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CAN NTFPS HELP ERADICATE POVERTY? A CASE STUDY FROM TROPICAL LOWLAND RAINFOREST OF SOUTHWEST NIGERIA

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Abstract
The study investigated the potential of NTFP trade towards eradicating poverty, by analyzing revenues accruable to harvesters and marketers of five top priority NTFP species including: bush mango (*Irvingia gabonensis*), African walnut (*Tetracarpidium conophorum syn. Plukenetia conophora*), chew-stick (*Massularia acuminata*), fever bark (*Anninckia chloranta syn. Enantia chloranta*) and bush pepper (*Piper guineense*) in the tropical lowland rainforest of Omo and Shasha Forest Reserves, Southwest Nigeria. The snowball method as well as a simple random sampling technique was used to select harvesters and marketers for questionnaire surveys. Information were gathered on products harvesting and utilization patterns, units of marketing of the products and pricing, influence of seasonality on product availability, and average quantity of products harvested and sold in a month among others. The data generated from the survey were subjected to descriptive statistics. The statistical model for student's t-test was used to compare the contributions of NTFPs and other source(s) of income of respondents. Results revealed a significant difference between the income generated from the selected products and those from other sources. All the NTFPs except *Irvingia gabonensis* currently have low- medium likelihood of helping to eradicate poverty. There is a marked influence of seasonality on the potentials of the selected species in income generating activities. There is also a wide reflection of decreasing trend in the availability of selected NTFPs, particularly among harvesters, thus portending an ominous picture of the resource base. Our results suggest that the potential of NTFPs towards helping in the eradication of poverty remains conjectural. There is therefore, the need for a conscious and concerted effort towards the improvement of the NTFP sector for both conservation and economic development.

Keywords: Non timber forest products; poverty eradication; income generation, average sales, livelihood

Introduction

Poverty has be defined as a pronounced deprivation of well-being related to lack of material income or consumption, low levels of education and health, vulnerability and exposure to risk, lack of opportunity to be heard, and powerlessness (World Bank, 2001). Following this definition, poverty eradication can be defined as a successful obliteration of deprivation of well-being. According to the World Bank (op.cit.), poverty is a colossal challenge with 2.8

billion of the world's 6 billion people living on less than $2 a day. There is a large and widening inequality among countries of the world with an average income in the 20 richest countries 37 times higher than that in the 20 poorest countries (World Bank, 2003).

The Millennium Development Goals (MDGs, 2010) commit the world's nations to greatly improve food security, eradicate extreme poverty and reduce environmental degradation by the year 2015. Towards achieving this, forests have continued to provide a large number of the local communities in Africa with sustainable livelihoods through the direct use of forest ecosystem goods and services for household consumption and income generation. Presently, 70% of the world's poor live in rural areas, and are most directly dependent on ecosystems such as the forest for their nourishment (World Fact Sheet, 2010). Beside the production of timber, the forests also provide many non-timber forest products (NTFPs) that are directly relevant to improving food security. There are wide varieties of NTFPs that are used for food, fuel, medicine, forage, and fiber. The majority of NTFPs are consumed directly by collectors and their families. Some are important mainstays in the household economy. Others are used infrequently, but can be critically important as safety net when other sources of food are unavailable. Such emergency foods, according to Sunderlin *et al.,* (2005), can make a difference between life and death. Many NTFPs are also produced for sale or barter. The extension of the market system to more remote areas has increased both the demand and the opportunity for increased cash incomes through NTFPs sales. They are thus, important for helping households meet consumption and income needs.

Consequently, the commercialization of NTFPs has been widely promoted as a means to the sustainable development of tropical forest resources (de Beer and McDermott 1989; Nepstad and Schwartzman 1992; Arnold and Ruiz Pérez 1998; Neumann and Hirsch 2000). This is based on the perceptions that forest exploitation for NTFPs can be more benign than for timber, and also the growing recognition of the subsistence and income generation contribution made by many NTFPs to rural livelihoods (Ruiz Pérez *et al.,* 2004). Within the context of new international commitments to address rural poverty, such as the Millennium Development Goals, NTFP commercialization is recognized as having the potential to achieve dual conservation and development goals by increasing the value of forest resources to local communities (Wollenberg and Ingles 1998; Neumann and Hirsch 2000; Angelsen and Wunder 2003).

