

EURO ASIA 9th. INTERNATIONAL CONGRESS ON APPLIED SCIENCES

AUGUST 11-12, 2021
ERZURUM, TURKEY



CONGRESS FULL TEXTS BOOK

Edited by
Prof. Dr. Memet ŞAHİN

ISBN 978-625-7720-54-0

İKSAD – INSTITUTE OF ECONOMIC DEVELOPMENT & SOCIAL RESEARCHES

FOREST CONSERVATION CHOICES AMONG ARABLE FARM HOUSEHOLDS IN THE FOREST ZONE: EVIDENCE FROM OYO STATE, NIGERIA

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ABSTRACT

The study assessed the forest conservation choices among the arable farm households in the forest zone of Oyo State, Nigeria. The specific objectives were to identify the socio-economic characteristics of arable farm households around the forest reserves and ascertain the determinants of forest conservation choices among the arable farm households around the forest reserves in the study area. A 3-stage sampling technique was used to select a total of 160 arable farm households around some selected forest reserves with the use of a structured questionnaire. The analytical tools employed were descriptive statistics and multinomial logistic regression model. The findings of the study revealed that the majority of the respondents are male (57.5%), educated (81.2%), married (71.9%), and having a household size of about 7 members. The forest conservation choices are NTFP domestication (68.75%), conservation advocacy (31.25%), and tree nursery or reforestation (13.13%). The determinants of forest conservation choices are household size ($p < 0.05$), participation in formal training ($p < 0.05$), age of household head ($p < 0.05$), primary education ($p < 0.01$), secondary education ($p < 0.01$) and gender ($p < 0.05$). It is therefore recommended that intensification of local capacities such as access to training and credit facilities which can significantly reduce forest-related livelihood dependence and forest exploitation should be provided.

Keywords: Forest reserves, Conservation choices, Household, Multinomial logistic regression

INTRODUCTION

A forest is an area with a large density of trees. Forest reserves are portions of state lands under reservation where commercial harvesting of wood products is controlled to conserve biodiversity and it is managed by the state government under the control of their forestry departments (Olujobi, 2015). Forest conservation is the practice of planting and maintaining

forested areas for the benefits and sustainability of future generations (Pawar and Rothkar, 2015).

In most developing countries, forest products help farmers to get by between harvest seasons and serves as a safety net to farmers by reducing vulnerability to shocks and adversities when crops fail in term of low yield or during times of droughts and floods or social conflict. In some areas, forests support the production of livestock through the provision of fodder, and in others, such as coastal mangrove swamps, they support local fisheries (Jonah et al., 2013).

Forest and forest resources are significant to sustainable rural livelihoods, biodiversity conservation, mitigation of climate change, supply of energy, soil, water and wildlife protection (Ajake and Anyadike, 2012). Forest provides a household with income, fuelwood, and food security, in addition to cultural, spiritual, and recreational values to millions of individuals. A study by IUCN (2015) noted that forest resources form the basis of the livelihoods of the communities around the forests and the development of the surrounding communities.

Kimengsi et al., (2016) reported a significant dependence of the poor rural households on the natural resource base including forest reserves in tropical African countries. Food and Agricultural Organization [FAO] (2015) indicated that despite the importance of forests, every year about 13 million hectares of forest areas in the tropics are degraded, mostly to agriculture.

There has been increased concern about the degrading condition of forest resources (Ajake and Anyadike, 2012). Human activities on forests and forest land has resulted into biodiversity loss, degrading forests, land and water, and emission of considerable amounts of carbon into the atmosphere with the greatest threats (most especially deforestation) occurring in developing countries within tropical ecosystems (FAO, 2007). Hence, the conservation of forest became an issue of increasing priority and urgency.

In Nigeria, arable farm households living in communities around forest reserves depend primarily on agriculture and forest gatherings. However, there is evidence of increased overexploitation, degradation, and depletion of forest ecosystems which is as a result of their high rate of dependence to secure and sustain livelihood. In recent times, these forest resources are faced with a decline in quality and quantity, and efforts to slow the rate of deforestation are significant in avoiding devastating environmental conditions. Also, due to excessive use, it will be difficult to expect that these resources will be available in the nearest future.

In order to address this menace, this paper is part of a bigger research, and it assesses the forest conservation choices of arable farm households around some selected forest reserves in Oyo state, with a view to be acquainted with their choice of conservation practices. The specific objectives were to identify the socio-economic characteristics of arable farm

households around the forest reserves and ascertain the determinants of forest conservation choices among the arable farm households around the forest reserves.

