GLOBAL JOURNAL OF PURE AND APPLIED SCIENCES VOL. 7, NO. 2, MARCH 2001:345-350
COPYRIGHT (C) BACHUDO SCIENCE CO. LTD. PRINTED IN NIGERIA. ISSN 1118-0579

AN ECONOMIC ANALYSIS OF WOMEN'S DEPENDENCE ON FOREST RESOURCES IN THE RAINFOREST COMMUNITIES OF SOUTH- EASTERN NIGERIA.

FRANCIS E. BISONG & ANIM O. AJAKE

(Received 31 January 2000; Revision accepted 30 November 2000)

ABSTRACT

The contribution of non-timber forest products (NTFP) to household income, employment and livelihood improvement opportunities of the rural women was assessed by the Participatory Rural Appraisal (PRA) and household questionnaire survey techniques.

Analysis of field data revealed that rural women derive more income from forest product gathering than from non-forest related activities, with forest products accounting for 56% of total monthly income, while non forest related activities accounting for 44% of total income. Also a multiple regression analysis of these forest products indicates that the *Irvingia gabonensis* (bush mango), *Elaeis guineensis* (oil palm), *Achantina marginata* (snail) and *Gnetum africanum* (afang) accounted for the highest production of the rural women's total monthly income from the NTFP sources with values of about N4,464; N3,571; N2,602 and N2,865 respectively.

The implication of this result is that these NTFPs should be exploited on sustainable basis, otherwise a decline in their stock would greatly affect the socio-economic livelihood of the rural women. It is therefore recommended that sustainable forest management practices should not underestimate NTFP resources as against the present focus on timber resources. More conservation efforts should be focused on the sustainability of the non-timber forest products that are most significant to rural earnings, if poverty alleviation is to become an integral component of sustainable forest management programmes.

KEYWORD: Women, Forest Resource, NTFP's, income, Sustainability.

INTRODUCTION

Several studies have investigated the importance of natural resources and their socio-economic benefits to the rural population in the rainforest zone, both in aggregate and regional terms (FAO, 1978; FAO, 1987 and Rodda, 1991). Many of these studies conclude that there are differential benefits of the forest in terms of energy requirement for domestic and industrial activities (FAO, 1987); food consumption (Falconer, 1990); income earnings (Unasylva, 1995); medicinal value (WWF, 1990) and employment opportunities (Bisong, 1993). According to FAO (1978), the income of rural people in Philippines and India is dependent on the gathering of forest products.

Recent work in South- West Bengal (Sarin, 1995) and the Tropical Forest Action Plan in 1990 confirmed fuelwood as the main source of the socio-economic livelihood of the rural women. In Addis Ababa, Rodda (1991) identified 73,000 women and children to be involved in the collection and sales of fuelwood in the city, while Cashman (1987) in South-Western Nigeria reports that many Yoruba women 'fix' their earnings from palm oil processing and other cash earning activities in livestock as a form of saving. It may be added that processing and marketing of some non-timber forest resources (NTFR) such as kolanuts, chewing sticks, bush mangoes and palm oil are dominated by rural women mainly as a means of earning income.

Generally, the issue of rural women involvement in forest-related activities in South-Eastern Nigeria has received very little attention and studies on their income earnings vis-à-vis level of dependence on forest resources are virtually non-existent.

FRANCIS E. BISONG, Department of Geography and Regional Planning, University of Calabar, Calabar, Nigeria,
ANIM O. AJAKE Environmental Education Unit, Institute of Education University of Calabar, Calabar, Nigeria

A close look at household activities and how they relate to the environment shows that women make primary contacts with those elements of the forest environment that are fundamental to family life. Their domestic roles coupled with the gathering of non-timber forest resources (NTFR) for food and income, bring them into daily contact with the natural forest environment. Women are thus the first to feel the impact of large scale forest degradation since they are the principal stakeholders in the utilization of natural resources for improved economic activities in the rural communities of south-eastern Nigeria. The understanding of the household activities of rural women and the forest resources they collect for income would enhance the formulation of rural economic policies and forest policies designed to improve sustainable forest management in the rural communities of South-Eastern Nigeria.

The paucity of data about the rural women's earnings from the forest may undermine efforts at improving the socio-economic conditions of the rural women. This may also translate into faulty forest economic development policies and could affect negatively the livelihood of the women in particular and the rural population in general.