Following from the above, it has been argued that establishing extractive reserves for the sustainable harvest of marketable NTFPs has the potential to unite economic and conservation goals by promoting nature protection while maximizing long-term economic returns per unit area (Plotkin and Famolare, 1992; Panayotou and Ashton, 1992). Supporters of NTFPs extraction as a basic component of forest management averred that forest residents are potent political actors whose involvement are important to forest conservation and protected area management (Schwartzman *et al*, 2000).

However, research on the financial rewards from NTFP collection and its contribution to sustainable development seems equivocal (Gubbi and MacMillan, 2008). As noted by

Sunderlin *et al.*, (2005), certain factors, such as poor market access, resource distribution within the forest, seasonal and annual fluctuations in quantity and quality of NTFP production, and overexploitation tend to limit the scope for NTFPs to lift people out of poverty. Against this backdrop, we examined whether NTFP collection can indeed help eradicate poverty, by analyzing revenues accruable to harvesters and marketers of five top priority NTFP species in tropical lowland rainforest of Southwest Nigeria.

Materials and Methods

The Study Area

The study was conducted in two government forest reserves viz: Omo and Shasha- located within the tropical lowland rainforest zone of southwest Nigeria. Omo Forest Reserve (OFR) is located between Latitudes 6° 35' - 7° 05'N and Longitudes 4° 19' - 4° 40'E in the Ijebu East and North Local Government Areas of Ogun State. The Nigerian Government legally gazetted OFR a forest reserve through Order No. 10 Gazette No. 40 of 7th May 1925 which was amended in 1952 (Bada, 1999) and it covers an area of about 130,500 ha. On the other hand, Shasha Forest Reserve (SFR) is located between Latitudes 7^0 00'- $7^0$30'N and Longitudes 4^0 00'– 5^0E in Osun State, and currently has a total area of 23,064 ha (Jimoh, 2002). SFR was also first gazetted in 1925. Both OFR and SFR were parts of the Old Shasha Government Forest Estate. There are several forest hedge communities and enclaves within and around the two Forest Reserves. The communities are agricultural communities that rely on the forests as supplementary source of livelihood. Farming, fishing, hunting and collection of NTFPs are the predominant occupations for the majority of the enclaves' population.

Data Collection

The target populations for the study were harvesters and marketers of selected NTFPs (Table 1) in local and major markets around Omo and Shasha Forest Reserves. These comprise people living in or near the forests and derive livelihoods from commercial NTFP activities. The total numbers of harvesters of each product, as well as the number of markets (sharing proximity with the reserves) and market days were determined based on the information obtained from key informants in both reserves. The snowball method (Marshall *et al.*, 2006) was used to access information among harvesters, while a simple random sampling technique was used to select markets and respondents among the marketers. The surveyed markets adjoining Omo Forest Reserve include Oke-Aje, New Market, Ogbere, Oja Orita J4, Itawade, and Oja Mushin while the surveyed markets adjoining Shasha Forest Reserve include Olode, Omifunfun, Egbejoda, Olohunda, Araromi-Owu, Araromi Oke-Odo, and Apomu. Structured questionnaire were administered on the respondents in both the reserves and selected markets. Information obtained through the questionnaire was supplemented with in-depth interview of the respondents. Information were gathered on products harvesting and utilization patterns, units of marketing of the products and pricing, influence of seasonality on product availability, average quantity of products harvested and sold in a month, payment of access fees to the forestry service department and also percentage contribution of products to household income among others. To estimate the income obtained from collection of NTFPs, the total quantity of products collected by harvesters and/or purchased by marketers per

month was multiplied by the mean unit sale price of the products (derived from that month). The proportion of income contributed to the total income was then arrived at.

