

**HOUSEHOLD INCOME OF RESIDENTS AS A DETERMINANT OF FOREST
RESOURCE CONSERVATION IN THE SUPPORT ZONE COMMUNITIES
OF OKWANGWO DIVISION OF CROSS RIVER NATIONAL PARK**

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Abstract

This paper examined the influence of house hold income as a determinant of forest resource conservation in the support zone communities of Okwangwo Division of Cross River National Park, Nigeria. One hypothesis was formulated to guide the study. Literature review was carried out based on the variable. Survey design was adopted for the study. Purposive and simple random sampling techniques were used in selecting the 10 communities and the 295 respondents for the study. To collect data, the researcher designed and validated a 10 items four point modified likert scale questionnaire for data collection. The reliability estimate of 0.88 was established using Cronbach Alpha Reliability method. Analysis of variance and multiple regression statistical tools were used for data analysis at 0.05 level of significance with various degrees of freedom. The result of analysis revealed that there is a significant influence of household income on forest resource conservation in the study area. Among the recommendations made in the study based on the findings was that indigenes in support zones communities of Okwangwo forests should be included in any forest conservation programme which would be designed to improve their income level and at the same time conserve forests resources within their domain.

Key words: House hold income, Forest resource conservation, Support zone community, Cross River National Park (CRNP), Okwangwo

Introduction

Nigeria is blessed with very rich biological diversity. As a result of the wide variety in physical environment, climate and vegetation zones, the country is endowed with a great variety of ecosystems and habitats and a number of unique species that are found mostly in Nigeria. However, the country has always had a relatively high population with a corresponding high demand for agricultural land. By the end of the nineteenth century, the pressures on natural areas arising from bush fallow cultivation and other factors were becoming noticeable and protective measures were considered necessary.

Forest resource conservation has assumed a significant position in global debates and conferences due to excessive exploitation of environmental resources and the consequences this has on the environment. Since natural resources are finite and exhaustible, there is an overwhelming need to maintain a balance between resources and population. There are challenges of forest resource conservation that are calling for attention such as: cultural practices, unemployment and poverty which have resulted to unabated encroachment in the protected areas. Deforestation is another problem that is

said to be deleterious to forest resources, as it causes grave dangers to the forest and often causes flooding or erosion. Illegal logging of forest woods by people living around the forest; poaching and other forms of encroachments; over-exploitation resulting to loss of animal habitat and increased water temperatures, timber extraction, mining, dams and their effects on forest and tribal people are equally posing threat to forest resource conservation.

Shater, Alves, Bergstrom and Bruford (2015) observed that the rate at which the tropical rainforest and its valuable resources are exploited and depleted is increasing; there is need to restore the lost of forest resources. Forest conservation brings about the protection of forest resources from reckless exploitation, wanton destruction as well as enhancing effective management of the forest resources sustainably for continuous benefit and posterity. Protected areas establishment, however affect the sustenance of the rural population that relies on the forest for agriculture, energy, medicinal and other human needs. Due to the lack of resources, poor management practices and ineffective legal systems in the state of protected areas' management in developing countries has worsened.

A notable challenge is that dense human settlements intercept areas of importance to critical conservation. This has become necessary that conservation managers implement a management plan that will consider the scope of communities' dependence on forest resources from the protected areas and assess the perception of the various stakeholders with regards to appropriate strategies to be applied. Biodiversity conservation, ecotourism activities, genetic resource preservation, scientific research and development in addition to its species abundance was the central thought that specifically guided the design of the Okwangwo Division of Cross River National Park. Okwangwo contains a number of other important species, such as the Nigeria-Cameroon chimpanzee, drill, preuss's guenon, forest elephant and the grey-neck rock fowl.

In this dimension, it was observed that the natural status of the park is at risk considering the actions and inactions of the indigenous forest inhabitants surrounding it. As the researcher sometimes in 1993/94 joined the first staff team of the Cross River National Park to the unit headquarters of Okwangwo Division, Butatong for conservation education, sensitization and awareness creation through rallies, town hall meetings, dramatization etc. There was a continuous demand for the provision of alternative means of livelihood to allow the restriction laws be effective in the conservation efforts. Then, livestock were provided to discourage hunting, school buildings were renovated, textbooks/exercise books as well as school uniforms and desks were provided. Yet as time goes by, there is still penetration into the protected area for various forest resources for the people's use, and there is still high demand for provision of alternative means of livelihood to meet their socio-economic needs.