This study, therefore, presents an economic analysis of rural women's dependence on the forest resources in the rainforest communities of South-Eastern Nigeria.

The specific objective are to:

Identify the socio-economic benefits which rural women derive from non-timber forest resources; and

Compare the income derivable from forest resources vis-à-vis income from non –forest related activities of the rural women.

METHOD OF STUDY

This study was conducted in Akamkpa forestry charge*[1] of the rainforest zone of South Eastern Nigeria (Fig. 1). The high forest in the area covers about 385,200 ha., representing 53 per cent of the region's 729,600 ha of forest land (CRSFP, 1994). The vast size of high forest in the study area is a reflection of the successful protection activities by the Cross River National Park,

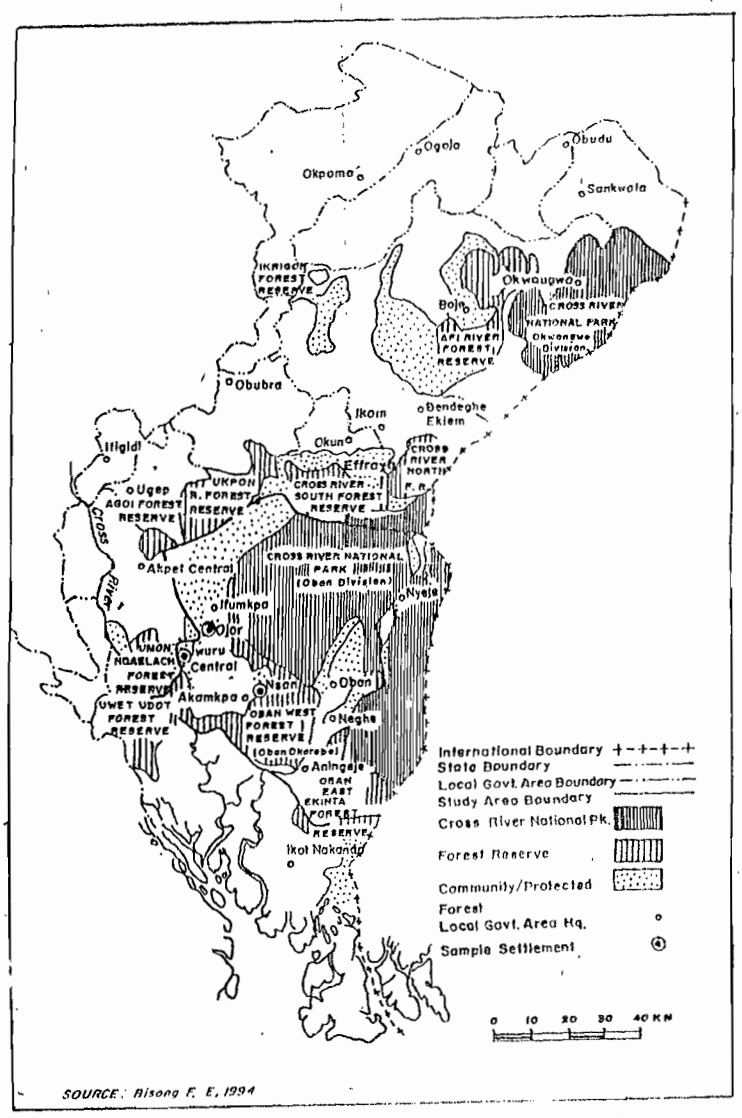

FIG.1 Study Area and the High Forest Zones of Cross River State.

Created in 1988 for conserving the rare fauna and flora species in the region. The rural people in the study area are largely dependent on forest resources for household income and other needs.

Three rural communities namely Ojor, Nsan and Iwuru central were purposively selected and used for this study based on their having interface with the existing forest conservation areas (i.e the Cross River Nation Park, Forest Reserve, and the Community Forest). A household questionnaire survey was carried out in area, eliciting information on rural women's household monthly income from both non-timber forest resources and non-forest related activities. The data obtained was used to establish a comparative relationship between household income from forest resources and non-forest related employment. About 134 households were

* A Forestry Charge refers to an administrative sub-division of the forestry sector for the purpose of effective forest management

sampled systematically in the three communities (Nsan, 46; Ojor, 52 and Iwuru central, 36). The sampling distribution covered about 20 percent of the household in each community. The field information from questionnaire survey was supplemented with more details using Participatory Rural. Appraisal (PRA) method. This method (PRA) provided the background information on the women involved in the gathering, harvesting and marketing of non-timber forest resources as well the income realized. The PRA techniques adopted were semi-structured interviews and group discussions.

