

INDIGENOUS KNOWLEDGE OF RURAL WOMEN IN FOREST RESOURCES UTILIZATION AND CONSERVATION IN AGOI-IBAMI AND AGOI-EKPO, YAKURR LOCAL GOVERNMENT AREA, CROSS RIVER STATE, NIGERIA

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ABSTRACT. *Indigenous Knowledge of Rural Women in Forest Resources Utilization and Conservation in Agoi-Ibami and Agoi-Ekpo, Yakurr Local Government Area, Cross River State, Nigeria.* This study was aimed at assessing the indigenous knowledge of rural women in forest resources conservation in Agoi-ekpo and Agoi-ibami in Yakurr Local Government Area of Cross River State, Nigeria. The objective of the study is: To examine the extent to which indigenous knowledge of rural women have influenced forest resources utilization and conservation. The sampling techniques used for the study are purposive and systematic in the selection of settlements. Purposive sampling was adopted because it was the researcher's deliberate intention to choose the rural communities in Yakurr L.G.A. that have direct interface with the Forest Reserves and are involved in the use and management of forest resources. While the systematic sampling was used to select rural women households at fixed intervals. The research findings revealed that a significant percent (71.2%) of the rural women were involved in the harvesting of forest resources. The study also showed that different quantities of edible leaves, fruits, snails, and medicinal herbs were collected by rural women for varying purposes. It further showed that these forest resources were harvested at varying frequencies and that they generate income to the rural women. The main forest resources conserved as revealed by the study included afang, atama, editan, bush mango, and hot leaf because of the high exploitation. Restrictions on the felling and uprooting of plants as well as ban on exploitation were the two prominent ways of forest resources conservation. Pearson's correlation result indicated a positive and significant association between indigenous practices of rural women and forest resources utilization and conservation. It also showed that problems encountered in the collection of forest resources did not vary by the ages of rural women. In order to control unwanted exploitation of forest resources as well ensure the availability for the future, local

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communities should set-up forest guards or vigilante to control the quantity of edible forest resources that will be harvested from the forest.

Keywords: Indigenous knowledge, rural women, local communities, forest resources, utilization, conservation, culture, management, products, sustainability

1. INTRODUCTION

Indigenous knowledge (IK) is knowledge that is unique to a community, culture or society. It is also known as local knowledge, traditional science or traditional wisdom or knowledge. This knowledge is passed on from generation to generation, usually by word of Mouth and Cultural rituals (Gough, 1996). Thus, Indigenous knowledge (IK) is part of the lives of the rural dwellers as their livelihood depends almost entirely on specific skills and knowledge essential for their survival. Accordingly, for the development process, IK is of relevance for the following sectors and strategies; use and management of natural resources, agriculture, animal husbandry and ethnic veterinary medicine, primary health care, preventive medicine and psychosocial care, community development, poverty alleviation, saving and lending (Food and Agricultural Organization (FAO), 2009a). Indigenous Knowledge is also vital for sustainability of natural resources including forests, water, and agroecosystems across a broad landscape continuum spanning from households through farms, village, commons and wilderness (Pandey, 2002a).

Natural and social sciences have helped by acquiring and applying knowledge about ecosystem conservation and restoration and by strengthening the policy and practice of sustainable development. A significant issue of importance in forest resources conservation research is the presence of local people who inhabit these areas, their impact on the local fauna and flora; and, their indigenous environmental knowledge necessary for sustainable management of forest resources. An example is the Akas, a small tribal group inhabiting the Sub-Himalayan part of India who have applied their own indigenous knowledge system in the conservation of forest resources. For example, specific species of plants are not extracted from the forests. Similarly, some animal species are neither killed nor eaten by these people, they spare the immature and pregnant animals in the forests, neither are small saplings of certain plants destroyed. As such, the Akas tribal group has developed a sustainable eco-friendly relation with the surrounding forest ecosystem (Nimachow, Joshi, Dai, 2011). Therefore, natural resource conservation and management is not a new concept to the Akas tribe. In view of the importance of IK in resource conservation, scientific research on human-environmental interactions is now a budding sustainability science (Kates, Clark, Corell, Hall, Jaeger, Lowe, McCarthy, Schellnhuber, Bolin, Dickson, Faucheux, Gallopin, Grubler, Huntley,

Jager, Jodha, Kaspersen, Mabogunje, Matson, Mooney, Moore 111, O’Riordan, & Svedlin, 2001).

Sustainability science recognises that the well-being of human society is closely related to the well-being of natural ecosystems. Hence, the intellectual resources, on which the sustainability science is building on, need to consider the knowledge of local people as well. There is thus, a need, therefore, to foster a sustainability science that draws on the collective intellectual resources of both formal sciences, and local knowledge systems of knowledge referred to as ethnoscience by Pandey, (2001b).

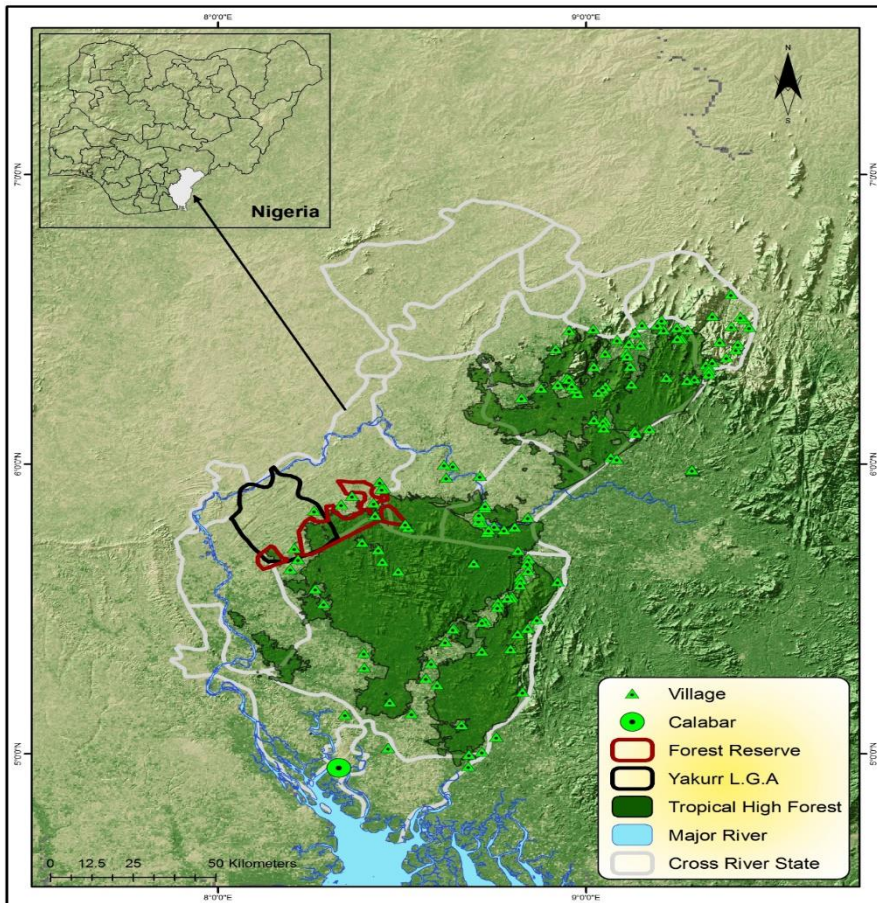


Fig.1: Modified Map of Cross River State indicating Forest Reserved Areas in Yakurr L.G.A. (SOURCE: Geographic Information System (GIS) Laboratory, Department of Geography and Environment Science, University of Calabar.)

The forest reserves in Yakurr LGA (Agoi-Ibami forest reserve wholly in Yakurr LGA and Ukpon River forest reserve partly in Yakurr LGA) as contain in figure 1 and 2 were established in 1949-1950 by the forestry ordinance No. 38 of 1937 in the then Obubra division of the Ogoja province, with a landmass of 28.968 square kilometres for Agoi-Ibami forest reserve. The reserves could be described as settlement of harsh terrains, with forested cover set apart for ecological, cultural and socio-economic significance. They are buffer zones to the surrounding communities and as sanctuary of earth biodiversity.

