

Effect of deforestation on livelihood and the adaptation strategies in Niger south Senatorial District, Niger state, Nigeria

Abstract

Tropical rainforests are ecosystem of genetic diversity that offers an important medicinal plants source, it's also provides high-yield foods, and a myriad of other important products. They are an important environment for migratory animals and maintain as much as fifty percent of the species on globe, as well as several diverse and unique indigenous cultures. They also act an important role in controlling world weather in addition to sustaining normal rainfall, while preventing against floods, deforestations, and erosion. The study's aim is to analyse the effect of deforestation on livelihood and the adaptation strategies in Niger South Senatorial District, Niger state, Nigeria. Information about the various effects of deforestation and adaptation strategies was collected using a structured questionnaire and Focus Group Discussion (FGD). The result shows that wind storms, flooding, late rainfall; low output yields, and wide spreads of pest infestation were ranked as the major effects of deforestation. Different survival strategies are been used by the respondents comprises of fishing, animal rearing, poultry production, hiring labour and use of fertilizer to maximize production. It was acceded by the more than half of the discussants at FGD that artisan work and small-scale businesses are the major other sources of livelihood used by the individuals. In their various submissions, they all attest that wind storms and flooding are the most common problem of deforestation noticeable in the study area.

Keywords: deforestation, livelihood, adaptation, strategies, Niger south

1.0 INTRODUCTION

Tropical rainforests are ecosystem of genetic diversity that offers an important medicinal plants source, it's also provides high-yield foods, and a myriad of other important products (Panayotou and Ashton, 1992). They are an important environment for migratory animals and maintain as much as fifty percent of the species on globe, as well as several diverse and unique indigenous cultures. They also act an important role in controlling world weather in addition to sustaining normal rainfall, while preventing against floods, deforestations, and erosion (Taylor, 2005). The changing of forested lands by human activities such as cutting down of trees represents one of the significant forces in global environmental change and one of the significant moves of biodiversity loss (Aliyu, A, Modibbo, M.A, Medugu, N.I. and Ayo. O. (2014).

The over-dependable on forest products and Non-Timber Forest Products (NTFPs) has accounted for the large change in forest product and that; 3.4 million hectares per year is estimated to be deforested in Africa (FAO, 2010). As submitted by Nzeh and Eboh (2007) exploiting the forest for food, fuel and other marketable products have been carry out by the rural dwellers, thus creating both income and employment for them. The forest is always seen as stock products, a free good, with the land as something freely available for change to other purposes without thinking of the complication of their activities on services and environmental importance of the forest, therefore several forest ecosystems have been transformed into less diverse and stable ones. According to Aruofor, (1999) the result of deforestation is erosion which in turn can result to desertification.

According to a report by (FAO, 2005), Nigeria has a total land area of 92,377,000 hectares with an annual change in total forest cover of 3.12% between 2000 and 2005. However, it's recorded - 11.14% of her primary forest covers annual change in the same period between 2000 and 2005. The decline in forest coverage is attributed to illegal cutting of forests trees and poor

government policies. This needs serious attention. As environmental degradation and its effects come openly into focus we are confronted with the prospect that the renewable forest products may be consumed and that man face the risk of damaging his environment if all the impacts of deforestation are allowed to go on unchecked. Hence it is, paramount to undertake a periodic impact assessment of deforestation on the livelihood of its communities in Niger south, Niger state.

While, it is a well-known that this loss in forest has far-reaching social and economic consequences, based on the knowledge of the researcher there is no available documented research work on the effects and the adaptation strategy on the impacts of the deforestation on the communities in Niger south, Niger State. This gap in no documented research work is impeding policy responses by government and forest stakeholders.

2.0 MATERIALS AND METHODS

2.1 The Study Area

Niger South comprises of eight (8) local government areas among the twenty-five (25) LGA in Niger State namely: Mokwa, Edati, Lavun, Bida, Gbako/Katcha, Agaie, and Lapai. The study area is located between Longitude 4°30'00" to 6°34'00" East and Latitude 8°30' 00" to 10°00' 00" North and occupy a total land area of 17,364km². The study area by 2006 national population census is 1,296,032 people (National Population Commission of Nigeria). The study area is located in the southern part of Niger State experiencing two distinct seasons, dry and wet seasons with an annual rainfall of about 1000mm to 1,200mm (Adefolalu, 1986).

