Socio-Economic Impact of Non-Timber Forest Products in Income Generation for Sustainable Forest Management in Gambari Forest Reserve, Oyo State, Nigeria.

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Abstract

Non-timber forest products (NTFPs) are vital to world food security mostly because of the dependence of majority of people especially the forest rural poor on forest products for food, shelter and other basic necessities. However, the sustainable production of many NTFPs is no longer assured in many places in which it is used and managed. Therefore, this study assessed the socio-economic impact of non-timber forest products in income generation for sustainable forest management (SFM) in Gambari forest reserve, Oyo state. Twenty households were selected from three communities (Ibusogboro, Gambari and Onipe) out of a total of ten communities in the study area using the simple random sampling procedure. The main targets were the household heads. A total of sixty respondents were selected for the study. Both primary and secondary data was used for this study. Primary data was collected through the use of questionnaire while secondary data was obtained from literatures and internet. The questionnaire was designed to elicit information on the socio-economic characteristics of the respondents, income generating opportunities, NTFPs available in the study area and socio-economic impact of income generating opportunities in enhancing rural livelihood. Data were subjected to descriptive statistics and logit regression. Result showed that majority of respondents is male with 61.7%, age class of 31-40 years (50.0%), married (56.7%), (31.7%) had no formal education, main occupation was farming (45.0%) and 55.0% have 11-15 years experience in NTFPs business. most abundant NTFPs were fuel wood (63.3%) and palm wine (43.3%). 28.3% of respondents generated income above ₦600,000/annum equivalent to US\$5.05 per day. Logistic regression indicated that high standard of living, high income (HI), basic health care (BHC), and provision of food (PF) was the most significant income generating opportunities with odds-ratio of 4.80, 3.30, 3.02 and 2.64 respectively. NTFPs in income generation can only be effective for sustainable forest management if forest resources are effectively managed.

Keywords: Forest reserves, Income, Livelihood, NTFPs, Rural communities, Sustainable forest management.

Introduction

The role of non-timber forest products (NTFPs) for sustainable forest management and poverty reduction has received increased attention for many years [3]. They play an important role in supporting household livelihoods and therefore can be used to raise the value of forest resources [11]. In Nigeria majority of rural households and a large proportion of urban households depend on NTFPs to meet some part of their nutritional health, construction materials and income generation for rural development, more equitable sharing of the benefits of forest and local participation in forest management [7].

In economic terms, NTFPs contributes substantially to national economic growth and international trade [17]; likewise, [19] reported that the NTFPs contributed around 68% of total monthly household income within Gambari forest reserve in Nigeria. [8] noted that rural women were found to be making ₦15,000/month from fruits gathering and sales from the forest for their household sustainability. It is therefore paradoxical that in spite of their real and potential value, most NTFPs remained grouped as minor products of forest management and is neither conducive to sustainable management of the forests. Therefore, this study is aimed at assessing the socio-economic impact of non-timber forest products in income generation for sustainable forest management in Gambari forest reserve, Oyo state, Nigeria.

The Study Area

The study was carried out in Gambari Forest reserve; located between Latitudes $7^{\circ}4'N$ and $7^{\circ}14'N$ and Longitudes $3^{\circ}42'E$ and $3^{\circ}56'E$ within the low land semi-deciduous rainfall belt of Nigeria and cover a total land area of 17,984ha. The topography of the study area is generally undulating, lying at an altitude between 90m and 140m above sea level. The annual rainfall ranges between 120mm to 130mm spreading over March to November. The dry season is severe and the relative humidity is low (about 42.3%) and average annual temperature is about $2.64^{\circ}C$ [18].