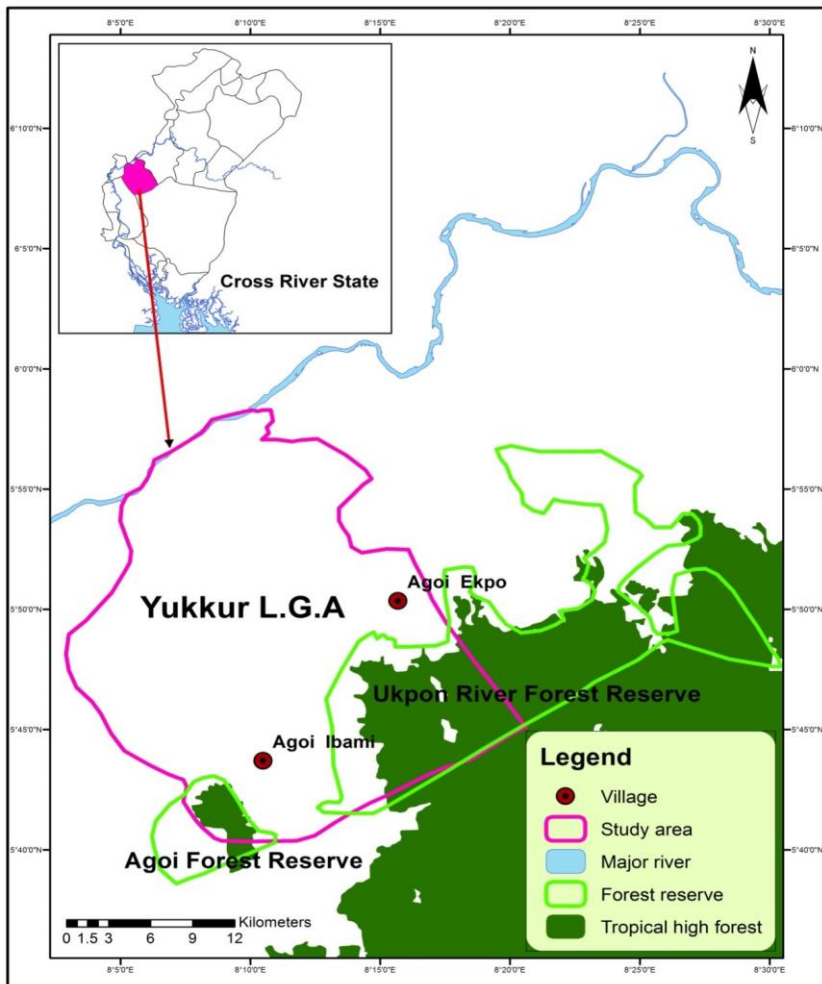


Fig.2: Modified Map of the study area.

(SOURCE: Geographic Information System (GIS) Laboratory, Department of Geography and Environmental Science, University of Calabar.)

The forest reserves are threatened by a high rate of deforestation and forest degradation as well as a decline in primary forest area. Associated with this disappearance is loss of cultural habitats and indigenous practices which were acquired and utilized to conserve and manage the forest over the years. The degradation of the Reserves began after the Nigeria civil war, when people began to source for food, better place to settle, and land to cultivate crops became limited. Then in late 1970's government began to grant license for logging as well as *tuangya* system practice which gradually led to indiscriminate intrusion of the populace into the reserves. About 80 percent of these Reserves forest cover has been cleared, fragmented, or degraded, of which about 50% has been totally cleared (Usani, 2005). The Forest Reserves are degraded in terms of loss of the goods and services that they provided (fibre, food, habitat, water, carbon storage and other protective, socio-economic and cultural values). These trends are still evident in the broad distribution patterns of cleared vegetation in Forest Reserves. The loss and degradation of high forest in Cross River state is expected to have improved considerably (at least temporarily) due to the moratorium on logging put in place by the government of Cross River State in 2008, as well as the establishment of the anti-deforestation task force. But this is not the case in Yakurr LGA. This is due to the neglect of requisite government agencies to integrate indigenous knowledge systems (IKS) in conservation measures. So, the people see the conservative strategies to be foreign, government own, hence unwilling to adopt it.

Several studies in the literature have critically examined the role of Indigenous Knowledge in forest resource conservation (Kweka, 2004; Eyong, 2007; Tiu, 2007; Cooper, 2010), others focused on the effect of IK in environmental planning and management (Clay, Alcorn, & Butler, 2000, Enya, 2006), however, studies that focused on the role of women in forest resources conservation in Yakurr LGA have not been adequately undertaken. This gap in literature may be attributed to the fact that in Africa, the issue of women in forest resource management and conservation have taken the centre-stage, but irrespective of this, women Indigenous Knowledge and participation have not been properly studied. A recent study by Colfer and Minarchek (2012), looked at the role of women in forest resource use, but did not empirically evaluate their IK and individual experiences in forest resource conservation. It is against this background that this study was carried out in Agoi-Ibami and Agoi-Ekpo, Yakurr Local Government Area of Cross River State, Nigeria.

The aim of this study was to assess the indigenous knowledge of rural women in Forest Resources utilization and Conservation in Agoi, Yakurr Local Government Area, Cross River State. The Specific objective of the study is to examine the extent to which indigenous knowledge of rural women have influenced forest resources utilization and conservation.

2. LITERATURE REVIEW

Indigenous knowledge of rural women and forest resources use and management. Rural women all over the world have adapted to different cultural belief systems which demonstrate an immense respect for forest resources. These systems contain rules which defined how the forest should be treated (Owan, 2011). Rituals, ceremonies and prohibitions all regulates the use of forest resources and thereby accomplish the goals of forest resources conservation. Understanding this knowledge and using it to solve forest problems remains incumbent on its owners.

According to FAO (2013), the developing world's 1.3 billion rural poor make up the world's largest group of natural resources managers. Understanding their roles and responsibilities - including the gender dimensions of natural resources conservation - is a starting point for reversing environmental degradation. Women manage natural resources daily in their roles as farmers and household providers. In non-industrial regions, forest resources are inextricably woven into the rural and household economies. These resources are used to provide fuel, fodder and food. They supply medicines and shade, increased soil fertility, shelter from the wind and protection from the rain. From them women fashion many of the products used in the house- and, often enough, the house itself (FAO, 2012). Perhaps most importantly of all, forests resources provide many rural women with their only source of personal income. Typically, they are responsible for growing subsistence crops and often have unique knowledge of local crop species. To meet family needs, rural women and girls walk long distances to collect fuel wood and water. Despite their reliance on natural resources, women have less access to and control over them than men.

Rhona, Abdul and Dyhairuni (1997) cited the penans of rural Brunei women to have great respect for and protect the dipterocarp tree which produces the seeds which the wild boar ate. These women do not pollute the river because they also knew that wild boars ate the plants that grew by the river banks. They allow the boar to get their share of the sago trees and protect the acorn producing trees which the boars also loved. For the penans, the forest seemed to be everything, and they felt an affinity with it and were thankful for its supply of staple foods, building materials, medicines and raw materials for their handicraft. The forest was their world and they lived in harmony with it and so guarded it jealously. In return for a support fund and tourism-related income, the people of Ban Thung Yao in Thailand were asked to allow a reserve to be established in the surrounding Forest. Villagers, however, feared loss of access to valuable non-wood forest products and the women of the village led the process of effecting it (Nabangchang, 2012). According to FAO (2013), Rural women and men often have disparate knowledge of forest resources and different roles in tree and forest

resources conservation. Women practice traditional agro-forestry production systems, such as home gardening and harvest and sell wood and tree products as part of small-scale enterprises. The women are mainly responsible for collection of fuel wood for the household, and of wild plants used as food and medicines. Men are involved more in high-valued activities such as crafting and hauling timber. But gender roles vary, in parts of Nepal, men weave bamboo baskets while in Lao PDR, women are more active in the craft. Women are the sole collectors of fuel wood in Bhutan, but men help in Sri Lanka (Agarwal, 2010). Research suggests that trees and forests are more important to rural women's livelihood than to those of men. In Madagascar, poor women in one community earned 37% of their income from forest products, compared to 22% earned by men. In Andhra Pradesh, 77% of women's income in some areas was derived from forests (FAO, 2013).

