

Effect of Fuelwood Exploitation on the Environment in Ganye Southern Adamawa State, Nigeria

Abraham., P. Teru., C. P., Isa W and Mamudu, A.

Department of Forestry Technology, Adamawa state College of Agriculture, P. M. B. 2088, Ganye, Adamawa State-Nigeria

ABSTRACT

The over-dependence on fuel-wood for energy is chiefly because of its relatively low prices and easy accessibility. The Assessment of Fuelwood exploitation and its effects on the Environment of Ganye area was investigated with the view to identify the causes of the fuelwood exploitation in the Area, identify the pattern of fuelwood exploitation and examine the effects of fuelwood on the environment. Data for the study were obtained from a total sample of 150 randomly selected respondents through interview and application of structured questionnaires in the months of May 2022. Data were analyzed using tables, frequencies and percentages. The results revealed that the fuelwood in Ganye Area is been used majorly for sales and household cooking. Some wood species were useful for fuelwood and are under threat of extinction. The massive exploitation of trees in the area results to soil erosion, flooding, occurrence of drought and increase in temperature rises at a threatening rate and there has been serious disappearance of many tree species within their surroundings. This work has recommended that supply of the conventional fuels and converting wood wastages (wood shavings and saw-dust) to briquettes and motivating the public to plant trees would improve energy supply and therefore reduce pressure on the natural forests. Policy-makers and other stakeholders should use the information to develop policies and strategies to preserve and sustain the forest

Key words: Biophysical, Deforestation, Fuelwood, Environmental degradation, forestry laws, user group.

INTRODUCTION

Fire wood gathered from the forest is an important source of domestic energy in the rural areas of poor countries (Ceccelki et al., 1979, Helberg et al., 2005). It has been estimated that more than 2.4 billion people rely directly on traditional plant biomass for cooking and heating and in poor countries plant biomass use represent half of the residential energy consumption (International Energy Agency 2005). Fuelwood is a source of the energy derived by burning wood biomass like logs and twigs and is common among the rural dwellers. Wood energy has remained the major fuel for over half of the world's population (FAO, 1981; Fuluwape, 1996, Ogunsawo Ajala, 2002).

The over-dependence on fuelwood for energy is chiefly, because of its relatively low price and easy accessibility (Adebayo et al., 2008). Sale and Kekeh, 2008). Other reasons are constraints in the supply of the conventional fuels and the growing population with a larger segments still falling below income that can afford the cost of conventional fuel (Aids Memo-Ire (2002).

Community forest is a branch of forest that deals with the communal management of forest for generating income from timber and non-timber forest products as form of goods while in the other hand regulating ecosystem, downstream settlements benefits from watershed conservation carbon sequestration and aesthetic values as in form of service FAO, (2010).

However meeting rural household fuelwood energy need in the country has become a herculean task due to enormous quantity of wood required (Yunana, (2014). The daily consumption of fuelwood in the rural community in Nigeria is estimated at 27.5 million kilograms per day. 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 (Aids Memo-Ire, 2002). The over-dependence on fuelwood in the country has been attributed to its availability and affordability compared to the other sources of energy (Ali, 2013).

Although, the exploitation of fuelwood is done primarily as a source of energy to the rural household in Nigeria, it has a great deal of effect on environment and the economic wellbeing Inoni, (2009).The collection of fuelwood from forests causes' land degradation. Forest degradation in turn leads to fuelwood scarcity and a variety of adverse consequences including loss of biodiversity, deterioration of watershed functions, and release of carbon dioxide into the atmosphere and soil erosion (*Chaw et al., 2015*).

FAO states that the forest in Nigeria would disappear by 2020 if the current rate of forest depletion continues unabated Onyeanusu and Otegbeye, (2012).

Fuelwood accounted for major part of the energy sources for domestic needs. More people depend on the use of fuelwood as source of energy and more trees are felled for such usage, and have negatively affected the forest sector and our environment.

The Study Examine the effect of fuelwood exploitation on the environment in the study area Determine socio-economic altruistic of the respondents, identify the causes of fuelwood consumption in the study area, Determined alternative renewable energy source for fuelwood.

This study would be justified because there is a growing concern over the use of forest resources which has become a matter of international concern. In Nigeria; there are public declarations against uncontrolled and indiscriminate wood cutting, enhance effective planning and conservation of these resources, contribute to research on the maximization of the negative environmental consequences of fuelwood exploitation and serves as one of the reference material for future researches,

The study would promote academic successes and also helps the rural communities to sustain their livelihoods and provides mitigation measures to fuelwood exploitation, sensitizing all shareholders on the impacts of fuelwood exploitation. Useful in designing and implementing appreciate strategy for sustainable development, energy policies, addressing issues of reducing energy emissions from deforestation, forest degradation and greenhouse gases.

