



LAND USE ACTIVITIES AMONG FOREST ENVIRONMENTS' DWELLERS IN EDO STATE, NIGERIA: IMPLICATIONS FOR LIVELIHOOD AND SUSTAINABLE FOREST MANAGEMENT

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Abstract

Although urbanization may be increasing globally, over 75.0% of Nigerian populations are still living in rural areas. Extensive rainfed farming used to sustain this population is limited by loss of forest biodiversity, climate change and exposure of fragile soil. This study reports the socio-economic background of Edo State forests environments dwellers in relation to their land use activities with a view to positively harnessing the synergy of the two variables for improving human livelihood and by extension sustainable forest management. Stratified random sampling technique was used to select 296 rural dwellers in settlements within and around three forest reserves: Ehor, Okomu, and Sakpoba. Information obtained was subjected to descriptive and chi-square test statistics at $p = 0.05$. Results revealed that the most popular land use activity within the forest reserves is farming (94.9%). A majority of the respondents practice mixed cropping with multiple choices of major crops through the *taungya*⁵ system. Socio economic status of rural dwellers affect their awareness of forest reserves, consent to use of forest reserves, willingness to plant trees on farm land and exploitation of forest resources. While participatory management of the reserves is expected to impact the economy of the study area, awareness of and exploitation of forest reserves as well as willingness to plant trees will on the whole influence the participation of rural dwellers in the management of the reserves.

Keywords: land use activities; socio-economic variables; livelihood; sustainable forest management

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⁵ *taungya* is a Burmese word used to describe the practice of establishing tree plantations by planting and tending tree seedlings together with food crops.

Introduction

Nigeria's forests and woodlands play important roles in providing economic, social and ecological benefits as well as provide wide arrays of forest products and services for the people. The contributions of forests to human well-being can only be sustained if the forests are themselves sustained (FAO 1994). Thus, Sustainable Forest Management (SFM) is essential for the continuous supply of natural forest resources. But Nigeria has lost most of her natural forest cover and the rate of forest depletion is put at about 3.5% per annum, which translates to a loss of 350,000 – 400,000 hectares per year (Adedoyin 2001, Aruofor 2000).

Forestry is a rural business in Nigeria and even though urbanization may be increasing, the World Bank (1998) observed that most of the world's poor people are still living in rural areas. In Nigeria, over 75.0% of her population fall into this category and are mainly farmers. Thus, anyone concerned for the poor should have a strong interest in rural development (World Bank 1998). However, Hazel and Lutz (1998) attributed resource degradation in extensive rainfed farming (characteristic of tropical forest environments) areas to poverty and population growth. Scherr and Hazell (1994) also identified conversion of primary forest to agriculture, with attendant loss of biodiversity, climate change and exposure of fragile soil as part of environmental problems emanating from rainfed farming.

Furthermore, FAO (2000) observed threats posed by economic constraints to sustainable forest management in sub-Saharan Africa as overwhelming. Trees and forests were also submitted by Crew (2003) as impacting people's ways of lives and are in cultures, languages, mythologies and folklores of people living within and around the forest. Okeyoyin (2002) defined culture as an aggregate of customs and beliefs, arts and mythology, rituals and habits, legends and festivals and other aspect of way of life of people having direct bearing on the relationship between people and their environment. Fishbein (1967) stated in attitude theory of reasoned action that there is a casual link between belief and behaviour; beliefs develop attitude which lead to intentions and the intention determines the behaviour. These beliefs, attitudes and behaviour of local people influenced their ways of live and assisted a great deal in local conservation of forest resources.

In addition, traditional beliefs influence people value, behaviour, and perception towards the forest and so help conserve the forest. Among the Benin people in Edo State for instance, many big markets started under Iroko trees. *Milicia excelsa* (Iroko) and *Bombax spp.* are believed to be abode of spirits, village gods or ancient gods and tales often revolve around the trees that are frequently left around villages. Plants such as Iroko, *Bombax sp.*, *Newbouldia laevis*, Kola nut (*kola accuminata*), *Garcinia kola*, *Chrysophyllum albidum* (otien), *Aukobaka aubreville* (Akuobisi), *Bacteria Fistulosa* (Ogenmwun), were preserved.

Animals such as vulture, crocodile, bushbuck, buffalo, leopard, chimpanzee and tortoise were all equally protected through traditional beliefs. In addition, sacred groves harbour several medicinal plants, which are of great value in primary health care delivery. As most of the country's population lives in rural areas without modern health care; these plant and animal species are relied upon. However, as earlier observed, there has been a phenomenal increase in population with attendant pressures on available forestlands and resources over the years. Also, advances in science and an upsurge of evangelism in Christian and Muslim faiths have greatly reduced the influence of sacred groves as methods of conservation. Cultural norms and taboos are violated with little or no penalty and sacred groves are increasingly degraded. But, as observed by Cornea (1985), WWF (1996), Bada (1998) and Uphoff (1998), local communities living within and around forest reserves are central to any meaningful planning for sustainable management of forest reserves, thus holding an important key to rural poverty alleviation. This was reposed by Kio (2002) who suggested a radical change in forest policy towards mobilizing the rural population in the interest of sustainable management of forest resources to arrest deforestation and check land degradation.

This, Oyebo (2004) opined will enable forestry contribute to poverty alleviation, environmental protection, and sustainable wood production (Oyebo 2004). This study therefore examines the two variables of Edo State Forest dwellers' socio-economic backgrounds together with their relationship to land use activities; the interplay of these two variables is expected to impact on the livelihood of the inhabitants.

