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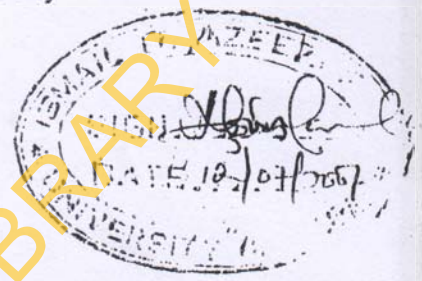
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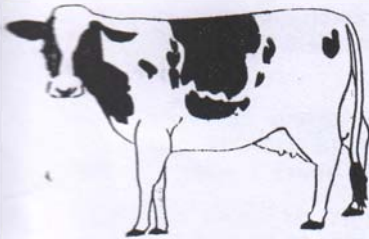
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CONTENTS OF THIS VOLUME

PAGES

THE HEAVY METALS IN THE MUSCLE OF SOME IMPORTED FROZEN FISH IN IBADAN, NIGERIA Ajani E K and Ayoola S O	1 - 4
FACTORS AFFECTING ADOPTION BEHAVIOUR OF AGROFORESTRY PRACTITIONERS IN ATISBO LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA Azeez, I O, S O Jimoh and T O Amusa	5 - 9
ENERGY BASELINE FOR MONITORING VULNERABILITY OF THE ENERGY SECTOR TO THE IMPACTS OF CLIMATE CHANGE: RWANDA CASE STUDY Nelson Lujara and Osmund Kaunde	10 - 16
PROMOTING ENVIRONMENTAL PROTECTION IN NIGERIA THROUGH ENVIRONMENTAL EDUCATION: THE ROLE OF WOMEN Agbogidi, O M and Ofucku, A U	17 - 24
ACUTE POISONING IN CATTLE DUE TO INGESTION OF RATTLEBOX WEED IN NIGERIAN PASTURE Kalshingi, HA, Yaroro, II, Daya, S Y Saddiq, M D Mohammed, A I, Kaikabo A A	25 - 27
CONTRIBUTIONS OF NON- TIMBER FOREST PRODUCTS TO HOUSEHOLD FOOD SECURITY AND INCOME AROUND ONIGAMBARI FOREST RESERVE, OYO STATE, NIGERIA Jimoh, S O and E. A. Haruna	28 - 33
SOCIO-ECONOMIC IMPORTANCE OF NON-TIMBER FOREST PRODUCTS AMONG RURAL RESIDENTS OF SHAKI AGRICULTURAL ZONE OF OYO STATE, NIGERIA Kuponiyi, F. A.	34 - 38
SUSTAINABILITY OF MARINE ARTISANAL FISHING AS A LIVELIHOOD AND THE ENVIRONMENT IN LAGOS STATE Fregene, B T. and A. E. Falaye	39 - 45
A STUDY OF MAGNETIC FIELD (Bz) AND IONOSPHERIC VARIATION DURING MAGNETIC ACTIVITIES AT LOW LATITUDE Adebesin, B.O; Chukwuma V.U; Bakare N O and David, T.W	46 - 50
VULNERABILITY OF THE HYDRO-ELECTRIC POWER PLANTS TO THE IMPACTS OF CLIMATE CHANGE IN RWANDA: COMMUNITY BASELINE Nelson Lujara and Osmund Kaunde	51 - 56
HOUSEHOLDS' WILLINGNESS TO PAY FOR IMPROVED SOLID WASTE MANAGEMENT IN IBADAN NORTH LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA Yusuf, S A., Ojo, O T., and Salmonu K K	57 - 63
INFLUENCE OF TRADITIONAL FARMING PRACTICES ON SOIL PRODUCTIVE POTENTIALS IN AGO-IWOYE ENCLAVE, OGUN STATE, NIGERIA B A. Senjobi; O.A. Adekun; O A Dada and A O Ogunkunle	64 - 70
THE FORCES OF CHANGE DEFINING THE RELEVANCE OF SOIL TO THE ECOSYSTEM OF KAINJI LAKE NATIONAL PARK, KAINJI KWARA Akinyemi, A F.	71 - 71
CROP FARMERS' USE OF ENVIRONMENTALLY SUSTAINABLE AGRICULTURAL PRACTICES IN OGUN STATE A S Onasanya	75 - 78
RISK FACTORS ASSOCIATED WITH WOMEN'S INVOLVEMENT IN WASTE MANAGEMENT PRACTICE: FOCUS ON ABIA STATE, NIGERIA G E. Ifenkwe	79 - 85
FARMERS' PERCEPTION AND KNOWLEDGE OF ENVIRONMENTAL PROBLEMS AFFECTING SUSTAINABLE FOOD PRODUCTION IN EDO STATE M T Ajayi and T O A Banmeke	86 - 91
LEARNING BY DOING AND SHARING PARTICIPATORY ENVIRONMENTAL APPRAISAL (A Case Study of Sarahgamish Village in Kurdistan Province of Iran) Rezvanfar A and Vaisy H.	92 - 99
MANAGEMENT ETHICS AND STRATEGIES TOWARDS SUSTAINABLE TOURISM DEVELOPMENT IN JOS WILDLIFE PARK, NIGERIA *Ijeomah, H M, *Alarape, A A, and **Ogogo, A U	100 - 106