Figure 1 shows the location of the study area.

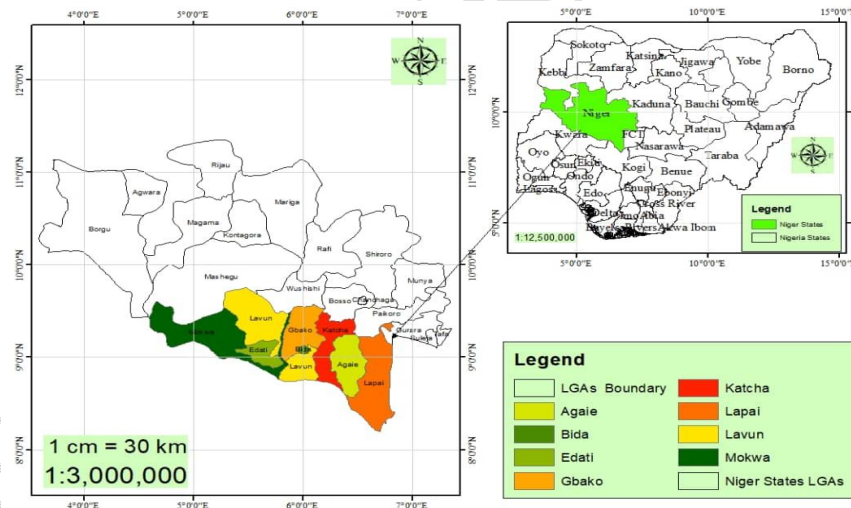


Figure 1 Showing Map of Nigeria, Niger State and the Study Area (Niger south, Niger State, Nigeria)

Climate

Meteorological research confirms that the climate of the study area is well suited for agriculture as it is a Guinea Savanna climate. Rainfall is much seasonal and regulated by the abnormal movement of the Inter-Tropical Discontinuity (ITD). Rainfall often starts in April or May and stops in October. It usually recorded an average of 200 days per rainy days for a year with a moderate mean annual rainfall of 1,300mm (Adefolalu, 1986). The temperature hardly falls below 20°C. The rainfall season temperature average is about 20°C with 38°C as the peak from February to March while 35°C are recorded from November to December. The mean

relative humidity recorded are often 33-83%.

2.2 Research Design, Sources and Types of Data

This research design adopted a descriptive-survey; both quantitative and qualitative data types were collected. Opinions and knowledge of a sampled population of respondents on deforestation in Niger South, Niger State was sought through direct and indirect modes of inquiry.

The data collection was according to the set objectives of the study. The study sources its data from both primary and secondary.

Satellite imagery as well as publications, annual and quarterly reports and books (hard and soft copies) that deal with the concepts and issues of deforestation extent and causes was the secondary data used for the study.

The primary data were obtained by the use of a structured questionnaire. Reconnaissance surveys, desk studies, interviews, and on-field observations were undertaken in the study area to obtain first-hand information on the prevailing situation, and causes of deforestation. An extensive literature review was undertaken to gather information on the extent of deforestation over the years and changes in forest cover.

A pilot test was conducted with a small group representative of the population to assess the face validity of the questionnaires. The questionnaires were pretested to ten farmers. Respondents were asked to fill out the questionnaire accompanied by interviews in order to refine the meaning, understanding, wording, and formatting of the questions.

Sample size and procedure

The population of the study area was derived from the National Population Commission census of 2006 which put the figure as 1296032. Hence, the total population of the study area was used as a sample frame for this research. The sample size was calculated from the projected total population of the study area using the formula $P_n = P_0(1+r)^n$ at the growth rate of 3.5% for 12 years up to 2019.

Exponential population projection formula $P_n = P_0(1+r/100)^n$ 3.1

Where;

P_n = projected population,

P_0 = base population,

r = growth rate (3.5%)

n = projected number of years

From the projected population of 1,355,685 the sample size was calculated using simplified formula:

$$n = \frac{N}{1 + N(e^2)} \quad 3.2$$

where:

n = Sample size,

N = Population size of the sample unit

e = Level of precision which is $\pm 5\%$ (0.05), at 95% confidence level.

Hence, a sample size of 400 respondents was sought from Mokwa, Edati, Lapai and Agaie LGA. Based on this, a total number of 400 questionnaires were randomly administered and 264 were returned.