Indigenous practices of women traverse a wide gamut of life, cultural experience, epistemologist and empiricism of thousands of disparate cultures often lumped together as if indigenous knowledge systems were a simple monolith. Indigenous women knowledge is implicated in ecology, agronomy, agriculture, medicine, animal husbandry, music, storytelling, cloth wearing, etc, across several thousands of different cultures and peoples.

In terms of medicinal culture, as practitioners of a distinct type of healthcare, indigenous women operate from a theoretical stand point that construes ailment and diseases as a psychosomatic phenomenon, rather than a biological or pathogenic phenomenon. Consequently, knowledge of the medical use of plants is only a part of a more holistic conception of diseases, treatment and recovery (Ikechi, 2009). Rhonda (1990) in Ajake, (1998) states that indigenous knowledge is cultural knowledge, which is specific and yet dynamic, knowledge which has been adapted to the physical and social environment in which it is used. It is a practical knowledge because it guides life on daily basis. This knowledge represents a source of ideas and adaptation whose implication can be explored and applied to address problems in other settings.

For indigenous people, plants cannot be viewed in isolation from the spirit world. They are also connected with the animal world; both domestic and wild. All parts of an environment that is composed of forces of air, water, fire and earth! Healing in such a world is always physical, psychological, spiritual and social. Their knowledge has been critical to their physical, cultural, and ontological survival. At the same time, they are many traditions of knowledge that are rooted in the notion and that to some extent form the basis for natural and cultural identities. These traditions of knowledge that are expressed through culture, heritage, are now located in the context of intellectual property within the category of indigenous knowledge system (Isaac & Thomas, 2007).

Today, the international forestry community fully recognises that women and men play different roles in forestry and forestry-related activities. Case

studies conducted in all parts of the world confirm that rural women and men fulfil significant, but distinct, functions in natural resource use and management. The tasks they perform, the way they earn a living and allocate their time, the way they use forest and tree resources, the control they have over resources are among the factors that can vary enormously (FAO, 2014). These differences can also be found at the level of constraints, barriers and opportunities. Further, these variations exist not only between cultures, but also within cultures, communities and families. The knowledge of oral cultures, most of which is embedded in folklore and not recorded in tangible material form is deemed to be in the public domain and therefore is appropriable (Mogomme, 2007). Folklore however is recognised as an important element of the cultural heritage of every nation (Mogomme, 2007). Folklore has been defined as the sum of human creativity. It is said to encompass the customs, beliefs, festivals and practices which human societies have owned through tradition from generation to generation.

It includes folk literature such as myths, legends, fairy tales, anecdotes, short stories, proverbs, riddles, rhymes, etc. it also includes folk practices, folk beliefs, superstitions, rites and rituals as well as folk arts or artistic folklores which includes folk dance, folk gestures, embroidery, weaving and carpet making costume designing. Lastly, it encompasses what has been broadly termed folk science and technology and which includes folk medicine, preparation of dairy product, fertilizers, methods of agriculture, folk architecture, tool making, ornament making and poetry (Mogomme, 2007).

3. MATERIALS AND METHOD

3.1 Study design

A reconnaissance survey which include consultation with village heads, elders, youth councils, and women's leaders was carried out and this was to intimate them on the purpose of the research and the benefits that may be derived.

The collection of data exercise was carried out by the Researcher assisted by a post graduate research assistant and local assistants from the two sampled communities. The function of local assistants was to interpret for the Researcher in the people's own language to enable the women to understand the essence of the discussion. For the participants to be familiar and conversant with the research theme, issues raised in the PRA and main objectives, the researcher carried out a training in PRA and administration of women household questionnaire survey.

3.2 Sources of data

The study used both primary and secondary data. The primary data were collected through focus group discussions (FGD), key informant interview (KII),

participatory rural appraisal (PRA) and questionnaire survey through the instrument of a pre-prepared checklist focussed on the forest utilization and conservation strategies of women in the study area.

The secondary data were reviews of related works on forest utilization and conservation, different approaches to forest resources conservation, forest resources and village development. They were also collected through the reviews of documented data from relevant government ministries, department of forestry, parastatals and board agencies and non-governmental organisations (NGOS). Textbooks, unpublished theses', journals, technical and occasional papers, periodicals like government publications, annual reports, newsletters among others are the main sources of secondary data.

3.3 Methods of data collection

The FGD was done in stages: stage one was the grouping of community women into 2 (farmers and resource user groups). Stage two was the sub-grouping of the forest resource users into Fuel Wood harvesters, and NTFP gatherers, e.g. Afang (*gnetum africana*) and Bush mango (*irvingia gabonensis*), herbs harvesters and other forest resources group domiciled in the community. Key informant interview was carried out with leaders of each of the sub-groups separately, 3 elderly women (70 years and above) and the Chiefs of each of the sampled villages were also interviewed. The KII is to help in triangulating the information from the FGD.

3.4 Sampling techniques

The sampling techniques used for the study are purposive and systematic in the selection of settlements. Purposive sampling was adopted because it was the researcher's deliberate intention to choose the rural communities in Yakurr L.G.A. that have direct interface with the Forest Reserves and are involved in the use and management of forest resources. While the systematic sampling was used to select rural women households at fixed intervals and every fifth households were interviewed and administered questionnaire. The women households were systematically chosen to ensure wider coverage of the communities.

3.5 Techniques for data analysis

The data obtained from the field were analysed using descriptive and inferential statistics. Descriptively, tables, percentages, averages, maps were used to bring the study to a clear perspective. The inferential statistics employed for the testing of the study hypothesis is Correlation Analysis.

Results and Discussion of findings

3.6 Top forest products affected by management activities

Table 1 shows the five top forest resources (non-timber forest species) that are affected by conservation initiatives. However, the commonly harvested non-timber forest species because of their general nutritional benefits and economic values are affected by the management activities initiated by the local women. The result presented in the Table identified afang, atama, bush mango, hot leaf and editan as forest resources affected or placed under management initiatives by the rural women. These forest resources need to be properly protected to reduce their wanton exploitation.

Table 1. Five top forest products affected by management activities

Top five	Communities				Total response (%)
	Agoi Ekpo		Agoi Ibami		
	Freq	%	Freq	%	
Afang	31	53.4	34	64.2	58.6
Atama	3	5.2	9	17.0	10.8
Bush mango	8	13.8	5	9.4	11.7
Hot leaf	8	13.8	3	5.7	9.9
Editan	8	13.8	2	3.8	9.0
Total sum	58	100%	53	100%	100%

3.7 Socio-economic and demography characteristics

From the result presented a similar age range or interval was reported by Raufu et al., (2012) in their work in Ife South local government area of Osun State, Nigeria, where they stated that 76.7 per cent of the respondents (rural women) fell within age range 20 - 50years. Also, Utin (2010) stated that majority of the rural dwellers in Akwa Ibom that engaged in forest activities fell within the ages of 20 – 50yrs. This age range is respected as this group of individuals dominates the farming system in these communities and is engaged in the harvest of forest resources. This group of rural women can travel long distances in search of forest resources for commercial and household use. For the commercials, it is aimed at providing alternative source of income to their various households, while others use it as their principal source of livelihood or living.

Considering the general pattern of education in the area, the implication is that the literacy level of respondents in the studied communities is very high and this is expected to have some influence on the people's level of knowledge on forest resources use, management and conservation. It also means that a good number of the people in the two communities are aware of the need for sustainable utilization of forest resources. Similar result was reported by Ogundele et al., (2012) when they carried out an assessment of non-timber forest products (NTFPs) utilization on rural livelihoods in Ini local government area of

Akwa Ibom State, Nigeria. These studies reported that majority of the respondents in their studies were literates, as such would be knowledgeable of the usefulness of forest resources. Information on occupation, the result showed that the occupational pattern in the two communities was dominated by farmers and partly traders. This agrees with the findings of Raufu et al., (2012) that majority of the rural women were chiefly traders and farmers followed by private firms. Also, Ogundele et al., (2012) stated that the occupational structure reveals that the respondents are predominantly farmers. This is apparent as the people in the communities are majorly farmers that engage in food crop and tree crop cultivation for sustenance. Being an agrarian society, the people make a living on the land which is the resource used to meet the demands of their respective households. In all, respondents in the two communities are engaged in different occupation as a source of livelihood (generating income to make a living), and the harvesting of forest resources is meant to complement income generated from their main occupation.