RESEARCH METHODOLOGY

Area of study

The study was carried out in Oyo state, located in the Southwestern part of Nigeria, occupying about 2,650,000 ha (NBS, 2012). It is situated between latitudes $7^{\circ}3'0.26''N$ and $9^{\circ}11'6.10''N$ and longitudes $2^{\circ}42'25.14''E$ and $4^{\circ}33'23.84''E$. The Climate is equatorial, notably with the dry season spanning from November to March and the wet season spanning from April to October. The average annual rainfall is 1252.5 mm, while the average daily temperature ranges between $23.2^{\circ}C$ and $31.9^{\circ}C$, almost throughout the year (NBS, 2012).

There are nine gazetted forest reserves in Oyo State covering about 342,461 ha of land. These are Lanlate, Okoo-Iro, Olasehinde, Olokomeji, Opara, Gambari, Igangan, Ijaiye, and Osho forest reserves. The Igangan, Opara, and Okoo-Iro forest reserves were located in the western part of the state, while Gambari, Ijaiye, Lanlate, Osho and Olokomeji forest reserves were located at the southern part of the state (Alo, 2017).

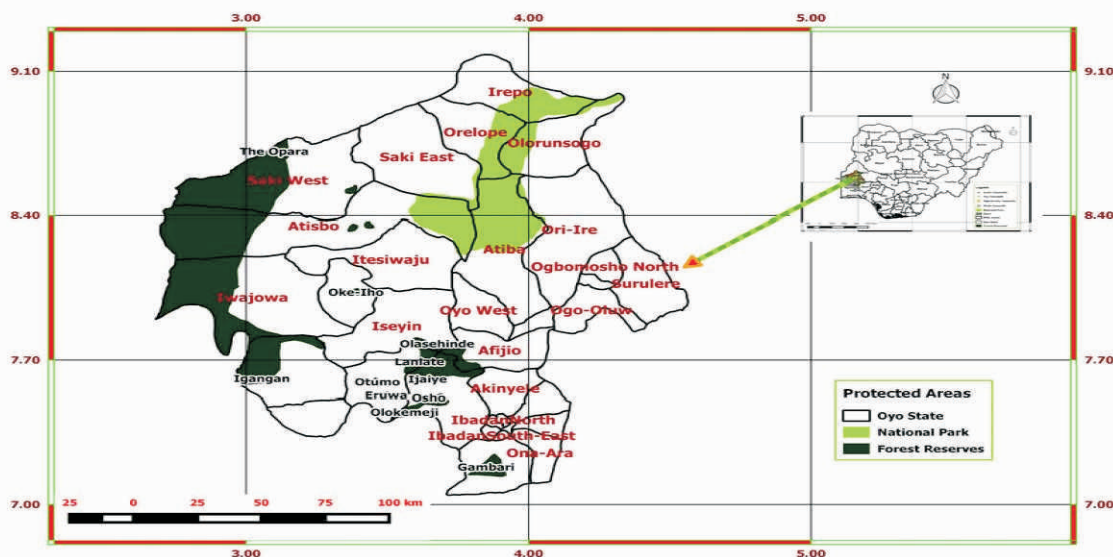


Figure 1: Map showing the spatial distribution of forest reserves in Oyo State, Nigeria

Source: Adapted from Alo (2017)

Sampling techniques

A 3-stage sampling technique was used to select the representative arable farm households around the forest reserves for the study. The first stage involved the random selection of four (4) forest reserves out of the nine (9) forest reserves. The second stage involved the random selection of four (4) villages around each of the selected forest reserves based on their proximity to the forest reserve, giving a total of 16 villages. The third stage involved the

random selection of 10 arable farm households in each of the resulting 16 villages, using a complete village housing list that was provided by the local authorities to give a total of 160 respondents for the study.

Method of data collection

The primary collection involved the use of a structured questionnaire to collect information on household socio-economic status, and forest conservation choices of the respondents. Based on the preliminary qualitative investigations, the key conservation choices were identified to include tree nursery/reforestation, NTFP domestication, and conservation advocacy.

Analytical techniques and model specification

The analytical techniques that were used for the analysis of this study include descriptive statistics and multinomial logistic regression model.

Descriptive statistics

Descriptive statistics such as mean, frequency distribution tables, and percentages were used to describe the socio-economic characteristics of the respondents and the preferred conservation choices of the respondents.

Multinomial logistic regression model

Multinomial logistic regression was used because it permits the analysis of decisions across more than two categories, allowing the determination of choice probabilities for different categories (Olufadewa et al., 2018). The model was adopted as used by Kimengsi et al., (2019) with some modifications, to ascertain the determinants of forest conservation choices among the arable farm households in the study area.