The multiple regression model was used to determine the effect of women's income from forest resources on the overall income of rural women from the broad array of agricultural and other non-forest related activities. The general form of the equation is as follows:

$Y = Bo + b_1x_1 + b_2x_2 \ldots b_n x_n + e$

Y = Women is total income, X_1 = income from forest resources, X2 = Income from other employment, b1 b2 = slopes of the independent variable, Bo = Y intercept, e = the stochastic error. The b-values in the analysis are the impact multipliers, which tells us the magnitude of the effect of a unit change in the income from forest resources and non-forest related activities.

RESULTS AND DISCUSSION

The availability of non-timber forest resources in the rainforest of south-eastern Nigeria provides viable economic base that give a significant number of rural women employment opportunities.

The occupational structure of the rural women (Table 1) is characterized by a multiple and overlapping set of forest related activities. This range from the more generalized occupations such as the collection of fruits (75%) and edible leaves (67%), the processing of palm oil/kernel (56%) the collection of snails (57%), mushroom etc; to the more specialized activities such as traditional medicinal practices (22%), and chewing stick collection (36%).

The high level of involvement of rural women in forest occupation is attributed to the high potentials offered by forest products in generating personal income to the women. This is largely due to their ease of collection, processing and accessibility. Forest products are largely common property resources and are often not subject to the restrictive tenure regulations that portends to limit women's access to resources as in other land related activities such as agriculture.

Table 1: Level of rural women's employment in forest related activities by households.

Forest Employment	Level of Rural Women's Involvement			
	Nsan (46)*	Ojor (52)*	Iwuru Central (36%)*	Total (134)*
Palm oil/kernel processing	26(57%)	29 (56%)	20 (56%)	75 (56%)
Fruits collection	35(76%)	40 (77%)	26 (72%)	101 (75%)
Traditional Medicine Practices	10(22%)	9 (17%)	10 (28%)	29 (22%)
Snail collection	28(61%)	26 (50%)	32 (64%)	77 (57%)
Chewing stick collection	24(52%)	22(42%)	2 (6%)	48 (36%)
Edible leaves collections	30(65%)	36(69)	25 (69%)	91 (67%)
Others	3 (7%)	10 (19%)	3 (8%)	16 (12%)

* Sample population per community.

Besides forest related employment, women in the sampled communities were involved in other income generating occupations such as farming, sewing, trading, teaching, health service and civil service (Table 2).

Table 2: Percentage involvement of rural women in non-forest related activities.

Non-Forest Related Activities	Level of Women's involvement			
	Nsan	Ojor	Iwuru Central	Total Average (%)
Farming	56.52	60	58	58
Sewing	17.4	13	17	16
Trading	22	15	16	18
Teaching	2.2	4	3	3
Health	00	6	6	4
Civil Service	2.2	2	00	1

These economic activities were, however supplementary to forest-based employment which are the priority income generating activities of the women. About 58 per cent of the rural women in the study area are involved in farming activities in addition to forest based occupations which apparently provided the women with more income yielding opportunities. An insignificant percentage of women were involved in government related occupations such as teaching, health service and the civil service accounting for 3, 4 and 1 percent respectively as against 18 percent involved in trading and marketing of rural products such as garri, yam, cocoyam, plantain, banana etc.

AN ANALYSIS OF RURAL WOMEN'S INCOME FROM FOREST AND NON-FOREST RELATED ACTIVITIES

This section attempts to model via empirical and descriptive statistics the individual and joint contribution of forest resources (NTFPS) to the total income of rural women. This, it first attempts, by a comparative analysis between income earned from forest resources and those earned from non-forest related activities. Thereafter, the individual rural income was analysed. Table 3 shows the income of the rural women in comparative terms from NTFPs and non-forest related activities.