JOURNAL OF ENVIRONMENTAL EXTENSION - VOLUME 6: JANUARY 2007

CONTENTS OF THIS VOLUME

PAGES

THE HEAVY METALS IN THE MUSCLE OF SOME IMPORTED FROZEN FISH IN IBADAN, NIGERIA Ajani E K and Ayoola S O	1 -4
FACTORS AFFECTING ADOPTION BEHAVIOUR OF AGROFORESTRY PRACTITIONERS IN ATISBO LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA Azeez, I O, S O Jimoh and T O Amusa	5 - 9
ENERGY BASELINE FOR MONITORING VULNERABILITY OF THE ENERGY SECTOR TO THE IMPACTS OF CLIMATE CHANGE: RWANDA CASE STUDY Nelson Lujara and Osmund Kaunde	10 - 16
PROMOTING ENVIRONMENTAL PROTECTION IN NIGERIA THROUGH ENVIRONMENTAL EDUCATION: THE ROLE OF WOMEN Agbogidi, O M and Ofucku, A U	17 - 24
ACUTE POISONING IN CATTLE DUE TO INGESTION OF RATTLEBOX WEED IN NIGERIAN PASTURE Kalshingi, HA, Yaroro, II, Daya, S Y Saddiq, M D, Mohammed, A I, Kaikabo A A	25 - 27
CONTRIBUTIONS OF NON- TIMBER FOREST PRODUCTS TO HOUSEHOLD FOOD SECURITY AND INCOME AROUND ONIGAMBARI FOREST RESERVE, OYO STATE, NIGERIA Jimoh, S O and E. A. Haruna	28 - 33
SOCIO-ECONOMIC IMPORTANCE OF NON-TIMBER FOREST PRODUCTS AMONG RURAL RESIDENTS OF SHAKI AGRICULTURAL ZONE OF OYO STATE, NIGERIA Kuponiyi, F. A.	34 - 38
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VULNERABILITY OF THE HYDRO-ELECTRIC POWER PLANTS TO THE IMPACTS OF CLIMATE CHANGE IN RWANDA: COMMUNITY BASELINE Nelson Lujara and Osmund Kaunde	51 - 56
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CONTRIBUTIONS OF NON-TIMBER FOREST PRODUCTS TO HOUSEHOLD FOOD SECURITY AND INCOME AROUND ONIGAMBARI FOREST RESERVE, OYO STATE, NIGERIA.