Data collection and Analysis

Sampling procedure

Simple random sampling was used to select three communities out of ten communities around the reserve namely; Ibusogboro, Gambari and Onipe. Twenty households were further selected randomly from each community making a total of sixty households. The main targets were the household heads. Therefore a total of sixty respondents were selected for the study. Both primary and secondary data was used for this study. Primary data was collected through the use of questionnaire while secondary data was obtained from literatures and internet. The questionnaire was designed to elicit information on the socio-economic characteristics of the respondents, income generating opportunities, NTFPs available in the study area and socio-economic impact of income generating opportunities in enhancing rural livelihood. Data were subjected to descriptive statistics and logit regression. The binary logistic models are very useful in situations where the dependent or response variable is binary in nature. This implies that they can have only two possible values. The models therefore describe the relationship between one or more continuous independent variable(s) to the binary dependent variable. Distinct information provided by logit is the odds ratio. It is defined as the ratio of the odds of an event occurring in the group to the odds ratio of it occurring in another group [10]. Logit also provides information on the consequences of one variable on the other. Hence, it clearly indicates the income generating opportunities that is most effective in enhancing rural livelihood. The logistic model of a response p between 0 and 1 is given as:

$$\text{Logit}(p) = \log\left(\frac{p}{1-p}\right) = \log(p) - \log(1-p) \text{----- (Equation 3.3)}$$

The simplest form of logistic model is expressed as:

$$\text{Logit}(p_i) = a + b_1x_1 + \dots + b_{16}x_{16} \text{----- (Equation 3.4)}$$

Where:

P_i = Socio-economic impact of income generating opportunities in enhancing rural livelihood (SIGOERL)(Dependent variable)

x_i = vector of predictor or independent variables

a and b = regression parameters

In binary choice models, the two possible results are assigned values of 1 or 0. In this study, respondent that said yes to socio-economic of income generating opportunities in enhancing rural livelihood was assigned a value of 1 and respondent that said no to socio-economic impact of income generating opportunities in enhancing rural livelihood was assigned a value of 0. The parameter estimation for this study was done using Quasi-Newton method under logistic regression (logit) option of STATISTICA version 5 Software. Models to be tested were obtained by fitting all the independent variables together and backward elimination was done to obtain the best subset model. Emphasis was placed on keeping the model as simple as possible and selecting combinations of independent variables which make practical sense. In this study, the binary logistic regression analysis was used to investigate the socio-economic impact of income generating opportunities in enhancing rural livelihood. The opportunities investigated were: High income (HI), High standard of living (HSL), Provision of food (PF), Provision of employment (PE), and Basic health care (BH). The resulting models were evaluated using the chi-square goodness-of-fit statistics [10;13]. The Final Loss on accuracy was computed using maximum likelihood estimation method and odds ratio [10].

Results and Discussion

Table 1: Socio-economic characteristic of respondents in the study area

Characteristics	Frequency	Percentage
Sex		
Male	37	61.7
Female	23	38.3
Total	60	100
Age		
<20	1	1.7
21-30	11	18.3
31-40	30	50.0
41-50	8	13.3
51-60	3	5.0
>60	7	11.7
Total	60	100
Marital status		
Single	15	25.0
Married	34	56.7
Widow	6	10.0
Divorced	5	8.3
Total	60	100

Educational status		
No formal education	11	31.7
Primary	16	26.7
Secondary	14	23.3
Tertiary	19	18.3
Total	60	100
Occupation		
Farmer	27	45.0
Artisan	7	11.7
Logger	4	6.7
NTFP collector	12	20.0
Trader	10	16.7
Total	60	100

Source: Field survey, 2015

Table 1 showed the socio-economic characteristics of respondents in the study area. The sex distribution of respondents in the study area showed that majority of respondents is male with 61.7% while the female respondents had a lower percentage of 38.3%. This might be due to the fact that males are more energetic considering the tasking nature of the farming activities as a means of sustaining their families. This therefore supported the findings of [15], who stated that the males are more actively involved in farming than their female counterparts and also the findings of [12] stated that men generally have greater access to cash economy from farming activities. The result on age distribution of respondents revealed that majority (50.0%) of the respondents in the study area fall within the age class of 31- 40 years. This was followed by those who are within the age class of 21-30 years with 18.3%. However, the least age recorded in this study was those that fell below 20 years of age with 1.7%. This is an indication that most of the respondents are within the active age group. As well they are young, agile, full of vigour and strength to carry out the laborious activities involved in agricultural production/ collection of NTFPs thereby raising income to sustain their daily needs. Marital status of respondents revealed that majority of respondents is married with 56.7% while the least number recorded are those respondents that are divorced with 8.3%. The high percentage of the married may be due to the fact that majority of rural households practice polygamy. This therefore agreed with the findings of [14] who stated that majority of the married are mostly engaged in farming activities in the rural areas. With reference to educational level of respondents, it was revealed that majority (31.7%) of respondents had no formal education. This was followed by those that had primary education with 26.7%. However, those that had one form of tertiary education or the other recorded the least percentage with 18.3%. It therefore supported the findings of [5] who reported that though education is an engine for development, it is not necessarily needed for the forest dependent communities as their utmost concern is the easy, cheap and readily available farm practice and NTFP gathering with which to generate income. It was also revealed that the main occupation of the respondents in the study area was farming which had the highest percentage of 45.0%. This was followed by the non- timber forest products gathering with 20.0% while the least number of respondents were those who engaged in logging activities with 6.7%. This implies that forest activities in the study area are propelled by majority of the farmers as they daily source for means of sustaining themselves, this corroborated the findings of [4] who reported that farming is the major economic activity in the rural areas.