The Multinomial Logistic Regression Model (MNL) is based on the probability of conservation choice, j , from the alternative J choices. The implicit form MNL is specified as:

$$P_{ij} = P_r(y_i = j) = \frac{\exp(X_i a_j)}{\sum_{n=1}^J \exp(X_i a_n)}, \quad j = 1, 2, 3, \dots, J$$

Where:

y_i = 3 nominal categories of conservation choices adopted by the respondents:

y_3 = those who adopt tree nursery / reforestation;

y_2 = those who adopt NTFP domestication; and

y_1 = those who adopt conservation advocacy; y_1 is the base category.

a = Vector of unknown coefficients.

RESULTS AND DISCUSSION

Socio-economic distribution of respondents

The result of gender distribution from Table 1 revealed that the majority of the respondents were male (57.5%) while females accounted for 42.5% of the respondents. This implies that there are more male-headed households in the study area. This conforms with the study of Aluko et al. (2019) who reported that most household heads are typically male because they are acknowledged to be the head of the family except in situations where the male is deceased leaving the position of the household head for the wife.

The age distribution of the respondents revealed that 10% of them were between the ages of 21-40 years, and 50% of them were between 41-60 years while 35% of the respondents were between the ages of 61-80, and 5% were above 80 years. The respondents had a mean age of 55. This result indicates the low participation of youths in farming.

The educational level of the household heads revealed that the majority (81.2%) of the respondents had formal education while 18.8% are not educated. This implies that the respondents' level of awareness is high concerning the significance of the forest reserve and it may have a positive effect on their ability to access information, adopt new technological innovations, and even access credits from formal financial institutions. The result on marital status of the households presented shows that the majority (71.9%) of the respondent was married, 1.3% was single, and 17.5% and 9.4% were widowed and divorced/separated respectively. This implies that a greater percentage of the respondents had family indicating stability. According to Njoku and Offor (2016), stability creates conducive environment for development of personal integrity and for entrepreneurship which is important for efficient use of resources.

The majority (83.1%) of the respondents had a household size of 6-10 members followed by those with 1-5 members (10%) and, those with over 11 members (6.9%) respectively. A mean household size of about 7 members was obtained. This is expected as the study was carried out in rural communities and it is typical of rural households to have a relatively large household size which is desirable in terms of supplying family labour instead of hired labour.

The result further revealed that, majority (63.8%) of the respondent had participated in formal trainings while 36.3% did not participate in any formal training. The high training participation could mean that the farmers are knowledgeable about their practices as well as the implications of overexploitation of forest resources.

Table 1: Socio-economic distribution of respondents

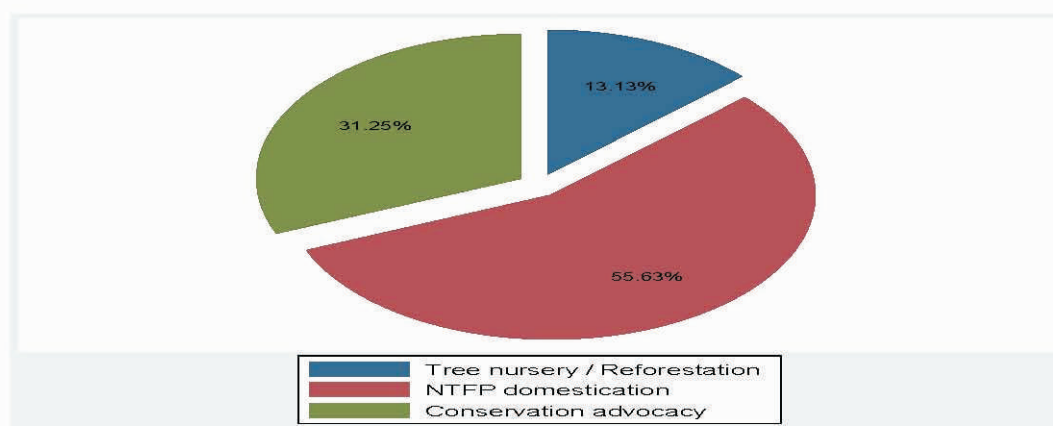
Variables	Label	Frequency (n=160)	Percent (%=100)	Mean
Gender	Female	68	42.5	
	Male	92	57.5	
Age of household head	21-40	16	10.0	55
	41-60	80	50.0	
	61-80	56	35.0	
	Greater than 80	8	5.0	
Education of household head	No Formal	30	18.8	
	Primary	61	38.1	
	Secondary	44	27.5	
	Tertiary	25	15.6	
Marital status	Single	2	1.3	
	Married	115	71.9	
	Divorced/Separated	15	9.4	
	Widowed	28	17.5	
Household size	1-5	16	10.0	7
	6-10	133	83.1	
	11-15	11	6.9	
Training participation	Did not participate	58	36.3	
	Participated	102	63.8	

Source: Field survey, 2021

Forest conservation choices of the respondents

The Figure 2 below shows the forest conservation choices adopted by the respondents in the study area. The respondents were requested to list their most preferred conservation choices. The information that they provided was used to rank the conservation choices. It was further grouped under tree nursery/reforestation, NTFP domestication, and conservation advocacy. The outcome was then estimated using the multinomial logistic regression model.