Table 1: Species selected for the study and commercial potentials

Species	Life form	Part harvested	Appreciation by local population	Use	Frequency of use	Commercial potential of species
Irvingia gabonensis (Aubry-Lecomte ex O'Rorke) Baill	Canopy-emergent Tree	Fruits/Seeds/ kernel	Medium-High	Food/Condiment/Soup thickener	Medium-High	High
Tetracarpidium conophorum (Mull.Arg.) Hutch. & Dalziel *(syn. Plukenetia conophora)*	Woody liana (climber)	Fruits	Medium-High	Food/Snack	High	High
Massularia acuminata (G Don) Bullock (Rubiaceae)	Under-storey Tree	Stem	High	Chew-stick	High	High
Anninckia chloranta (Oliv.) Setten & P.J.Maas *(syn. Enantia*	Under-storey Tree	Bark	High	Medicinal	High	High

chloranta)						
Piper guineense (Schum. &Thonn.)	Non woody liana (climber)	Leaves and Seeds	High	Condiment/ Leafy vegetable	High	High

Data Analysis

The data generated from the survey were subjected to descriptive statistics using frequency distribution tables and percentages. The statistical model for student's t-test was used to compare the contributions of NTFPs and other source of income of respondents. Specifically, the Paired Samples t- test procedure which is used to test the hypothesis of no difference between two variables was employed. Mathematically, the Paired t-test model is depicted thus:

$$t_{\alpha/2} = \frac{\overline{X}_A - \overline{X}_B}{\sqrt{S^2 d/N}}$$

Where: t = t-test; $\overline{X}_A$ = average monthly revenue generated from NTFPs; $\overline{X}_B$ = average monthly revenue generated from other sources; S^2 d = variance of the individual difference between A and B and; N = number of variables.

Results

Trade-in and Revenue Generation from Selected NTFPs in the Study Areas

Irvingia gabonensis

Irvingia (*Aapon* in Yoruba; *Ogbono* in Ibo) is sourced from both the forest and communities' farmland. The most important part of the product is the kernel; this has a large market value and it is used as a soup thickener. The trend in marketing of the product has expanded through bulk buyers and retailers, who come from different parts of the country. Table 2 shows that highest average sale per month for the product among harvesters was 21kg – 25kg (62.5%), while that of the marketers was 11kg – 15kg (29.3%) per month. The highest revenue generated from the sales of the product per month was ₦ 31,000 – ₦ 40,000 (62.5%) for harvesters, while that of the marketers was ₦ 21,000 – ₦ 30,000 (29.3%).

All the sampled harvesters and marketers of *Irvingia* had other sources of income. The highest average percentage contribution of the product to respondents' income ranged from 61% – 70% (25% of respondents) and 81% - 90% (75% of respondents) for harvesters, while that of the marketers ranged from < 10% (3.4%) to 31% - 40% (18.9%). Major constraints to sustainable trading of the product as indicated by harvesters are seasonality (62.5%) and destruction of mother trees (37.5%), while marketers indicated only seasonality as being the major constraint (Table 2).

Paired t-test indicates significant difference between the income generated from the product to livelihood and those from other sources ($n = 8$; $df = 7$; $t = 9.165$; $p < 0.05$) with contribution from the sales of the product higher than that derived from other sources (positive (+) t-value). Similarly, there is significant difference between the income generated from the product and those from other sources among marketers ($n = 58$; $df = 57$; $t = -3.1555$; $p < 0.05$) but with contribution from other sources being higher than that derived from the sales of the product (negative (-) t-value).

Table 2: Financial contributions and factors influencing availability of *Irvingia gabonensis* in the Study Areas

Variables	Harvesters			Marketers		
	Freq	%	Mode	Freq	%	Mode
Average Sales per month per unit quantity						
< 5kg	-	-		-	-	
5kg – 10kg	-	-		12	20.7	
11kg – 15kg	-	-	21kg – 25kg	17	29.3	11kg – 15kg
16kg – 20kg	3	37.5		15	25.9	
21kg – 25kg	5	62.5		14	24.1	
Total	8	100.0		58	100.0	
Average Sales per month (₦)						
< 10,000	-	-		7	12.1	
10,000 – 20,000	-	-		15	25.9	
21,000 – 30,000	3	37.5	31,000 – 40,000	17	29.3	21,000 – 30,000
31,000 – 40,000	5	62.5		11	18.9	
40,000 – 50,000	-	-		8	13.8	
Total	8	100.0		58	100.0	
Other source (s) of income						
Yes	8	100.0	Yes	58	100.0	Yes
No	-	-		-	-	
Total	8	100.0		58	100.0	
Average Percentage contribution of NTFPs to livelihood						
< 10%	-	-		2	3.4	
10% - 20%	-	-		9	15.5	
21% - 30%	-	-		7	12.1	
31% - 40%	-	-		11	18.9	
41% - 50%	-	-		8	13.8	
51% - 60%	-	-	81% - 90%	9	15.5	31% - 40%

