FARMERS' PERCEPTION ON ROLES OF AGROFORESTRY PRACTICES IN SUSTAINABLE LAND MANAGEMENT IN BASSA LOCAL GOVERNMENT AREA OF PLATEAU STATE, NIGERIA

Erhabor T.A.*, Dahunsi O.M., Ukanyirioha C.J. and Banjo O.T
Department of Forestry Technology, Federal College of Forestry, Jos, Nigeria
Corresponding Author: * Email: erhabort@gmail.com
Phone: +2347035010430

ABSTRACT

Degraded lands affect more of the rural poor because of their dependence on annual agricultural crops and rely on property lands that are highly prone to degradation due to excessive farming over the years. The role of agroforestry practices on sustainable land management was therefore evaluated in Bassa Local Government Area of Plateau State, Nigeria. The study was aimed at identifying the various types of agroforestry practiced in the local government area as well as identify the roles of agroforestry in sustainable land management. Multi stage sampling technique was used in the selection of 3 villages in the study area and a total of 450 copies of structured questionnaire were randomly distributed (proportionately based on population size) among farmers to elicit information on agroforestry and sustainable land management. The result revealed low female and youth participation in agroforestry. Agrisilviculture (62.13%) and hortisilviculture (35.6%) were the most dominant types of agroforestry practiced by the farmers. The practice of multipurpose trees on farms was also the dominant (88.89%) form of agroforestry in the study area. Evidence from the study indicate strong awareness of the benefit of agroforestry in sustainable land management and could translate to a willingness to adopt practices that could further improve sustained production of the land. Therefore, farmers should be introduced to other types of agroforestry which they could adopt to increase farm productivity.

Key words: Agrisilviculture, agroforestry, degraded lands, hortisilviculture

INTRODUCTION

Soil degradation affects more of the rural poor, because they are more dependent on annual agricultural crops. They also rely more on common-property lands, which often are most seriously degraded because of excessive use for farming. Land degradation has thus become a social, economic, political and technical problem (Tilauhun and Zewide, 2021). Soil degradation which is a decline in soil characteristic properties often caused by its improper use or poor management leadsto low productivity. Therefore, to manage agricultural lands and increase productivity, carefully selected and managed trees should be used in agroforestry to increase soil fertility and control erosion.

Land degradation in Jos, Plateau state is closely related to the prevalence of mining activities in the plateau. There is also the problem of high impact grazing and deforestation. These anthropogenic activities has resulted in heavy incidence of gully erosion and a consequent degradation of a large expanse of agricultural lands(Adamu*et al*. 2021). Impact of these activities has resulted in annual loss of 0.108 sq.km of vegetation cover in the plateau between 1986 and 2012 (Ogunmola (2014).

Sustainable land management which is the adoption of land use systems that enable land users to maximize the economic and social benefits from land could also improve the quality and conditions of a degraded land over

time(Kolapo *et al.* 2022). Agroforestry as a land use system has been identified as a sustainable and economic way of land management, it is beneficial to the land user, the land used and the environment in general. This study therefore assessed farmers' perception on the roles of agroforestry in sustainable land management in Bassa Local Government Area of Plateau State, Nigeria. Specific objectives of this study include:

I. identification of the types and forms of agroforestry prevalent in the study area

ii. identification of specific benefits of agroforestry practices in prevention and control of land degradation.

To understand and develop a sustainable model for environmental amelioration in the rural areas, there is a need for rural farmers to understand the benefits derived from any farming operations practiced on the land which provides for their basic needs holistically. In this part of Nigeria, rainfall is very erratic and scarce and exploitation of natural resources is very high as a result of agricultural activities. The transformation of the study area into the effective and aggressive practices of agroforestry will go a long way in combatting the problems of desertification, deforestation, erosion, pollution, wind damage, flood, land degradation and other environmental disasters.

METHODOLOGY

Study area

Bassa is a Local Government Area in the Northern part of Plateau State, Nigeria, bordering Kaduna and Bauchi States. Its headquarters isBassa town (9°56′00″N 8°44′00″E.). It has an area of 1,743 km² and a population of 186,859 at the 2006 census with a projection to 318,154 (3.18% projection) in 2023. The climate of the study area is replica of the climate of Jos Plateau since it lies within the plateauelevation of about 1,200m above sea level. The climate is characterized by two different seasons; wet and dry. The wet season last a period of 6 months (April-October) while the dry season covers the Months of November to March. Precipitation is relatively high with annual rainfall of 1500mm compared to Guinea savannah rainfall patterns. Temperature ranges from 15.5 °C to 18.5 °C in the coolest months to 27.5 °C to 30.5 °C during the hottest months.