The desire to replenish soil nutrient naturally was the principal reason for practicing land rotation. This is apparent as land rotation may have positive effects on successive crops in the rotation, leading to greater production overall as well as it may also give benefits in terms of improved soil, better distribution of nutrients in the soil profile (deep-rooted crops bring up nutrients from below) and increases biological activity. Other benefits of land rotation were control of pest and disease as well as preservation of the environment because different crops have varying impacts on the environment. Indeed, land rotation goes a long-way in the preservation of the environment because it encourages vegetation growth with endless ecological services or benefits like the conservation of biodiversity, improvement in soil structure and nutrient, erosion control and carbon sequestration among others (Kaple, 2011). To allow the land to recover its lost nutrients, this system of farming is practiced in the area to allow their pieces of land to fallow or rest (Mathews et al., 2006). The differences in population and forest land areas may be responsible for this pattern of rotational bush fallowing. In a related study, Offiong and Iwara (2012) attributed the number of years allowed for a piece of land to rest or fallow to population factor and availability of large expanse of forested land.

3.8 Forest activities and products harvested with their economic value

A cursory look at the data gathered showed that edible leaves and fruits were the forest resources or products mostly collected by rural women; this was followed by edible leaves alone. This lends support to the work of Raufu et al., (2012) who also identified leaves and seasonal fruits as non-timber forest activities frequently collected by rural women in Osun State, Nigeria. It also agrees with the findings of Utin (2012) who posited that edible leaves and fruits including snails were habitually collected by rural dwellers in Akwa Ibom State, Nigeria. In a

similar study, Ogunbanjo and Aina (2013) showed that edible leaves *Beilshmidia manni* and snails (*Achatina achatina*) are mostly harvested by people in Ogun State because they have the major economic potentials or tendencies to improve their standard of living. Similarly, Falconer (1992) cited in Raufu et al., (2012) noted that forest foods continue to contribute significantly to the diet of many rural households while a great variety of goods are gathered from forest and fallow lands, the forests commonly supply tubers, mushrooms and snails.

The high collection of mushrooms in the communities used to garnish or spice soup is at variance with the study of Raufu et al., (2012), who reported or identified mushroom as one of the least collected forest resources in Osun State. Cultural difference and identity in the use of forest resource could be attributed to the low use of mushroom in Osun State, as against the high collection and utilization of mushroom in the study communities. In a related study, Adinya et al., (2012) identified mushroom as one of the forest products mostly collected by rural dwellers in Cross River State. They are also collected for domestic and commercial purposes. Similarly, Utin (2010) identified mushroom as one of the forest resources normally harvested in Akwa Ibom State. Other forest resources collected in the area included atama, editan and water periwinkle among others.

The result presented somehow supports the findings of Omara-Achong et al., (2012) when they noted that small bundles of Atama across different markets in Calabar Municipality and Calabar South is sold at N10 and N20. In concise, the information implies that <5 bags of Atama are usually harvested from the forest; the product is harvested twice a week and weekly and N20, 000 – N30, 000 is monthly earned from the sales of Atama. In a related study, Fuashi et al., (2010) stated that forest products have economic values to rural communities as varying amount of money are earned from the marketing of different forest resources. They stated for instance that the harvesting and marketing of *Gnetum africana* in Cameroon and Nigeria provide revenue to the harvesters. They further stated that the total cost of harvesting about 250 bundles of *Gnetum africana* in a week was estimated at 16.00 USD. This means that so much money is generated from the sales of forest products mostly when sold in bags. In a related study to the result presented in, Omara-Achong et al., (2012) identified *Piper guineense* as the third mostly consumed indigenous leafy vegetable in Calabar and that small bundle are sold at N20 in many of the markets. Omara-Achong et al. further stated that *Piper guineense* are largely collected from the wild and are regularly available to the local people at no cost but contribute considerably to the nutritional well being of the rural people.

According to Malleson et al., (2014) Afang and other NTFPs are at the domain of the poor and they contribute substantially to rural livelihoods. Households in rural communities are engaged in NTFP-related because there are few alternative sources of income (Mallesonet al., 2014). In line with the result

reported on the collection of Afang, a study carried out by Omara-Achong et al., (2012) stated that across different markets in Calabar Municipality and Calabar South, Afang is sold in small bundles at N70 to N80. This means that so much money is realized from the marketing of this God given resource. To prepare a sumptuous and delicious pot of Afang soup, more than two bundles are required; implying that it is a good generator of household income in the rural areas. In another study, Fuashi et al., (2010) stated that the harvesting and marketing of Afang provide revenue to the harvesters in Cameroon and Nigeria. They estimated 16.00 USD as the total cost of harvesting about 250 bundles of Afang in a week. The result further indicated that the harvesting of Afang was usually carried out in 2 months, followed by a month.

Editan an edible leave like Afang, Atama and Hot leaf are daily required by people in the two communities to meet their food needs. In many hotels and households, these edible leaves are used for the preparation of soup, sold to make money and used for medicinal purposes. Majority of the harvesting of Editan as shown in the result were carried out once in a week, followed closely by daily; implying that the harvest was usually carried out daily and monthly. This is so to meet the daily demands of the forest resource. Like other forest products already discussed, Editan provides or serves as good source of income to many households who are involved in forest activities (Malleeson et al., 2014). John et al., (2013) pointed out that non-timber forest products such as Editan continue to contribute to household economies and food security. This is so as they serve the food needs and demands of households in both the rural and urban areas in Nigeria and other African countries. In Agoi-Ekpo, N6, 000 to N8, 000 was often earned monthly by majority of the rural women involved in forest activities, while N6, 000 to N7, 000 was earned monthly by those in Agoi-Ibami. The study carried out by Omara-Achong et al., (2012) revealed that Editan in different markets in Calabar Municipality and Calabar South is sold from N10 to N20 naira. This verifies the economic gains derived from the harvesting and sales of Editan.

Wrapping leaves are another forest resource usually collected from the forest for various uses. They are used to preserve mushrooms, pepper, kola nut and other consumable items harvested from the forest and farm (Akanni, 2013). Wrapping leaves are also used to wrap moi-moi and to make another household food (Kabuo et al., 2015). They are of different types and purposes. Kabuo et al., (2015) stated that leaves play vital role in the traditional packaging of food products with regards to their packaging properties such as aroma and taste. Also, Aina (2012) cited in Akanni (2013) noted that 55% and 59.2% of the respondents used teak leaves and wrapping leaves (*Thaumatococcus danielli*) for packaging food items and kola nuts for sale. In a related study, Akanni (2013) stated that 12 bundles of wrapping leaves were harvested daily by household in southwestern Nigeria. In a similar study, Akanni (2013) reported that appreciable amount of money is generated from the sales of wrapping leaves. In a similar

study, Larinde and Omokhua (2015) stated that bush mango is a money-making business with high returns for people that engage in it because huge amount of money is realized from its sales. On like other forest products, the responses obtained tend to suggest that cane rope is not well a widely harvested forest product by the rural women within the study area. This is so as majority of the respondents did not response to the questions.

Bush Mango (*Irvingia gabonensis*) is a major source of ‘Ogbono’ widely used as soup thickener in most West African countries (Ladipo, 2003). In the study area, the seed is also used to garnish oil used for local delicacies. Also, the fleshy parts are usually eaten before the nut is cracked to extract the seeds. The quantities of bush mango harvested from the forest as earlier mentioned are commercialized. This means that bush mango is a vital forest resource used by rural women to diversify the revenue base of their respective families. In all, the result in Table 4.10 shows that 5 basins and above of bush mango are harvested weekly and monthly from the forest and that rural women involved in forest resource exploitation make N25, 000 and above from the sales of this essential forest resource.

Water periwinkle (*Littorina littorea*) is another resource usually harvested from the forest. It is a sea food that is sometimes found in shallow water bodies. They are benthic sea animal or sea snail that constitutes a source of protein to people in southern Nigeria where it is of high demand. Apart from being used as food, its shell is used as a building material and for decoration of buildings among others (Akinrotimi et al., 2009). Akinrotimi et al., (2009) in their study of the economic viability and marketing strategies of periwinkle *tympnotonus fuscatus* in Rivers State, Nigeria alleged that periwinkle has huge economic value to people who trade on it. They showed that processed and unprocessed periwinkle in Choba market was sold at N200 and in Kono Waterside Market it was sold at N75. This means the sea animal has different market value at different locations. Periwinkle is therefore an essential sea animal with high economical viability.