Materials and Method

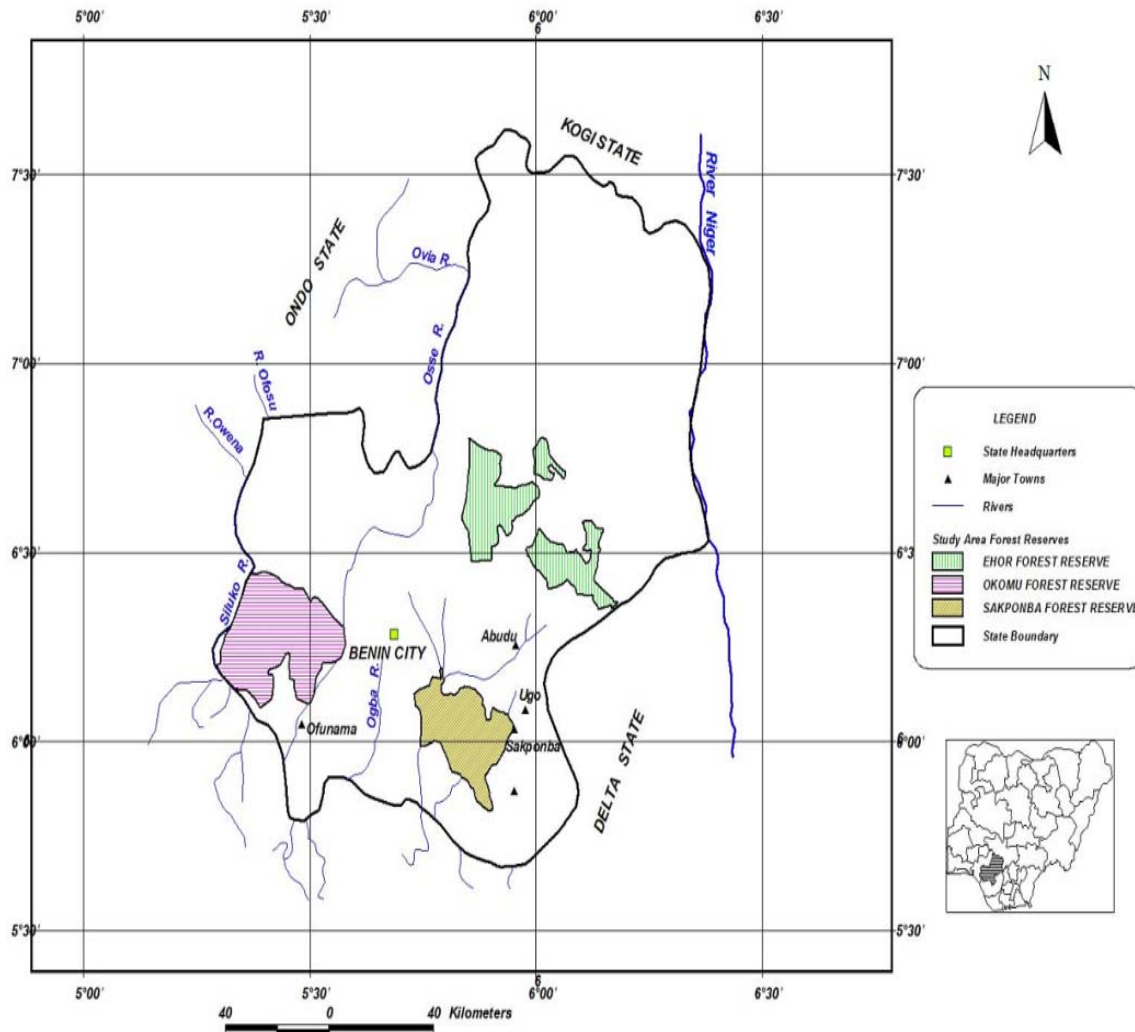
Study Area

The study was carried out in the southern part of Edo State (Figure. 1). Edo State is situated between latitudes 5° 5'N - 7° 35'N and longitudes 5°E - 6° 40'E, (Wright, *et al.* 1985). It is located inland, in the Southern part of Nigeria and is bounded partly by Ondo and Kogi States on the West, Kogi and Delta states on the East while only shares boundary with Delta state on the South. The State has a total land area of 19,840km² and a population of approximately 2.2 million people (1991 census). The population density is medium at 174.4 persons per km². Generally, the state is in a low-lying area except to the north where it is marked by undulating hills rising to a peak of about 672 meters above sea level.

The climate is mainly tropical, characterized by the dry and wet seasons. November to March is dry and usually accompanied the dry northeast trade winds, which causes *harmattan*. The rainy season commences at about late March to October. Presently, there are 18 Local Government Areas (LGAs) in

the State. The state forestry department has area offices in each of the LGAs for administrative purposes (FORMECU 1998).

Figure 1. Map of Edo State, Nigeria Showing Okomu, Sakponba and Ehor Forest Reserves



Study Sites

Okomu Forest Reserve

It is situated between longitudes 5° - 5° 30' E and latitudes 6° N' - 6° 10' N. It is located in Ovia South-West LGA of Edo State and about 40km west of Benin City. It lies between Rivers Osse and Siluko to the East and West respectively. The reserve derived its name from River Okomu from the Benin word 'Akomu' meaning unity. The reserve was named Okomu during the colonial constitution of the reserve. Some of the villages/settlements within and around the forest reserve are Nikrowa, Ofunama, Udo, Okomu,

Iguohuan, Arakhuan, Iguelaho, Iguagbado, Igueze, Urhezen, Iguafole, Iguokakhan, Odobaiho, Izide-Noke, Izide and Namen. The Benins' are the original landowners and still form 60% of the population but there are other groups of settlers like Ijaw, Urhobo, Esan within and around the reserve.

Sakpoba Forest Reserve

Sakpoba Forest Reserve lies between latitudes 4° - $4^{\circ} 30'$ and longitudes 6° - $6^{\circ} 5'E$. It is bounded on the south by Delta State, on the East by Urhonigbe Forest Reserve and on the West by Free Area, B.C. 30. It is located in Orhionmwon Local Government Area, about 30 kilometres South-East of Benin City. Some of the major villages located within and around the reserve are Ugo, Ikobi, Oben, Iguelaba and Amaladi in Area B.C 32/4, and Ugboko-Niro, Iguere, Idunmwowina, Evbarhue, Idu, Evbueka, Iguomokhua, Ona, Abe, Igbakele, Adeyanba, Evbuosa in Area B.C 29. The Benins are the original landowners and still form 80% of the population living within and around the forest reserve. There are other ethnic groups such as Urhobo, Itsekiri and Esan.

Ehor Forest Reserve

Ehor Forest Reserve lies between latitudes 6° - $6^{\circ} 32'$ and longitudes $5^{\circ} 58'$ - $5^{\circ} 7' E$. It is bounded on the North and North West by Owan (S & N) Forest Reserves, on the East by Free Areas BC 13/2, 16/2 on the South by free areas B.C 21/2, 16/2, 21/1 and on the West by Ekiadolor Forest and Owan (S) Forest Reserves. It is located in Uhumwode Local Government Area, about 40 kilometres from Benin City along Benin Auchu road. Some major villages located within and around the forest reserves are Odighi, Osasimwioba Igbekhue, Egba, Urhokuosa Ugha, Obagie. Ehor, Oke, Okemuen, Osazuwa, Eguaholor, Ohe, Egbisi, Evbowe, Igieghudu and Uhi. It derives its name from Ehor being the major town then and now the headquarters of Uhumwode Local Government Area. The Benins are the predominant tribe that forms more than 75% of the population. The other ethnic groups are Esan, Igbanke and Ibo.

Sampling Procedure

Stratified random sampling design was used to select respondents for the study. To remove bias, the selection of respondents cut across such variables as religion, age occupation, income, ethnicity, educational attainment, nativity, family size, size of farmland etc. Data was collected using a combination of structured questionnaire and participatory methods: Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal technique (PRAT). PRAT is an excellent tool, which bring together the researcher and forest communities with the view of defining the development needs of such

communities by the community groups and relevant non-governmental organization (Olayinka *et al.* 2006, Popoola *et al.* 2009). Simple random technique was used in selecting settlements inside and around the forest reserves with a minimum of 19% sampling intensity each site.

Sample Size

Using participatory rural appraisal technique, the study identified 106, 35 and 58 enclaves and villages in and around Okomu, Sakpoba and Ehor forest reserves respectively. Out of the identified settlements, 19, 17 and 16 settlements were respectively selected for sampling based on their nearness, significance and population size (Appendix 1). This represented between 18 and 49 percent sampling intensity at this stage of sampling.

Sets of structured questionnaire (200, 80 and 120) were randomly administered in selected communities of Okomu, Sakpoba and Ehor forest reserves respectively, representing at least 1% sampling intensity at respondent level. However, only 165, 40 and 91 sets of questionnaire were retrieved in each site in the given order.