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ABSTRACT

The study evaluated the contributions of non-timber forest products (NTFPs) to household income and food security in the adjoining villages of Gambari forest reserve Nigeria. Stratified random sampling was used to select respondents among the community members. 141 copies of questionnaires were administered among consumers and marketers of NTFPs. The data obtained were subjected to descriptive statistics, t-test and rate of return on investment (RORI). Results indicate that 61.7% of the marketers were involved in NTFPs marketing on full time basis and 63.12% of them were females. Ten important NTFPs were found to contribute to food intake and income in the area. Sixty one percent of the respondents obtained the products from the forest. Vegetables are consumed with 45.4% of their meals on a year round basis. The contributions of NTFPs to household income amount to 68.1% of total monthly income. The difference in monthly income generated from NTFPs and other sources is significant ($p \leq 0.05$). Fuel wood is used by 46.09 % of the respondents as a source of energy for cooking and preserving foods. It is recommended that important NTFPs be integrated into the traditional farming system so as to enhance sustainable supplies. The NTFPs should also be developed in terms of value addition in order to promote efficient resource utilization. Also, proper inventory of the forest should be carried out to assess the stocking level and determine potential yield to guard against over-exploitation.

INTRODUCTION

A forest is a natural ecosystem in which trees are the dominant component. These trees together with other plants, animals and micro organisms make up a "web of life". There are many people living in close proximity to the forests and their livelihoods are economically and ecologically intertwined with these ecosystems. They eat forest products; heal themselves with them build houses and make marketable products out of them. They forage the forest as a source of the diverse necessities of everyday living; thus the forests contribute to national income. The money-based and urban biased statistics often fail to account for this, thereby obscuring the mainstay of many rural economies (Novlb, 1997). The products that provide most of these goods are usually not of timber origin and they are thus referred to as non-timber forest products (NTFPs).

Non-timber forest products can be defined as goods of biological origin other than wood as well as services derived from forests and allied land uses (FAO, 1995). According to Chandrasekhran (1995), NTFPs can be defined as all tangible products other than timbers, natural or processed derived from forest or any other land under similar use. Non-timber forest products are an integral part of the survival and development strategy for the continued well-being of man,

livestock and native flora and fauna. Unfortunately the potential economic value, either monetary or in terms of utilization (e.g. wild foods, bush meat) is often underrated or ignored. For many households, gathering, processing and trading in NTFPs provide a great source of supplementary income. These activities are especially important at instances when agricultural tasks diminish or when the need for cash is acute. For some households, NTFPs provide the source of livelihood, (FAO, 2000).

NTFPs also support income-earning activities indirectly by providing materials used in off-farm processing activities. The returns from gathering and processing of NTFPs vary immensely depending on the product and gatherers' location. Forest foods contribute significantly to the diet of many rural households although mostly on occasional basis. Many different fruits and seeds are eaten as snacks on the farm or in the bush especially by children. Mushrooms, bush meat and fruits consumption are most popular in villages. Gathered foods complement the sauces that accompany starch staples for flavouring, as medicines or tonics and as substitutes for staple foods during periods of food scarcity. Collectively, forest products such as fruits, seeds, rhizomes and leafy vegetables add diversity and flavour to diet as well as providing

protein, energy, vitamins and minerals. Forest foods are perhaps most important to children especially during the "hungry season" (when most agricultural crops are off season) as snack food play a more significant role in their diets at this time. This is very important because this is the time when they are most vulnerable to nutritional problems such as anaemia (FAO 2000).

Refusal to acknowledge the subsistence value of NTFPs by decision makers, economists and urban elites as an integral part of forest conservation planning, had resulted in the under valuation of forests. Under valuation of NTFPs is a major problem militating against sustainable management of the products (Wickens 1991).

In this study, a survey of the contributions of NTFPs to peoples livelihood in the adjoining villages of Gambari Forest Reserve Ibadan, Nigeria was conducted with a view to evaluating their contributions to household food security and income.

MATERIALS AND METHODS

Study Area:

Gambari Forest Reserve is located on latitude 7° 25'N and longitude 30° 53'E within the low land semi-deciduous forest belt of Nigeria. The reserve is divided into two: natural and plantation forests. The natural forest is made up of indigenous species such as *Terminalia* sp, *Triplochiton scleroxylon*,

Irvingia garbonensis, *Treculia africana*, *Chrysophyllum albidum*, *Artocarpus alilus*, *Xylopia aethiopica* and *Terapleyra tetraptera* among others while the plantation forest is made up of exotic species such as *Gmelina arborea* and *Tectona grandis*. Indigenous or settler farmers from different parts of the Country live in several communities located around the forest reserve.