Chewing stick is another non-timber forest resource that is often collected or harvested from the forest for both domestic and commercial use depending on the quantity harvested. There are different species of trees or plants from which chewing stick is collected. In Nigeria, *Randia acuminata* chewing sticks is a common species collected from primary and secondary forests across the country (Okafor, 1989 cited in Olawumi et al., 2013). It is another source of income generation in this part of the world where many people in both the rural and urban areas still regard it or prefer it over toothpastes. Olawumi et al., (2013) stated that chewing stick harvesting and processing is a profitable business that serves a source of livelihood for many households in rural Nigeria. Their study showed that above N400, 000 can be realized from the harvesting and processing of chewing stick.

Mushroom is a non-timber forest species exploited for nutrition (food nutrients) and medication (Oyetayo, 2011; Akanni, 2013). Its medicinal use is

believed to slow down the spread and effect of cancer and heart disease (by boosting immune system). It is collected from the forest and other surrounding areas for domestic consumption and for commercial purpose. It is used in the study communities as food and as a supplement for meat for many households that cannot afford meat or fish. The harvest was often carried intermittently or monthly intervals. At the community level, the highest harvest was done in 3 months in Agoi-Ekpo, while in Agoi-Ibami it was carried out once in 2 months. This means that the harvest of mushroom is usually carried out at interval during which large quantities can be collected. This is apparent as the species is seasonal in nature with high quantities in the rainy season (Okhuoya et al., 2010; Akanni, 2013). In a related study, Akanni (2013) opined that mushroom business is very lucrative and rural women involved in its collection from the forest earn huge amount of money. He stated that gatherers of mushroom make approximately N2, 400 from the sales of the resource.

Firewood is a major source of energy or power in the rural areas and in Nigeria where electricity is not stable. It is a highly dependable source of energy for household needs. Williams, 2003 cited in Gbadegesin and Olorunfemi, (2011) stated that about 2.5 to 3.0 billion people (40 to 50 percent of the world's total) rely on wood for fuel, both for warmth and food preparation. In Africa, 58% of all energy requirements are dependent on fuelwood. With the increasing cost of kerosene and gas, the demand and use of firewood has been on the increase. Zaku et al., (2013) stated that rural areas in developing countries rely on firewood for their energy consumption. Firewood plays a vital role in household energy requirements and because of the increasing economic hardship currently faced in the country, many people are finding it increasingly difficult to afford conventional fuels (kerosene and gas) in Nigeria. However, in the two communities, firewood is a vital non-timber forest that is mostly dependent upon by rural household as well as some households in urban areas for energy. Zaku et al., (2013) stated that rural areas in developing countries are dependent on firewood for livelihood and sustenance.

Tree barks and roots are non-timber forest products that are used for century by man for medicinal purposes as well as source of employment. FAO, (1998) and Adewusi (1997) cited in Bolanle-Ojo and Onyekwelu (2014) stated that tree barks, leaves, fruits, roots, seeds, etc are used to cure a variety of sickness and diseases thereby contributing to the health care delivery. Bark/root of trees provides employment to rural women that exploit them, and they are used for the treatment of sicknesses. This statement is supported by the reports of Bolanle-Ojo and Onyekwelu (2014) that use of these parts contribute significantly to rural poverty alleviation by providing employment and enhancing economic empowerment of rural dwellers through the collection, processing and marketing of their products such as fruits, seeds, leaves, root, etc.

Snails are invertebrates with soft-segmented exoskeleton in the form of calcareous shells. They belong to the phylum mollusca (Agbogidi and Okonta,

2011). In West Africa, it is habitually collected in moist forest areas from where there are collected by villagers for consumption and for sales among others (Ademosu and Omidigi, 1999). The meat is a key constituent in the cuisines of people living in the high forest zone. It is rich in protein, iron and low in fat (Agbogidi et al., (2008) and amino acids (Adeyeye (1996) cited in Agbogidi and Okonta, 2011). In a related study, Asa (2006) and Obinaju & Asa (2016) reported that snail farming is a rural livelihood in Akwa Ibom State because huge amount of money is generated from it.

In the two communities, exploitation of forest resources is not the only income generation source to the women. This lends credence to the study of Adepaju and Obayelu (2013) when they found that income from non-farm activities, as well as income from a combination of non-farm and farming activities, impacted welfare positively relative to income from farming activities. This indeed is glaring because in Africa, many rural households are engaged in agricultural activities such as livestock, crop or fish production as their main source of livelihood, they also involve in other income generating activities such as trading and hunting among others to add to their primary source of income (Sheheli, 2012; Adepaju and Obayelu, 2013). In an earlier study, Bolanle-Ojo and Onyekwelu (2014) noted that the exploitation of forest resources such as fruits, seeds, leaves, root, etc. contribute considerably to rural poverty alleviation by providing employment and enhancing economic empowerment of rural dwellers. The bark/root of some trees and well as leaves of non-timber or woody tree species are used for medication like treatment of malaria, typhoid and cholera among others.

These parts of sensitive and medicinal plants form bulk of the recipe or constituents for traditional medicines such as *agbo* a term used in Yoruba land to describe the combination of herbs and tree barks/roots in bottles or plastic containers used for treating different types of ailments. Similar mixture of herbs and bark/root are used in other areas and localities for the treatment of infectious and degenerating sicknesses. The use of herbal concoctions for traditional treatment of diseases is a part of the African society. Falodun (2010) reported that 80% of Africans and about 27 million South Africans (54%) are herbal remedy users. In Nigeria, use of herbal medicine is well acknowledged in the literature. For instance, Ezeome and Anarado (2007) stated that herbs are used for the supply of alternative medicine in Nigeria.

Among the resources, *afang* tops because of its high demand and economic value to the people. *Afang* as noted in the preceding sections is a unique plant that is widely consumed by people in the area. It is either used for the preparation of delicious and sumptuous soup (known as *afang soup*) or the fresh leaves are eaten with a locally prepared mixture. It is a commonly used forest resource in ceremonies and occasions due to its delight or appetizing nature and

look when properly prepared. Because of its wide demand and use, buyers from the urban areas make daily visit to local areas to buy the harvested leaves from the gatherers. In line with this state, Ekpo et al., (2012) opined that due to high demand of *Gnetum africanum* leaves in the South-south and south-east region of Nigeria, buyers visit local villages on daily or weekly basis to purchase the vegetable to consumers. This vegetable is obtained from tropical forest which is grown as wild. Similarly, Ezengige (2016) stated that afang leaf (*Gnetum africanum*) is commonly used to prepare delicacies such as afang, okazi and nsala soups in Nigeria.

Afang leaf is an excellent source of some amino acids such as glutamic acid, aspartic acid and leucine. It also contains many vitamins and minerals. The second in the list of priority forest resource is atama. This like afang is also heavily harvested due to its nutritional value and economic value. This also applies to other forest resources in the priority list of conservation. They form the bulk of daily cuisines in the area and barely a day households in the area and beyond do not make use of them for food preparation. Akinfolarin and Gbarakoro (2016) noted that atama like other vegetables are important commodities for poor households because their prices are comparatively inexpensive compared with other food items; and it contains nutritional value of economic importance and they are source of food.

3.9 Challenges in exploitation of forest resources and possible solutions

In the two communities, a good number of luxuriant forests are located far away from the community as such; they are mostly exploited by young adults who can trek to the forest. These young adults spend days in the forest to search and harvest forest resources of their choice. The stings/bites from insects and reptiles are another factor that serves as a barrier to the collection of forest resources. Anybody who is ready to visit the forest must be fully prepared for stings/bites from mosquitoes, bees, scorpion, snakes and many others. Accessibility is another problem that prohibits the full exploitation of forest resources in the two communities. This is apparent because there are no tarred roads that lead to the forest as such, rural women find it difficult to adequately enter the forest and carry out harvest. Many of the routes created by man over time have been invaded by grasses and many covered with water which affects free movement. Also, the absence of good road to the forest affects transportation activities in the area which would have helped to facilitate the delivery of forest products.