Measurement of Variables

Information were sought on demographic and social status of the respondents, importance of the reserves to their livelihoods, impression about present management system, forest resource use and willingness to participate in joint forest management. Also Focus Group Discussions (FGDs) were conducted to supplement information gathered from the interviews especially from non-literate participants who were not willing to volunteer information freely and clearly as it involved fewer numbers of people.

Statistical Analysis

The data collected were subjected to descriptive and inferential statistics. Descriptive statistics, which involve the collation, simplifying and giving the properties of data, such as frequency counts; percentages and mean were used to describe variables and their occurrences among the population. Tables and histograms were used to present data. A null hypothesis - "The socio-economic background of respondents has no significant impact on their forest reserve use", was tested using chi-square statistics to make judgment on the population sampled based on selected variables. The chi-square statistics was also used for inferring the dependence or otherwise of Forest Reserve use by the Local Communities on their demographic and socio-economic characteristics.

Results and Discussion

Demographic Background

Findings from this study shows that Okomu, Sakpoba and Ehor forest reserve enclaves were respectively fraught with 86.1%, 97.5% and 75.8% male respondents, which is high, compared to 13.3%, 2.5% and 20.9% female respondents. Thus, the male gender (an average of 84.69%) is higher in the study area than the female (14.3%). Nevertheless, age distribution of the enclave dwellers in the three forest reserves cut across age range from 20 to more than 80 years of age (Table 1). This does not necessarily mean that dwellers whose age is less than twenty do not reside in forest enclaves, but they may not have the necessary experience needed to respond to questions posed. Further, more than half of the respondents fall within the age bracket of 40 and 60 yrs. Respondents within the age bracket of between 20 and 30 years were low (2.04%) compared to those within 30 and 40 yrs (17.4%). In addition, respondents with ages above 70 years were few (5.10%).

On marital status, 94.0% of the respondents were married while only 3.0% of them were single (Table 1). Identified modal (34.3%) household size was between 6 and 10 people while 17.7% of the respondents (on the average) are living with between 11 and 15 people. Religious diversity is more obvious in Ehor and Okomu Forest Reserves compared to Sakpoba where Islamic religion was not recorded among any of the respondents (Table 1). An average of 59.6% of enclave dwellers in the three study sites was found to be Christians. Traditional religion worshippers were next to Christianity in term of population (35.4%) in the study area, while only 2.0% practice Islam. Religious diversity observed in the study area will likely explain the jettisoning of traditional conservation methods, which invariably encouraged wanton forest destruction. For example, many activities, which are inimical to sustainable forest management and hence traditionally forbidden in sacred groves (Adebisi 2002) have been submitted as common events in the same places due to advances in science and upsurge of evangelism in Christian and Muslim faiths (Ikponmwonba 2008). In the same vein, ethnic diversity is more pronounced in Okomu Forest reserve environment than the other two study sites (Table 1). Majority of the enclave dwellers in the study area are the Benins (78.5%). Other identified ethnic groups in the enclaves are Urhobo (9.2%), Esan (9.18%), Calabar (1.02%) and Ibo (1.02%). Hausa and Yoruba tribes are found only in Okomu forest reserve enclaves (Table 1).

Table 1. Demographic Characteristics of Respondents

Demographic Variables	Okomu		Sakpoba		Ehor		Mean		Mode
	f	%	f	%	f	%	f	%	
Gender									
Male	142	86.1	39	97.5	69	75.8	83.0	84.69	Male
Female	22	13.3	1	2.5	19	20.9	14.0	14.29	
No Response	1	0.6	0	0.0	3	3.3	1.0	1.02	
Age									
20 - 30 yrs	4	2.4	1	2.5	3	3.3	2	2.04	>40 - 50 yrs
>30 - 40 yrs	31	18.8	7	17.5	14	15.4	17	17.35	
>40 - 50 yrs	42	25.5	11	27.5	31	34.1	28	28.57	
>50 - 60 yrs	43	26.1	10	25.0	20	22.0	24	24.49	
>60 - 70 yrs	31	18.8	7	17.5	12	13.2	17	17.35	
>70 - 80 yrs	6	3.6	2	5.0	7	7.7	5	5.10	
>80 - 90 yrs	2	1.2	2	5.0	1	1.1	2	2.04	
No responses	6	3.6	0	0.0	3	3.3	3	3.06	
Marital Status									
Single	6	3.6	1	2.5	1	1.1	3	3.00	Married
Married	154	93.3	38	95.0	89	97.8	94	94.00	
No Response	5	3.0	1	2.5	1	1.1	3	3.00	
Religion									
Christianity	92	55.8	25	62.5	61	67	59	59.6	Christianity
Islam	5	3.0	-	-	1	1.1	2	2.0	
Tradition	65	39.4	15	37.5	24	26.4	35	35.4	
No Response	3	1.8	-	-	5	5.5	3	3.0	
Ethnic Background									
Benin	118	71.5	31	77.5	81	89	77	78.6	Benin
Urhobo	22	13.3	4	10.0	2	2.2	9	9.2	
Yoruba	1	0.6	-	-	-	-	0	0.0	
Ibo	2	1.2	-	-	1	1.1	1	1.0	
Esan	15	9.1	4	10.0	7	7.7	9	9.2	
Calabar	4	2.4	-	-	-	-	1	1.0	
Hausa	1	0.6	-	-	-	-	0	0.0	
No Response	2	1.2	1	2.5	-	-	1	1.0	
Household size									
1 - 5	7	33.3	3	7.5	5	5.5	5	4.90	6 - 10
6 - 10	64	38.8	14	35.0	27	29.7	35	34.31	
11 - 15	31	18.8	5	12.5	17	18.7	18	17.65	
16 - 20	12	7.2	2	5.0	9	9.9	11	10.78	
≥ 21	3	1.8	1	2.5	3	3.3	2	1.96	
No response	48	29.1	15	37.5	30	33.0	31	30.39	

Source: Field Survey, 2009 (f = frequency)

Socio-Economic Features

The study revealed that western education is not a priority in the study area. 23.6% of the respondents were illiterates while 37.8% (the highest) have primary school certificates. Only 1.2% on the average had degrees (Table 2). This may not be unconnected with the prevalent primary occupation in this part of the state, which does not demand western knowledge, but rather traditional skills. Frequency analysis of respondents' occupation (Table 2) reveals that 94.9% of the entire study population are engaged in farming. Other activities primarily engaged in are: wine tapping/palm oil processing (3.06%), trading (1.02%) and civil service work (1.02%).

Further, more than half of the respondents (58.3%) have farm sizes of between 1 and 5 hectares. This will barely meet subsistence needs and may explain the poverty level in the study area. 11.46% of respondents have farm sizes of between 5 to 10 hectares while 8.3% have farmlands of more than 10 hectares (Table 2). Generally, land distribution in the study area is inequitable, which Hazell and Lutz (1998) opine may encourage resource degradation. On land ownership (Table 2), more than half of the respondents (53.6%) rent the land on which they farm, a practice that is more prominent among residents (76.9%) in Ehor forest reserve enclave and environ. Other land ownership types identified by the study are ownership through inheritance (14.3%) and purchase (12.2%). This trend is connected with the land tenure type operational in the study area. Osemeobo (1994) submitted that cultural owners of the land whose consents were sought before creation of forest reserves use the traditional religion and folklore to administer land use.