Table 3: Average Monthly Income of Rural Women from NTFPs and Non-Forest Related activities.

Village	Income from NTFPs		Income From Non-forest Related Activities		Total
	N	%	N	%	N
NSAN	8,480.80	59.23	6,005.40	40.01	14,486.20
OJOR	6,740.39	54.69	5,594.23	45.40	12,334.62
IWURU CENTRAL	6,120.56	54.38	5,095.56	45.45	11,216.12
AVERAGE	7,113.92	56.10	5,565.01	44.11	12,678.98

From the table above, income from NTFPs were at both the individual village level and on aggregate terms higher than those from non-forest related activities in each study location. While rural women on the average derived 56 percent of their total monthly earnings from forest product gathering, they derived 44 percent of their total earning from non-forest based employment such as agriculture, trading, sewing, teaching and government employment. The income structure did not seem to differ significantly across the sampled communities. Nsan community, however, had earning from NTFPs that was slightly higher (59.23 percent) than average values as against about 54 percent in Ojor and Iwuru Central respectively.

The regression analysis on the data set of the women's employment structure and their corresponding income levels yielded the result as shown below (Table 4).

Table 4: Result of Regression analysis of women's income from forest based employment and non-forest related activities.

Variable	Beta Coefficients	Multiple R	R^2	F-Value
Forest based Activities	0.76001			Cal. F=705.20 Tab. F = 3.00
Non-forest related Activities	0.544063	0.9566	0.91501	At 0.05 and 2 and 131 Df

* Constant (Bo) = 944.20

Table 5: Average Total Monthly Income (N) from Ten selected Non-Timber forest products collected by Rural Women

Products	Average Total Income (N)			
	NSAN	OJOR	IWURU CENTRAL	TOTAL
Bush Mango *(Irvingia gabonensis)*	1758.78	1485.19	1220.42	4464.39
Afang *(Gnetum africanum)*	954.54	1093.27	817.64	2865.45
Palm Oil *(Elaeis guineensis)*	1467.26	1062.60	1041.11	3570.97
Snail *(Achantina marginata)*	990.98	850.00	761.81	2602.79
Editan *(Lasianthera africanum)*	545.22	363.94	380.69	1289.85
Atama *(Heinsia crinata)*	475.00	328.27	387.36	1190.63
Kolanut *(Cola acuminata)*	313.59	280.10	328.33	922.02
Bitter Kola *(Garcinia Kola)*	403.36	278.87	325.25	1008.48
Chewing Stick *(Garcinia mannii)*	1136.41	698.85	335.97	2171.23
Hot Leaf/seed *(Piper guineensis)*	317.28	209.13	293.61	820.02

Source: Author's Field Survey, 1998
Note: The Monthly income is within gathering season

The regression equation is defined by $Y = 944.20 + 0.76X_1\ 0.54x_2$. This defines the relationship between rural women's income level, and income from forest and non-forest related occupations. The R^2 (Coefficient of determination) given by 0.915 and highly significant at 0.05 level, shows that forest related employment and non-forest related activities of the rural women, acting jointly accounts for 91.5 percent of variation in the overall income of the women. The separate contributions of the different sectoral activities to the total earnings of the rural women exemplified by the coefficients, show that forest based employment with higher coefficients (0.76001) contributes more to the total earning of the women than non forest based employment with an appreciable but lower coefficient of 0.544063. The calculated f (705.2) is greater that the tabulated f (3.00) at 0.05 confidence limit, and 2 and 131 degree of freedom (df). This as shown in table 4 above reveals a significant variation in women's income derived from forest and non-forest related activities. The above implies that rural women are more dependent on forest for income than other sources.

Income data from ten most significant NTFP resources gathered by rural women, derived from household survey is presented in table 5.

The bush mango *(Irvingia gabonensis)*, Oil palm *(Elaeis guinensis)*, and 'afang' *(Gnetum Africanum)* top the list as the highest income earners, with total household monthly earning of about N4,464.39, N3570.97 and N2,865.45 respectively. This result confirmed that of Bisong (1993) in the

study of twelve sampled settlements in the Cross River Rainforest which showed that 'afang' *(Gnetum africanum)* and bush mango *(Irvingia gabonensis)* are the most important non-timber forest products across the communities.