Some motorists and *Okada* (cyclists) who can make use of the bad earth road charge high and most times, the charges are beyond the reach of the rural women. This makes many to carry harvested forest products on their heads. All these factors affect the steady visit to the forest as well as collection of forest products which ironically helps in the conservation of forest resources. Wan et al., (2011) in explaining the challenges women face in forest resource exploitation

stated that women are likely to bear the strenuous burden of carrying fuel wood (and other forest products) long distances.

The issue or problem of common property for instance has made many women not to have regards for the forest. Since they believe it does not belong to anybody, they do whatever they like. Many women still uproot edible leaves even when such unsustainable practice has been frowned at and many go at night with the children to harvest bush mangoes and other forest resources. This attitude needs to be investigated for better use of forest resources. Another significant factor that has undermined the conservation initiative is the absence of security. This seriously affects the proper conservation of the forest as forest resources are still wantonly destroyed or harvested by rural women and many others without concern for tomorrow. The lack of common defined boundary to checkmate the activities of non-timber forest gatherers is a serious issue that has continuously affected the adequate conservation of forest resources in the area.

For the steady supply of forest products which are demanded by people in the rural and urban areas to be ensured, certain actions need to be carried out. A critical look at the result shows that the respondents in the two communities have similar viewpoints on ways to address the problems of forest exploitation in the study area. Hence, it can be said that planting of some species to regenerate and provision of alternative source of income are the main suggestions provided by the rural women as solutions to the problems identified above. A sustainable approach is the planting of some species to regenerate. This indeed is imperative to ensure steady supply. Fast growing and improved non-forest timber species such as atama, afang, editan and hot leaf that serve as vegetables used in the preparation of soup can be planted in community forest and degraded forest areas to speed their regeneration. This agrees with the assertion of FAO (2014) that designing agroforestry programmes that identify women as users of forest resources and recognize women's valuable knowledge and experience can help in providing solution to forest resources related problems.

According to one of the respondents, people are only allowed to pick the fruits of bush mangoes and not to climb or make use of any substance to harvest them. By this approach, the tree would not be damaged, and the fruits can be picked by other women who also depend on the resource for their livelihood. On the prohibition from uprooting the edible leaves while harvesting, she said that this has been a decision taken by them due to the increasing difficulty in gathering edible leaves like afang and atama that were initially very abundant and easily seen in the forest. By harvesting the edible leaves without uprooting the stems, it gives room for quick regeneration or regrowth which helps to maintain the diversity of the forest as well as sustain the productivity of the species. Other forest conservation initiatives are also aimed at protecting forest resources for continuous use. In a related study, Onwubuya et al., (2014) identified

enforcement of law against bush burning, legislation against indiscriminate felling of trees and restrictions on some areas as prevailing conservation practice by rural farmers in Anambra.

4. TEST OF HYPOTHESIS

H₀: There is no significant relationship between indigenous practices of rural women and forest resources conservation and utilization

H₁: There is a significant relationship between indigenous practices of rural women and forest resources conservation.

The hypothesis above was tested using Pearson's Product Moment Correlation Technique. Data on indigenous practices of rural women and data on forest resources conservation was gathered using a structured questionnaire. To make the data suitable for parametric test, the various responses on indigenous practices of rural women and forest resources conservation were recorded or transformed into dummies of 1 and 0 (Hyun & Ditton, 2006; Alkharusi, 2012; Stockburger, 2012).

Table 2. Pearson's correlation result between

Test statistics	Indigenous practice	Conservation practices
Pearson Correlation	1	0.471*
Sig. (2-tailed)		0.000
N	111	111

*Correlation is significant at the 0.05 level (2-tailed).

Thus, positive responses were taken as 1 and negative as 0. The Pearson's result showed that the probability value (p-Value) of 0.000 is less than 5% significance level, and the r value is 0.471. With this result, the null hypothesis is rejected, and the alternate hypothesis upheld. It therefore means that there is a significant relationship between indigenous practices of rural women and forest resources conservation. The result indicates a positive and significant association of r value of 0.471 between indigenous practices of rural women and forest resources conservation. The positive correlation coefficient implies increase in forest resources conservation with the increase in indigenous practices of rural women. This is evident as the existence and strict adherence to indigenous practices of forest resource collection and restriction will bring about a corresponding increase in the proportion of forest resources that will be conserved. Indeed, the conservation of forest resources is strongly dependent on indigenous knowledge of restricting the exploitation of forest resources. The use of indigenous knowledge of protecting wanton exploitation of forest resources

help in biodiversity conservation. This assertion agrees with those of World Bank (2008) that engaging Indigenous Peoples more effectively in biodiversity conservation represents a win-win situation. They further argued that indigenous peoples are carriers of ancestral knowledge and wisdom about this biodiversity. Their effective participation in biodiversity conservation programs as experts in protecting and managing biodiversity and natural resources would result in more comprehensive and cost-effective conservation and management of biodiversity worldwide.

5. CONCLUSIONS

Indigenous knowledge of rural women in forest resources use and conservation is significant because indigenous knowledge, particularly in the context of Africa (Nigeria inclusive) has long been ignored and maligned by outsiders and even some insiders (Warren, 1992). Indigenous knowledge contributions to sustainable forest resources conservation has been grossly neglected in conservation science in Africa generally and Nigeria in particular. The study evaluated the indigenous knowledge of rural women in Agoi, Yakurr Local Government Area and its relevance in forest resources conservation. Data for the study was gathered through the distribution of 111 copies of structured questionnaire to rural women in two communities (Agoi-Ekpo and Agoi-Ibami) in Yakurr Local Government Area, Cross River State. Data obtained from the administered questionnaire was analyzed using simple percentages and Pearson's correlation. The study has shown that significant proportion of rural women in Agoi-Ekpo and Agoi-Ibami area are involved in the harvesting of forest resources. It shows that different forest resources are usually harvested from the community forest. Edible leaves, fruits, snail and medicinal herbs are frequently collected by rural women for varying purposes. Because of the engagement of a good number of rural women in the harvesting of forest resource, different quantities of atama, hot leaf, afang, editan, wrapping leaves, cane rope, bush mango, water periwinkle, chewing sticks, mushroom, firewood, bark/root of trees and snails are obtained from the forest and are used to generate income among other uses. The study further reveals that because of the exploitation of forest resources, conservation measures are put in place to reduce the exploitation as well as ensure sustainable use of these unique forest products based on IK.

On this note, restrictions on the felling and uprooting of plants as well as ban on overexploitation are the two prominent ways of forest resource conservation carried out in both communities. Despite the existence of different conservation measures in the two communities considered in the present study, ignorance, problem of common property and absence of security are shown to be the main factors impeding the successful and effective execution of conservation

initiatives. Though, a significant percentage of the rural women are engaged in the exploitation of forest resources, the study identifies distance, stings/bites, accessibility, restrictions and conveying of load as the main problem influencing the exploitation of forest resources. These factors are noted in the study to affect the full exploitation of forest resources.

The study also shows that indigenous practices of rural women have positive and significant relationship with forest resources conservation. This implies that the use of indigenous practices encourages forest resource conservation. This is apparent as the practices favour the conservation of forest resources. The involvement of local women in forest resources exploitation is observed in the present study not to vary among socioeconomic profile and that problem encountered in the collection of forest resources do not vary by the ages of rural women. This is because rural women of different ages, education and income are observed to engage in the exploitation of forest resources. This is intended to complement household income and to serve as food and medicine.

In line with the findings of the present study, the following suggestions are put forward to reduce the way forest resources are exploited as well as ensure the continuous supply and use of forest resources for diverse purposes.

To control unwanted exploitation of forest resources as well ensure the availability for the future, local communities should set-up forest guards or vigilante to control the quantity of edible forest resources that will be harvested from the forest.

Individuals found of overexploitation should be severely penalized to serve as deterrent to others. Overexploitation is destructive and can result in the loss of sensitive forest resources. Sometimes, forest resources that are overexploited can become wasteful if they are not used at the right time or sold on time.

To encourage the continuous use and supply of forest resources, vital edible forest resources with high demands such as *afang*, *atama* and *editan* among several others should be planted in man-made forest or garden. This practice will help to reduce the pressure on existing forest.