Results in Table 2 also show that on the average, 14.43% of the respondents make an annual income of between ten and fifty thousand *naira*; the modal annual income range. Only 1.0% makes less than ₦10,000/annum while the highest annual income (more than ₦300,000) was made in Okomu forest enclaves (Table 2). Though, barely more than half of the respondents volunteered information on their annual income, available data showed that most of the rural dwellers are living below poverty level. This reposed World Bank (1996) assertion that out of the 30 countries defined as least developed in the World, 21 are in Sub-Saharan Africa (World Bank 1996) and that 47% of Sub-Saharan Africa population lives below poverty line. The institution also observed that an individual subsisting on less than US\$1 dollar a day is officially defined as poor (World Bank 2000). Worthy of note also, is that poverty has accelerating effect on environmental degradation just as environmental degradation accentuates poverty (Durning 1989, World Bank 1996, Dasgupta 1997). While examining nearness of respondents to forest reserves (Figure 2), the study reveals that an average of 75.5% of the respondents resides between one and five kilometres away from the reserves. Only 1.0% of the respondents are residing less than one kilometre from the

forest reserves while another 8.16% stay more than 5km away. Despite the distance from the reserves, the most popular use to which residents put forest reserves in the study area is farming (Figure 3). This is highest in Ehor and lowest in Okomu. Majority of the respondents (83.8%) use the reserves as farmland, hence the reserves help to sustain the population in the study area. However, only an average of 7.1% of the respondents hunts in the reserves.

Table 2. Socio-Economic Background of Respondents

Socio-Economic Variables	Okomu		Sakpoba		Ehor		Mean		Mode
	f	%	f	%	f	%	f	%	
Educational Background									
No formal Education	45	27.3	6	15.0	26	28.6	29	28.16	Primary School
Primary School	54	32.7	16	40.0	38	41.8	36	34.95	
Secondary School	44	26.7	15	37.5	18	19.8	26	25.24	
OND / HND	4	2.4	2	5.0	1	1.1	3	2.91	
B.Sc /M.Sc	2	1.2	1	2.5	-	-	1	0.97	
No responses	16	9.7	0	-	8	8.8	8	7.77	
Primary Occupation									
Farming	157	95.2	34	85.0	89	97.8	93	94.90	Farming
Wine Tapping/ Palm Oil Processing	7	4.2	1	2.5	-	-	3	3.06	
Trading	1	0.6	1	2.5	1	1.1	1	1.02	
Civil Service	-	-	4	10.0	-	-	1	1.02	
No Response	-	-	-	-	1	1.1	0	0	
Farm Size									
1 - 5ha	98	59.4	22	55.0	47	51.6	56	58.3	1 - 5ha
> 5 <= 10ha	22	13.3	5	12.5	5	5.5	11	11.46	
> 10ha	17	10.3	-	-	6	6.6	8	8.33	
No Response	28	17.0	13	32.5	33	36.3	21	21.88	
Land Ownership Types									
Inheritance	30	18.2	7	17.5	5	5.5	14	14.29	Rent
Purchase	23	13.9	6	15.0	6	6.6	12	12.25	
Rent	70	42.4	17	42.5	70	76.9	52	53.06	
Inheritance & Purchase	3	1.8	-	-	1	1.1	1	1.02	
Inheritance & Rent	5	3.0	-	-	2	2.2	2	2.04	
No response	34	20.6	10	25.0	7	7.7	17	17.35	
Annual Income (₦,000)									
≤ ₦10	-	-	-	-	2	2.2	1	1.03	> ₦10 - ₦50
> ₦10 - ₦50	13	7.9	5	12.5	22	24.2	14	14.43	
> ₦50 - ₦100	8	4.8	6	15.0	13	14.3	9	9.28	
> ₦100 - ₦150	2	1.2	4	10.0	7	7.7	4	4.12	
> ₦150 - ₦200	17	10.3	6	15.0	-	-	8	8.25	
> ₦200 - ₦250	13	7.9	2	5.0	-	-	5	5.15	
> ₦250 - ₦300	13	7.9	2	5.0	1	1.1	5	5.15	
> ₦300	6	3.6	-	-	-	-	-	-	

Source: Field Survey, 2009 (f = frequency)

Figure 1. Distribution of Relative Distance from Forest Reserve among Respondents in the Study Area

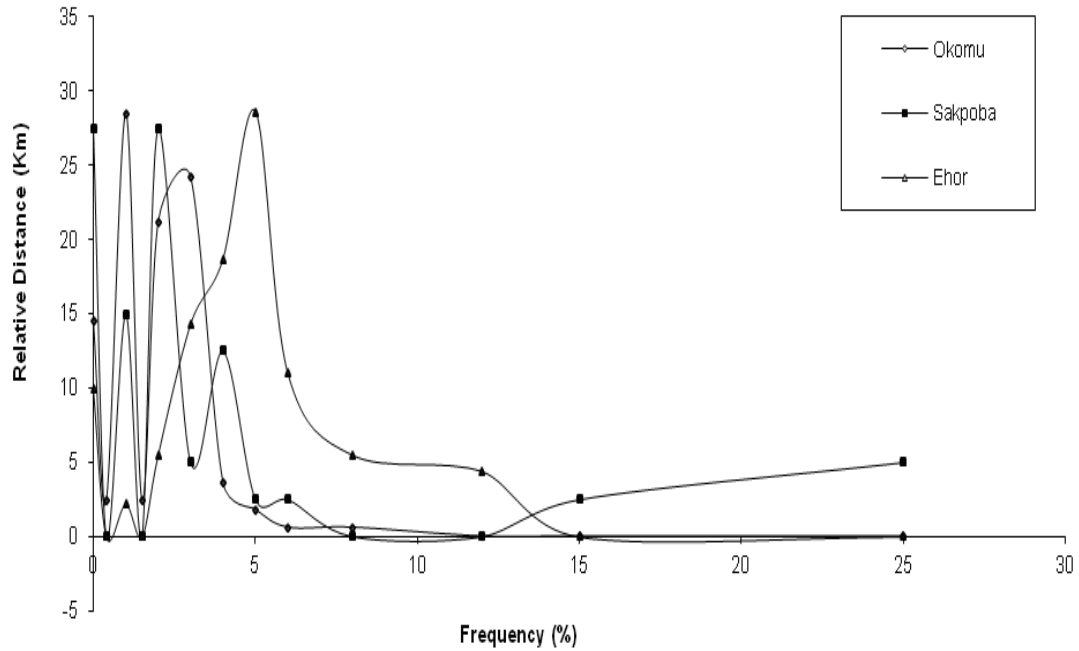
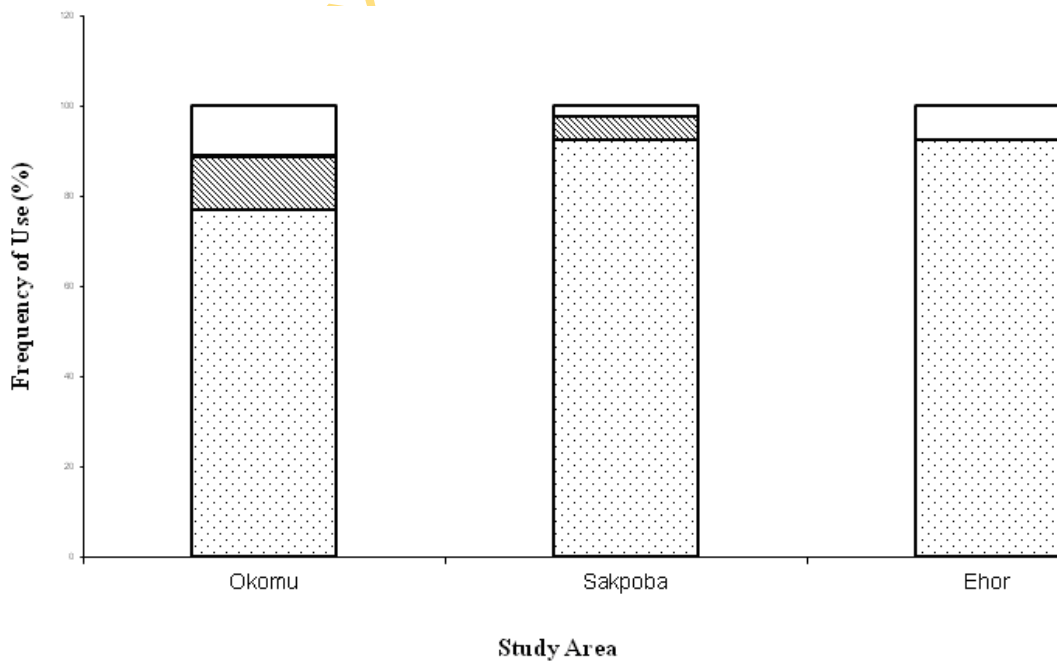