The findings of the study revealed that NTFP domestication accounted for 68.75%, conservation advocacy accounted for 31.25% while tree nursery or reforestation accounted for 13.13% of the conservation choices.

Figure 2: Forest conservation choices of the respondents

Source: Field survey, 2021

Determinants of forest conservation choices

The result of the multinomial logistic regression analysis of the determinants of forest conservation choices adopted by the respondents in Oyo State is presented in Table 2. The chi-square value of 40.74 which was significant at 1% level shows that the model has a good fit for the data. Each regression slope here is interpreted as the predicted change in log odds of belonging to the comparison group (relative to the baseline group) per unit increase on the predictor.

The coefficient of household size of 0.375 was significant at 5%, implying that an increase in the household size by one member increased the likelihood of adopting the tree nursery or reforestation activity relative to the adoption of the conservation advocacy. That is, the larger the household size, the higher the likelihood of opting for the tree nursery or reforestation activity. Similarly, the coefficient of participation in formal training ($p < 0.05$) of 1.835 was positive and significant, implying that participating in formal training increased the likelihood of adopting tree nursery or reforestation activity relative to non-participating in formal training. This could be related to the effort of the Forestry Research Institute of Nigeria and other relevant stakeholders in promoting sustainable forest management through various outreach programs.

On the other hand, the coefficient of age of household head ($p < 0.05$) of -0.0660 was negative and significant at 5%, implying that for each one unit increase in the age of household head, the likelihood of adopting the tree nursery or reforestation activity reduces relative to the adoption of the conservation advocacy category. That is, the higher the age of household head, the lower the likelihood of opting for the tree nursery or reforestation activity. Also, the coefficients of primary education ($p < 0.01$) of -2.711 and secondary education ($p < 0.01$) of -3.013 were negative and significant indicating that household heads with primary education and those with secondary education are less likely to adopt the tree nursery or reforestation activity relative to the no-formal education category.

With respect to the choice of NTFP domestication as a conservation option, the coefficients of gender ($p < 0.05$), household size ($p < 0.1$) and primary education ($p < 0.1$), secondary education ($p < 0.1$) and tertiary education ($p < 0.05$) were positive and significant suggesting that having a male-headed household increases the probability of choosing NTFP domestication as a conservation activity than having a female-headed household. Also, having a larger household size increases the probability of adopting NTFP domestication relative to the conservation advocacy category. Likewise, for education, having a higher level of education increases the probability of adopting NTFP domestication relative to the base category. From these findings, it is evident that the determinants of forest conservation choices adopted by the respondents in Oyo State are gender, age of household head, household size, and participation in formal training and higher level of education of the household head.

Table 2: Multinomial logistic regression estimates of the determinants of forest conservation choices

Variables	Tree nursery/Reforestation		NTFP domestication	
	Coef.	Std. Err.	Coef.	Std. Err.
Gender	-0.931	0.703	0.865**	0.433
Individual is married	0.716	0.758	0.0743	0.491
Age of Household head	-0.0660**	0.0292	0.00872	0.0166
Household size	0.375**	0.185	0.229*	0.129
Participated in formal training	1.835**	0.812	-0.0278	0.471
Primary education	-2.711***	0.946	1.133*	0.626
Secondary education	-3.013***	1.105	1.339*	0.687
Tertiary education	-0.333	0.898	1.555**	0.750
Constant	0.205	1.600	-3.123**	1.360
LR chi2(16)	40.74			
Prob > chi2	0.0006			
Log likelihood	-132.63429			
Pseudo R2	0.1331			
Observations	160			

Note: The base category for conservation choices is conservation advocacy, no formal for educational status, female for gender, non-married for marital status, and non-participation for formal training. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

CONCLUSION

In conclusion, the majority of the arable farmers around the forest reserves in Oyo State are male (57.5%), educated (81.2%), married (71.9%), and having a household size of about 7 members. The results of the study revealed that NTFP domestication accounted for 68.75%,

conservation advocacy accounted for 31.25% while tree nursery or reforestation accounted for 13.13% of the conservation choices adopted by the respondents in the study area. The determinants of forest conservation choices adopted by the respondents are gender, age of household head, household size, and participation in formal training and higher level of education of the household head. It is therefore recommended that access to the use of unclean energy sources should be regulated since almost all of the respondents are using unclean energy as their source of household energy, most especially for cooking. Awareness and sensitization programmes should be massively provided to promote the use of clean energy which is environment friendly and safe for human health.

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