Data Collection

Six communities within thirty kilometres radius of the forest reserve were selected randomly. Questionnaires were administered using stratified random sampling design. The basis for stratification was size of settlements. The six communities were thus stratified into two: urban and rural communities. The urban communities sampled include: *Idi-Ayunre*, *Challenge* and *Bode* while the rural communities include *Gambari*, *Mamu* and *Onipe* villages. A sampling intensity of 10% was adopted for the survey.

Sampling Procedure

Two sets of questionnaires were administered. Each set was directed to Marketers and consumers of NTFPs. A total of 141 copies of the questionnaires were administered including 111 for consumers and 30 for marketers. Table 1 shows the distribution of households and respondents among the communities.

Table 1: Distribution of Households and Respondents in the Selected Communities.

SN	Communities	Estimated number of households	10% random sampling
1	Onigambari	110	11
2	Mamu	210	21
3	Onipe	92	9
4	Bode	250	25
5	Idi-Ayunre	200	20
6	Challenge	550	55
	TOTAL	1412	141

DATA ANALYSIS

Descriptive and inferential statistics were used for analysis in this study. These include frequency distribution tables, percentages, and student's t-test. Profitability of Trade was analysed using Rate of Return on Investment (RORI). The statistical model for student's t-test used to compare the contributions of NTFPs and other forest based non-farm works to income of respondents is:

$$t_{\alpha/2} = \frac{\bar{X}_A - \bar{X}_B}{\sqrt{\frac{S^2_d}{n}}}$$

t = t-test

\bar{X}_A = Average Monthly income generated from NTFPs

\bar{X}_B = Average Monthly income generated from non-NTFPs

S^2_d = Variance of the individual difference between A and B i.e standard deviation.

n = Number of Variables

Profitability of Trade in NTFPs

Rate of Return on Investment (RORI) was calculated as follows:

$$RORI = \frac{T_i}{T_c} \times \frac{100}{T_r}$$

T_i = Profit (TR - TC)
 T_c = Total Cost
 T_r = Total revenue

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

Non-timber forest products gathering in the forest reserve was found to be gender independent. Male and female members of the communities participate in the harvesting of one product or the other. 36.66% of the respondents were males while 63.12% were females (table 2). In these communities females are normally engaged in less arduous tasks such as leaves, vegetable and fire wood gathering while their male counterparts are involved in land preparation planting and farm maintenance. Men who are involved in NTFPs gathering are either hunters who hunt for subsistence or market purposes or settlers faced with landlessness and emergency cash needs either to pay school fees or to procure food for the family. Children are often found in the forest reserve hunting for fruits such as *Irvingia gabonensis*, *Chrysophyllum albidum*, *Mangifera indica* and *Snscephalus dulcificum*. Adults also engage in fruit and firewood harvesting particularly during the 'hungry season between February and May when most agricultural crops are not yet matured. This agrees with the views of Okafor (1991) that non-timber forest products play important roles in household food security particularly during emergency periods. People involved in NTFPs business in the study area generally have low level of education between first school and secondary school certificates (Table2). This category of people has only very little alternative to farm works since they are largely unskilled. They are usually farmers who gather and process the products to supplement their diets and income. Women dominate marketing of NTFPs in the village and urban markets.

Table:2 Socio Economic Characteristics of Respondents. (N=141)

Parameter	Freq	Percent
Gender(Male/Female)	-	-
Male	52	36.68
Female	89	63.12
Age (years)		
16-20	29	20.57
21-30	38	26.95
31-40	44	31.20
> 40	30	21.28
Educational background	-	-
No formal education	53	37.59
Primary	59	41.84
Secondary	22	15.60
Tertiary	7	4.97

Mean Annual Income		
12,000 -60,000	38	26.95
72,000 -120,000	28	19.86
132,000 -192,000	56	39.72
204,000- 360,000	17	12.05
> 360,000	2	1.42

Socio-economic Analysis of NTFPs in Gambari Forest Communities.