The settlements are generally rural and dispersed, with families securing portions of land around their houses for subsistence food production and livestock rearing. The main economic activity in the study area is agriculture. Farmers are involved in large scale production of maize and guinea corn in combination with yam, irish potatoes, beans, soya beans, acha, millet and varieties of vegetables like carrot, cabbage and cucumber.

Sample size and Sampling Technique

A multi-stage sampling technique was used in this study. Thirty percent sampling intensity was applied to select 3 districts from the list of all 9 districts in the local government area. Mafara, Buji and Here district were randomly selected and One village was then randomly selected from each of the selected districts and a total 450 farmers were proportionately selected (based on the population farmers) from the 3 villages by random sampling. The selected villages where this study was carried out were Jengir, Zabolo and Gurum. The instrument of data collection was a semi-structured questionnaire. A total of 450 copies of the questionnaire was distributed proportionately, retrieved (441 copies) and then analysed.

Methods of Data Analysis

The information obtained from the questionnaire was statistically analysed using Statistical Package for Social Sciences (SPSS).

RESULT AND DISCUSSION

Socio Economic Characteristics of Agroforestry Farmers

Table 1 shows that most of the farmers practicing agroforestry in the study area are males (84.45%) and are married (61%). Although Labiru*et al*, (2019) had reported that women participate more in agroforestry practices in Plateau State, Nigeria, this study reveals otherwise and agrees with Onuwa*et al* (2021). Kiptot and Franzel (2012) has earlier reported that generally in Africa, women have low participation in agroforestry for reasons such as land tenure, religious and traditional taboos among others. Most of the respondents (67.78%) were married while the others (32.22%) were single and none were divorced or widowed. Agroforestry farmers in the study area where classified in age groups of 16- 25 year (22.45%), 26 – 35 years (15.56%), 36 – 45 years (46.67%), 46 – 55 years (13.33%) and 56 – 65 years (0%). This shows that majority of the farmers are in the age range of 36 – 45 years.

All respondents were strictly farmers with no alternative source of income. This is an indication that they depend totally on proceeds of their farm for food and other family livelihood needs. All the agroforestry farmers have some levels of formal education. Most (58.89%) of the farmers had primary education as their highest level of education while 35.56% and 5.56% had secondary and tertiary education respectively as their highest educational levels. The household size of the agroforestry farmers revealed that most farms were between 1 and 3 hectares in size; 1-2 ha (27.4%) and 2-3 ha (36.1%) representing about 63.5%) of the entire farmers. This is an indication that most agroforestry farmers in the study area practices small scale farming as reported by Saliu*et al.* (2018).

Table 1: Socio-Economic Characteristics of Respondents

Variable	Frequency	Percentage
Gender		
Male	372	84.45
Female	69	15.56
Marital Status		
Single	142	32.22
Married	299	67.78
Widowed	0	0.00
Divorced	0	0.00
Age(yrs)		
16-25	99	22.45
26-35	69	15.56
36-45	214	48.66
46-55	59	13.33
56-65	0	0.00
Highest level of education		
No formal education	0	0.00
Primary school	260	58.96
Secondary school	157	35.60
Tertiary	24	5.44
Occupation		
Farmer	441	100
Civil servant	0	0.00
Business	0	0.00
Student	0	0.00
Farm size		
Less Than 1	33	7.5
1-2	121	27.4
2-3	159	36.1
3-4	82	18.6
4-5	46	10.4

Agroforestry practices in the study area

The type of agroforestry practiced in the study area are mainly Agrisilviculture (62.13%), Horti-silviculture (35.60%) and Agrisilvipastoral (2.27%) (Table 2). Other types of agroforestry practices (Silvi-pastoral, Api-silviculture, Aqua-silviculture) are not being practiced in the study area. Agri-silviculture was recognized by Saleh (2016) as a major agroforestry type in Northern Nigeria because of its perceived benefits as means of environmental conservation, source of fodder, food and poles for construction.Most of the farmers engage in agroforestry are predominantly farmers who have left some trees in their farms in order to also obtain some benefits from the trees. These benefits include shade provision, source of fruits, vegetables and fuelwood The predominance of Silvopastoral in the study area is stemmed to the fact that farmers obtain fodder from the trees for their livestock.