Figure 1. Distribution of Respondents of Forest Reserved in the Study Area



Income Generation pattern from Major Land use Activities

Findings on rural dwellers sources of income reveal that 50.0% of them made more than 40% of their annual income from agriculture (Table 3). Also, 10.1% of the rural dwellers (the highest) generate less than 40% of their income from tree crops. It must however, be pointed out that response to this variable was very low. Table 3 shows that only 1.01% of respondents make between 80 and 100% of their income from tree crops. This nonetheless, may not contradict the observation of Momoh (2002), who submitted that forests provide many of rural dweller's daily needs, which are directed more at meeting subsistence needs rather than income generation.

Meanwhile, income generation from other forest products were also found to be low (Table 3), although not as low as income from tree crops in the study area. About 21.2% of the respondents make not more than 20% of their income from other forest products while another 12.1% make between 20 and 40%. Only 2.01% of the respondents make more than 40% but not more than 60% from NTFPs. This would not be unconnected with many NTFPs being treated as intangible, hence placing on them values that are often lower than the cost of replacement (Osemeobo 1992). Okafor (1993) and Akachuku (1997) also asserted that over 90% of NTFPs respond to market failure hence their value in economic term is only 1.3% of Nigeria's GDP.

Table 3. Income Generation pattern from Major Land use Activities among Respondents in the Study Area

Income Generation	Okomu		Sakpoba		Ehor		Mean		Mode
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
From Agricultural Crops									
0 - 20%	7	4.3	-	-	17	18.7	8	8.16	> 40 - 60%
> 20 - 40%	13	7.8	3	7.5	5	5.5	7	7.14	
> 40 - 60%	37	22.4	11	27.5	19	20.9	22	22.45	
> 60 - 80 %	45	27.2	13	32.5	5	5.5	21	21.43	
> 80 - 100%	10	6.0	4	10.0	4	4.4	6	6.12	
No response	53	32.1	09	22.5	41	45.1	34	34.69	
Income from Tree Crops									
0 - 20%	7	4.2	3	7.5	5	5.5	5	5.05	> 20 - 40%
> 20 - 40%	2	1.2	7	12.5	5	5.5	5	5.05	
> 40 - 60%	-	-	-	-	-	-	-	-	
> 60 - 80 %	-	-	-	-	-	-	-	-	
> 80 - 100%	1	0.6	-	-	1	1.1	1	1.01	
No response	155	93.9	30	75.0	80	87.9	88	88.89	
Income from other Forest Products									
0 - 20%	37	22.4	16	40.0	10	9.0	21	21.21	0 - 20%
> 20 - 40%	25	15.1	9	22.5	1	1.1	12	12.12	
> 40 - 60%	6	3.4	-	-	-	-	2	2.02	

> 60 - 80 %	-	-	-	-	-	-	-	-
> 80 - 100%	-	-	-	-	-	-	-	-
No response	97	58.8	15	37.5	80	87.9	64	64.65

Source: Field Survey, 2009.

Taungya Practice

Rural dwellers average response on their years of experience in the practice of *Taungya* was highest (32.6%) for the >10 - 20 years option and lowest (2.1%) for those who have more than 50 years experience (Table 4). Further, rural dweller's years of experience in *Taungya* practice was highest in Sakpoba (>20 - 30 years) and lowest in Ehor (>5 -10 years). This might related with the year of establishment of individual reserve and may explain why encroachment is highest in Sakpoba forest reserve. Adetula (2001) has observed the use of *Taungya* system of plantation establishment as one of the factors responsible for forest reserve encroachment.

Table 4. Years of Experience in *Taungya* System

Number of years	Okomu		Sakpoba		Ehor		Mean		Mode
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
1 - 10 Yrs	29	17.6	5	12.5	41	45.1	25	26.32	> 10 - 20 Yrs
> 10 - 20 Yrs	77	46.7	10	25.0	17	18.7	31	32.63	
> 20 - 30 Yrs	28	17.0	14	35.0	21	23.1	21	22.11	
> 30 - 40 Yrs	22	13.3	6	15.0	6	6.6	11	11.58	
> 40 - 50 Yrs	2	1.2	1	2.5	4	4.4	2	2.11	
> 50 - 60 Yrs	-	-	2	5.0	-	-	1	1.05	
> 60 Yrs	-	-	2	5.0	-	-	1	1.05	
No response	7	4.2	-	-	2	2.2	3	3.16	

Source: Field Survey, 2009.

Food Grown and Consumed

The domestic food which is grown and consumed in the study area is not too different (Table 5). It was found that an average of 15.8% of the respondents consume vegetables while 15.44%, 15.3% and 15.08% consume maize, plantain as well as yam and pepper respectively. The study reveals that majority of the respondents practice mixed cropping which informs the multiple choices of major crops grown in the study area. On the average, the most favoured crop grown in the study area is yam (16.21%) while oranges and potatoes are the least planted. Oranges and potatoes are grown only in Okomu enclaves by 0.10% of the 959 responses to crop (s) grown. Plantain and cassava are equally popularly grown on the average.