Sampling techniques

In the sampling techniques, both purposive and random sampling techniques were employed to ensure a good spread of respondents for the study.

Focus Group Discussion (FGD)

Focus Group Discussion is a technique where a researcher assembles a group of individual to discuss a specific topic, aiming to draw from the complex personal experiences, beliefs, perceptions, and attitudes of the participants through a moderated interaction.

Focus Group Discussions (FGD) were held with major stakeholders (forestry officers, community heads, religious heads, heads of trade unions of various communities) to seek for vital information and to validate or otherwise of the issues that arises during the interview.

2.3 Methods of Data Analysis

The two objectives were achieved using descriptive statistics and were presented as frequency tables, percentages, graphs, and charts. The Statistical Package for Social Sciences (SPSS) and Excel were employed to process and analyze the data.

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3.0 Results and Discussion

Table 1 Parameters analysed on how deforestation has affected the livelihood patterns of the respondents in the study area.

Parameters	Frequency	Percentage (%)
Does changing forest cover effects your livelihood?		
Yes	258	98
No	06	2
Effects of deforestation		
Wind storm	238	90
Flooding	238	90
Wide spreads of pest infestation	26	10
Reasons for late planting		
Late rainfall	216	82
Other reasons	48	18
Effects of late planting of crops		
Low output yield	158	60
Poor quality of yield	98	37
Pest infestation	08	3
Reasons for decreasing of output yield		
Inadequate rainfall	120	45
Excessive rainfall (flooding)	21	8
Pest an diseases	76	29
Soil infertility	47	18
Annual income from farming activities (Naira)		
Less than 100,000	17	6
100,000 – 500,000	89	34
500,000 – 1Million	83	31
1Million – 5Million	41	16
5Million – 10Million	29	11
Above 10Million	05	2

Source: Field Survey, 2021

3.1.1 Does changing forest cover affect your livelihood?

Fig 2(a) presents the analysis of the question; does changing forest cover affect your livelihood? The result indicates that 98 percent of the respondents attest that changes in forest cover **have** affected their livelihoods. While 2 percent attest to no effect of change in forest cover on their livelihoods.

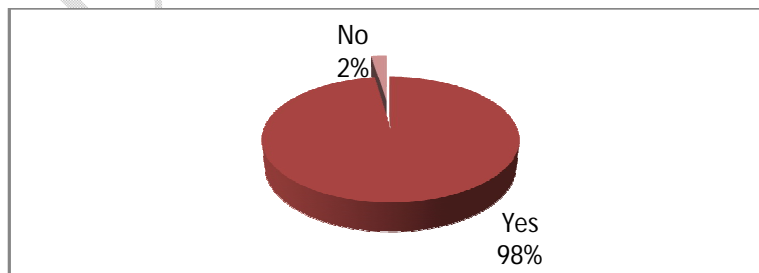


Fig 2(a) Effects of changing forest cover on livelihood

The result implies that majority of the respondents has been affected by changing forest cover, that is decreasing vegetation cover here refers to as deforestation.

3.1.2 Effects of Deforestation experience by the respondents.

Fig 2(b) shows the analysis of the types of effects of deforestation experienced by the respondents. The result reveals that wind storms, and flooding tops the effect of deforestation experienced by the respondents accounting for 48 and 47 percent respectively. While the wide spread of pest infestation accounted for 10 percent.

