E-ISSN: 2346-7290

Determinants of proportions of household land used for forestry practice in Southeast Nigeria

[1]Azeez, I. O.[*] and [2]Onyema, M. C.

[1]Department of Forest Resources Management, University of Ibadan, Nigeria.
[2]Department of Forestry and Wildlife Technology, Federal University of Technology Owerri, Imo State, Nigeria.
*Corresponding author (Email: ismail.azeez@mail.ui.edu.ng)

ABSTRACT
Forestry activities if properly planned, designed and executed can provide significant economic, social and environmental benefits. But land availability and more importantly size, determines the level of investment in forestry. The growing scarcity and social issues surrounding land acquisition necessitate identifying opportunities to enhance forestry development at the household level. Thus, this study investigated the determinants of the proportion of a household land that can be put into forestry use by households in South-eastern Nigeria. Seven (7) communities were randomly selected from Imo and Anambra States. Semi-structured questionnaire was administered to ten percent (10%) of heads of households in the selected communities. A total of 547 sets of questionnaire were administered but, 490 were used for analysis. The questionnaire was based on the socio-economic background of the respondents, their number of farmlands, average size of farmland unit and proportion of the household farmlands, which can be used for forestry activity. Data generated were analysed using bar chart, frequency table and Tobit regression. Modal percentage of total farm land available for forestry activities was 54.0% while the lowest was 17.4%. Also, the form of household leadership, occupation and education of respondents as well as indigenous forestry groups had impacts on the percentage of land area that household heads are putting up for forestry activities in the study area. While male headed households and farmers show more interest in forestry activities, the educated elites hold a reverse perception.

Keywords: Forestry development, Southeast Nigeria, Indigenous organisation

INTRODUCTION
Land is the most limiting factor in production activities. Its availability and more importantly size, determines the level of investment. This is more critical with investment in forestry activities that involve large expanse of land, which very often is beyond the size owned and/or controlled by an average individual. Community forestry, which is a form of forestry practice flourished in some locations because it involves fusing of fragmented individual lands into a joint/communal ownership.

Forestry scholars have presented evidence-based reports showing that forestry activities if properly planned, designed and executed even within individual fragmented land, can provide significant economic, social and environmental benefits not only to such households but also to a variety of other population groups (Forest Research, 2010). As a rapidly expanding sub-sector in the

economy of most developing societies, forestry is important as a commodity for investment and more importantly for daily use for livelihood improvement. Zuang *et al*. (2008) as well as Butler and Leatherberry (2004) documented some prospective individuals with interest in forestry practice within their smallholding. However, no agreement was arrived at on what determines the proportion of a parcel of land that a given household can put into forestry activities (Lee *et al*., 1992 and Wilent, 2004).

Considering the growing scarcity of land and social issues surrounding acquisition and mapping out of community lands for possible large scale forestry practice, the process of which is poorly supported in terms of policies, efforts are currently directed at identifying opportunities to enhance forestry development at the household level (Boakye and Baffoe, 2006).

Compared to other regions in Nigeria, some reports revealed that over time, land has generally become a widespread and critically challenging issue across the rainforest zone of Nigeria (Dike, 1983; Emeasoba, 2013). This has been linked to the slow rate of socioeconomic and infrastructural development in the Southeastern region of Nigeria (Dike, 1983; Emeasoba, 2013).

Determination of the proportionate size of a household land that can be put into forestry use by such households will provide convincing basis upon which Forestry Department can justifiably formulate and/or recommend evidence-based policies for adoption, implementation and development of household forestry programme. In addition, research result will be of particular interest for the rainforest zone of Nigeria given the growing land scarcity, fragmentation and diverse land use interests in the region as well as the difficulty in accessing lands for development by prospective individuals and groups alike. Forest conservation planners and managers can use the information garnered from the study and particularly those on current household social and economic situations that border on land use, to update databases as well as identify and rapidly focus adaptable forestry programmes and activities.

Gavin and Anderson (2007) have demonstrated the importance of such studies relating to proportionate household land area for use in any choice forestry activity by landowners and users in guiding and shaping policies of inter-sectoral importance with possibilities of positively impacting different population groups. Such has improved the state of forestry with improved benefits on local communities in China (Liu, 1998). The result of this study is therefore expected to guide and ultimately improve future proposals on land area for forestry use in Southeastern and neighbouring locations in particular and the Nigeria rainforest zone in general.

METHODOLOGY

Study Area

The study was carried out in seven (7) agricultural zones in the southeast region of Nigeria, which lies within latitude 4^{o} $45^{'}$ N and 7^{o} $15^{'}$ N and longitude 6^{o} $50^{'}$ E and 7^{o} $25^{'}$ E. Three (3) of the above zones are located in Imo State while four (4) are in Anambra State. Both locations occupy an estimated land area of about 94,153 km^{2}.