Occurrence and Utilisation

Twenty eight non-timber forest products contribute to the social and economic welfare of the forest community in the study area. Some of these include fruits such as white straw apple-*C.albidum*, Bush mango- *I. gabonensis*, Aridan- *Tetrapleura tetraptera*, bush pepper -*Xyloplea aethiopica* mango-*artocarpus artilus* and vegetables such as bitter leaf-*Vernonia amygdalina*, Yawe - *Pipper umbellatum* Oori-, *Vitex doniana*, water leaf-, *Talinum triangulare* and curry/scent leaf *Ocimum gratissimum*. Fire wood is of vital importance as every household utilize it for cooking (Table 3). Bush meat and fish from rivers and streams within the forest reserve serve as important sources of animal protein to over 70% of the community members

Trade in NTFPs

Trade in NTFPs in the study area includes sales of NTFPs either directly or in processed forms. 61.70% of the marketers trade in NTFPs full-time while 38.30% of the marketers trade in NTFPs part-time. The Rate of return on investment (RORI) for firewood a typical NTFP in the study area is 42.86%.

Table 4 shows that 61.70% of the sampled population are engaged in NTFPs marketing as a full-time business while 38.30% are occasionally involved. The NTFP business is largely specialized and organized. Those who are full time traders include medicinal plant sellers, bush meat and fuel wood sellers. These full time traders/professionals have Associations, which are recognized by the forest service as important forest stakeholders. Some of these include Hunters' Association, Fuel wood Marketers' Association, Farmers' Association and Leaves Sellers' Association. The implication of this for sustainable forest management is that there exists on the ground organized structures which may be mobilized for active support and participation in forest management.

Table 3: Some NTFPs prevalent in the Study Area and their Uses.

S/N	NTFPs category	SCIENTIFIC NAME	LOCAL NAME (Yor.)	Uses
1	Vegetables	<i>Piper umbelatum</i>	Yawe	Food Supplement
		<i>Ocimum gratissimum</i>	Efinrin-Oso	Food supplement/flavouring
		<i>Crassocephalumcrepidoides</i>	Ebolo	Food supplement
		<i>Vitex doniana</i>	Oori	Food supplement
		<i>Vernonia amygdalina</i>	Bitter leaf	Food supplement/ medicine
2	Packaging leaves	<i>Tectona grandis</i>	Teak	Wrapping of traditional food items
		<i>Musa sp.</i>	Ogede	Wrapping of traditional food items
		<i>Thomatococcus danielli</i>	Eeran	Wrapping of traditional food items
3	Fruits	<i>Crysophyllum albidum</i>	Agbalumo	Snacks
		<i>Syncephalumdulcificum</i>	Agbayun	Snacks
		<i>Artocarpus artilus</i>	Berefutu	Snacks
		<i>Irvingia gabonensis</i>	Ooro	Snacks and soup ingredient
4	Medicinal plants	<i>Alstonia booneii</i>	Eepo ahun	Traditional medicine
		<i>Khaya Sp.</i>	Eepo Aganno	Traditional medicine
		<i>Anninckia clotantha</i>	Yaani	Traditional medicine
5	Bush Meat/fish	<i>Crycelomys gambianus</i>	Okete	Animal protein supplement
		<i>Tryonormys swindrianus</i>	Oya	Animal protein supplement
		<i>Acatina acatina</i>	Igbin	Animal protein supplement
		<i>Tilapia Sp.</i>	Sawa	Animal protein supplement
		<i>Clarias gariepinus</i>	Aro	Animal protein supplement
6	Resins & Dyes	<i>Rolhmaniawhitfiedii.</i>	Buje-nla	Weaving of jute bags
		<i>Pterocarpus osun</i>	Osun	Dye stuff/ local pomade
7	Chewing stick	<i>Massularia acuminata</i>	Pako Ijebu	Tooth caring
8	Fuel wood	<i>Tectona grandis</i>	Teak	Household energy
9	Spice	<i>Piper guineese</i>	Iyere	Pepper soup ingredient/medicine
1	Sponge	<i>Luffa luffa aegyptiaca,</i>	Kainkain-Ayaba,	Washing/ bathing
0		<i>Momordica angusticephalas</i>	Kain kain -Hausa	

Sources of Supply of NTFPs.