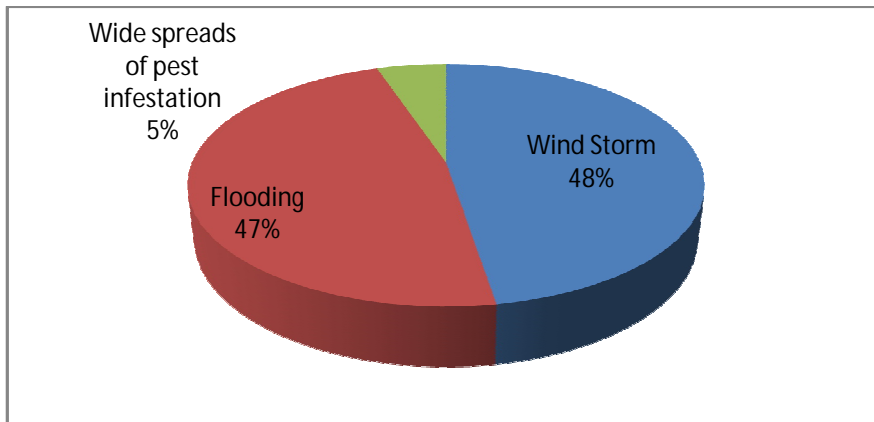


Fig 2(b) Effects of deforestation experience by the respondents

This implies that the respondents are not unaware of the consequences of deforestation but they still choose to continue with their actions of deforestation. This result is similar to the earlier report of Jeminiwa, *et al.*, (2020) on the assessment of forest degradation indices in the Mokwa forest reserve, Niger state, Nigeria; who reported that wind storm and flooding are some of the effects of deforestation in the study area.

3.1.3 Reason(s) for late commencement of planting

Fig 2(c) Presents the analysis of those who said that they were not able to commence planting at the right time. The result reveals that 82 percent of the respondents said that they were unable to commence planting at the right time due to the late starting of rainfall. However, 18 percent of the respondents give other reasons like: lack of money for land preparation and sickness for their late planting.

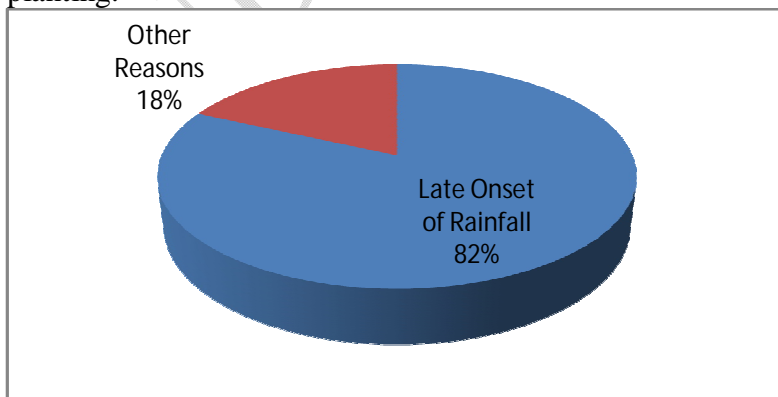


Fig 2(c) Reason(s) for Late Commencement of Planting

This implies that deforestation has affected the livelihood of majority of the respondents in the study area.

3.1.4 Effects of late planting of crops

The analysis of effect of late planting of crops is presented in Fig 2(d); the result reveals that the majority of the respondents accounting for 60 percent attributed the effect of late planting of crops to low output yields. 37 percent attributed the effect to poor quality of yields. However, only 3 percent of the respondents attributed the effect of the late planting of crops to pest infestation. This implies that low output yield is the major effect of late planting of crops.

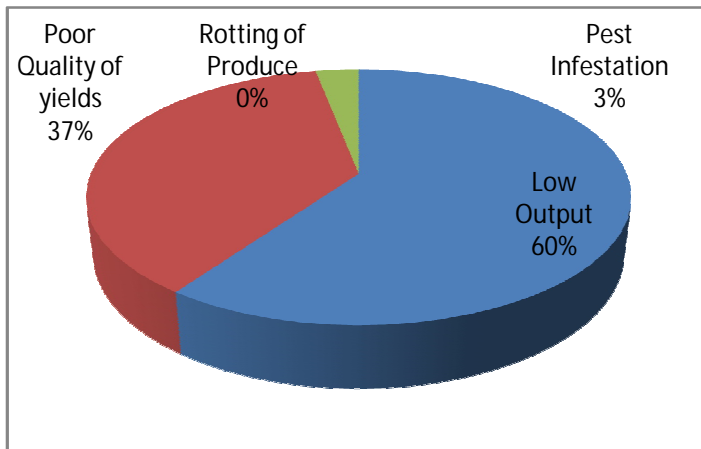


Fig 2(d) Effects of Late Planting of crops

This result is similar to the work of Abubakar, (2014) on deforestation and its effects on livelihood patterns of forest fringe communities in the Asunafo North municipality of Ghana; who reported that low output production is one of the effects of deforestation in the study area.

3.1.5 Reason(s) for decreasing of farm yields

Further analysis of the respondents that attest to decreasing output yield is presented in Fig 2(e); the result shows that the majority of the respondents accounting for 45 percent attributed the decrease in output to inadequate rainfall. 29 percent attributed it to pests and diseases. 18 percent of the respondents attributed the decrease in output yield to soil infertility. While only 8 percent of the respondents attributed the decreasing of output yield to excessive rainfall (flooding).