61% - 70%	2	25.0		5	8.6	
71% - 80%	-	-		7	12.1	
81% - 90%	6	75.0		-	-	
91% - 100%	-	-		-	-	
Total	8	100.0		58	100.0	
Factors affecting availability of products*						
Seasonality	8	44.4		58	100.0	
Destruction of mother trees	4	22.2		-	-	
Pest and disease infestation	1	5.6	Seasonality	-	-	Seasonality
Consumption of fruits by wild animals	3	16.7		-	-	
Natural death of mother trees	2	11.1		-	-	
Total	18	100.0		58	-	

*Multiple responses were allowed.

Tetracarpidium conophorum (syn. Plukenetia conophora)

The African walnut (*Asala* in Yoruba) is widely marketed for the nutritive value of its nuts, which is consumed as a snack and delicacy. The seeds are now being transported to different parts of the country by wholesalers and thus expanding the market scope of the produce. As presented in Table 3, the highest average sales per month for walnut among harvesters were < 5kg (50.0%) and 5kg – 10kg (50.0%) while for the marketers it was 5kg – 10kg (43.1%). The highest revenue generation from the sales of the product for the harvesters and marketers were < ₦ 5,000 (62.5%) ₦ 5,000 – ₦ 10,000 (43.1%) respectively.

Also, all the sampled harvesters and marketers of *Asala* had other sources of income. The highest average percentage contribution of the product to respondents' livelihood was 31% - 40% (62.5%) for harvesters and 41% - 50% (17.6%) for marketers. Major constraints to sustainable exploitation of the product as indicated by harvesters are seasonality (75.0%) and destruction of mother trees (25.0%), while marketers indicated only seasonality as being the major constraint (Table 3).

Paired t-test indicates significant difference between the income generated from the product to livelihood and those from other sources ($n = 8$; $df = 7$; $t = -6.148$; $p < 0.05$) but with contribution from other sources greater than that derived from the sales of the product (negative (-) t-value). Similarly, there is significant difference between the income generated from the product to livelihood and those from other sources among marketers ($n = 51$; $df = 50$; $t = -5.698$; $p < 0.05$) with contribution from other sources also greater than that derived from the sales of the product (negative (-) t-value).

Table 3: Financial contributions and factors influencing availability of *Tetracarpidium conophorum* in the Study Areas

Variables	Harvesters			Marketers		
	Freq	%	Mode	Freq	%	Mode
Average Sales per month per unit quantity						
< 5kg	4	50.0		19	37.3	
5kg – 10kg	4	50.0		22	43.1	5kg – 10kg
11kg – 15kg	-	-		10	19.6	
16kg – 20kg	-	-		-	-	
21kg – 25kg	-	-		-	-	
Total	8	100.0		51	100.0	
Average Sales per month (₦)						
< 5,000	5	62.5	< 5,000	19	37.3	
5,000 – 10,000	3	37.5		22	43.1	5,000 – 10,000
11,000 – 20,000	-	-		10	19.6	
21,000 – 30,000	-	-		-	-	
31,000 – 40,000	-	-		-	-	
Total	8	100.0		51	100.0	
Other source (s) of income						
Yes	8	100.0	Yes	51	100.0	Yes
No	-	-		-	-	
Total	8	100.0		51	100.0	
Average Percentage contribution of NTFPs to livelihood						
< 10%	-	-		8	15.7	
10% - 20%	3	37.5		6	11.8	
21% - 30%	-	-		8	15.7	
31% - 40%	5	62.5	31% - 40%	8	15.7	
41% - 50%	-	-		9	17.6	41% - 50%
51% - 60%	-	-		5	9.8	
61% - 70%	-	-		7	13.7	
71% - 80%	-	-		-	-	
81% - 90%	-	-		-	-	
91% - 100%	-	-		-	-	
Total	8	100.0		51	100.0	
Factors affecting availability of products*						

Seasonality	8	28.6	51	100.0	Seasonality
Destruction of mother trees	8	28.6	-	-	
Pest and disease infestation	2	7.1	-	-	
Consumption of fruits by wild animals	8	28.6	-	-	
Natural death of mother trees	2	7.1	-	-	
Total	28	100.0	51	100.0	

*Multiple responses were allowed.