Therefore, it was obvious that the greater the importance the indigenes attach to the park, the more secured the park becomes and hence the idea of the park's "support/buffer zone" was adopted. Socio-economic factors embrace the social and the economic status of the populace as indicated by income, education, family size and occupation. Environmental concern and social class are related and are associated with individuals' attitudes toward their basic material and physical needs. Once the essential needs are met, other forms of indulgence like higher standard of living will be demanded for leading them to seek for more aesthetic gratification (quality of life) to help them restore and enhance a healthier environment. The decisions that the indigenes of the support zone communities in Okwangwo make in regards to the use of forest resources are strongly

influenced by the desire to improve the livelihood, especially households' income and other variables.

The greatest threat to the environment and the forests is caused by poverty whereby people's basic needs for adequate food, shelter, education and health are not met. The people's effort to obtain resources to meet their basic needs lead to the destruction of forest resources. The negative attitudes of the people toward forest conservation in the area make it difficult for conservation activities to take place. It is disturbing to realise that, despite the level of education of most of the people in the area, and the expectation from the society to act in ways that would enable them show positive attitudes toward forest resource conservation. Most of them still deplete the forest resources, and show negative attitudes toward forest conservation as their mind are not adequately enlightened to know the consequences of their actions on the forest resources.

Forest resource utilization is as old as humankind and will remain increasingly important to succeeding generations especially in developing countries of the world. Forest resource is one of the most exploited natural resources in the Okwangwo Division of Cross River National Park and the state in general. Human dependence on forests is a multifaceted phenomenon. The degree of reliance on forests varies geographically, overtime and across communities. These dynamics underpin the importance of understanding the determinants of household reliance on forests for long-term sustainable forest management and conservation (Garekae, Thakadu & Lepetu, 2017).

In a study undertaken by Ofoegbu, Chirwa, Francis and Babalola (2017) in Vhembe District of South Africa, to investigate the influence of households' dependence on forest resources and associated implications on forest conservation interventions. Proportionate stratified random sampling was used to select 366 households from forest based rural communities. The Pearson's chi-square test was used to analyse the factors that influence household dependence on forest for income generation. The effects of household incomes dependence on forest resources were determined by using the binary logit model. Up to 97% of the respondents depended on the forest resources predominantly because of low costs associated with using them. It was observed that household incomes sources were based on farm husbandry, skills in harvesting non-timber products (NTPs), years of residence in the communities and age of respondents (38-65) significantly ($P < 0.05$) influence use of the forest resources. Thus, effectiveness and sustainability of forest conservation intervention initiative can be promoted if the socio-economic conditions prevailing within households in the areas next to forests are improved especially with the low income earners or poor rural dwellers.

The income level of local households has a great influence on forest resource conservation. Tacconi (2011) states that, rural households are rarely the targets of forest conservation efforts because their impact on forest is a cumulative result of millions of household resources all of which are identified agents in forest degradation which can be amenable to intervention. Harvesting of Non-Timber Forest Products (NTFPs) is noted to constitute the major economic engagement of the poorest people around the world. According to FAO (2003) on its writing on the state of the world forest, pointed out that, NTFPs provide a wide variety of commodities for home use as well as for the market which include among other things: games, fruits, nuts, herbs, forage, thatch, medical herbs and edible leaves. The report further shows that, forest resources require less capital for their extraction and are obtainable in semi open access and open access circumstances. That in one perspective, NTFPs could be considered as a safety refuge for they become sources of livelihood sustenance in periods of severe economic hardship occasioned by

such phenomenon as: flood disaster, drought, crop failure, crop destruction by animals and disease, conflicts and wars.

Also Langat (2016) in their study on the role of forest resources to local livelihoods in Kenya, they obtained a forest use data by interviewing 367 households, where forest product market survey was undertaken to determine prices for various forest products for valuation of forest use. The result shows that, forest income was significant to households contributing 33% of total household income, fuel wood contributing 50%, food 27%, construction materials 18%, fodder and thatching materials 5% to household incomes. They opined that, poor households were more dependent on forest resources, however, in absolute terms, the rich households derive higher forest income. The results provide value information on the role of forest resources to livelihoods and could be applied in developing forest conservation policies for enhanced ecosystem services and livelihoods. Planners (2012) equally noted that, high income earners also exploit the forest resources in the area of intensive agriculture which hinders many aspects of the natural environment, e.g., forest degradation. Apart from sustained increased in forest resources demand, that could lead to the destruction of the resource base; planners and researchers can promote the production on estates of plantations outside forest or the manufacturing of synthetics which are more viable than NTFPs.

