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Analysis of Factors Influencing Land Use Typologies among Farming Households in Akinyele Municipality of Oyo State

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Abstract

Land utilisation for various production practices in rural communities in Nigeria is marked with copious challenges and the management has become unsustainable among the local population. Therefore, the study was conducted to analyse factors influencing land use typologies, LUT among farming households in Akinyele Municipality of Oyo State, Nigeria. The employed a 3-stage sampling procedure for selection of 50 respondents from the study area. Information on demographic characteristics of the respondents, typologies of land use and factors impacting was collected with a structured questionnaire. The analyses of data collected was carried out was with frequencies, percentages and logit regression. The study showed majority (78.0%) were male, aged between 40 and 49 years, married (86.0%) and had secondary education (56.0%). The majority (78.0%) had household size ranging from 4-6 members, engaged in farming (80.0%). Furthermore, the result revealed that 94.0% of respondents conserve existing trees on their farmland, and about 56.0% of them were practicing agroforestry. The major factors affecting land use typologies were outcomes of climate change. The determining factors influencing LUT among farming households were occupation (β=1.829*), irregular rainfall (β=1.436*), depleted fruiting (β=1.438*), poor weather condition/drought (β=1.020*), and farmers' indigene (β=3.247*) at $\alpha_{0.05}$. The study recommends strengthening of land management policies and stakeholders' engagement in decision making as regards policies actualization to make land use typologies noticeable, effective and pronounce among farming households.

Key Words: LUT, sustainable land management, logit regression, farming households, Akinyele

Introduction

Land use typologies (LUT) impact human wellbeing, human survival and sustainable development (Xue et al. 2019). Since emergence of earth, man has made use of land with its resources to meet their material, socio-cultural nee and spiritual need (Egri 1997; Food and Agriculture Organization of the United Nations 2003). Land had been in use for provision of crops, animals, clothing, shelter and heat as well as large variety of goods and services. Agroforestry is eco-friendly land use practice that maintains an overall farm productivity through combination of arable food crops with woody perennial trees and livestock production on the same piece of land with an aid of scientific management practices that would improve the livelihood sustenance of the people (Stiles 2017). Hence, agroforestry is increasingly promoting important tools for innovative practices that could contribute to organic matter composition of the

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soil (Mbow et al. 2014). Barrios et al. (2013) elucidated that when existing trees are incorporated with crops in the field, this integration often enhance reduction in soil fertility as well as increasing abundant activity of soil organic matter.

Further, there exist certain indigenous management practices in the rural communities which form the components of land use. Food and Agriculture Organization of the United Nations (2017) asserts that sustainable land management (SLM) is the use of land resources which entails the mix of soils, water, animals for the production of food to meet numerous hunger of man. TerrAfrica (2009) corroborates that sustainable land management is the land use type established to enhance production and to help maximize output level while sustaining the ecological functions of the land resources.

Land use pattern creates insight into factors that could cause transition in land cover change (Wubie et al. 2016). Some notable cities of Nigeria such as Lagos, Kano, and Ibadan are the foremost to put pressure on land because of agricultural production, urban development and industrialisation (Enisan and Aluko 2015). *Notwithstanding, land use has demonstrated series of benefits for rural farmers that would improve their livelihoods and productivity* (Akinnifesi et al. 2010; Garrity et al. 2010).

Furthermore, agroforestry creates and enforces benefits for the environment through provision of various ecosystem interrelationship (Nair et al. 2009). Adoption of agroforestry practices by farmers might have been a response to ensure sources of sustaining their families. The economic benefit of most of the woody perennial take very long to be realized and this is deterrent to the agroforestry. Therefore, based on the foregoing, the study examined the demographic characteristics of respondents, land use typologies and factors impacting land use typologies in Akinyele municipality.