Table 2: Respondents years of experience in NTFPs business in the study area

Years of business	Frequency	Percentage
0-5	11	18.3

6-10	16	26.7
11-15	33	55.0
Total	60	100

Source: Field survey, 2015.

Table 2 showed the years of experience in NTFPs business. It was indicated that majority (55.0%) of respondents had been in the business for 11-15years, while those with 0-5 years experience recorded the least percentage (18.3%). This might be due to the great role played by NTFPs in meeting food and other basic needs of the rural populace. This therefore corroborated with the findings of [11] that rural populace depend on the NTFPs for a large number of their basic necessities of life.

Table 3: Available NTFPs in the study area

Available NTFPs	Frequency	Percentage
Fuel wood	Yes 38	63.3
	No 22	36.7
	Total 60	100
Fruit	Yes 17	28.3
	No 43	71.7
	Total 60	100
Mushroom	Yes 16	26.7
	No 44	73.3
	Total 60	100
Snail	Yes 9	15.0
	No 51	85.0
	Total 60	100
Palm wine	Yes 26	43.3
	No 34	56.7
	Total 60	100
Sponge	Yes 12	20.0
	No 48	80.0
	Total 60	100
Honey	Yes 9	15.0
	No 51	85.0
	Total 60	100
Vegetable	Yes 18	30.0
	No 42	70.0
	Total 60	100
Wrapping leaf	Yes 19	31.7
	No 41	68.3
	Total 60	100
Shea butter	Yes 14	23.3
	No 46	76.7
	Total 60	100
Medicinal plants	Yes 8	13.3
	No 52	86.7
	Total 60	100

Ropes	Yes	6	10.0
	No	54	90.0
	Total	60	100
Gums	Yes	5	8.3
	No	55	91.7
	Total	60	100

Source: Field survey, 2015.

Table 3 showed the NTFPs available in the study area. Fuel wood was the most abundant NTFPs with 63.3%, followed by palm wine (43.3%) while the least was gum with 8.3%. The high percentage recorded in fuel wood may be due to the fact that fuel wood was mostly collected and used by rural households as source of fuel energy and also for sale to generate income for their daily needs. This result corroborated the findings of [16], who reported that forest biomass has remained the most common source of household energy in Nigeria, meeting 80% of domestic energy requirements.

Table 4: Income generated (₦)/annum from the sale of NTFPs in the study area

Income generated (₦)	Frequency	Percentage
100,000-190,000	6	10.0
200,000-290,000	8	13.3
300,000-390,000	13	21.7
400,000-490,000	5	8.3
500,000-590,000	11	18.3
Above 600,000	17	28.3
Total	60	100

Source: Field survey, 2015.

Table 4 revealed income generated from NTFPs per annum by respondents in the study area. Majority (28.3%) generated above ₦600,000/annum while a few respondents (8.3%) generated between ₦400,000 - ₦490,000. The amount generated from gazetted forest reserves in the study area was an indication that the respondents generated income from the sale of NTFPs to sustain their needs. However, if forest resources are sustainably and effectively managed it can serve as a sustainable means of income generation especially for forest dependent communities as well as its urban counterpart. This result therefore corroborated the findings of [6] who reported that forest resources do not only play a role in the subsistence economy, but also have the potential and real contribution to the economies of many developing countries and household food security and the findings of [2] that the forest also contribute to poverty alleviation through generation of income, providing food and improved nutrition, medicine and foreign exchange earnings.