Various factors are known to influence forest resource conservation in the rural communities. It has been differently identified that non forest/farm products, job opportunities, income from agriculture, influence from outside markets, household size and education had a proportionate influence towards forest dependency (Gunatilake, 1996; Hedges & Enters, 2000). These results have been confirmed in studies across national parks in Nigeria as well as Cross River National Park (Mamza 2006; Marguba 2002 & Ite, 1996). The proponents observed that, protection policies are affected by high dependence on protected areas resources and poverty generates negative attitudes towards forest/wildlife protection. But that, better education and other benefits from protected areas when properly administered can result in more optimistic attitudes towards forest resource conservation. In a related study, Heinen (2003) emphasised that provision of rights to collect forest products and education enhance positive attitudes toward forest conservation. However, it has been variously revealed that crop raids by animals, restriction on gathering of fuel wood and grazing to have adverse impacts on conservation in the wildlife reserve in Kosssi-Tappu, Nepal. Moreso, greater dependence on bush meat, loss of livestock and crop raid often lead to greater negative conservation attitudes. Other studies like that of Mheta and Heinen (2001) confirmed that, profits from tourism, gender and educational level and wildlife hunting issues were strong predictors of local attitudes toward conservation.

A study carried out by Buyuiza and Byakaba (2014) in Masindi District, North Western Uganda to establish the role played by local people in the management of forest outside protected areas and to determine local forest resource use and conservation. A sample of 160 (98 males and 62 females) respondents was selected from 16 Parishes in 4 sub-countries of Masindi District. Participatory rural appraisal (PRA) tools which include direct interviews and questionnaires were used in data collection. The results obtained using the Chi-Square (X^2) and cross tabulations test suggested that both men and women play important roles in community-base forest management at different level.

They observed that, the people's willingness to participate in forestry management is dependent on income level, literacy level and ethnic background. Indigenous conservation practices by local communities in different Parishes mainly focused on tree growing practices. That, commitment-oriented forest management system

should be integral part of the national forest plans. Therefore, communication linkages should be established between government agencies and user groups such as the rural women and low income households that heavily depend on forest resources for their livelihoods. Greenbolt (2012) stated that, more than 10,000 years after Agricultural revolution started, millions of rural small holders derive as much income from foraging forest and wild lands from cultivating crops. That, this steady flow in environmental or forest resources incomes often from public forests is noticed.

According to Otu, Judith, Joseph, Eja & Eja (2011), researchers and development policy circles are becoming much more important and even outweighing farm income in many small holders' settings. This made rural household to increasingly benefit from wage-employment in agriculture, mining, or service sectors and small business enterprise. Forest resource exploitation could be seen in capitalist system of government where the capitalist who is a high income earner with sophisticated technology exploit forest resources faster and efficient than a low income earner (Pegg, 2014).

The review showed that high level income earners tend to exploit forest resources more than the low income earners or the rural poor. From the literature review on household incomes and forest resource conservation, various areas were considered. The literatures have some exceptions on the views that, the high-income earners exploit forest resources more than the low income earners and the poor residents. The results might not be completely valid or true, because the low income earners or poor rural dwellers tend to penetrate the forests most to extract resources that can help them take care of their families, thereby, exploiting, and degrading the forest resources to earn incomes for their living. Also, there is limited literature on this variable since a few researchers carry out studies on household incomes and forest resources conservation as most of them generalise it on household forest dependence covering other variables too. The researcher seeks to bridge the gap that, the influence of household incomes on forest resource conservation is relative to both high level and low level income earners depending on the available resources they can get to meet their income needs.

In attempts to address these issues, governments at various levels have designed forest policies and regulations geared towards ensuring effective forest resource management and conservation. Also, different development agencies and Non-governmental organizations (NGOs) are equally engaging the people in conservation education, creation of awareness and sensitization to enable them have positive attitudes toward forest conservation. Despite the efforts of government toward forest resource conservation through the implementation of forest regulations. There is still rampant commercial logging, unsustainable agricultural activities, indiscriminate hunting and poaching in the area. That is why the study is aimed at answering this fundamental question, how does socio-economic factors influence forest resource conservation in the Okwangwo Division of Cross River National Park?