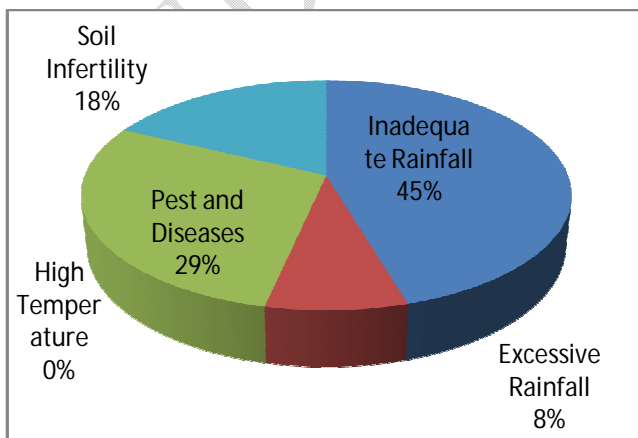


Fig 2(e) Reason(s) for Decreasing of farm Yields

This result is similar to the earlier report of Jeminiwa, *et al.*, (2020) on the assessment of forest degradation indices in the Mokwa forest reserve, Niger state, Nigeria; who reported that some of the effects of deforestation in the study area include climate change which resulted to erratic rainfall season leading to late planting of crops in some years.

3.1.6 Annual income from farm sells

The analysis of annual income from farm proceeds is presented in Fig 2(f) the result indicates that 6 percent of the respondents earn less than #100,000 from the sales of their farm goods. 34 percent of the respondents earns between #100,000 to #500,000. #500,000 to #1million accounted for 31 percent and #1million to #5million accounted for 16 percent. #5million to #10million accounted for 11 percent, while the respondents that earns more than 10 million accounts for 2 percent of the total respondents.

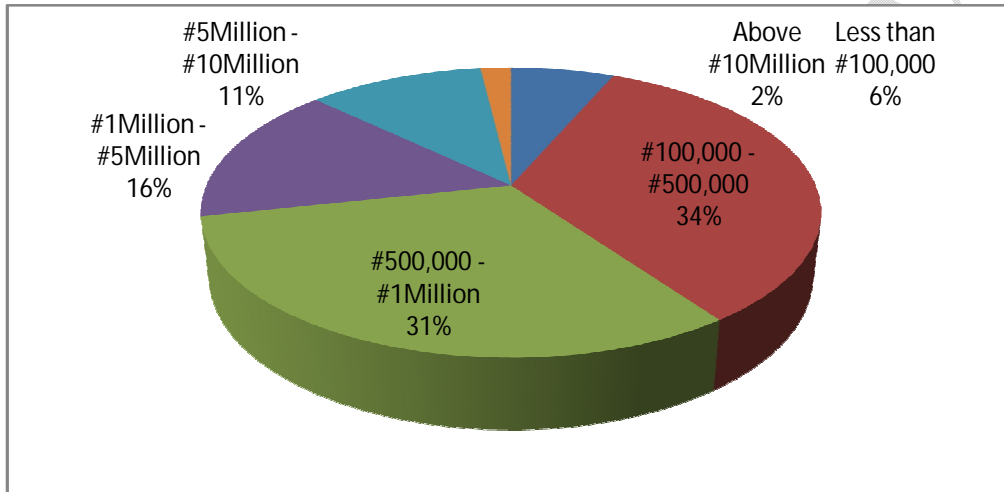


Fig 2(f) Annual Income from Farm Sells

Source: Field Survey, 2021

Table 2 present the various parameters analysed on the adaptation strategies to reduce the effects of deforestation by the respondents in the study area.

Table 2 Parameters analysed on the adaptation strategies to reduce the effects of deforestation.