Massularia acuminata

The chew-stick, (*Pako Ijebu* in Yoruba) is harvested in form of logs and processed into billets of about 30 cm in lengths. It is used as a toothbrush and has provided the primary form of dental care for people for several millennia. Because of the long and widespread use of chew-sticks in the study area, there is a wide trade network, which involves a large number of people, both from rural and urban settings. From Table 4, the highest average sales per month for *Pako Ijebu* among harvesters was 31kg – 40kg (55.6%) followed by 41kg – 50kg (44.4%) while the highest for the marketers was 10kg – 20kg (71.8%)per month. The same trend of highest revenue generated per month from the sales of the product was obtained for the harvesters and the marketers with the highest amount of < ₦ 10,000 followed by ₦ 10,000 – ₦20, 000.

Both harvesters and marketers of chew-stick also had other sources of income. Highest average percentage contributions of the product to livelihood of the harvesters and marketers were 31% - 40% (66.7%) and 11% - 20% (41.0%) respectively. The destruction of mother trees was indicated as the major constraint to sustainable exploitation of the product by both harvesters and marketers.

Paired t-test indicates significant difference between the income generated from the product to livelihood and those from other sources (n = 9; df = 8; t = -6.500; p< 0.05) but with contribution from other sources greater than that derived from the sales of the product (negative (-) t-value). Similarly, there is significant difference between the income generated from the product to livelihood and those from other sources among marketers (n = 39; df = 38; t = -9.103; p< 0.05) with contribution from other sources also greater than that derived from the sales of the product (negative (-) t-value).

Table 4: Financial contributions and factors influencing availability of in the *Massularia acuminata* in the Study Areas

Variables	Harvesters			Marketers		
	Freq	%	Mode	Freq	%	Mode
Average Sales per month per unit quantity						
< 10kg	-	-		-	-	
10kg – 20kg	-	-		28	71.8	
21kg – 30kg	-	-		-	-	
31kg – 40kg	5	55.6	31kg – 40kg	11	28.2	10kg – 20kg
41kg – 50kg	4	44.4		-	-	
Total	9	100.0		39	100.0	
Average Sales per month (₦)						
< 10,000	5	55.6		28	71.8	
10,000 – 20,000	4	44.4		11	28.2	
21,000 – 30,000	-	-	< 10,000	-	-	< 10,000
31,000 – 40,000	-	-		-	-	
40,000 – 50,000	-	-		-	-	
Total	9	100.0		39	100.0	
Other source (s) of income						
Yes	9	100.0	Yes	39	100.0	Yes
No	-	-		-	-	
Total	9	100.0		39	100.0	
Average Percentage contribution of NTFPs to livelihood						
< 10%	-	-		8	20.5	
10% - 20%	3	33.3		16	41.0	
21% - 30%	-	-		-	-	
31% - 40%	6	66.7		8	20.5	
41% - 50%	-	-		-	-	
51% - 60%	-	-	31% - 40%	7	17.9	10% - 20%
61% - 70%	-	-		-	-	
71% - 80%	-	-		-	-	
81% - 90%	-	-		-	-	
91% - 100%	-	-		-	-	
Total	9	100.0		39	99.9	
Factors affecting availability of products*						
Seasonality	-	-		15	27.8	
Destruction of mother trees	9	64.3	Destruction of mother trees	39	72.2	Destruction of mother trees
Pest and disease infestation	2	14.3		-	-	
Consumption of fruits	-	-		-	-	

by wild animals				
Natural death of mother trees	3	21.4	-	-
Total	14	100.0	54	100.0

*Multiple responses were allowed.