Methodology

The research design be adopted for this study is the survey design. The study area is the Okwangwo Division of Cross River National Park. It lies between longitudes 5° 05' -6°29' N and Latitudes 8°15' -9°30' E. It is bounded to the North by Obudu-Obudu Ranch, to the South by the Cross River National, to the East by Cameroon Frontier and to the West by Ikom-Obudu Highway. The office location is at Butatong in Boki LGA. The Okwangwo Division of the Cross River National Park (CRNP) is located in the North-Central part of Cross River State. It is named after the former Okwangwo Forest Reserve. To the east of the Mbe Mountains and separated from them by the Okorn River, lies the Okwangwo

Division of CRNP, established in 1991. Managed by Nigeria National Park Service, the Okwangwo Division is one of the two widely separated divisions of the National park (the other being the Oban Division to the South), although gorillas are only found in the Okwangwo Division. Okwangwo was created by amalgamating three former Forest Reserves (Boshi extension, Okwa Hills and Okwangwo Reserve) and covers an area of 1000km².

The purposive and simple random sampling techniques were adopted for this study. The sample for this study was 295 respondents out of the total of 2981 registered farmers from the ten randomly selected communities of out of the 66 support zone communities in Okwangwo Division of CRNP. The instrument used for this study is the structured questionnaire. A 10-items questionnaire was designed by the researcher. In order to analyse the data, the raw scores of all the items in each variable were summed together to show the result for each variable. Data was analyzed using Statistical Package for Social Sciences (SPSS) program version 19. Hypothesis was tested at 0.05 level of significance (i.e. 95% confidence interval). One Way Analysis of Variance (ANOVA) was the statistical tool used for data analysis.

Result and discussion

The hypothesis for this study stated that there is no significant influence of household income of the residents on forest resource conservation. The independent variable in this hypothesis is household income which is categorized into 18,000-30,000; 31,000-50,000; 51,000 and above. While the dependent variable is forest resource conservation. One way analysis of variance statistical tool was used for data analysis. The result of this analysis is presented in Table 1.

The result in Table 1 revealed that the mean score obtained by the 99 subjects whose income level is between ₦18, 000-₦30,000 was 3.442 with a standard deviation of .4868 is less than the mean score of 3.576 with a standard deviation of .1525 obtained by the 85 subjects whose income level is between ₦31,000 – ₦50,000 and this is also less than the mean score of 3.663 with a standard deviation of .1144 obtained by the 111 subjects whose income level is ₦51,000 and above. This implies that the higher the income level, the better the forest resource conservation practices among the residents of Okwangwo Division of Cross River National Park of Ikom Education Zone.

The result of analysis as presented in Table 1 showed that the calculated F-value of 14.016 is greater than the critical F-value of 3.04 at 0.05 level of significance with 294 degree of freedom. This implied that the null hypothesis was rejected. Therefore, there is a significant influence of household income on forest resource conservation in Okwangwo Division of Cross River National Park in Cross River State.

Table 1: One-way analysis of variance of the influence of household income of the residents on forest resource conservation in Okwango Division of Cross River National Park

Household income	N	\bar{X}	SD		
18,000-30,000	99	3.442	1.4868		
31,000-50,000	85	3.576	1.1525		
51,000 and above	111	3.663	1.1144		
Total	295	3.564	1.3150		

Source of variance	SS	Df	MS	F-ratio	Sig.
Between groups	2.566	2	1.283	14.016*	.000
Within groups	26.613	292	.091		
Total	29.179	294			

Significant at 0.05; df = 294; Critical – F = 3.04

Since the result of this analysis was significant, a Fisher's protected t-test analysis was carried out to determine where the significant difference was highest among the various categories of household income used in the study. The result of this analysis is presented in Table 2. The result of the Fisher's protected t-test analysis as presented in Table 4 revealed that the mean score in forest resource conservation among the subjects who earn between 18,000-30,000 differ significantly in absolute sense when compared with that of those who earn between 31,000 – 50,000 naira as income in favour of those who earn between 31,000 – 50,000 naira as income (MD = -.1340; $p < .05$) and also differ significantly when compared with the mean score of those who earn 51,000 and above in favour of those who earn 51,000 and above (MD = -.2206*; $p < .05$). The result finally revealed that the mean score in forest resource conservation among the subjects who earn between 31,000 – 50,000 naira as income differ significantly in absolute sense when compared with the mean score of those who earn 51,000 and above in favour of those who earn 51,000 and above (MD = -.0866*; $p < .05$). Based on these, the source of the difference was basically from all the various household income categories but was more from those that earn 51,000 and above as income.