Table 3 shows the forms of agroforestry practices in the study area and revealed that majority of respondents (88.89%) practice multipurpose trees on farmland while only (11.11%) practice home gardens. Other forms of agroforestry practices investigated in this study (hedgerow cropping, alley cropping and taungya farming) were not being practiced in the study area.

Table 2: Agroforestry practices in the study area

Type of agroforestry practice	Frequency	Percentage
Agri-silviculture	274	62.13
Silvipastoral	0	0.00
AgriSilvipastoral	10	2.27
Horti-silviculture	157	35.60
Others	0	0.00

Table 3: Form of agroforestry practices in the study area

Farm practice	Frequency	Percentage
Multipurpose trees on farmland	392	88.89
Hedgerow cropping	0	0.00
Alley cropping	0	0.0
Taungya farming	0	0.00
Home gardens	49	11.11

4.3. Agroforestry as a land management practice

The study revealed that there is awareness (88.89%) that agroforestry is a land management practice and that management of land improve the productivity of the land (100%) (Figure 1). Awareness of the benefits of agroforestry is a positive factor to adoption of agroforestry practices by farmers (Oladele *et al*, 2020). The high level of awareness of farmers in the study area is a good indication that as practice of agroforestry is intensified, land degradation will be gradually reduced and reclamation of degraded areas may be possible

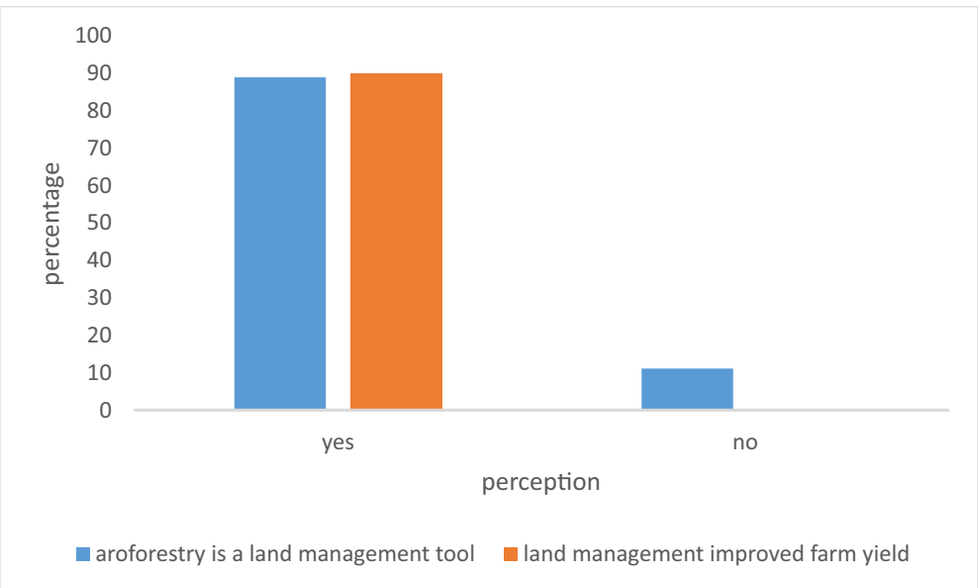

Figure 1: perception of agroforestry as a land management practice

Table 4: Role of agroforestry in sustainable land management

Land management benefits	Frequency of respondents	Percentage
Prevention of land conversion	221	50.11
Prevention and restoration of degraded lands	274	62.13
Erosion control	393	89.11
Soil water retension	399	90.48
Enhance soil fertility	251	56.92
Increases soil organic matter content	148	33..56

Respondents identified some benefits of agroforestry that aid land management (Table 4). The farmers agreed that agroforestry helps in erosion control (89.11%), soil water retention (90.48%), prevent and restore degraded farmlands (62.13%), enhance soil fertility (56.92%), prevent land conversion (50.11%) and increase soil organic matter content (33.56%). This result is in agreement with El-Tantawi *et al*., (2017) that agroforestry enhances soil fertility and prevent soil erosion. It is important to note that this benefit of erosion control is very important in the study area because of the nature of soil and the type of agricultural crops that are predominantly cultivated in the study area. Most of these drops are cereals such as maize and guinea corn and their production can be greatly reduced asa result of soil erosion (Fujisao,*et al*.2020). In addition, Kuyah*et al.,* (2019) identified agroforestry as beneficial in raising water tables and improves yield (both crop and animal). The importance of agroforestry in prevention and restoration of degrade farmland has been reported by Celeridad (2020) and is crucial to agricultural yield especially in areas where land in relatively scarce.