Table 5. Domestic Food Crop Grown and Consumed among Respondents

	Okomu		Sakpoba		Ehor		Mean		Mode
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
Food grown									
Yam	146	15.22	29	15.34	65	19.46	80	16.23	Yam
Plantain	143	14.91	28	14.81	61	18.26	77	15.62	
Cassava	147	15.33	28	14.81	53	15.87	76	15.42	
Maize	106	11.05	15	7.94	13	3.89	45	9.13	
Pepper	110	11.47	19	10.05	34	10.18	54	10.95	
Pineapple	17	1.77	2	1.06	20	5.99	13	2.64	
Coco yam	95	9.91	21	11.11	28	8.38	48	9.74	
Melon	94	9.80	19	10.05	11	3.29	41	8.32	
Garden egg	5	0.52	-	-	-	-	2	0.41	
Vegetable	60	6.26	11	5.82	13	3.89	287	5.68	
Rice	4	0.42	2	1.06	-	-	2	0.41	
Beans	15	1.56	6	3.17	14	4.19	12	2.43	
Groundnut	1	0.10	1	0.53	8	2.40	3	0.61	
Sugar cane	1	0.10	1	.53	2	0.59	1	0.20	
Orange	1	0.10	-	-	-	-	-	-	
Potatoes	1	0.10	-	-	-	-	-	-	
No Response	13	1.36	7	3.70	12	3.59	11	2.23	
Food consumed									
Yam	135	15.02	36	16.67	82	14.72	84	15.08	Vegetable
Plantain	143	15.91	31	14.35	82	14.72	85	15.26	
Cassava	96	10.68	26	12.04	80	14.36	67	12.03	
Maize	141	15.68	34	15.74	82	14.72	86	15.44	
Pepper	137	15.24	33	15.28	81	14.54	84	15.08	
Pineapple	87	9.68	17	7.87	62	11.13	55	9.87	
Vegetable	147	16.35	36	16.67	80	14.36	88	15.80	
No Response	13	1.45	3	1.39	8	1.44	8	1.44	

Source: Field Survey, 2009.

Affinity for Forest Enclaves and Settlements

Investigating why respondents choose to stay in the forest enclaves and settlements; an average of about 41.0% of them cited proximity to their farms as major reason (Table 6). Also, 32.0% were resident in the study area because they were indigenes. Others are residents based on their civil service status (2%) and business types (2%) while some (1.0%) are indigenes who believe their lack of education naturally confer their rural status on them.

Table 6. Respondents Reasons for Residing in the Forest Enclaves and Settlements

Reasons (s)	Okomu		Sakpoba		Ehor		Mean		Mode
	f	%	f	%	f	%	f	%	
Nearness to farm	62	37.6	22	55.0	39	42.9	41	41.00	
Civil service status	4	2.4	1	2.5	-	-	2	2.00	

Indigene	55	33.3	11	27.5	29	31.9	32	32.00	Near- ness to farm
Marriage	1	0.6	-	-	-	-	0	0.00	
Business	6	3.6	-	-	-	-	2	2.00	
Abundance of food	10	6.1	1	2.5	-	-	4	4.00	
Joblessness	2	1.2	-	-	1	1.1	1	1.00	
Lack of education	-	-	-	-	2	2.2	1	1.00	
For security	-	-	2	5.0	-	-	1	1.00	
No response	25	15.2	3	7.5	19	20.9	16	16.00	
Σ	165	100.0	40	100.0	91	100.0	100	100.00	

Source: Field Survey, 2009 (f = frequency)

Social Amenities Status

The study (Table 7) identified the most needed social amenities in the study area as good road (24.4%). Other social amenities needed according to the respondents are piped water (21.9), secondary schools (21.5%) and hospitals/ dispensaries (18.6%). The unavailable social amenities identified in the study area among residents are also contained in Table 6. They include secondary schools (19.0%), good roads (19.3%), hospital/dispensary (18.2%), piped water (16.2%) and electricity (16.2%).

Table 7. Status of Social Amenities in the Study Area

Social Amenities	Okomu		Sakpoba		Ehor		Mean		Mode
	f	%	f	%	f	%	f	%	
Most needed social amenities									
Primary Schools	11	1.66	-	-	2	0.88	4	1.43	Good Roads
Hospitals/ Dispensaries	78	11.75	33	23.24	45	19.74	52	18.64	
Piped Water	111	16.72	18	12.68	54	23.68	61	21.86	
Electricity	20	3.01	14	9.86	13	5.70	16	5.73	
Secondary Schools	102	15.36	36	25.35	41	17.98	60	21.51	
Good Roads	109	16.42	35	24.65	60	26.32	68	24.37	
Markets	19	2.86	5	3.52	2	0.88	9	3.23	
No Response	14	2.11	1	0.70	11	4.82	9	3.23	
Unavailable Social Amenities									
Primary Schools	28	40.13	1	0.56	8	2.73	12	3.13	Good Road
Hospital/Dispensary	117	17.26	36	20.23	56	19.11	70	18.23	
Piped Water	122	17.99	23	12.92	41	13.99	62	16.15	
Electricity	106	15.63	33	18.54	48	16.38	62	16.15	
Secondary Schools	123	18.14	38	21.35	57	19.45	73	19.01	
Good Road	125	18.44	36	20.22	60	20.48	74	19.27	
Market	37	5.46	9	5.06	10	3.41	19	4.95	
No Response	20	2.95	2	1.12	13	4.44	12	3.13	

Source: Field Survey, 2009 (f = frequency)

Attitude to and Awareness of Forest Conservation

Awareness among rural dwellers about forest reserves in their environment was high in the study area (Figure 4). This was confirmed by the fact that on the average, majority of the respondent (85.7%) are exploiting forest resources. 70.7% agreed to using forest products to satisfy domestic needs and even 42.4% consented to commercial exploitation of forest reserves in their environments. These findings further reposed the position of Momoh (2002) and Amakiri (1995) on the importance of forests to the livelihood of rural dwellers. The level of awareness among respondents notwithstanding, only 33.3% of the respondents are planting trees on their private land (Table 8). These would explain the low number of people generating income from forestry activities as earlier observed (Table 3), compared to those using forest resources in the study area. However, worthy of note is that consent to planting trees on private land is more pronounced among enclaves dwellers in Sakpoba forest reserve (Figure 5).

Figure 4. Distribution of Interest in Forest Conservation among Respondents in the Study Area