The finding from analysis of hypothesis one revealed that there is a significant influence of household income on forest resource conservation across communities within the Okwango Division of CRNP with the result suggesting that the lower the income, the poorer the resource conservation practices. The source of the difference was determined using a Fisher's protected t-test and it was revealed that the source of the difference was from the category of those who had first degrees and above.

Table 2: Fisher's protected t-test of the influence of household income of the residents on forest resource conservation in Okwangwo Division of Cross River National Park

Household income	Joint	Mean difference	Significant
18,000-30,000	31,000-50,000	-.1340	.003
	51,000 above	-.2206*	.000
31,000-50,000	18,000-30,000	.1340*	.003
	51,000 above	-.0866*	.048
51,000 above	18,000-30,000	.2206*	.000
	31,000-50,000	.0866*	.048

*Mean difference is significant at 0.05

This meant that those in the aforementioned category had statistically significant higher means when being compared with the means of those from other categories of household income level while the means of those in the other categories were statistically significant when being compared with each other in the following decreasing order – 18,000-30,000, 31,000-50,000.

May be, this result could be as a result of the mediating factor of the mentality pattern which is presumed to accompany the acquisition of various levels of income. Those with more income are presumed to be more concerned with how they will utilize the resources in a manner so that they will not run out of stock while those who survive on subsistence farming and collection of forest resources seemingly do not have much concern about utilizing the resources in a sustainable manner. This then could also serve to explain why it is easier for those having more to willingly donate for conservation related projects while those having less will have more difficulties doing such.

The finding of this result is in agreement with the finding of Langat, Maranga, Aboud and Cheboiwo (2016) who stated in their study that that, forests are important in the livelihoods of local people in most developing countries. Local people depend on forest resources for various products such as fuel wood, construction materials, medicine and food. The finding also supports the finding of FAO (2003) on its writing on the state of the world forest, pointed out that, forests provide a wide variety of commodities for home use as well as for the market which include among other things: games, fruits, nuts, herbs, forage, thatch, medical herbs and edible leaves. The report further shows that, forest resources require less capital for their extraction and are obtainable in semi open access and open access circumstances. That in one perspective, forests could be considered as a safety refuge for they become sources of livelihood sustenance in periods of severe economic hardship occasioned by such phenomenon as: flood disaster, drought, crop failure, crop destruction by animals and disease, conflicts and wars.

The finding of this result also supports the finding of Pegg (2014) who stated that the high income earners exploit forest resources more than the low income earners and the poor residents. However, the results might not be completely valid or true, because the low income earners or poor rural dwellers tend to penetrate the forests most to extract resources that can help them take care of their families, thereby, exploiting, and degrading the forest resources to earn incomes for their living.

The finding was not in agreement with that of Abdullahi (2012) who found out that annual income was not a significant indicator of indigenes' dispositions towards a reserve. The finding also contradicted that of Ratsimbazafy *et al.* (2012) who explored community forest resource utilization, attitude and perception towards forest co-

management and reported income level as an insignificant predictor of indigenes' tendencies towards conserving forest resources. The finding also disagreed with that of Mutanga *et al.* (2015) who reported an insignificant relationship between income level and voluntary agreement of participating in forest resource co-management.

Conclusion

The study aimed at finding out and presenting information on household income and forest resource conservation in the support zone communities of Okwangwo Division of Cross River State National Park. The findings from the study showed that there is a significant influence of household income of residents on forest resource conservation in the study area. The forest resource conservation has assumed a significant position in global debates and conferences due to excessive exploitation of environmental resources by being aware of the consequences this has on the environment. Since natural resources are finite and exhaustible, there is an overwhelming need to maintain a balance between resources and the population.

Recommendations

Based on the result of the study, it was recommended that indigenes in support zone communities of Okwangwo forests should be included in any forest conservation programme which would be designed to improve their income level and at the same time conserve forests resources within their domain. Again, indigenes within the Okwangwo division should be adequately and regularly sensitized through extension services on the need to desist from unsustainable logging and deforestation due to their impacts on forest conservation and management.

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