Seven (7) communities were randomly selected for the study, each representing a given agricultural zone. From Imo State, the communities are Egbema in Orlu agricultural zone; Okwuohia in Okigwe agricultural zone and Onicha-Mbaise in

Owerri agricultural zone. In Anambra State, the communities are; Njikoka in Awka agricultural zone, Orumba in Aguata agricultural zone, Ogbaru in Onitsha agricultural zone and Ayamelum in Anambra agricultural zone. Imo State has 176,740 households while Anambra State has a total of 188,002 households both of which have an average of five (5) persons per household (NBS, 2009). The trend of poverty level across the study area shows variation over time especially between 1980 and 2004 with 12.9% in 1980, 30.4% in 1995, 41.0% in 1992 and 26.7% in 2004 indicating socioeconomic and livelihood instability (NBS, 2009).

Sampling

Information was obtained on the number of households across the communities under study from desk officers at the information units of the respective local council offices as documented from the household census of 2006. Semi-structured questionnaire was administered to ten percent (10%) of heads of households in the selected communities. A total of 547 sets of questionnaire were administered and after a series of sorting for consistency of responses, 490 were used for analysis.

Household heads provided responses on the number of farmlands they own as well as the estimate of the average size of each land unit, which were estimated in local area dimension (but later converted to hectare). Also, the respondents provided information on the proportion of the household farmlands, which can be effectively used for their choice forestry activity. Background socioeconomic data of the respondents elicited in the research included form of household leadership, household size, major occupation and educational attainment. Other variables considered were estimated maximum period of usage of household farmland for forestry activity, access to extension service, access to loan as well as the presence and activities of indigenous forestry groups, conservation Non-Governmental Organistaions (NGOs) and government Forestry Department.

Tobit model was employed to determine the factors that accounted for the proportion of land, which households allocated to forestry or forestry-related activities. It assumed that households have a certain area of land from the total area of land owned, which can be kept or given out for forestry activities.

$$Lf = \frac{\text{Actual household land area useable for forestry}}{\text{Total Area of household land}} \quad \text{.....(Equation 1)}$$

$$L_f = \beta X_1 + ,,,,,,,,,,,X_{10} + E_i \text{.....(Equation 2)}$$

Where: L_f = Proportion of land for forestry practices. $0 \leq L_f \leq 1$

Where:

β = Coeficient of the explanatory variable X_1

X_1 = Presence and activities of indigenous forestry-linked groups in the area (1=Yes, 0=Otherwise)

X_2 = Presence and activities of Conservation NGOs in the area (1=Yes, 0 = Otherwise)

X_3 = Presence and activities of Department of Forestry (1=Yes, 0 = Otherwise)

X_4 = Form of household leadership (1= Man-headed, 0 = Otherwise)

X_5 = Household size (Continuous variable)

X_6 = Major occupation (1= Farming as major occupation, 0 = Otherwise)

X_7 = Form of educational attainment (1= Formal education, 0 = Otherwise)

X_8 = Maximum duration (years) a household puts own land into forestry (Continuous variable)
X_9 = Access to extension service (1=Yes, 0 = Otherwise)
X_{10} = Access to loan from government (1=Yes, 0 = Otherwise)

RESULTS

Modal household farm size in the study area was found to be between 1 and 1.5 ha (Figure 1). This was followed by those less than 0.5 ha. The least common household farm size were those greater than 5 ha.