Materials and Methods

Study area

Investigation into this study was conducted in Akinyele Municipality, Nigeria. The Municipality was established in 1976 in a land area of 464.892 km^2 on the geographical coordinates of 7 °31'42" North and 3 °54'43" East. The Municipality is headquartered at Moniya with twelve (12) wards. The studied area in the selected municipality is peri-urban, and most farmers available are household smallholder farmers in the rural part because urban settlement is in transition into the rural area of the municipality. The choice of the studied area was due to the practice of agroforestry among the household farmers because of the limited land area due to urban conurbation trickling into the rural area of the municipality. The wider land area of the Local Government is covered by rain forest broadly dominated by palm trees and plantain. The vegetation in the local government is classified as crop lands, secondary forest, natural forest, bare land, and built up areas. The type of crops cultivated includes maize, cassava, yam, and vegetables among others. The Fig. 1 (Quadri and Abdulhameed 2020) and Fig. 2 below are the map of Nigeria showing the map of Oyo and the map of Akinyele municipality respectively.

Fig. 1. Map of Nigeria showing the map of Oyo State & Akinyele municipal in blue colour. Source: Quadri and Abdulhameed (2020).

Fig. 2. Showing the map of Akinyele municipality of Oyo State.

Sampling procedure and sample size

The study made use of multistage random sampling. The use of this procedure was informed by the fact that effective and fairly even representation of all units within the studied area. The sampling procedure was carried out in stages and the peculiar features were considered at all the stages to ensure equal representation. The multistage comprises a-three stage sampling procedure employed for selection of residents in Akinyele Municipality. In the first stage, five (5) wards were randomly selected and these were (Ijaye/Ojedeji, Ajibade/Alabata/Elekuru, Akinyele/Isabiyi/Irepodun, Ojo Emo/Moniya and Ojoo/Ajibode/Laniba), while in the second stage, one (1) district area (village) was selected from each of the selected wards which were Ajeja, Alabata, Akinyele, Moniya and Idowu Oko. In the third stage, ten (10) farming households were selected from each villages randomly. Eventually, a total of 50 household farmers were sampled.

Method of data collection

This study employed a qualitative data collection with the use of primary data. The data were elicited using a structured questionnaire and face-to-face interview method among the farming household heads in the studied area. The independent variables are the parameters adopted to measure the responses of household farmers to the utilization of land use types in the municipality. The dependent variable depends on variation or varying responses of the independent variables. Furthermore, the fieldwork started May 2021 and was completed in the month of July, 2022.

Method of data analysis

Land use typologies in the studied area delved into the type of use land is put into among the sampled population in the selected villages. This study employed both descriptive and inferential statistics. The descriptive statistics were frequencies and percentages while the inferential statistic was the logistic regression model was further used to analyse the data. The choice of logistic regression was considered due to several activities household farmers engaged in with response to land use. The model was considered to allow use of several chains for the estimate. This study includes analyses of various factors that influence the use of land in the studied area. The study was conducted in accordance with the ethics committee approval of the Federal College of Forestry, Ibadan with a reference code: *FCFAEM2022A.*

Analytical procedures

Logistic regression model was employed to establish the determinants of land use typologies among farming households. In this logistic regression equation, logit (Y) is the dependent or response variable and X is the independent variable. The beta parameter, or coefficient, in this model is commonly estimated via maximum likelihood estimation (MLE). This method tests different values of beta through multiple iterations to optimize for the best fit of log odds. All of these iterations produce the log likelihood function, and logistic regression seeks to maximize this function to find the best parameter estimate. Once the optimal coefficient (or coefficients if there is more than one independent variable) is found, the conditional probabilities for each observation can be calculated, logged, and summed together to yield a predicted probability. For binary classification, a probability less than 0.5 will predict 0 while a probability greater than 0 will predict 1. After the model has been computed, it is best practice to evaluate the how well the model predicts the dependent variable, which is called goodness- of-fit.