CONCLUSION

Agroforestry is practiced in Bassa Local Government area, Plateau State, Nigeria. And there is low female participation. Participation of female household members in agroforestry could be a source of additional labour and lead to increase productivity per unit area. Most farmers rely solely on the proceeds of their farms and agroforestry trees for the livelihood of their household and this further drives home the need for sustainability in the management of their farmland since they have no other alternative for livelihood.

Evidence from the study indicates strong awareness of the benefits of agroforestry in sustainable land management and could translate to a willingness to adopt practices that could further improve sustained production of the lands.

REFERENCES

Adamu B., Garba, S. and Youngu, T. (2021). Geospatial Analyses of Mining-Induced Land Degradation Sites in Jos South Local Government Area, Plateau State-Nigeria. Smart Surveyors for Land and Water Management – Challenges in a New reality. https://www.researchgate.net/publication/352771455_Geospatial_Analyses_of_MiningInduced_Land_Degradation_Sites_in_Jos_South_Local_Government_Area_Plateau_State-Nigeria

Celeridad R. (2020). The role of agroforestry in forest restoration. World Agroforestry. https://worldagroforestry.org/blog/2020/03/20/role-agroforestry-forest-restoration. Last visited, November,2021.

El-Tantawi A.M.., Badr A.M. and Daura U.S. (2017).Benefits of Agroforestry on Smallholder Farms in Jigawa State, *Nigeria Journal of Environmental Science, Toxicology and Food Technology*11: (5) 31-38

Fujisao, K., Khanthavong, P., Oudthachit, S. (2020). Impacts of the continuous maize cultivation on soil properties in Sainyabuli province, Laos *Scientific Report* **10**, 11231

Kiptot, E. andFranzel, S. (2012). Gender and agroforestry in Africa: who benefits? The African perspective.*Agroforestry Systems*. 84:35–58

Kolapo, A,.Didunyemi, A.J., Aniyi, O.J., Obembe, O.E. (2022). Adoption of multiple sustainable land management practices and its effects on productivity of smallholder maize farmers in Nigeria.*Resources, Environment and Sustainability*. Vol 10: 1-11

Kuyah, S., Whitney, C.W., Jonsson, M. Sileshi, G.W., Oborn, I., Muthuri, C.W., and Luedeling E. (2019). Agroforestry delivers a win-win solution for ecosystem services in sub-Saharan Africa. A meta-analysis. *Agron. Sustain. Dev.* 39, 47 (2019). https://doi.org/10.1007/s13593-019-0589-8

Labiru,, M. A., Yahaya, S., Binbol, N. L., Maton, S. M, Dabis, N. D., Oludare, A., Nuhu, H., and Amina, A. (2019). Analysis of rainfall and sunshine duration variability as evidence of climate change on the Jos Plateau, Nigeria**.** *Tropical journal of agricultural research.* 2 (1): 26-36

Ogunmola, J. K., Gajere, E. N., Jeb, D. N.and Agene, I. J. (2014). Study of Landcover Change in Yelwa-Heipang Area of Plateau State, North-Central Nigeria: A Geoinformatics Approach**.** ISPRS *International Archives of the Photogrammetry*, 40(1):.331-337

Oladele O. N., Emeghara U. U., Ishola B. F., Ayodele J. T., Awpbana T. A. and Olukotun O. (2020). Adoption of Agroforestry Practices by Arable Farmers in Igabi Local Government Area of Kaduna State, Nigeria. *Asian Journal of Research in Agriculture and Forestry.* 6(2): 28-37

Onuwa, G.C, Adepoju, A.O and Mailumo, S.S (2021). Analysis of Arable Farmers Agroforestry Practices in Bokkos Local Government Area, Plateau State, Nigeria. Journal of Forests.8 (2): 161-170

Saleh M.K, (2016). Agrosilviculture as a strategy for Environmental Conservation and Sustainable peace in Sudan-Sahelian Zone of Northern Nigeria, *Nigerian Journal of Rural Sociology* 16(4): 14-21

Saliu , O., Oluwagbemi, T. and Ifatimehin, O. (2018). Characteristics of Agroforestry Systems' Adoption by Farmers in the North Central Zone of Nigeria. *Journal of Environmental Research and Development.* 13 (1): 7-19

Tilauhun E., and Zewide I. (2021). Causes and Impacts of Land Degradation. *British Journal of Earth Sciences Research.* 9 (2):.28-37