Table 4 shows that 61% of respondents obtain their products from the forest reserve. 10.63% and 28.37% of the respondents obtain their products from crop farms and fallow lands respectively. This indicates that majority of the respondents still depend on wild stocks of these products. The implication of this is that there is little or no effort directed at regenerating the species by individuals. If this trend continues the wild population may soon diminish thereby exposing the genetic resources of these species to the risk of local extinction.

Table 4: Characteristics of NTFPs Trade in the Study Area.

CHARACTERISTIC	FREQ.	PERCENT
Mode of Trade		
Full-time	87	61.70
Part-time	54	38.30
Frequency of supply		
Daily	77	54.61
Weekly	35	24.82
Monthly	21	14.89
Quarterly	4	2.84
Yearly	4	2.84
Sources of Supply		
Forest reserve	86	61.00
Crop farm	15	10.63
Farm fallow	40	28.37

Frequency of supply of NTFPs.

Table 4 shows that 54.61% of respondents get their supply of NTFPs on a daily basis, 24.82% get their supply on a weekly basis. 14.89% and 2.84% of respondents get their supplies on a monthly and quarterly basis respectively while 2.13% gets their supplies on a yearly basis. Many NTFPs are seasonal in their availability and hence the differences in the frequency of supply indicated by the marketers. This is in accordance with the flowering and fruiting phenologies of the different species. Many of these species are available mainly during the dry season which coincides with the period of food scarcity (hungry season) when preparation for next seasons' crops are just beginning and the harvests for the last season are virtually exhausted. This is an important characteristic in ensuring food security, which has been described as access to food to all people at all times.

Contributions of NTFPs to Household Diets and Income in the Study Area
NTFPs in the house hold Diets.

Table 5 shows that 12.77% of the respondents consume edible NTFPs as main foods in their diet. 69.50% consume NTFPs as complimentary foods and snacks, while 17.73% of respondents consume NTFPs as diets supplements. e.g spices, condiments

and flavours. Eleven meals including Amala, pounded yam, *fufu*, *eba*, boiled rice, cooked beans, boiled yam, boiled plantain, corn pap, bread and yam porridge were listed by respondents, five of them are consumed with vegetables. These include: *amala*, *fufu*, *eba*, pounded yam and corn pap. This implies that 45.5% of their meals are consumed with vegetables many of which are sourced from the forest. This observation agrees with the findings of Carney (1998) and (Bryon and Arnold 1999) that rural people rely on NTFPs for sustainable livelihood and that majority of households in developing countries and a proportion of urban households depend on plants and animal products for part of their nutritional, cooking and/or health needs.

Table 5: Roles of NTFPs in Household diet in the Study Area.

DISTRIBUTION	FREQ.	PERCENT
Main food	18	12.77
Supplementary food and snacks	98	69.50
Others	25	17.73
TOTAL	141	100

Contribution of NTFPs to Household Income.

Income generation from NTFPs is very significant in the study area. Though for many of the respondents, NTFPs are not the sole source of income, they generate between 59 and 84 percent of their average monthly income from the business (table 6)

Table 6: Contribution of NTFPs to Household Income

Average Monthly Income of Respondents (N)	Average Monthly Income derived from NTFPs (N)	Freq.	Percentage of the Average Monthly Income Derived from NTFPs.
5500	3,250	51	59.1
14500	9,000	42	62.1
20500	14,750	22	72.0
32000	20,500	17	64.1
46000	38,750	09	84.2
Overall 16,301	11,103	141	68.1

Table 7. t-test analysis of the difference in monthly income generation from NTFPs and other sources

Income Source	Mean	Std.Dev. (S)	N	t-cal	t-tab	d-f
Ntfps	17250	13647.34	5	2.6184	2.13	4
Other sources	6450	4424.36	5			

Non timber forest products constitute about 68.1% of the over all average monthly income of the respondents. Further more, student t-test indicates significant difference between the income generated from NTFPs and those from other sources (Table7).