Logistic regression model

$$Y = \exp\ (b_0 + b_1X_1 + b_1X_1 + \cdots\cdots b_nX_n)/1 + \exp\ (b_0 + b_1X_1 \cdots\cdots + b_nX_n) \quad (1)$$

Where:

Y = dependent variable for the study, that is; land use typologies

$X_1, X_2, \cdots\cdots, X_n$ = independent variables

$b_0, b_1 \cdots\cdots, b_n$ = estimated parameters

Measurement of variables

For the purpose of this study, the land use typologies utilised by the farming households as the dependent variable for the empirical estimation;

X_1 = Age of the household head (measured in years),

X_2 = Sex of the household head (Dummy: 1 = male, 0 = if otherwise),

X_3=Farming experiencing of household head (measured by years of farming)
X_4=Education level (number of years of schooling of the household head),
X_5=Household size (numbers of people in each household)
X_6=Farm size (measure in hectares)
X_7=Membership of social organisation (Dummy: 1=yes, 0=if otherwise),
X_8=Occupation (1=for having occupation, 0 if otherwise),
X_9=Awareness (1=for awareness, 0 if otherwise),
X_{10}=Irregular rainfall (1=for experience of irregular rainfall, 0 if otherwise).
X_n=Others

Results and Discussion

Demographic characteristics of residents

The results from Table 1 show that 78.0% of the residents were male gender. This indicates that male gender is more dominated farming activities in the study area. This corroborates Adedotun (2010) who reported that most households headed by men in most communities in Nigeria. Most respondents (80.0%) were aged between 40 and 49 years. The result indicates that most respondents were still productive and active, hence they could actively utilise land use typologies for their production. Most of the respondents (86.0%) were married. This implies respondents' commitment with responsibility to land use typologies. This confers that marital responsibility drives them to put more commitment and resources into their business and consequently enhance productivity. This result was corroborated by Atibioke et al. (2012) who noted that rural dwellers are usually married people. About 56.0% of respondents had secondary school education. According to Adekunle (2009) education has direct effect on disposition of people to adapt to change and to accept a new idea, hence most likely to accept or use new technologies. Majority of the respondents (80.0%) practice farming as their major occupation. This indicates that farming is their major source of livelihood and survival. About 78.0% of respondents were having a family size of 4 to 6 members. This implies that the higher the members in a household the more the labor force availability to carry out land use typologies and productive activities.

Land use typologies among the respondents

Table 2 shows that most respondents (94.0%) conserve

Table 1. Demographic characteristics of residents (n=50)

Variables	Frequencies	Percentages (%)
Gender		
Male	39	78.0
Female	11	22.0
Age (in years)		
20-29	2	4.0
30-39	8	16.0
40-49	29	58.0
>50	11	22.0
Marital status		
Single	3	6.0
Married	43	86.0
Divorced	1	2.0
Widow	3	6.0
Religion		
Christianity	28	56.0
Islam	14	28.0
Traditional	6	12.0
Others	2	4.0
Education		
Informal	4	8.0
Adult literacy	2	4.0
Primary school	12	24.0
Secondary school	28	56.0
Tertiary institution	4	8.0
Occupation		
Farming	40	80.0
Hunting	4	8.0
Civil servant	6	12.0
Ethnicity		
Yoruba	46	92.0
Hausa	3	6.0
Igbo	1	2.0
Farming experience (years)		
<5	10	20.0
6-10	14	28.0
11-15	18	36.0
16-20	5	10.0
>20	3	6.0
Household size		
<3	4	8.0
4-6	39	78.0
7-9	7	14.0

Source: Field Survey 2022.

Table 2. Distribution of land use typologies among the residents (n=50)

Land use typologies	Utilised	Un-utilised
Conserving existing trees on farmland	47 (94.0)	3 (6.0)
Mixed cropping	43 (86.0)	7 (14.0)
Agroforestry	28 (56.0)	22 (44.0)
Silvopastoral system	31 (62.0)	19 (38.0)
Shelterbelt/windbreak	18 (36.0)	32 (64.0)
Collection of fuel wood	43 (86.0)	7 (14.0)
Taungya cultivation system	4 (8.0)	46 (92.0)
Alley cropping system	6 (12.0)	44 (88.0)
Innovative bush fallow technology	10 (20.0)	40 (80.0)
Mulching practice	44 (88.0)	6 (12.0)
Improvised local irrigation practice	33 (66.0)	17 (34.0)
Organic farming techniques	39 (78.0)	11 (22.0)
Animal rearing	35 (70.0)	15 (30.0)
Tree planting/reforestaion	19 (38.0)	31 (62.0)
Fencing	21 (42.0)	29 (58.0)
Coppicing	36 (72.0)	14 (28.0)
Clear-cutting	36 (72.0)	14 (28.0)

Frequencies without parentheses, percentages in parentheses.
Source: Field Survey 2022.