Anninckia chloranta (syn. Enantia chloranta)

A. chloranta (*Yaani/Awopa/Oso-pupa* in Yoruba) is extensively harvested for its bark. Known as the Fever Bark, *A. chloranta* plays a significant role in medicinal plant market in the study area and widely used by people in the treatment of malaria. As shown in Table 5, the highest average sales per month for *A. chloranta* among harvesters was 71kg – 80kg (60.0%) followed by 91kg – 100kg (40.0%). For marketers, the highest average sales per month was 61kg – 70kg (46.9%) followed by 51kg – 60kg (26.6%) per month. For the highest revenue generated from the sales of the product, the same trend obtained for the harvesters and marketers was ₦ 10,000 – ₦20,000.

Both harvesters and marketers of *Yaani* also had other sources of income. Average percentage contribution of the product to respondents' livelihood was 31% – 40% (80.0%) followed by 51% - 60% (20.0%) for harvesters, while that of the marketers was 51% - 60% (31.3%) followed by 41% - 50% (25.0%). The destruction of mother trees was indicated as the major constraint to sustainable exploitation of the product by both harvesters and marketers (Table 5).

Paired t-test indicates significant difference between the income generated from the product to livelihood and those from other sources ($n = 5$; $df = 4$; $t = -3.500$; $p < 0.05$), but with contribution from other sources greater than that derived from the sales of the product (negative (-) t-value). Conversely, there is no significant difference between the income generated from the product to livelihood and those from other sources among marketers ($n = 64$; $df = 63$; $t = -1.182$; $p > 0.05$), though the contribution from other sources was greater than that derived from the sales of the product (negative (-) t-value).

Table 5: Financial contributions and factors influencing availability of *Anninckia chloranta* in Study Areas

Variables	Harvesters			Marketers		
	Freq	%	Mode	Freq	%	Mode
Average Sales per month per unit quantity						
< 10kg	-	-		-	-	
10kg – 11kg	-	-		-	-	
21kg – 30kg	-	-		-	-	
31kg – 40kg	-	-		-	-	
41kg – 50kg	-	-		11	17.2	
51kg – 60kg	-	-		17	26.6	
61kg – 70kg	-	-		30	46.9	61kg – 70kg
71kg – 80kg	3	60.0	71kg – 80kg	6	9.4	
81kg – 90kg	-	-		-	-	
91kg – 100 kg	2	40.0		-	-	
Total	5	100.0		64	100.1	
Average Sales per month (₦)						
< 10,000	-	-		-	-	
10,000 – 20,000	3	60.0	10,000 – 20,000	58	90.6	10,000 – 20,000
21,000 – 30,000	2	40.0		6	9.4	
31,000 – 40,000	-	-		-	-	
40,000 – 50,000	-	-		-	-	
Total	5	100.0		64	100.0	
Other source (s) of income						
Yes	5	100.0	Yes	64	100.0	Yes
No	-	-		-	-	
Total	5	100.0		64	100.0	
Average Percentage contribution of NTFPs to livelihood						
< 10%	-	-		-	-	
10% - 20%	-	-		-	-	
21% - 30%	-	-		-	-	
31% - 40%	4	80.0	31% - 40%	18	28.1	
41% - 50%	-	-		16	25.0	
51% - 60%	1	20.0		20	31.3	51% - 60%
61% - 70%	-	-		10	15.6	
71% - 80%	-	-		-	-	
81% - 90%	-	-		-	-	
91% - 100%	-	-		-	-	
Total	5	100.0		64	100.0	
Factors affecting availability of products*						
Seasonality	-	-		37	57.8	Seasonality
Destruction of mother trees	5	45.5	Destruction of mother trees	-	-	
Pest and disease	3	27.3		-	-	

infestation					
Consumption of fruits by wild animals	-	-		-	-
Natural death of mother trees	3	27.3		27	42.2
Total	11	100.1		64	100.0

*Multiple responses were allowed.