As much as possible, government can sponsor research to come out with fast-producing species of *afang*, *atama* and *editan* to meet up with the daily household demands. As a matter of necessity, these edible forest resources can be planted in wetlands in both rural and urban areas to meet up with their demands. The existence of man-made forest where these edible leaves are planted will encourage regeneration and biodiversity conservation.

Local communities and forest guards should give periods of harvest of forest resources. Forest areas from which forest resources are harvested should be given some rest or allowed some time to encourage regrowth or regeneration. This approach will help to preserve the continuous existence of forest resources. This is necessary because uncontrolled exploitation without restriction can result

in the loss of edible forest resources.

In addition, tree species such as Iroko, Afara, Obeche, Gmelia, Mahogany and Ebony should be strictly restricted from exploitation. These tree species should be adequately protected from felling and sawing. Man-made forest where these tree species are planted should be encouraged and their seedlings made available to the local people at affordable prices. The locals should be informed of the fine placed on the exploitation of these unique tree species in the forest.

In order to reduce the over-reliance of rural women in the exploitation of forest resources, government should make frank effort to divert attention from the forest by providing alternative sources of income. Some of the rural women identified to involve in forest resource exploitation can be employed in local government as well as given soft-loans to go into trading. This will help reduce to a significant extent the complete reliance on forest resources. The time taken to engage in these alternative sources of income would not give the rural women sufficient time to visit the forest to harvest edible leaves and other forest resources.

REFERENCES

1. Ademosun, A. A. & Omidiji, M.O. (1999). *The nutrient value of African giant land snail (Archachatina marginata)*. *Journal of Animal Protection Research*, 8 (2): 876 – 877.
2. Adepoju, A. O. & Obayelu, O. A. (2013). *Livelihood diversification and welfare of rural households in Ondo State, Nigeria*. *Journal of Development and Agricultural Economics*, 5 (12): 482 – 489.
3. Agarwal, B. (2010). *Gender and green governance: The political Economy of women's presence within and beyond community forestry*; Oxford: University Press, Oxford.
4. Agbogidi, O. M. & Okonta, B. C. (2011). *Reducing poverty through snail farming in Nigeria*. *Agric. Biol. J. N. Am.*, 2(1): 169-17.
5. Ajake, A. O. (1998). *Women in forest use and management in the Akamkpa area of Cross River State* (Master's Thesis unpublished).
6. Akanni, K. A. (2013). *Economic benefits of non-timber forest products among rural communities in Nigeria*. *Environment and Natural Resources Research*, 3 (4): 19 – 26.
7. Akinfolarin, O. M. & Gbarakoro, S. L. (2016). *Proximate analyses of atama (Heinsia Crinita) and Editan (Lasianthera Africana)*. *OSR Journal of Applied Chemistry*, 9 (3): 76 – 79.
8. Akinrotimi, O. A., Abu, O. M. G., Ibemere, I. F., & Opara, C. A. (2009). *Economic viability and marketing strategies of periwinkle tympantonus fuscatus in Rivers State, Nigeria*. *International Journal of Tropical Agriculture and Food Systems*, 3 (3).

9. Alkharusi, H. (2012). *Categorical variables in regression analysis: a comparison of dummy and effect coding*. *International Journal of Education*, 4 (2): 202 – 210. *Ambio* 22: 151–156.
10. Asa, U. A. (2006). *Perceived effect of Akwa Rubber Estates Limited (AKRUBEL) on rural livelihoods in Akwa Ibom State*. *Nigerian Journal of Agriculture, Food and Environment*, 3(1&2): 52 – 55.
11. Bolanle-Ojo, O. T. & Onyekwelu, J. C. (2014). *Socio-economic importance of Chrysophyllum albidum in rainforest and derived savanna ecosystems of Ondo State, Nigeria*. *European Journal of Agriculture and Forestry Research*, 2 (3): 43-51.
12. Clay, J. W., Alcorn, J. B., & Butler, J. R. (2000). *Indigenous peoples, forestry management and Biodiversity conservation: An analytical study for the World Bank's forestry policy implementation review and strategy development framework*. Washington DC: World Wildlife Fund.
13. Colfer, C. P. & Minarchek, R. D. (2012). *Women, men and forest research: A review of approaches, resources and methods for addressing gender*. *Occasional paper 80*. CIFOR, Bogor, Indonesia.
14. Cooper, D. (2010). *Indigenous Knowledge and Sustainable Forest Management in Chile*. Retrieved on 7/6/2013 from <http://www.worldforestry.org>.
15. Ekpo, F. E., Uffia, I. D., Udo, E. S. & Udofia, O. (2012). *Comparative study of nutrients and anti-nutrients content in domestic and wild leaves of gnetum africanum (afang, okazi) consumed by south-south and south east Nigeria*. *IJBPAS*, 1(11): 1608 -1617.
16. Enya, E. E. (2006). *Indigenous environmental practices and forest conservation in Agbos of Abi Local Government Area, Cross River State, Nigeria*. Unpublished Thesis, University of Calabar, Calabar.
17. Eyong, Charles Takoyoh (2007). *Indigenous Knowledge and Sustainable Development in Africa: Case Study on Central Africa*. *Tribes and Tribals Journal, special volume 1*:121-139.
18. Ezeome, E. R., & Anarado, A. N. (2007). *Use of complementary and alternative medicine by cancer patients at the University of Nigeria Teaching Hospital, Enugu, Nigeria*. *BMC Complement Altern Med*, 7: 28.
19. Falodun, A. (2010). *Herbal medicine in Africa-distribution, standardization and prospects*. *Research Journal of Phytochemistry*, 4: 154 – 161.
20. FAO (2009a). *Towards defining forest degradation: Comparative analysis of existing definitions forest resources assessment programme*. Working Paper 154. Rome. Retrieved on 4/4/2014 from <http://www.fao.org/forestry/degredation-cpf>.
21. FAO (2012). *Forests, food security and gender: linkages, disparities and priorities for action*. Retrieved on 15/8/2013 from <http://www.fao.org/gender/gender-home/gender-links/en/>.
22. FAO (2013). *Measuring forest degradation*. Retrieved on 4/4/2014 from <http://www.fao.org/forestry/degredation-cpf>.
23. FAO (2014). *Women in forestry: Challenges and opportunities*. Retrieved from: <http://www.fao.org/3/a-i3924e.pdf>.
24. Fuashi, N. A., Popoola, L., Mosua, I. S., Wehmbazeyi, N. F., Louis, N. N. &