Table 3. Factors affecting land use typologies

Factors affecting land use	Yes	No
Land ownership	36 (72.0)	14 (28.0)
Dwindling rainfall	31 (62.0)	19 (28.0)
Depleted fruiting of fruit trees	34 (68.0)	16 (32.0)
Reduction in root and herbs	15 (30.0)	35 (70.0)
Poor weather/drought	39 (78.0)	11 (22.0)
Anthropogenic activities	38 (76.0)	12 (24.0)
Awareness	42 (84.0)	8 (16.0)
Farmers' indigene	34 (68.0)	16 (32.0)
Farm's proximity to residence	28 (56.0)	22 (44.0)
Dwindling growing season	32 (64.0)	18 (36.0)

Frequencies without parentheses, percentages in parentheses.
Source: Field Survey 2022.

existing trees on their farmland. This implies that these existing trees enhance infiltration and the water holding capacity in top soil as reported by (Kalaba et al. 2009). Also, 86.0% of respondents practiced mixed cropping, 56.0% of the respondents also engaged in agroforestry, 62.0% practiced silvopasture, mulching practice (88.0%), shelter-belt/windbreak (36.0%), collection of fuel wood (86.0%), organic farming technique (78.0%), animal rearing (70.0%) coppicing (72.0%) and so on. This result was corroborated by Rolo (2022) that growing windbreaks, shelterbelts, silvopastoral systems, forest farming, riparian planting of plants and crops and many others are management approach in forest management practices.

Factors affecting land use typologies

Table 3 shows that about 72.0% of respondents signified land ownership as a major factor affecting the utilisation of land use typologies among farming households. This indicates possession of land by indigenes of the study area would impact the adoption and practice of land use typologies. Further, dwindling rainfall (62.0%), depleted fruiting of fruit trees (68.0%), poor weather/drought (78.0%), dwindling growing season show high preponderance of distribution which implies that they are having high influence on utilisation of land use typologies. This confers that outcomes of climate change influence level of engagement of farming households in land use typologies. Baptista et al. (2022) corroborates that notably, rising temperature, rainfall volatility are key contributors to shrinkage in land use and productivity year in year out. In addition, farmers' Indigene (68.0%) and awareness (84.0%) are factors which

engenders stakeholders' engagement among the farming households which could drive the typologies. Adekoya and Ajayi (2000) corroborates the result that awareness and locality of farmers influence the land management practices among them in the rural setting of Ido area in Oyo State.

Analysis of factors affecting land use typologies

The Table 4 presents the logistic regression of factors impacting the land use typologies in the studied area. The respondents' occupation (β=1.829*), irregular rainfall (β=1.436*), depleted fruiting (β=1.438*), poor weather condition/drought (β=1.020*), and farmers' indigene (β=3.247*) at $\alpha_{0.05}$ were determining factors that had positive and significant influence on land use typologies in the study area. The findings from logistic regression showed that occupation influenced the decision of household farmers to adopt land use typologies. It suggests that adoption of land use types rises as more household farmers had more access to occupation opportunities in the studied area. Also, irregular rainfall, depleted fruiting of crops and economic trees, and poor weather condition/drought significantly influenced the embrace of land use typologies by farmers. This suggests that adoption of land use typologies would increase in the studied area as outcomes of climate change rise. This brings about the reason for the choice of land use types among farmers to improve their production practices. Furthermore, farmers' indigene had positive influence on the adoption of land use types. This suggests that land use typologies adopted by famers would increase because most farmers were native and residents of the studied area. The results indicate that when there is more of respondents' occupation, irregular rainfall, depleted fruiting, poor weather condition/drought, farmers' indigene, there would be higher probability of their practice of land use typologies in Akinyele Municipality. This confers high impact of occupation, irregular rainfall, depleted fruiting, poor weather condition/drought, farmers' indigene on the utilization of land use typologies as forms of sustainable land management.