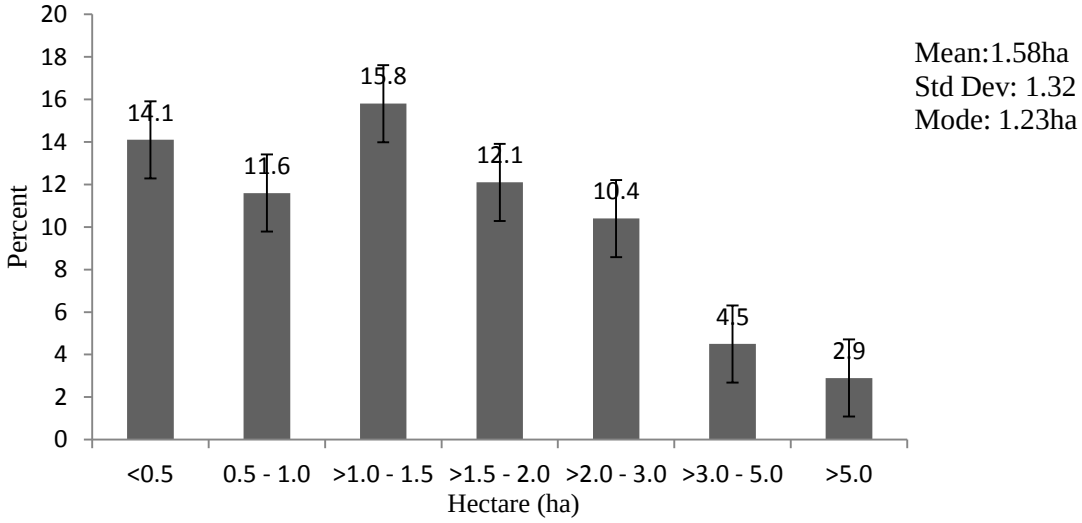

Fig. 1: Distribution of Sizes of farmland owned by individual households in the study area

Table 1 presents relative proportion of the farm sizes that were allocated for forestry activities across the different agricultural zones in the study area. From the study (Table 1), a total of 490 households (out of the initially targeted 547) representing 89.6% of the targeted household have farmlands, which can accommodate forestry-related activities. Percentage of total farm land that were signified as available for forestry activities was highest in Orlu (54.0%) and lowest in Awka (17.4%) both of which have the lowest number of respondents, 42 and 57, respectively.

Table 1: Proportion of Household land useable for Forestry in the study area

Location	Estimate of Household farmsize (ha) - A	Fraction of Household farmland useable for forestry (ha) - B	$L_f = \frac{B}{A}$ (ha)	Difference (ha) A - B	Percent of total land in favour of forestry
Owerri (N=78)	129.1 (1.66)	66.86 (0.86)	0.52	62.22 (0.80)	51.8
Okigwe (N=75)	120.97 (1.61)	56.13(0.75)	0.47	64.84 (0.87)	46.4
Orlu (N=42)	78.03 (1.90)	42.1 (1.03)	0.54	35.93 (0.94)	54.0
Awka (N=57)	64.85 (1.14)	11.29 (0.20)	0.18	53.57 (0.94)	17.4
Aguata (N=66)	105.15 (1.62)	56.72 (0.87)	0.54	48.44 (0.75)	53.9
Anambra (N=75)	93.45 (1.27)	37.61 (0.52)	0.41	54.85 (0.75)	40.3
Onitsha (97)	183.44(2.11)	87.355(1.004)	0.48	96.085(1.1044)	47.6
Total Means (ha)	**1.62**	**0.75**	**0.45**		**44.5**

Values in parentheses are means obtained in each case

From Table 2, the form of household leadership, occupation and education of respondents as well as indigenous forestry groups in the study area were observed to impact on the percentage of land area that household heads are putting up for forestry activities.

Table 2: Summary of Tobit Analyses of Factors Influencing the Proportion of Farmland that Households can Use for Forestry Activities

Variables	Coefficient	Standard Error	T-Value	Prob. Level
Constant	0.2730	0.058	4.73	0.000
Indigenous groups with forestry interest	0.052*	0.028	1.85	0.046
Conservation NGOs	-0.013	0.028	-0.47	0.636
Forestry Department	0.032	0.027	1.19	0.236
Male-headed households	0.070**	0.032	2.19	0.029
Household size	0.004	0.003	1.44	0.149
Farming as major occupation	0.019**	0.009	2.08	0.038
Formal education	-0.006**	0.003	-2.49	0.013
Duration of use of land	0.002	0.002	0.75	0.454
Access to extension services	0.054*	0.032	1.72	0.086
Access to loans	-0.006*	0.028	-0.2	0.0839

Mean land size household allocate to forestry = 0.75ha
Modal Land size households allocate to forestry= 0.93ha
*Significant at p<0.1 **Significant at p<0.05 Log Likelihood = -545.86921 Pseudo R^2= 0.0274 Chi-Square Value = 30.75

DISCUSSION

The study revealed that only a fraction (7.4%) of the respondents owned lands beyond 3.0ha with modal farm size of 1.23ha and average land size of 1.58ha. This finding differed from 2.68ha average size of family landholding recorded by Okezie *et al*. (2012) in Southeastern Nigeria. This may be due to evident progressing land scarcity/fragmentation, which may work against forestry practice in the area unless urgent steps are taken to encourage small scale forestry holdings or cooperation among land holders. This was reposed by USAID (2010) which observed population increases as well as improper land use and mismanagement as responsible for declining forestry development especially in Southeastern region of Nigeria. USAID (2010) also noted that most African households build and plan their production-based enterprise activities within their ancestral landholdings, which is fixed and fragmented. This phenomenal incidence however in the mid and long term range can be a potential limiting factor to effective planning, which result can manifest in forms of low informal sector land productivity, disinterest in Public Private Partnership (PPP) transactions in land production activity and discouragement in meaningful private forestry investments.