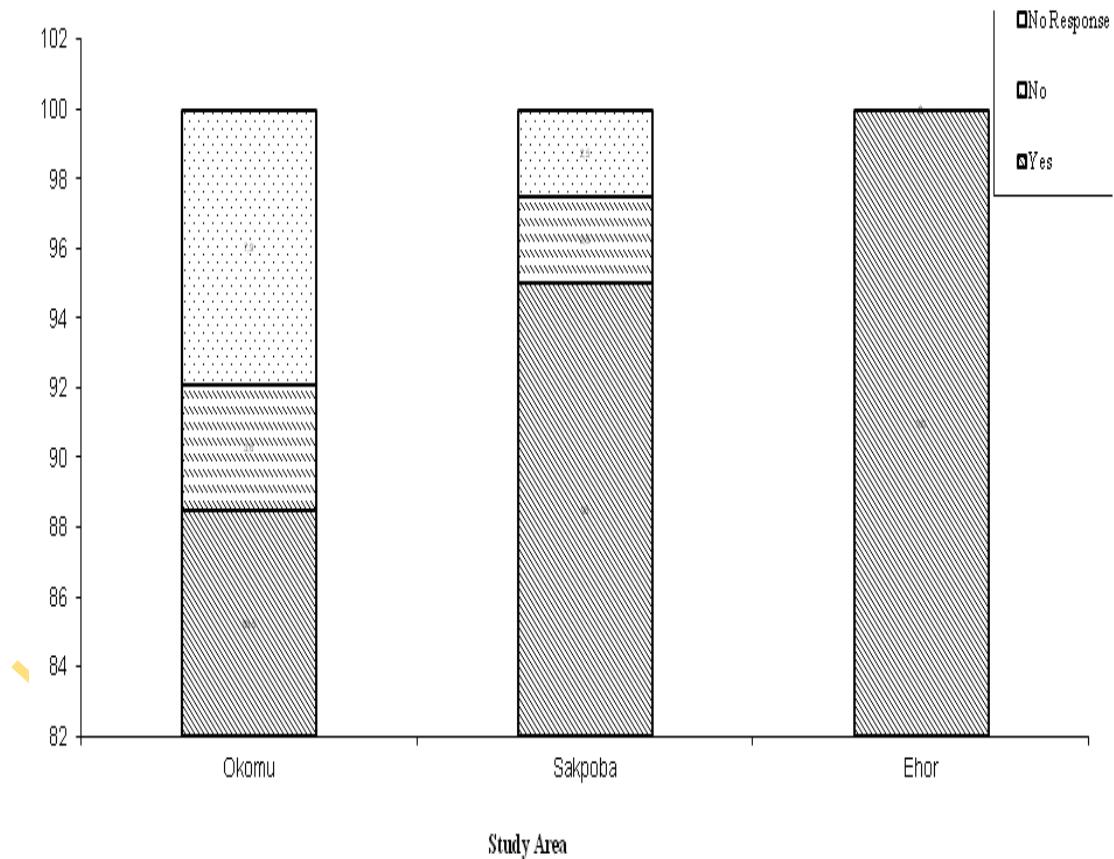
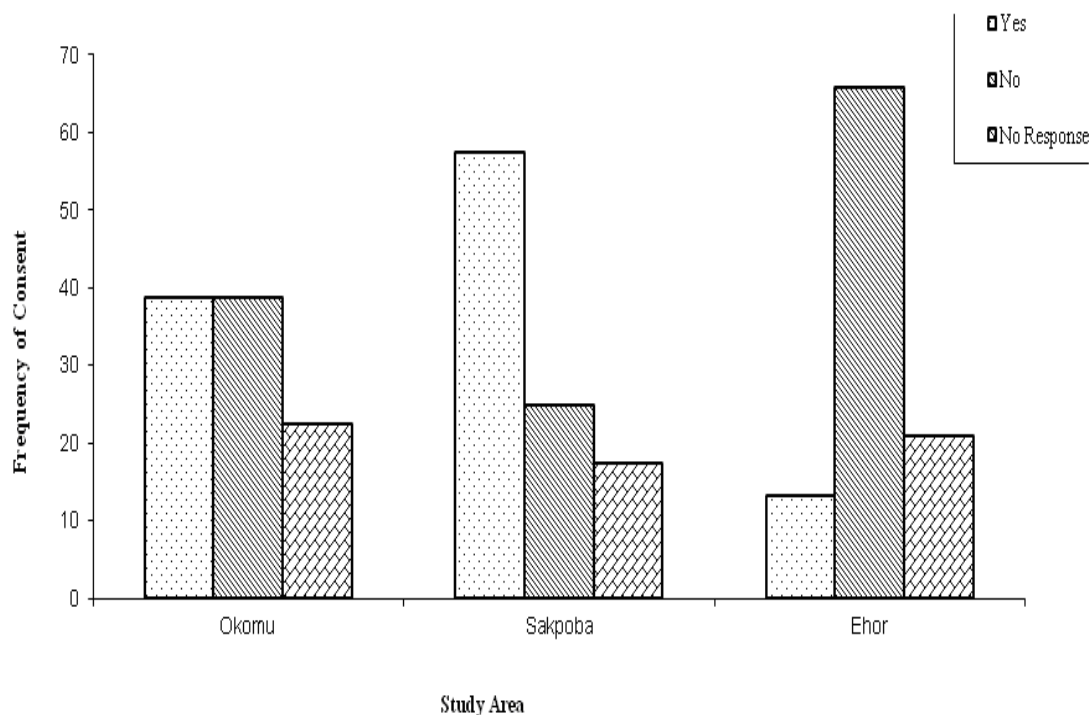


Figure 5. Distribution of Respondents' Consent to Planting Trees or Planting Trees



Interest in Forest Conservation

The interdependence of respondents on forests in the study area is obvious (Table 8): a majority sells (42.42%) and uses (70.71%) forest products, but do not plant trees (45.46%). Also, a majority (85.71%) consented to exploiting forest reserves in their environments, while the inherent community benefit associated with sustainable management of forest reserve is the most common reason for their interest in forest conservation. Therefore it will worthwhile to create a learning environment on sustainable forest management benefits among respondents if rural livelihood is to improve in the study area and by extension Nigeria.

Table 8. Respondents' Interest in Forest Conservation

	Okomu		Sakpoba		Ehor		Mean		Mode
	f	%	f	%	f	%	f	%	
Consent to Sale of Forest Products									
Yes	58	35.2	18	45.0	51	44.0	42	42.42	Yes
No	24	14.5	2	5.0	-	-	9	9.09	
No Response	83	50.3	20	50.0	40	56.0	48	48.49	
Consent to Use of Forest Products									
Yes	111	67.3	34	85.0	65	71.4	70	70.71	Yes
No	23	13.9	4	10.0	-	-	9	9.09	

No Response	31	18.8	2	5.0	26	28.6	20	20.20	
Plant Trees?									
Yes	64	38.8	23	57.5	12	13.2	33	33.33	No
No	64	38.8	10	25.0	60	65.9	45	45.46	
No Response	37	22.4	7	17.5	19	20.9	21	21.21	
Exploit Reserve?									
Yes	150	90.9	40	100.0	62	68.1	84	85.71	Yes
No	2	1.2	-	-	5	5.5	2	2.04	
No Response	13	7.9	-	-	24	26.4	12	12.25	
Identified Interest of Rural Dwellers in Forest Conservation									
For effective change	8	4.52	3	6.98	7	7.69	6	5.21	For community benefit
Better tomorrow	35	19.7	8	18.60	4	4.40	16	14.04	
To guard against misuse	2	1.13	-	-	1	1.10	1	0.88	
For community benefit	61	34.4	9	20.93	26	28.5	32	28.07	
For more experience	2	1.13	2	4.65	7	7.69	4	3.51	
For sustainability of forest	32	18.0	3	6.98	3	3.29	13	11.40	
To serve	-	-	1	2.33	-	-	-	-	
Time factor	-	-	-	-	6	6.59	2	1.75	
To improve National Economy	-	-	7	16.28	11	12.0	6	5.26	
Not employed	-	-	-	-	1	1.10	-	-	
No Response	37	20.9	10	23.26	25	27.5	31	27.19	

Source: Field Survey, 2009.