Using the multiple regression analysis to delineate in statistically significant terms the individual contributions of the ten top NTFPs to the women's total earnings from forest products, the regression model was defined by the equation.

$$Y = 706.67 + 0.37X_1 + 0.35X_2 + 0.16X_4 + 0.15X_5 + 0.32X_6 + 0.18X_7 + 0.10X_9 + 0.34X_{10}$$

Details of the regression results are shown in Table 6.

Table 6: Results of Regression analysis on Rural Women Income from ten selected forest products.

Variable	Beta Coefficient	Multiple R	R2	F-Value
Bush Mango (X_1) *(Irvingia gabonensis)*	0.370624			
Palm Oil (X_2) *(Elaeis guineensis)*	0.353837			Cal.F= 54.30
Chewing stick (X_3) *(Garcinia mannii)*	0.246264	0.90295	0.81533	Tab.F=2.27
Native Kola (X_4) *(Garcinia kola)*	0.157971			At
Bitter Kola (X_5) *(Cola acuminata)*	0.146668			0.05
Snail (X_6) *(Achantina marg.)*	0.320775			
Editan (X_7) *(Lasianthera africanum)*	0.181413			10 and 123df
Atama' (X_8) *(Heinsia crinita)*	0.162489			
Hot Leaf/seed (X_9) *(Piper guineensis)*	0.104184			
"Afang' (X_{10}) *(Gnetum africanum)*	0.339570			

Constant (Bo) = 706.67

From the table results, a high positive relationship is evident between women's total income from all forest resources and income from the ten top NTFPs shown by the multiple R of 0.903. The coefficient of determination (R^2) suggest that 81.5 percent of variation in women's income from forest products is accounted for by the income derived from ten NTFPs. The beta coefficients which explains the partial regression of the individual NTFP species on total income from forest resources indicates that the bush mango (0.320624), palm oil (0.353837), 'afang' (0.339570), snails (0.320775) and chewing stick (0.246264) play very significant role in influencing women's total earnings from forest products in the order in which they are stated. An effective management and regeneration of these products to ensure increased and stable supplies will be significant to improving the earnings of rural women in the rainforest regions of Cross River State.

CONCLUSION

The statistical evidence from the foregoing analysis support the contention that rural women in the rainforest of South Eastern Nigeria are highly dependent on the forest for their livelihood support. The forest provides an economic base for the employment of rural women and a saving bank for income. Non-timber forest products should not be underestimated in their contribution to economic improvement due to their high value and critical role in the rural exchange economy.

From the empirical analysis presented in this paper, the demand for and use of forest resources as income source is high. The dominant role of NTFP resources in the total earning of rural women lives little alternative for developing viable income generating activities for the women outside forest related occupations. Thus there is an urgent need for sustainable forest management programmes in the forest communities in South-Eastern Nigeria which should be focused on NTFPs as a panacea for improving living conditions and alleviating poverty among rural women.

REFERENCES

Bisong F. E., 1993., *Farming systems, Human Ecology* and Natural Resources Conservation in the Cross River State, FDD and CRSFP Calabar 15 – 85.

Cashman, K., 1987. Women's Activities and The Potential of Alley Farming in South Western Nigeria. *Report prepared for the Ford Foundation International Livestock Centre For Africa, Humid Zone Programme Ibadan Nigeria* (Unpublished).

Cross River State Forest Project, 1994. *A strategy for Sustainable Development, Conservation and Management of The Forest of Cross River State*. FDD/CRSFP, Calabar.

FAO, 1978. Forestry for Local Community Development, *FAO Forestry Paper* SIDA, Rome: 28-30.

FAO., 1987. *Restoring The Balance: Women And Forest Resources, SIDA, Rome.*

Falconer, Julia, 1990. *The Major Significance of Minor Forest Products: The Local Use and Value in West Africa Humid Zone, FAO, Rome.*

Rodda, Annabel, 1991. *Women and The Environment Zed* Books Ltd, London and Newjersy.

Sarin, M. 1995. Joint Forest Management in India. Achievement and Unaddressed Challenges" UNASLYVA, 46: (180): 30 – 36

Unasyla 1995. Common Property Forest Resource Management, 46; (180): 2-26.

WWF, 1990. *"Medical Plants Conservation"* WWF Reports August/September, 1990.