This confirms a significant direct contribution of NTFPs. to household income in the study area, which also implies indirect contribution to food security as people spend part of their income, to buy food from the market for their family. Hence NTFPs enhance both physical and economic access to food in the study area

The foregoing agrees with (FAO 1997) that NTFPs have been a source of income to large populations of rural dwellers, who are usually poor, particularly women, who collect NTFPs from the forest to satisfy their daily domestic consumption demands but at times they collect more than domestic needs and sell them in local or urban markets to provide

income so as to raise their standard of living. Thus there is no clear demarcation between NTFPs harvested for household food and those sold to generate income. While items such as fruits, nuts, vegetables, fish and bush meat are consumed at the household level, excess collections are sold to generate income.

Some of the NTFPs sold to generate income include *Thaumatococcus daniellii*, *Chrysophyllum albidum*, *artocarpus artilus*, *Momordica agulsticcephalas* *Vernonia amygdalina* and various species of fish and wild life. These are collected from the forest and sold to middlemen or to the consumers directly.

Most forest based income generating activities are seasonal; some products can only be gathered at certain time of the year. Income from forest products may contribute to purchase of farm inputs or food between harvests, hire labour for cultivation of food

crops or generate working capital for trading activities from which incomes are generated (Warner 2000).

Firewood as a Source of Cooking Energy

A large proportion of the sampled population depends on the use of firewood from the off cuts of teak as source of household cooking energy. Table 8 shows that 46.1% of respondents utilize fuel wood as their source of energy for cooking, 13.5% and 15.6% use electricity and gas respectively, while 24.8% use kerosene for cooking.

Table 8: Firewood as Source of Cooking Energy

DISTRIBUTION	FREQ.	PERCENT.
Fuel wood	65	46.1
Electricity	19	13.5
Gas	22	15.6
Kerosene	35	24.8
TOTAL	141	100

This is in agreement with the observation of Falconer (1990) that forest fuels are important for enhancing and ensuring food security as they provide energy for processing otherwise raw food and for preserving foods to forestall seasonal shortage. Some snacks and food items such as roasted plantain, mutton/beef barbecue, corn and plum, are processed mainly by using firewood or charcoal. Bush meat and fish are preserved to increase their shelf lives by smoking using firewood and charcoal. Villagers prefer the use of firewood/ charcoal for these food items as they believe that it does not impart unsavoury odour on the food as would kerosene for instance and is cheaper and more available and affordable than gas and electricity.

CONCLUSION

NTFPs contribute both directly and indirectly to food security in the study area. Twenty-eight species of NTFPs were being used for one purpose or the other. At least 61.7 % of the population are involved in NTFPs trade. Sixty one percent of the respondents obtained their products from the forest reserve. Though there is seasonality in supply, many of the species occur at the period of food scarcity during the dry season. About 47% of the respondents depend on firewood from the forest for their cooking energy. Also 70% of respondents consume NTFPs as food supplements while about 18% consume them as condiments, flavours and spices. Income from NTFPs constitutes about 68 % of the households' average monthly

income. Sixty one percent of the respondents obtain their products from the forest reserve implying very little effort at domestication and cultivation. Stakeholders Association exist in the study area which could be mobilized and encouraged to participate in the sustainable management of the forest

Deriving from the above, it is recommended that: NTFPs be integrated into farming systems to ensure the continued availability of NTFPs and to ease the pressure on the natural forest; Development potentials of NTFPs in terms of value addition should be explored to ensure efficient utilisation of the products. Inventory of the forest reserve should be carried out to assess stocking level and determine potential yield of each species in order to guard against over exploitation while the existing forest stakeholders Associations should be mobilized for participation in the management of the forest reserve.

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