Inferential Test of Hypothesis

Chi-Square analyses (Tables 9, 10 and 11) revealed that the socio-economic status of rural dwellers affects their awareness of forest reserves, consent to use of forest reserves, residency, willingness to plant trees on farm land and exploitation of forest reserve in the study area.

Table 9. Summary of Chi-Square Analyses – Dependence of Residents Interaction with Okomu Forest Reserve on their Socio-Economic Circumstances

Socio-Economic Background of Respondents	Awareness	Use Reserve?	Why Reside in Village?	Plant Trees on Land?	Obtain Product from Reserve?
Gender	30.85 (4)*	13.41 (6)*	9.11 (14)	3.96 (4)	20.30 (4)*
Age	9.37 (14)	15.13 (21)	54.43 (49)	44.71 (14)	14.20 (14)
Ethnic Background	12.54 (14)	48.35 (21)*	105.86 (49)*	25.75 (14)*	14.25 (14)
Marital Status	7.93 (4)	4.78 (6)	11.81 (14)	10.32 (4)*	8.25 (4)

Religion	6.63 (6)	25.72 (9)*	29.84 (21)	2.13 (6)	4.45 (6)
Education	18.96 (10)*	16.13 (15)	90.79 (35)*	23.86 (10)*	9.09 (10)
Primary Occupation	33.12 (18)*	25.15 (6)*	27.04 (14)*	13.27 (4)*	0.34 (4)
Distance of Village from reserve	94.30 (18)*	132.46 (27)	107.73 (63)	54.19 (18)*	66.30 (18)

Note: * Test is significant at 0.05 confidence limit. Degree of freedoms are in parentheses

Table 10. Summary of Chi-Square Analyses - Dependence of Residents Interaction with Sakpoba Forest Reserve on their Socio-Economic Circumstances

Socio-Economic Background of Respondents	Awareness	Use Reserve?	Why Reside in Village?	Plant Trees on Land?	Obtain Product from Reserve?
Gender	0.05 (2)	0.18 (3)	0.84 (5)	3.08 (2)	-
Age	6.32 (12)	15.95 (18)	22.88 (30)	8.59 (12)	-
Ethnic Background	0.61 (6)	2.05 (9)	15.38 (15)	11.39 (6)	-
Marital Status	0.11 (4)	0.37 (6)	3.49 (10)	9.93 (4)*	-
Religion	1.26 (2)	2.73 (3)	3.60 (5)	1.99 (2)	-
Education	3.20 (8)	21.51 (12)*	35.28 (20)*	8.91 (8)	-
Primary Occupation	40.16 (8)*	20.28 (12)	53.00 (20)*	10.72 (8)	-
Distance of Village from reserve	26.63 (16)	36.54 (24)	68.59 (40)*	31.59 (16)*	-

Note: * Test is significant at 0.05 confidence limit. Degree of freedoms are in parentheses.

Table 11. Summary of Chi-Square Analyses - Dependence of Residents Interaction with Ehor Forest Reserve on their Socio-Economic Circumstances

Socio-Economic Background of Respondents	Awareness	Use Reserve?	Why Reside in Village?	Plant Trees on Land?	Obtain Product from Reserve?
Gender	-	2.02 (4)	11.19 (10)	10.08 (4)*	6.65 (4)
Age	-	10.08 (14)	42.09 (35)	18.96 (14)	7.94 (14)
Ethnic Background	-	0.65 (6)	22.17 (15)	12.82 (6)	7.28 (6)
Marital Status	-	0.12 (4)	92.34 (10)*	7.16 (4)	3.27 (4)
Religion	-	49.13 (6)*	15.04 (15)	10.04 (6)	19.39 (6)
Education	-	11.42 (8)		25.40	

Primary Occupation	-	0.12 (4)	3.49 (10)	10.47 (4)*	3.27 (4)
Distance of Village from reserve	-	17.89 (16)	71.87 (16)	9.07 (16)	41.86 (16)

Note: * Test is significant at 0.05 confidence limit. Degree of freedoms are in parentheses.

- Awareness is total in Ehor FR, hence no Chi-square statistics can be computed

However, not all identified socio-economic characteristics (dependent variables) affect the independent variables listed above. In Sakpoba (Table 9) the independent variables are only affected by gender, age, ethnic background and religion, which are very strong socio-cultural defines in any African society. Similarly in Ehor (Table 10), the independent variables are only significantly affected by ethnic and education background of the rural dwellers. But in Okomu (Table 11), none of the identified socio economic variables have any significant influence on the independent variables.

Awareness of and exploitation of forest reserves as well as willingness to plant trees will influence the participation of rural dwellers in the management of forest reserves. Thus, if these variables are functions of the socio-economic status of rural dwellers, participatory management of the reserves is expected to impact the economy of the study area, most especially in Sakpoba and Ehor forest reserve communities.

Conclusion

The socio-economic background of Edo State forests environments dwellers in relation to their land use activities influence participation in sustainable forest management. Land use activities in the reserves, which include farming, tree cropping, NTFPs gathering and *taungya*, significantly help to sustain population in the study area. To this end, deep understanding of land-use patterns of forest edge communities will provide a basis for seeking their participation in forest and woodland management. In the same vein, and given the fact that sustainable livelihood is an integral part of any forest conservation effort, education on the interdependency of renewable natural resources and anthropogenic activities is increasingly an imperative enterprise. Likewise, since socio-economic factors play an important role in conservation education and to a large extent enlisting the supports of local people to forest conservation, it will be worthwhile to create a learning environment on sustainable forest management benefits among forest edge communities if rural livelihood is to improve in the study area and other areas with similar socio-economic context in the tropics.

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Appendix 1. Sampled Villages and Enclaves Within and Around the Study Sites

S/No	Okomu FR	Population
1	A.T. & P Camp.	1195
2	Ajakurama	2064
3	Gbelebu	1340
4	Gbelemotin	471
5	Gbolomosho	244
6	Iguagbado	346
7	Iguelaho	1387
8	Iguelaho camp	737
9	Iguerhahon	563
10	Iguohuan	432
11	Izide - Namen	345
12	Izide - Noke	418
13	Madagbayo	846
14	Nikrowa	3663
15	Ofunama	2330
16	Okomu	1160
17	Ora	560
18	Udo	6714
19	Urhezen	675
Total		25490

S/No	Sakpoba FR	Population
1	Adeyanba	1137
2	Akpajigha	297
3	Akpobi camp	225
4	Amaladin	104
5	Avbiugo	694
6	Evbuehia	395
7	Evbueka	484
8	Evbuosa	347
9	Idu	221
10	Iguere	478
11	Iguomokhua	717
12	Ikobi	640
13	Ikpe	98
14	Obyantor	367
15	Oben	1027
16	Obozogbe - Niro	1523
17	Okporu camp	39
Total		8793

S/No	Ehor FR	Population
1	Ehor	7191
2	Eke - Aimufua	421
3	Ekudo	200
4	Erhua	1248
5	Idunmwungha	1060
6	Iguo-Ovbiahiamwen	875
7	Inner Erhua	663
8	Irhue	786
9	Ofunmugbe camp	288
10	Obagie	1967
11	Okemuen	592
12	Egbisi	204
13	Obazagbon	476
14	Ugbiyaya camp	665
15	Iriwe camp	283
16	Ayen	872
Total		17791

S/No = Serial Number