The study area

The study was carried out in Ganye local Government area, located in the Southern part of Adamawa state (Latitude 09⁰ E, Longitude 12⁰ N it is bounded by Jada to the North, Mayobelwa and Taraba state in the west, Toungo to the south and the east Cameroon Republic (Adebayo *et al.*,2020). It has a land mass of about 2291.42km² and a population 164,087 (NP, 2007).

The mean annual temperature of the study area is 26.7⁰c and the mean annual rainfall ranges between 1000mm and 1600mm with a distinct dry season which begins in November, and end in April and the wet season begins in April and end in October or sometimes in November. The area is located within Guinea Savannah zone of Nigeria s vegetation zone (Adebayo, 1999). The major economic activity in the area is agriculture, food crops are grown in the area including maize, sorghum, cowpea, Cassava and potatoes while cash crops such as groundnut, Rice, yam and sugarcane are produce in large quantities. The farmers are also engage in collecting and processing of the non-timber forest products such as Shea nuts. Major livestock reared in the zones are cattle, sheep, pigs (Ad Seeds, 2004)

Methods of data collection

The data were collected from all the communities involved in the agricultural activities. A total number of one hundred and fifty respondent Farmers, vendor's loggers, fire wood sellers interviewed were selected using purposive and random sampling techniques. Information gathered includes; age, gender, marital status educational level and years, farming experience and major occupation of the respondents. Others include causes of fuelwood consumption, impact of government policies and programs in combating indiscriminate impact of tree felling and logging on the rural livelihoods.

Data analysis

The completed questionnaires were retrieved coded and subjected to descriptive statistical analysis such as table's frequencies distribution and percentage.

RESULTS AND DISCUSSIONS

The Socio – Economic Characteristics of Respondents

Demographic analysis of the respondents' shows that age groups of 31 - 40years had the highest number of respondents (33.3%).This was followed by the age group of 41 -50years with 30%. The year group of 20 - 30 followed with the ranking of 20%. The list year group is 50years and above with 16.6%. This shows that majority of the respondents were in their active age and bread winners to their respective families within their communities. According to Amaza (2004) the respondent's age is at a stage at which marginal productivity and productive efficiency, physical energy to work, managerial ability and interest are assumed to increase with age. Youths appear uninterested in fuelwood harvesting. However, the proportion of people engaged in these fuelwood harvesting and marketing with respect to age should favor income generation.

The results observed that majority of the respondents 53.3% were females while 46.7% were males, which mean that fuelwood harvesting is more exclusive preserve of the females even though males are involved in harvesting of fuelwood in the study area. This might also be due to the fact that women are involved in domestic cooking and supplementing farm income in off season periods. This supports the finding of Ani, (2004) and Fedelia, (2005) that generally women have greater access to the cash economy from harvesting fuelwood. This can be agreed upon because from the result shown in the table, more females have access to forest products

The results also show that majority of the respondents (37.3) were married, 33.3% of the respondents are single and 29.3% of the respondents are widows/widowers. This result is in line with the findings of Jande (2005). Who reported that married people have more responsibilities such as the provision of food, education, health and well-being of their spouses and children. This may be the reason why the harvesting of fuelwood is dominated by the married people unlike the case for the singles, who may not likely have other people to take care of beside themselves.

Most of the respondents (26.6%) had no formal education, 26.6% Adult education, 17.4% attained primary school and 16 % in the result obtained secondary school while 13.4% of the respondents tertiary education the result shows 26.65% are no formal and adult education 13.4% respondents attended tertiary education. This depicts that educational level of the people is inversely proportional to the number in the fuelwood harvesting business, implying that those that were well educated are not many in the fuelwood business. This is not surprising since a great percentage of the people in the communities have little education. This shows that literacy level among the fuelwood business in the study area was low. The preponderance of non-literates in high labor and demanding livelihood labor was reported by Amaza (2004), who stressed that practitioners' level of education is inversely proportionate to involvement in labor. This may be for the fact that education helps to liberate the mind and could expose practitioners to several alternatives and helps in efficient use of information which could lead to better output and income.

The result also indicates that majorities (46.6%) of the respondents were farmers by primary occupation, 33.3% of the respondents were traders, 20% of the respondents are civil servant and 1.3% of the respondents were craftsmen. As observed fuelwood harvesting in the study area is dominated by farmers, it means that fuelwood harvesting in the area will markedly affect the farming season due to the attention and time given to fuelwood harvesting. Farmers spend substantial part of their time on the fuelwood business during the dry season.