However, despite the small farmland holdings of respondents (Mean size of landholding for an individual household = 1.58ha), the interest of majority of households to accommodate forestry can still not be overstressed. This is a positive signal for forestry development, despite the characteristically phenomenal land fragmentation across the study area. It is not common for people in this type of situation to invest in long-term land use activities. Also, except perhaps for residents in Njikoka in Awka agricultural zone of Anambra State, between 40% - 54% of farmlands across the study area have been signified to be available for one form of forestry use or another. The exception of Njikoka community from using at least 40.0% of household farmland for forestry activities may be linked to the past unpalatable experience of residents' with Forestry Department in the 1970s. The recorded high proportion of household lands that were proposed for forestry activities (As high as 54.0% and 53.9% of farmlands in Orlu and Aguata zones, respectively) revealed that forestry is not entirely new to residents and can therefore be accommodated by identified traditional land use practices in these areas.

Government, policy makers, rural development planners as well as other relevant stakeholders can therefore build on this strength to identify possible areas of collaboration, partnership and support to build on this interest by landowners and users to improve conservation and development. This is therefore a timely call challenging the stakeholders to develop and promote multiple and efficient land use management to enhance a balance of mix output from crop/livestock production as well as forestry development and conservation.

The study revealed that households headed by males exhibited the probability of granting more size of own farmland for forestry use (Coeff. = 0.070). Similarly, farmers compared to other occupation exhibited higher probability of land granting for forestry activities (Coeff. = 0.019). Conversely, attainment of formal education by the respondents did not positively encourage use of household land for forestry (Coeff. = -0.006). The position of elite (represented by formally educated

household members) in the study area can be corroborated with similar viewpoint attributable to members of the elite class observed in the study documented by CIFOR (2007) where large tracts of forest lands and estates are more strongly held and dominantly controlled by the informally educated class.

With the growing quest for acquisition of education in Nigeria, there appears to be shallow prospects for significant development of forestry by the elite class (formally educated persons) especially at the household level. Thus, the use of own farmlands for forestry could appear unfashionable among educated households. This finding is however not consistent with the report of German *et al*. (2009) that formal education significantly improved forestry practice and development. In this context, the observed result of the study could be partly because more of the household lands tend to be in the control of holders without formal education. From whatever perspective, the education of the elite in the study area may need to be re-examined along bringing the importance of forest conservation and long-term investment in natural resources to the fore.

The non-impact of NGOs on household decision on forestry matter can be linked to the non-popularity of NGOs across the study area than maybe in other regions of Nigeria. The dominating presence and activities of most NGOs especially recently for instance in the western parts of Nigeria have reportedly been linked partly to the comparatively higher level of forestry development in the area. The abysmal presence of Conservation NGOs in the communities visited in this study in some ways reflect the position of NBSA (2005), which reposed more domiciliary influence and impact of conservation NGOs away from less developed regions. Across the study area, the proportion of farmlands that households can devote to forestry use (Mean size = 0.75ha) will depend on the influence/presence of local indigenous groups (Coeff. = 0.052) that promote forestry. This underpins peoples' growing attachment to indigenization especially in the 21st century.

It is worthy of note that indigenous groups in the rainforest belt of Nigeria engage in and indeed drive most development activities and initiatives in the areas of resource protection. Similarly, some studies show that indigenous population groups have shown the capacity to spur development and conservation. For instance, hunter groups in Mbe Mountains have shown responsibility in the protection of wildlife and policing of their habitats in Cross River State and Cameroon conservation projects (WCS, 2013). This was also reported in Nepal among cooperatives of Village Forestry Association (VFA) who have helped in protecting and conserving huge forest resources (Springate, 2003).

CONCLUSION

Household lands are almost perennially put into a variety of agricultural end uses. The proportion of a given land devoted to a given end use is determined by several factors ranging from household capability, occupational preferences and level of identification with group-based organizations engaged in conservation. Despite the incidence of growing land hunger, households still show preference to use appreciable proportion of their available farmland for forestry activities in the study area. In the rainforest belt of Nigeria, out of an average landholding of about 1.62ha across different agricultural zones in the area, an estimated 0.75ha of this composite

size is usable for forestry, representing 44.5% of available farmland in the area. The use of part of the household land for forestry can positively be influenced by the predominance of farming population, male headship of such households as well as the level of indigenization of forestry based groups operating in such areas.

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