Piper guineense

Both the seeds and leaves of Bush pepper (*Iyere* in Yoruba) are used majorly as condiment and leafy vegetable respectively. The seeds are further used in traditional medicine, particularly in form of ancillary items in the preparation of herbal concoction. Harvesting and trade in the products are conducted both during the dry and wet seasons for the seeds and leaf respectively. The products are transported by traders across various parts of the country. From Table 6 , the highest average sale per month for Iyere among harvesters was 31kg – 40kg (55.6%) while that of the marketers was 11kg – 20kg (40.0%) per month. The highest revenue generated from the sales of the product was ₦ 21,000 – ₦ 30,000 (55.6%) per month for harvesters and < ₦ 10,000 (51.0%) for marketers.

As presented in Table 6, both harvesters and marketers of *Iyere* also had other sources of income. Highest average percentage contribution of the product to respondents' livelihood was 41% – 50% (55.6%) for harvesters and 51% - 60% (45.3%) for marketers. The destruction of mother plants was indicated as the major constraint to sustainable exploitation of the product by harvesters (100.0%). 41.5% of marketers indicated same, while 58.5% showed no response.

Paired t-test indicates significant difference between the contribution of income generated from the product to livelihood and those from other sources (n = 9; df = 8; t = -3.250), but with contribution from other sources greater than that derived from the sales of the product (negative (-) t-value). Similarly, there is significant difference between the contribution of income generated from the product to livelihood and those from other sources among marketers (n = 53; df = 52; t = -2.490; p> 0.05; Table 26), though the contribution from other sources was greater than that derived from the sales of the product (negative (-) t-value).

Table 6: Financial contributions and factors influencing availability of *Piper guineense* in the Study Areas

Variables	Harvesters			Marketers		
	Freq	%	Mode	Freq	%	Mode
Average Sales per month per unit quantity						
< 10kg	-	-		9	16.9	
10kg – 11kg	-	-		18	40.0	
21kg – 30kg	4	44.4		15	28.3	
31kg – 40kg	5	55.6	31kg – 40kg	11	20.8	10kg – 11kg
41kg – 50kg	-	-		-	-	
51kg – 60kg	-	-		-	-	
61kg – 70kg	-	-		-	-	
71kg – 80kg	-	-		-	-	
81kg – 90kg	-	-		-	-	
91kg – 100 kg	-	-		-	-	
Total	9	100.0		53	100.0	
Average Sales per month (₦)						
< 10,000	-	-		8	15.1	
10,000 – 20,000	-	-		19	35.8	
21,000 – 30,000	5	55.6	21,000 – 30,000	16	30.2	10,000 – 20,000
31,000 – 40,000	4	44.4		10	18.9	
40,000 – 50,000	-	-		-	-	
Total	9	100.0		53	100.0	
Other source (s) of income						
Yes	9	100.0	Yes	53	100.0	Yes
No	-	-		-	-	
Total	9	100.0		53	100.0	
Average Percentage contribution of NTFPs to livelihood						
< 10%	-	-		-	-	
10% - 20%	-	-		-	-	
21% - 30%	-	-		-	-	
31% - 40%	3	33.3		12	22.6	
41% - 50%	5	55.6		17	32.1	
51% - 60%	1	11.1	41% - 50%	24	45.3	51% - 60%
61% - 70%	-	-		-	-	
71% - 80%	-	-		-	-	
81% - 90%	-	-		-	-	
91% - 100%	-	-		-	-	
Total	9	100.0		53	100.0	
Factors affecting availability of products*						
Seasonality	-	-		53	100.0	
Destruction of mother plants	9	100.0		-	-	

Pest and disease infestation	-	-	Destruction of mother plants	-	-	Seasonality
Consumption of fruits by wild animals	-	-		-	-	
Natural death of mother trees	-	-		-	-	
Total	9	100.0		53	100.0	

*Multiple responses were allowed.