The result reveals that 41.3% of the respondents have been harvesting fuelwood in the area for, about 10 - 20years, 28% of the respondents have 20 - 30years experience and 20% respondents have 1–10years experience, while 10.7% of the respondents indicate have 20-30years experience. This indicates that majority of the fuelwood harvesters have the knowledge of the

environmental problems from the fuelwood harvesting since they have been doing the business over 20years.

Table 2: gives the various sources of the fuelwood harvesting in Ganye area. The results indicate that 53.3% of the respondents harvest their fuelwood in the free areas, 46.7% of the respondent's harvest the fuelwood in their farmlands, and since there is no government reserved area, the third option indicated nothing

Table 3: The result explains the reasons for the fuelwood harvesting. The result reveals that 26.7% of the respondents harvest the fuelwood for sales, 23.3% of the respondents harvest the fuelwood for charcoal production, 20% respondents harvest fuelwood for cooking, 16.7 % of the respondents harvest the fuelwood for baking bread and cake and 13.3% of the respondent harvest fuelwood for hotels/restaurants.

Table 4: The results show that 23.3% of the respondents observed a disappearance in plant and animals species, 20% of the respondents observed a reduction in vegetation cover, 20% observe flood/soil erosion in the area, 16.7% of the respondents observed an increase in temperatures, 20% of the respondents observed the occurrence of drought.

Table: 5 gives the remedies to harvesting of fuelwood, 37.3% respondents reveals that the best solution to fuelwood exploitation is forestation, 33.3% respondents indicate that used of biofuel and 29.3% respondents shows that used of briquetting will solved the problems of fuelwood exploitation.

Conclusion

Fuelwood is the major source of energy for the inhabitants of Ganye area. It is utilized for a variety of purposes for both domestic and industrial activities. There is a widening demand for fuelwood, with increasing pressure on the remaining trees. The supply of fuelwood within the metropolis is mainly from fuelwood dealers, who obtained it mainly from the free access forest areas and on farmlands. For the continued supply of wood and protection of the forest, the traders and other user groups should be made to pay for research and establishment of the trees in plantations. Increased awareness and education on the environmental consequences of over-exploitation and poor management practices should be intensified, while joint management efforts are explored between forest managers, traders and other stake-holders.

Recommendation

Based on the findings the following recommendations were made

- a. Adoption of improved harvesting techniques, reduced exploitation pressures, extensive silvicultural research and planting of these species in plantations as well as proper enforcement of forest regulations will protect these trees from extinction.
- b. To ensure fuelwood supply and environmental sustainability, massive awareness should be created both at the grassroots and in the townships about the adverse effects of tree overexploitation on the environment. Stakeholders should encourage tree planting by providing

incentives like seeds, seedlings, equipments, finance and materials for forestation in order to meet the demand for fuelwood and curtail environmental hazards.

c. Government and other stakeholders should ensure the enforcement and prosecution of defaulters of forestry regulations. Furthermore, the increase in prices of other energy sources should be checked and kept on the minimum in order to shift attention from sole dependence on fuelwood.

d. In order to minimize losses and also reduce pressure on the tree species, special briquette Production from sawdust generated from saw mills and other timber works should be encouraged. Again, research options on bio-fuel and other mineral resources like coal can be supported to supplement fuelwood.

e. Finally, trees are of immense importance to man, not only in maintaining environmental balance, but also for other uses, hence their preservation and conservation is essential for the present and future needs. Conservation and preservation strategies adopting community participatory approach should be harnessed.

Table 1; Age distribution of the respondent

Age Percentages (%)		frequency	No 150
20 – 30	30		20
31 – 40	50		33.4
41- 50	45		30
51-60	25		16.6
Total	150		100
Sex			
Femel	80		53.3
Male	70		46.7
Total	150		100
Marriage status			
Single	50		33.3
Married	56		37.3
Widow/widower	44		29.3
Total	150		100
Educational (qualification)			
No formal Education	40		26.6
Adult education	40		26.6
Primary Education	26		17.4
Secondary Education	24		16
Tertiary Education	20		13.4
Total	150		100
Occupation			
Farming	70		46.7
Trading	50		33.3
Civil servant	30		20
Total	150		100
Fuelwood harvesting experience (years)			
1 - 10	30		20
10- 20	62		41.3
20-30	16	10.7	
30and above	42		28
Total	150	100	