Table 5: Computation of income (₦/\$) generated per day by respondents in the study area.

Amount (₦)	Frequency	Percentage	Amount (₦) per day	Amount (US\$) per day
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100,000-190,000	6	10.0	397.26	1.13
200,000-290,000	8	13.3	671.23	1.92
300,000-390,000	13	21.7	945.21	2.70
400,000-490,000	5	8.3	1219.18	3.48
500,000-590,000	11	18.3	1493.15	4.27
Above 600,000	17	28.3	< 1767.12	< 5.05
Total	60	100	-	-

Source: Field survey, 2015,

Table 5 showed the computation of income per day in naira and dollars generated by the respondents in the study area. Income generated per day in naira and dollars by majority of respondents (28.3%) was above ₦1767.58 which was equivalent to US\$5.05 per day (where ₦350.00 = US\$1). Judging from the findings of [20] majority of respondents can be categorized as living above the poverty level. This corroborated with the findings of [1] that rural households spend income generated from the sale of NTFPs to buy food to maintain their families.

The binary regression model obtained for socio-economic impact of income generating opportunities in enhancing rural livelihood

$$\text{SIGOERL}_{(\text{Gambari forest reserves})} = 1.74 + 1.37\text{HI} + 1.69\text{HSL} + 0.08\text{PF} + 0.02\text{PE} + 1.89\text{BH} \text{-----}(1)$$

N = 60, Final loss = 17.00, Chi – square (df, 5) = 10.92, p = 0.0128

Odds – ratio (Unit change): Constant (5.00); HI (3.30); HSL (4.80); PF (2.64); PE (1.18); BHC (3.02).

The model 1 presented for socio-economic impact of income generating opportunities in enhancing rural livelihood gave an overall significant fit to the data judging from χ^2 value that was significant at $p < 0.05$. However, high standard of living (HSL) was the most significant income generating opportunities with odds-ratio of 4.80, followed by high income (HI), basic health care (BHC), and provision of food (PF) with odds-ratio of 3.30, 3.02 and 2.64 respectively (Table 6). The result obtained from the logistic regression analysis indicated that the parameters in the model were statistically significant. There was sufficient evidence that the estimated coefficients were not zero for independent variables. This implies that the regression parameters in the model were statistically significant. However, the higher the value of odds-ratio, the more likelihood the variable contributes to the socio-economic impact of income generating opportunities in enhancing rural livelihood study area. This implication was corroborated by [10;13] that the logistic model provides information on the consequences of one variable or the other.

Table 6: Logistic binary nature for socio-economic impact of income generating opportunities in enhancing rural livelihood in Gambari forest reserve

Dependent variable (SIGOERL) = Socio-economic impact of income generating opportunities in enhancing rural livelihood (Yes = 1; No = 0)

Independent variables	Coefficients	Odds-ratio
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High income (HI)	1.37	3.30*
High standard of living (HSL),	1.69	4.80*
Provision of food (PF),	0.08	2.64*
Provision of employment (PE),	0.02	1.18
Basic health care (BHC).	1.89	3.02*
Model $X^2(df = 5)$		

*= significant at $p < 0.05$

Conclusion

The study which focused on the socio-economic impact of income generating opportunities in enhancing rural livelihood revealed that majority of the respondents in the study area were males, age between 31-40 years while 60 years and above were minority. However, the married had the highest percentage with majority having no formal education. Farming and forest product gathering were the major occupations in the reserve. The study also showed that the most available NTFPs in the study area were fuel wood and palm wine. Income generated from these NTFPs was above ₦60000/annum. In addition, high standard of living (HSL) was the most significant income generating opportunities followed by high income (HI), basic health care (BHC), and provision of food (PF) indicating that income generating opportunities has a great socio-economic impact in enhancing the livelihood of rural dwellers in the study area. Therefore, these income opportunities can only be effective for sustainable forest management if forest resources are effectively managed as a means of sustainable livelihood for forest dependent communities in the study area.

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