildlife Park where wooded land has been converted into grassland through farming, logging, and excessive fuelwood harvesting. Hence, large game is scarcely seen at the Park except in the core. It was discovered during the study that species of fuelwood were not mature trees (Nagotha, 2001; Arnold and Person, 2003). Demographics of community members can also drive the increased rate of fuelwood harvesting and consumption. The majority of people were males aged 21-40 years, implying they were young and vibrant with the energy to harvest larger quantities compared to older individuals who may be too weak to explore forest resources. Moreover, poverty and burgeoning population growth are major drivers of unsustainable fuelwood harvesting. However, this can be minimized if alternative sources of fuel/energy consumption, such as kerosene, are provided cheaply for surrounding communities. This is crucial considering the high dependency on fuelwood, as evidenced by the largest percentage of people relying on it compared to kerosene. It was evident that people harvested fuelwood not only for subsistence but also commercially. Results showed a total of 83,000 metric tons of firewood (about 2 ½ trailer loads) were harvested and sold weekly in the study area, posing a serious threat to the park. If this trend continues, the wildlife and the park's status will be significantly affected.

CONCLUSION

Fuelwood emerges as the primary energy source in households surrounding the Pandam Wildlife Park, significantly outweighing the use of kerosene. Predominantly, males aged between 21 and 41 years are engaged in fuelwood collection, reflecting the active population demographic. This reliance on forest resources has fueled tensions between protected area management and local communities, highlighting the challenge of balancing conservation goals with local livelihood needs. The situation is exacerbated by rapid population growth, leading to increased commercialization of fuelwood harvesting beyond subsistence requirements. Alarmingly, the study reveals a high rate of fuel consumption within the Pandam Wildlife Park, posing a significant threat to its biodiversity and ecological integrity. Addressing this issue requires a multifaceted approach, integrating rural development policies, private sector initiatives, and community-based interventions.

RECOMMENDATIONS

Implementing alternative energy promotion, community engagement, and capacity building strategies is essential to address unsustainable fuelwood harvesting and promote conservation in the surrounding areas of Pandam Wildlife Park.

ACKNOWLEDGEMENT

We appreciate the support and cooperation of the Management of Pandam Wildlife Park, Local communities and stakeholders.

REFERENCE

Arnold, M., and Person, R. (2003). Reassessing the fuel wood situation in developing countries. International Forestry Review, 5(4), 379-383.

Akash, J., and Prodyut, B. (2013). Fuel wood dependence around protected areas: A case of Suhelwa Wildlife Sanctuary, Uttar Pradesh. Journal of Human Ecology, 42(2), 177-186.

Gajic, G., Djurdjevic, L., Kostic, O., Jaric, S., Mitrovic, M., and Pavlovic, P. (2018). Ecological potentials of plants for phytoremediation and eco restoration of fly ash deposit and mine wastes. Frontiers in Environmental Science, 6, 124.

Idris, H. A., Ahmad, M., Muhammad, U. K., and Nuhu, Z. (2018). An examination of changes in some forest reserves of Kano State, Nigeria. FUDMA Journal of Science, 2(4), 221-230.

Jafari, R. K. (2006). Wildlife conservation and local land use conflicts in western Serengeti corridor, Tanzania. Doctoral

Thesis, Norwegian University of Science and Technology, Faculty of Natural Sciences and Technology, Department of Biology.

Pyles, M. V., Magnago, L. F. S., Maia, V. A., Pinho, B. X., Pitta, G., de Gasper, A. L., Vibrans, A. C., Dos Santos, R. M., van den Berg, E., and Lima, R. A. (2022). Human impacts as the main driver of tropical forest carbon. Science Advances, 8(24), eabl7968.

Nagothu, U. S. (2001). Fuel wood and fodder extraction and deforestation: Mainstream views in India discussed based on data from the semi-arid region of Rajasthan. Geoforum, 32, 319-332.

Madaki, K., and Sayok, A. K. (2019). Effects of deforestation in Kurmi Local Government Area, Taraba State, Nigeria. Journal of Advanced Research in Social and Behavioral Sciences, 14(1), 16-28.

Keenan, R. J., Reams, G. A., Achard, F., de Freitas, J. V., Grainger, A., and Lindquist, E. (2015). Dynamics of global forest area: Results from the FAO Global Forest Resources Assessment. Forest Ecology and Management, 352, 9-20.

Appendix

Plate 1: Fuel Wood heaped at Pandam and Kyarda village respectively.

Plate 2: Domestic animals from Pandam Village trailing into the park in search of green pastures from Pandam Village.