Source: Field Survey, 2022

Table: 2.sources of harvesting fuelwood

Source percentages (%)		Frequency
Reserved	00	00.0
Farmland	70	46.7
Free areas	80	53.3
Total	150	100

Source: Field Survey, 2022

Table 3: reasons for fuelwood exploitation

Reasons percentages (%)		Frequency
For sales	40	26.7
For cooking	30	20
For baking	25	16.7
For Hotel/Restaurant	20	13.3
For charcoal	35	23.3
Total	150	100

Source: Field Survey, 2022

Table: 4 Effects of Fuelwood exploitation on the environment

Effects percentages (%)		Frequency
Reduction in Vegetation cover	35	23.3
Reduction in plant and animal species	30	20
Appearance of soil erosion	30	20
Increase in temperature	25	16.7
Occurrence of drought	30	20
Total	150	100

Source: Field Survey, 2022

Table 5: Solutions to fuelwood exploitation

Solution percentages (%)		Frequency
Aforestation	56	37.3
Used of bio-fuel		50
		33.3
Briquetting production		44
		29.3
Total		150
100		

Reference

- Adebayo, A.G, Sale, F.A, Kekeh, O. (2008). *Rural household wood energy utilization pattern and its impact on deforestation in Akoko South West LGA Odo State, Nigeria*.
- Aide Memo-ire, (2002), *National stakeholder forum and formulation strategy for rural Industrialization and development through renewable energy technology* Nicon Hilton Abuja. 14th and 15th Nuvembe, (2002).
- Ali, I. N. (2013), thesis submitted in partial fulfillment of the requirement for the award of the Degree of Doctor of Philosophy of the University of Portsmouth, Uk. Pp 167.
- Amaza, P. S. (2004). Resources-use Efficiency in food crop production in Gombe state, Nigeria, PhD thesis. Department of Agricultural Economics, Ibadan: University of Ibadan.
- Ani, A.O, (2004). Women in Agriculture and Rural Development. 1st Edition. Maiduguri, Nigeria. Priscaquila Publishe
- Ccecelki, E. (1979), Household energy and the poor in the third World, in resources for the future, Washington DC. Energy initiative for Africa (2015).
- Chaw, C. Sein, Z., Min A., Bam, H. N. Razafindrabe, (2015) *Study on consumption of fuelwood and its impacts to forest resources in Taungyi District* Iforest Research Institute. Ministry of Environmental conservation and Forestry, Myanmar 2Tharant University, Dresden, Germany 3Department of Subtropical Agro-Environmental Sciences Faculty of Agriculture, Japan Accepted 2 June, 2015 ISSN: 2449-1780 V 3 (2) ,Pp43
- Chuku, M. (2001). *The energy transition in action: Urban domestic fuel choices in a changing Zimbabwe Energy Policy* 31, 553-562.
- FAO, (2010). Global forest resource assessment – Key finding. Food and Agriculture organization of the United Nation, Rome.
- Heltberg, T. (2000). *Fuelwood Consumption and Forest Degradation. A household model for domestic energy substitution in rural Indian*, *Land Economics* 76 (2), Pp3
- Inoni, O.E. (2009). *Effects of Forest resource exploitation on the Economic well-Being of rural Households in Delta State, Nigeria*. *Agricultural tropical ET, Subtropica*. Vol. 42(1) 2009, Pp12.
- Jande, J. A. (2005). *Analysis of fuelwood consumption among the residents of Markurdi suburbs, Benue Stat. In: environmental Sustainability and Conservation in Nigeria*. Okoko, E. Environmental conservation research team, Federal University of Technology. Akure, Nigeria. Pp58-61.
- Ogunsawa, O.Y and Ajala, O.O. (2002). Firewood crises in Lagos- implication on the suburban and rural ecosystem management. In: JE Abu, P.O, Oni, L. Popoola, (eds). Proceeding of the 28th annual conference of Forestry Association of Nigeria at Akure, Ondo, State. Nov, 4th – 8th. Pp257-264
- Onyeanus, A.E., Otegbeye, G.O. (2012). *The impact of Deforestation on Soil Erosion and on the Socio-economic Life of Nigerians*. *Sustainable Environmental Management in Nigeria Book Builders publisher, Nigeria*. pp. 315-331.
- Yunana, M. A, Shat, A.T, Galadema, N. H and Mercy, O. (2014). *Environmental Implication of fuel Wood Consumption in Gora area, Kaduna State, Nigeria*. Department of environmental management Kaduna State University, Nigeria. P. 9 *international Journal of Advanced studies in Ecology, Development and Sustainability*.