Parameters	Frequency	Percentage (%)
Other economic activities engage outside farming		
Fishing	61	23
Animal rearing	99	38
Poultry	88	33
Other activities	16	6
Types of labour use in the farm		
Owner / family member	43	16
Hire	13	5
Both owner / family member and hire	208	79
Reason for the use of type of labour in the farm		
For maximum production output	238	90
Because of limited capital	26	10
Mode of production		
Labour intensive	38	14
Capital intensive	12	5
Both Labour intensive and Capital intensive	214	81
Type of fertilizer used in the farm		
Natural (animal dome)	13	5
Artificial (chemical)	169	64
Both Natural and Artificial	82	31
Use of power saw machine in the farm		
Yes	9	3
No	255	97

Source: Field Survey, 2021

3.2.1 Adaptation strategies other than forest or crop production

The analysis of other agricultural related activities engaged by the respondents as part of adaptation strategies to caution against the effect of deforestation in the study area is presented in 3(a); the result reveals that 23 percent of the respondents are into fish farming, 38 percent are engaged in animal (goat, sheep, and cow) rearing. Poultry farming accounted for 33 percent, while 6 percent of the respondents are engaged in other agricultural farming like: rabbit keeping, and horse and pig rearing.

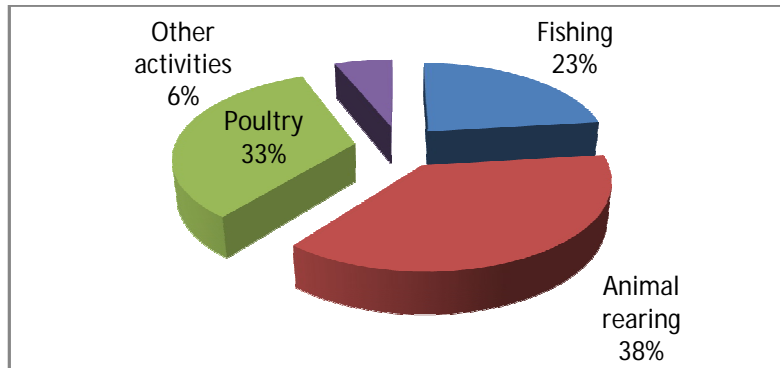


Fig 3 (a) Other agricultural related activities other than forest or crop production
Source: Field Survey, 2021

This result implies that the majority of the respondents are engaged in animal rearing to complement the income from farming activities. This result is similar to the work of Abubakar, (2014) on deforestation and its effects on livelihood patterns of forest fringe communities in the Asunafo North Municipality of Ghana; who reported that the majority of the farmer are engaged to other agricultural related activities other than forest/crop production like fishing and poultry keeping.

3.2.2 Types of labour used in the farm

The analysis of the types of labor employed in the farm as part of adaptation strategies to caution against the effect of deforestation is presented in Fig 3(b); the result indicates that 16 percent of the respondents use self or family members. 5 percent of the respondents use hired labor, while 79 percent of the respondents use both family members and hiring labor for farming in the study area.

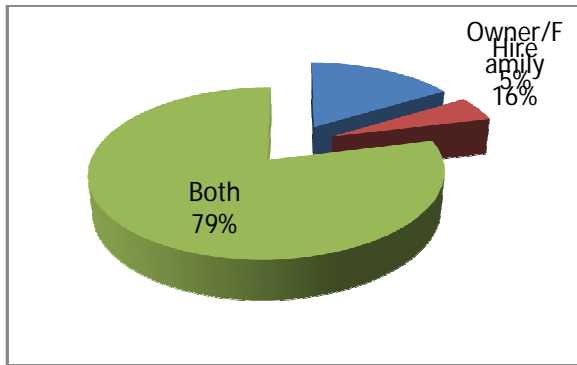


Fig 3(b) Types of Labour used in the Farm
Source: Field Survey, 2021

This implies that the majority of the respondents are employing the services of both family members and hire labor for farming. This result is similar to the earlier report of Jeminiwa, *et al.*, (2020) on the assessment of forest degradation indices in the Mokwa forest reserve, Niger state, Nigeria; who reported that the majority of the farmers in the area use either self or family member and hire labour for production.

3.2.3 Reason(s) for type of labour used in the farm

Fig 3.(c) Present the reason(s) for using the selected type of labour in the farm. The result reveals that 90 percent of the respondents said that they used both family members and hire labour to maximize the output yield. However, 10 percent of the respondents said that they are limited by capital and hence the choice of only family members.