- Elah, E. M. (2010). Harvesting and marketing of Gnetum species (Engl) in Cameroon and Nigeria. *Journal of Ecology and the Natural Environment*, 2(9): 187-193.
25. Gbadegesin, A. & Olorunfemi, F. (2011). Socio-economic aspects of fuel wood business in the forest and savanna zones of Nigeria: Implications for forest sustainability and adaptation to climate change. Retrieved from: https://globaljournals.org/GJHSS_Volume11/5_Socio_Economic_Aspects_of_Fuel_Wood_Business_in_Forest.pdf.
 26. Gough, A. (1996). *Indigenous Knowledge And Sustainable Development*. Sri Lanka Centre for indigenous knowledge, University of Sri Jayewardenapura, Sri Lanka.
 27. Hyun, W. & Ditton, R. B. (2006). Using multinomial logistic regression analysis to understand anglers willingness to substitute other fishing locations. *Proceedings of the 2006 Northeastern Recreation Research Symposium*, 248 – 255. Retrieved from: http://www.nrs.fs.fed.us/pubs/gtr/gtr_nrs-p-14/34-hyun-p-14.pdf
 28. Ikechi, M. (2009). An overview of African indigenous knowledge system and the patent regime. Retrieved 4/4/2014 from <http://www.indigenousknowledge.org>
 29. Isaac, M. & Pradi T. (2007). *Indigenous knowledge systems and intellectual property in the twenty-first century: Perspective from Southern Africa*. University of Botswana, Botswana.
 30. Jackson, D. (2004). Implementation of international commitments on traditional forest related knowledge: indigenous peoples' experiences in Central Africa. Retrieved on 15/8/2013 from <http://www.forestpeoples.org>.
 31. John, J. I., Nnamdi, M. S., & Aduralere, I. A. (2013). Economics of non-timber forest products (NTFPs) in Oyo-state, Nigeria. *IOSR Journal Of Humanities and Social Science*, 18 (4): 1-18.
 32. Kabuo, N. O., Asoegwu, S. N., Nwosu, J. N., Onuegbu, N. C., AkAssessment of leaf-type and number of leaves used in wrapping on the quality of “Ugba” (fermented *Pentaclethramacrophylla benth seed*). *European Journal of Food Science and Technology*, 3 (1): 11 – 23.
 33. Kates, R. W., Clark, W. C., Corell, R., Hall, J. M., Jaeger, C. C., Lowe, I., McCarthy, J. J., Schellnhuber, H. J., Bolin, B., Dickson, N. M., Faucheux, S., Gallop, G. C., Grubler, A., Huntley, B., Jager, J., Jodha, N. S., Kasperson, R. E., Mabogunje, A., Matson, P., Mooney, H., Moore III, B., O'Riordan, T., & Svedlin, U. (2001). *Sustainability Science*. *Science* 292: 641-642.
 34. Kweka, D. (2004). The role of local knowledge and institutions in the conservation of forest resources in the East Usambara. Retrieved on 7/12/13 from <http://www.academia.edu>.
 35. Ladipo, D. (2003). Harvesting of *Irvingia gab*
 36. Larinde, S. L & Omokhua, G. E. (2015). Economic valuation of investment in bush mango (*Irvingia gabonensis* .Baill) plantation establishment in southern Nigeria. *Researcher*, 7(4):35-43.
 37. Malleson, R., Asaha, S., Egot, M., Kshatriya, M., Marshall, E., Obeng-Okrah, K. & Sunderland, T. (2014). Non-timber forest products income from forest

- landscapes of Cameroon, Ghana and Nigeria – an incidental or integral contribution to sustaining rural livelihoods? *International Forestry Review*, 16 (3): 262 – 277.
38. Matthews, K. B., Buchan, K., Sibbald, A.R. & Craw, S. (2006). Combining deliberative and computer-based methods for multi-objective land-use planning. *Agricultural Systems*, 87 (1):18-37.
 39. Mogomme A. M. (2007). Contesting Space and Time: Intellectual Property Right and Indigenous Knowledge Systems Research- A Challenge. In *Indigenous Knowledge Systems And Intellectual Property in the Twenty-First Century: Perspective From Southern Africa*. University of Bostwana, Bostwana.
 40. Nabangchang, O.(2012). Assessment of the contribution of forestry to Poverty Alleviation in Thailand. In *making forest work for the poor*. FAO,Bangkok.
 41. Nimachow G., Joshi, R. C., & Dai, O. (2011). Role of indigenous knowledge system in conservation of forest resources: A case study of the Akas tribe of Arunachal Pradesh. *Indian journal of Traditional knowledge*, 10 (2), 276-280.
 42. Obinaju, L. C. & Asa, U. A. (2016). Economics of rural livelihoods: a case study of snail farming in Itu local government area, Akwa Ibom State, Nigeria. *American Journal of Research Communication*, 2016, 4 (2): 75- 85.
 43. Offiong, R. A.1 & Iwara, A. I. (2012). Effects of fallow genealogical cycles on the build-up of nutrients in soils of the Cross River rainforest, south-southern Nigeria. *Ethiopian Journal of Environmental Studies and Management*, 4 (4): 84 – 95.
 44. Ogunbanjo, O. O. & Aina, A. S. (2013). Non-timbers forest products for poverty reduction in ogun waterside local government, Ogun State, Nigeria. *Journal of Agricultural Science*, 4(1): 49-53.
 45. Ogundele, F. O., Utin, E. A., Iwara, A. I., Njar, G. N. & Deekor, T.N. (2012). An assessment of non-timber forest products (NTFPs) utilization on rural livelihoods in Ini local government area of Akwa Ibom State, Nigeria. *Journal of Biodiversity and Environmental Sciences*, 2 (8): 1 – 13.
 46. Okhuoya, J. A., Akpaja, E. O., Osemwegie, O.O., Oghenekaro, A.O. & Ihayere, C. A. (2010). Nigerian mushrooms: underutilized non-wood forest resources. *Journal of Applied Science Environmental Management* 14(1)43–54.
 47. Olawumi, A.T.1., Oluwalana, S. A, Momoh, S. & Aduradola, A. M. (2013). Cost and returns on chewing stick processing in southwest Nigeria. *American Journal of Human Ecology*, 2 (1): 1-6.
 48. Omara-Achong, T. E, Edwin-Wosu, N. L., Edu, E. A. & Nkang, A. E. (2012). Survey of indigenous vegetables species in parts of Ogoja and Calabar, Cross River State, Nigeria. *European Journal of Experimental Biology*, 2 (4):1289-1301.
 49. Onwubuya, E. A., Ogbonna, O. I., & Ezeobiora, O. C. (2014). Conservation of forest resources by rural farmers in Anambra State, Nigeria. *Journal of Agricultural Extension*, 18 (2).
 50. Owan, E. I B. (2011). Indigenous practices and forest resource conservation and management in Balep and Opu communities in Ikom Local Government Area of Cross River State, Nigeria. (Unpublished Thesis).

51. Oyetayo, O. V. (2011). Medicinal uses of mushrooms in Nigeria: towards full and sustainable exploitation. *African Journal of Traditional Complement and Alternative Medicine*. 8(3):267 - 274.
52. Pandey, D. N. (2001b). Ethnoforestry for small-scale Forest Management in India. In Herbohn, J. et al.(eds)Developing Policies to Encourage Small-Scale Forestry. Australia, pp.220-231.
53. Pandey, D. N (2002a). Cultural resources for conservation science. *Conservation Biology* (in press).
54. Raufu, M. O., Akinniran, T.N., Olawuyi, S.O. & Akinpelu M. O. (2012). Economic analysis of rural women income from non-timber forest products in Ife south local government area of Osun State, Nigeria. *Global Journal of Science Frontier Research Agriculture & Biology*, 12 (1): 22 – 32.
55. Rhona, U, Abdul, A. K., & Dyhairuni, H. M. M., (1997). Indigenous Knowledge and Environmental Education. Paper Presented at Environmental Education Workshop, University of Brunei, Darussalem. Rome, Italy.
56. Sheheli, V. S. (2012). Improving livelihood of rural women through income generating activities in Bangladesh. Retrieved from: <http://edoc.huberlin.de/dissertationen/sheheli-shonia-2012-01-27/PDF/sheheli.pdf>
57. Stockburger. D. W. (2012).Multiple regression with categorical variables. Retrieved from: <http://www.psychstat.missouristate.edu/multibook/mlt08m.html>
58. The World Bank (2008). The role of indigenous peoples in biodiversity conservation: the natural but often forgotten partners. Retrieved from: [https://siteresources.worldbank.org/INTBIODIVERSITY/Resources/ Role of Indigenous Peoples in Biodiversity Conservation .pdf](https://siteresources.worldbank.org/INTBIODIVERSITY/Resources/RoleofIndigenousPeoplesinBiodiversityConservation.pdf)
59. Tiu, S. A. (2007). The Role of Indigenous Knowledge in Biodiversity Conservation: Implications for Conservation Education in Papua New Guinea. Retrieved on 4/6/2013 from <http://waikato.researchgateway.ac.nz/>
60. Utin, E. A. (2010). Non timber Forest Products utilisation and rural livelihood in Ini LGA, Akwa Ibom State. Unpublished M.Sc. Dissertation, Department of Geography, University of Ibadan.
61. Wan, M., Colfer, C.J.P. & Powell, B. (2011). Forests, women and health: opportunities and challenges for conservation. *International Forestry Review*, 13 (3): 369 – 387.
62. Warren, D. M. (1992). Indigenous Knowledge, Biodiversity Conservation and Development. Ames, IW: Iowa State University.
63. Zaku, S. G., Kabir, A., Tukur, A. A. & Jimento I. G. (2013) Wood fuel consumption in Nigeria and the energy ladder: A review of fuel wood use in Kaduna State. *Journal of Petroleum Technology and Alternative Fuels*, 4(5)85-89