Table 4. Logistic regression of factors impacting land use typologies

Factors	Beta coefficient	Standard error	Chi-square	p-value
Constant	-3.905	2.58	2.283	0.13
Sex	-0.176	0.445	0.158	0.09
Age	0.453	0.474	0.911	0.34
Marital status	1.823	1.235	2.178	0.14
Religion	-0.352	0.382	0.850	0.36
Occupation	1.829*	0.420	16.927	0.00*
Access to land	-0.48	0.170	0.080	0.77
Household size	-0.083	0.747	0.012	0.91
Farming experience	0.472	0.806	0.343	0.56
Land ownership	-19.573	0.398	0.000	0.99
Irregular rainfall	1.436*	0.615	5.441	0.02*
Depleted fruiting	1.438*	0.715	4.054	0.04*
Reduction in roots and herbs	1.027	0.706	2.121	0.15
Educational qualification	0.351	0.832	0.178	0.67
Poor weather condition/drought	1.020*	0.410	6.202	0.01*
Anthropogenic activities	-0.044	0.825	0.003	0.96
Awareness	-0.115	0.990	0.013	0.91
Farmers' indigene	3.247*	1.218	7.112	0.01*
Farm's proximity to residence	-1.589	0.851	3.490	0.06
Dwindling growing season	0.347	0.773	0.201	0.65
Language barrier	-1.510	1.275	1.402	0.24

Frequencies without parentheses, percentages in parentheses, level of significance at $\alpha_{0.05}$.
Source: Field Survey 2022.

However, the findings from logistic regression model that sex, religion, access to land, household size, land ownership, anthropogenic activities, awareness, farm's proximity to residence and language barrier had negative coefficients and were not significant at $\alpha_{0.05}$. This implies that the chances of adopting land use typologies do not exist with the parameters tested. This suggests that the parameters had limitations on farmers' adoption of land use types. These parameters of sex, religion, access to land, household size, land ownership, anthropogenic activities, awareness, farm's proximity to residence and language barrier did not have impact on adoption of land use typologies by farmers in the studied area.

Conclusion

Findings from the study exemplified that most residents were male gender, married with age between 40 and 49 years. About half of residents had secondary school education with majority of respondents practicing farming as their major occupation. Further, most farming households conserved existing trees on their farmland with mixed cropping, agroforestry, silvopasture, mulching practice, shelterbelt, and windbreak. In addition, in consonance with the result of the study, majority of them possessed their own land, and among several factors, the major factors affecting land use typologies were outcomes of climate change such as dwindling rainfall, depleted fruiting of fruit trees, poor weather/drought, dwindling growing season which are environmental related.

According to results of the study, there should be adequate creation of awareness and provision of information on innovative practices in land use management by extension workers to farming households. Also, there is need for government to engage forest extension workers to train stakeholders in land use typologies and land management that could better improve their livelihood status. In addition, there should be strengthening of land management policies and stakeholders' engagement in decision making regarding policies achievement in making land use typologies noticeable, effective and pronounce among farming households in Akinyele Municipality.

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References

Adedotun AA, Morenikeji OA, Odaibo AB. 2010. Knowledge, attitudes and practices about malaria in an urban community in south-western Nigeria. J Vector Borne Dis 47: 155-159.

Adekoya AE, Ajayi MA. 2000. An assessment of farmers' awareness and practices of land management techniques in Iddo Local Government Area of Oyo State. J Environ Ext 1: 98-104.

Adekunle VA. 2009. Contributions of agroforestry practice in Ondo State, Nigeria, to environmental sustainability and sustainable agricultural production. Afr Focus 22: 27-40.

Akinnifesi FK, Ajayi OC, Sileshi G, Chirwa PW, Chianu J. 2010. Fertiliser trees for sustainable food security in the maize-based production systems of East and Southern Africa. A review. Agron Sustain Dev 30: 615-629.