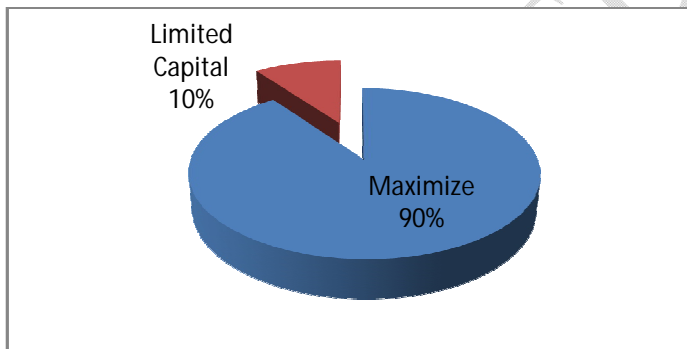


Fig 3(c) Reason(s) for Type of Labour used in the farm
Source: Field Survey, 2021

The implication of the result is that majority of the respondents have to use both family members and hire labour to cope with the effect of deforestation in the study area.

3.2.4 Mode of production of farming activities

Fig 3 (d) Present the mode of production of farming activities. The result indicates that labour intensive account for 14 percent, while capital intensive accounted for 5 percent. However, 81 percent of the respondents said that their modes of production of farming activities are both labour and capital intensive.

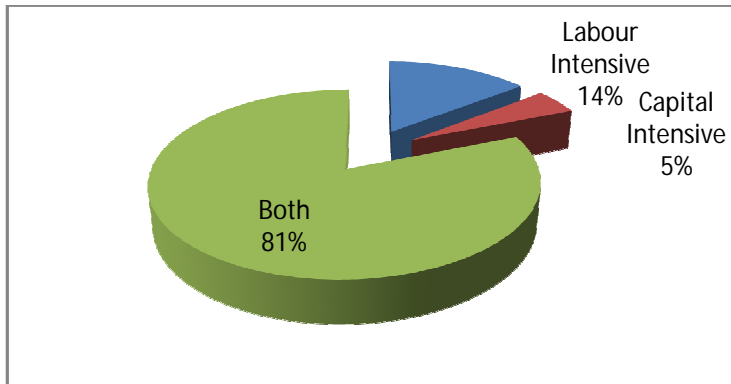


Fig 3(d) Mode of Production of farming activities
Source: Field Survey, 2021

This implies that majority of the respondents interview has adopted both labour and capital in their farming activities.

3.2.5 Type of fertilizer used in the farm

As part of adaptation strategies to caution against the effect of deforestation in the study area, various types of fertilizers are being used by the farmer for maximum production as presented in Fig 3 (e); the result reveals that only 5 percent of the respondents uses natural (Animal feces) fertilizer in their farms. 64 percent of the respondents use artificial (modern chemical) fertilizer in their farms. However, 31 percent of the respondents use both natural and artificial fertilizers in their farms.

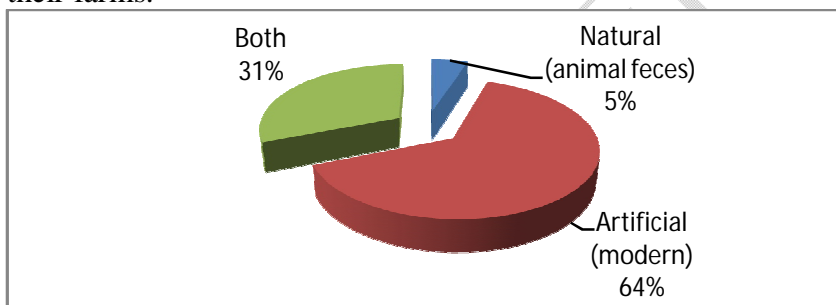


Fig 3(e) Type of Fertilizer used in the farm
Source: Field Survey, 2021

The result implies that the majority of the respondent uses artificial chemical fertilizer to cope with the effect of deforestation. This result is in agreement with the study of Bishiret *al* (2018) on the impact of desertification on livelihoods in Katsina state, Nigeria; who reported that the majority of the farmers uses artificial fertilizer to maximize their farm production output due to poor soil fertility as a result of deforestation.

3.2.6 Do you use Power saw Machine in your farm?

The analysis of the use of the power saw machines on the farm during land clearing is presented in Fig 3(f); the result shows that 97 percent of the respondents said that they do not use the power saw machines during land clearing in their farms. However, 3 percent of the respondents agree that they use a power saw machines in their farms during farm clearing.