Table 7: Summary of Findings on the Potential of Study NTFPs to Help Eradicate Poverty

Species	Overall Mean Percentage Contribution of NTFP to Income	Overall Mean Sales per Month (₦)	Potential of NTFP to Help Eradicate Poverty
Irvingia gabonensis	61 – 90	31,000 – 40,000	High
Tetracarpidium conophorum syn. Plukenetia conophora	10 – 40	5,000 – 10,000	Low
Massularia acuminata	10 – 40	5,000 – 10,000	Low
Anninckia chloranta syn. Enantia chloranta	31 – 60	10,000 – 20,000	Medium
Piper guineense	31 – 60	10,000 – 20,000	Medium

Table 7 summarizes the potential of each of the selected NTFPs towards poverty eradication. This was arrived at by contrasting the daily average income generation from sales of each NTFP against the prevailing average casual labour wage of between ₦ 1,000.00 – ₦ 1,500.00 per day. It was therefore, presumed that both harvesters and marketers of NTFPs should be able to generate an average monthly income of between ₦ 25,000.00 – ₦ 35,000.00 for any species to qualify as having the potential to help eradicate poverty. Only *Irvingia gabonensis* meets the set criterion. The potential of *Anninckia chloranta (syn. Enantia chloranta) and Piper guineense* were medium, while those of *Tetracarpidium conophorum (syn. Plukenetia conophora) and Massularia acuminata* were low.

Discussion

All the selected NTFPs in this study are highly integrated into the cash economy. Evaluation of their contributions to income generation of people in the study areas shows that they contribute fairly to household income. This agrees with the stand of the FAO (1995) that NTFPs are important source of income to large populations of rural dwellers, who are usually poor. However, all the NTFPs except *Irvingia* currently have low- medium likelihood of helping to eradicate poverty. There is a marked influence of seasonality on the potentials of the selected NTFPs in income generating activities. The effects of seasonality are particularly pronounced for *Irvingia gabonensis, Tetracarpidium conophorum* and *Piper guineense* because they are fruit/seed-producing species. This could as well explain why income generations from other sources among respondents were generally higher (with the exception of *I. gabonensis*) than that derived from the NTFPs.

As submitted by Shackleton and Shackleton (2004) and Ros-Tonen and Wiersum (2005), forest product harvesting for NTFPs does not stand alone to support households but forms an integral component of a diversified livelihood strategies of rural household in the tropics. In other words, NTFPs are generally more extensively used to supplement household income during particular seasons in the year. Likewise, NTFPs extractions are combined with other livelihood activities to improve and sustain rural welfare. Furthermore, seasonality may reflect availability, needs for additional cash at particular points in the annual cycle or seasonal fluctuations in demand. The importance of NTFPs and incomes derived from their sales thus often lies more in its timing than in its magnitude as a share of total household inputs (Arnold and Ruiz Pérez, 1998).

Meanwhile, given that the average sales per month per unit quantity of selected NTFPs were found to be generally higher among harvesters than marketers, without a corresponding higher revenue generation among harvesters tends to show that it is the marketers that derive greater benefit from NTFP collection, trade and use, a pattern similar to that found by Godoy *et al.* (1995) working with the Sumu Indians in Nicaragua. This observation, according to Nkwatoh (2005), could be attributed to a number of issues: The first being the lack of improved processing methods for the NTFPs that could add value and increase product selling prices. The second is the lack of market information, which often made it difficult for harvesters to project quantity demanded. The third issue is the lack of storage facilities, which also made it difficult for the harvesters to store the products beyond the peak production seasons, a period noted for low market prices.

In the intervening time, the wide reflections of decreasing trend in the availability of selected NTFPs, particularly among harvesters portend an ominous picture of the resource base. Although some marketers indicated an increasing trend in the availability of *Irvingia* and walnut, this could largely be due to the effect that they are often cultivated and/or managed within the farming/agro-forestry systems. In their work, Sunderland *et al* (2003) posited that in certain instances, cultivation can provide a long-term solution to over-exploitation of certain forest resources if it is economically and biologically feasible. It is unlikely, however,

that cultivation is a viable option for many over-exploited NTFPs in forest reserves, particularly with poor market access.

Conclusion

NTFPs usually help in the stabilization of local incomes as well as providing seasonal employments to harvesters for a greater part of the year. Their potential towards helping in the eradication of poverty, however, remains conjectural. There is therefore, the need for a conscious and concerted effort towards the improvement of the NTFP sector for both conservation and economic development. An important issue in realizing these prospects would be the need for value addition locally, through some form of rural processing, in order to ensure that a fair portion of a product's market value accrues to the people at the rural level. Other important conditions would be an improved access to market information and improved institutional support for forest dwellers and traders who are engaged in the extraction of these resources.

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