Atibioke OA, Ogunlade I, Abiodun AA, Ogundele BA, Omodara MA, Ade AR. 2012. Effects of farmers' demographic factors on the adoption of grain storage technologies developed by Nigerian Stored Products Research Institute (NSPRI): a case study of selected villages in Ilorin West LGA of Kwara State. J Res Humanit Soc Sci 2: 56-63.

Baptista DMS, Farid M, Fayad D, Kemoe L, Lanci LS, Mitra P, Muehlschlegel TS, Okou C, Spray JA, Tuitoek K, Unsal FD. 2022. Climate Change and Chronic Food Insecurity in Sub-Saharan Africa. International Monetary Fund (IMF), Washington, DC.

Barrios E, Sileshi GW, Shepherd K, Sinclair F. 2013. Agroforestry and soil health: linking trees, soil biota and ecosystem services. In: Soil ecology and ecosystem services (Wall DH, ed). Oxford University Press, Oxford, pp 315-330.

Egri CP. 1997. Spiritual Connections with the Natural Environment: Pathways for Global Change. Organ Environ 10: 407-431.

Enisan G, Aluko E. 2015. Process of Urban Land Use in Nigeria. Int J Educ Res 3: 87-100.

Food and Agriculture Organization of the United Nations (FAO). 2003. Sustainable Forest Management and the Ecosystem Approach: Two Concepts, One Goal. Working Paper FM 25.

Food and Agriculture Organization of the United Nations (FAO). 2017. Sustainable Land Management (SLM) in practice in the Kagera Basin: Lessons learned for scaling up at landscape level. FAO, Rome, 452 pp.

Garrity DP, Akinnifesi FK, Ajayi OC, Weldesemayat SG, Mowo JG, Kalinganire A, Larwanou M, Bayala J. 2010. Evergreen ag-

riculture: a robust approach to sustainable food security in Africa. Food Secur 2: 197-214.

Kalaba FK, Chirwa PW, Prozesky H, Ham C. 2009. The role of indigenous fruit trees in rural livelihoods: the case of communities in the Mwekera area, Copperbelt province, Zambia. In: International Symposium on Underutilized Plants for Food Security, Nutrition, Income and Sustainable Development (Jaenicke H, Ganry J, Hoeschle-Zeledon I, Kahane R, eds). International Society for Horticultural Science, Leuven, pp 129-136.

Mbow C, Van Noordwijk M, Luedeling E, Neufeldt H, Minang PA, Kowero G. 2014. Agroforestry solutions to address food security and climate change challenges in Africa. Curr Opin Environ Sustain 6: 61-67.

Nair PKR, Kumar BM, Nair VD. 2009. Agroforestry as a strategy for carbon sequestration. J Plant Nutr Soil Sci 172: 10-23.

Quadri AB, Abdulhameed M. 2020. Assessment of Selected Engineering Properties of Sandcrete Blocks from Akinyele Local Government Area, Oyo State. ABUAD J Eng Res Dev 3: 43-53.

Rolo V. 2022. Agroforestry for Sustainable Food Production. Sustainability 14: 10193.

Stiles W. Agroforestry: an opportunity for sustainability. 2017. https://sustainablefoodtrust.org/news-views/agroforestry-an-opportunity-for-sustainability/. Updated 28 Sep 2017.

TerrAfrica. 2009. Using Sustainable Land Management Practice to Adapt to and Mitigate Climate Change in Sub-Saharan Africa: Resource Guide Version 1.0. TerrAfrica, Washington, DC, 80 pp.

Wubie MA, Assen M, Nicolau MD. 2016. Patterns, causes and consequences of land use/cover dynamics in the Gumara watershed of lake Tana basin, Northwestern Ethiopia. Environ Syst Res 5: 8.

Xue Z, Zhen L, Miah MG, Shoyama K. 2019. Impact assessment of land use functions on the sustainable regional development of representative Asian countries - A comparative study in Bangladesh, China and Japan. Sci Total Environ 694: 133689.