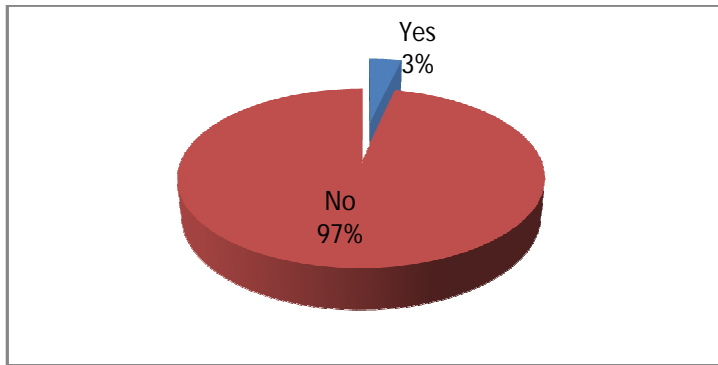


Fig 3(f) Analysis of use of Power saw Machine in the farm
Source: Field Survey, 2021

The result implies that the majority of the respondents have resolved not to use the power saw machines in their farms. This decision is taken so as to stop further deforestation and as a strategy to cope with the already impact on their livelihoods.

4.0 Conclusion and recommendations

In conclusion, the study established that deforestation impacts the lives of the respondents in many areas including affecting crop production in the areas of delayed commencement of planting seasons, pest and diseases infestation as well as a reduction in the income levels of farmers. Although several efforts has been initiated to mitigate these impacts of deforestation in the study area, the people of the study has engaged in other agriculture related activities as part of adaptation strategies to caution the effect of deforestation in the study area.

The study recommendations that:

- i. Gas and kerosene prices should be subsidised by the government so as to discourage the use of fire wood and charcoal for domestic uses.
- ii. Again to help ensure effective mitigation of the impacts of deforestation on crop production it recommends that resource capacity of the institutions be strengthened to enable them function effectively.
- iii. Promotions of active research for mitigating the impacts of climate change on crop production in the study area.

References

- Abubakar, S. M. (2014) Deforestation and its effect on livelihood patterns of forest fringe communities in the Asunafo North municipality, Ghana. *Unpunished master's thesis*.
- Adefolalu, D. O. (1986). Rainfall trends in Nigeria. *Theoretical and Applied Climatology* 37, 205-219
- Aliyu, A, Modibbo, M.A, Medugu, N.I. and Ayo.O. (2014).Impacts of Deforestation on SocioEconomic Development of AkwangaNasarawa State.*International Journal of Science, Environment and Technology* 3 (2) 403 – 416
- Aruofor, R.O. (1999). An economic appraisal of pricing policy and tariff systems for *Gmelinaarboreapulpwood* and sawlog in Nigeria.*An unpublished M.sc thesis submitted to the department of Forest Resources Management, University of Ibadan.*
- Bishir, G. S., Julius, A., Michael, B. K. D., and Bothepha, M. (2018) Impact of Desertification on Livelihoods in Katsina State, Nigeria. *Journal of Agriculture and life Sciences*.5, (1), 34 - 52
- FAO. (2005). "Mobilizing resources to halve world hunger". Paper prepared for the 2005 World

Summit. Rome.

- FAO, (2010). Food and agriculture organization, *Global Forest Resources Assessment Food and Agriculture Organization of the United Nations*, Rome Italy, 340
- Jeminiwa, O. R., Jeminiwa, M. S., Taiwo, D. M., Dauda, M., and Olaoti - Laoro, S. O., (2020) Assessment of Forest Degradation Indices in Mokwa Forest Reserve, Niger State, Nigeria. *Journal of applied sciences, environment and management* 24, (8), 1351 - 1356.
- National Population Commission (NPC). (2006). Nigeria census figure.
- Nzeh, C.E.P. and Eboh, E.C. (2007). Analysis of income effects of forest products activities among rural households in Enugu state Nigeria, *Journal of Agriculture and Social Research (JASR)*, 7, (1), 23-33. www.ajol.info/journals/jasr.
- Panayotou, T. and Ashton, P.S. (1992). *Not by Timber Alone: Economics and Ecology for Sustaining Tropical Forests*. Washington, DC: Island Press.
- Taylor, R.W. (2005). "Urban Development Policies in Nigeria: Planning, Housing, and Land Policy". New Jersey: *Centre for Economic Research in Africa*, Montclair State University.

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