

## FOREST FOODS/FRUITS AND CONTRIBUTIONS TO HUMAN WELL-BEING (SOCIO-ECONOMIC, ENVIRONMENTAL AND POLICY IMPLICATIONS)

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### ABSTRACT

All people benefit from forests in some way, whether directly or indirectly. This includes both individuals whose lives are deeply entwined with forest ecosystems and those who live far away from woods, such as urban populations. Understanding the significance of forests because the importance of nutrition and food security has grown dramatically in recent years, but less focus has been placed on how these factors affect human health. The two are inextricably linked; neither excellent health nor adequate nutrition can be obtained without the other.

As a result, it is crucial to address both nutrition and health when discussing connections with Forest. However, woodlands also offer a variety of advantages to human health and wellbeing that go beyond those often connected with nutrition and food security.

In a world that is fast becoming urbanized, understanding that forests are necessary for everyone's wellbeing and

fostering an atmosphere where people may make use of them can help change how people engage with forest ecosystems. Forests provide edible products that contribute macro- and micronutrients to a healthy diet, such as fruits, leaves, nuts and seeds, mushrooms, honey, wild meat and insects. While forest foods may have a small role in terms of calories, they form a critical part of diets commonly consumed by rural populations, which are often poor and food insecure. Forest foods also contribute to dietary diversity, which increases the diversity of the gut microbiome for improved health. On the other hand, forest provides medicine to thousands of enclaves in one of the reserves (Ukponm Forest Reserve) in Abia State Nigeria. Forest policy is also very weak in many states of Nigeria with very few states that can boost of a functional forest policy in their states.

### INTRODUCTION

Across the world, forests, trees on farms, and agroforestry systems play a crucial role in the livelihoods of rural people by providing employment, energy, nutritious foods and a wide range of other goods and ecosystem services. They have tremendous potential to contribute to sustainable development and to a greener economy.

Forests play an important role in many food systems, either through direct and indirect provisioning for human nutrition, particularly in developing countries (Hladik et al., 1993; Vinceti et al., 2008; Arnold et al., 2011; Jamnadass et al., 2011; Sunderland, 2011), or through ecosystem services essential for both near and distant agro-ecological systems (Millennium Ecosystem Assessment, 2005). Forests and trees-outside- forests contribute to the livelihoods of more than 1.6 billion people (FAO, 2010).

Forest is a tract of land covered by a plant association predominantly composed of trees and other woody vegetation (Adeyoju 1981). The "other woody vegetation" here includes shrubs and herbs. **Herbs** are plants with no persistent woody stems above ground. Many are low growing plants with succulent or fleshy stems. **Trees** are woody, perennial plants above 7 meters in height with a single main stem or trunk. The forest as a community often includes in addition to the above, lichens, fungi, bacteria, insects, mosses, reptiles, birds and mammals. Other inseparable components of the forest are rocks, streams/rivers and other land form within it. All these components of the forest community, collectively and individually contribute to the welfare of human beings. (Etukudo 2000).

In most regions of the world, forests, trees on farms, and agroforestry systems play important roles in the livelihoods of rural people by providing employment, energy, nutritious foods and a wide range of goods and ecosystem services. Well managed forests have tremendous potential to contribute to sustainable development and to a greener economy (FAO's SOFO 2014).

In Nigeria, 20 to 50% of rural household income comes from selling these forest fruits, especially during hungry seasons when farms are planted with cash crops. Non Timber Forest Products (NTFP) have cultural importance for rural dwellers, as well as medicinal values. For example, kernels of wombulo, a special tree seeds in West Africa, can be processed into flour, margarine, cooking oil, soup and cosmetic products. (Tropentag 2013).

However, forest fruit tree species are facing challenges such as deforestation and forest degradation. In Nigeria, mother trees are in extinction and ageing situation. Also, there is a lack of domestication and conservation

measures to preserve these fruit trees. For post-harvest management there is a lack of appropriate storage facilities and technology.

This research study is centered on forest food/fruits and their contribution to well-being especially in Nigeria. Consequent upon this, non-wood forest products of flora and fauna will serve as the epicenter of this research work; whether edible, medicinal, or other economical

values associated with non-wood and non timber forest products.

Thus in this paper, I attempt to organize and synthesize the diverse literature on forest food/fruits in order to help focus future forest research. The literature review is not exhaustive but should provide access to the remaining literature.

**Table 1 classification of non-wood forest products**

Non-wood forest product	Non- timber forest product
Derived from: Wild animal Herbs Leaves Latex Gum Resins Ropes Fruits Seeds Fungi Fodder Forage Gravel Clay Limestone and Natural salt	Woody but non-timber includes: Poles Fuel-wood Charcoal Rattan Canes Sponge Chewing stick Bamboos etc.

Source FAO Corporate Document Repository

**Occurrence and distribution**

The non-wood forest products occur naturally in all the ecological zones in the country; through the mangrove forest and coastal vegetation, fresh water swamp forest, lowland rainforest, Montane areas to the savannah ecozones (derived savannah, guinea savannah, Sudan savannah and Sahel savannah). The numbers, types, population and diversity of species which occur in the ecological zones vary in accordance to inherent genetic characteristics, land use practices, edaphic conditions and environmental influences

The availability of NWFP in any ecozone is a function of the richness of the vegetation in terms of the structure of species occurring in it and the use of biotic species by the rural population. However, the ecological zones in the country have been subjected into various changes due to human interference with the natural environment

**Table 2 Climatic data of major ecozones**

Major ecozones	Annual rainfall (mm)	Rainy days per year	Minimum temp.	Maximum temp.	Mean annual temp.	Altitude (m)
Fresh water swamps and coastal vegetation	3,000 - 4,400	290	21°C	32°C	25°C	0 - 15

particularly land extensive agricultural production. For example, the land devoted to food crops alone rose from about 7.6million ha in 1970 to 35.5 million ha in 1995 (Agboola, 1987; FORMECU, 1985).

The second main cause of vegetation changes is the high dependence on the natural vegetation for food, medicine, shelter, income generation and other socio-cultural activities. The biotic resources on which NWFP are derived exhibit some bio-ecological characteristics, which make data collection and their conservation difficult. The species occur in narrow ecological ranges and respond to irregular flowering and fruiting in the same and different locations. NWFPs are not fully known and poorly documented. However, NWFPs remain central to the socio-economic and cultural wellbeing of rural communities in Nigeria.

Lowland Rainforest	2,000 - 3,000	250	20°C	36°C	25°C	15 - 150
Derived Savannah	1,500 - 2,000	220	15°C	36°C	25°C	150- 600
Jos Plateau (Montane)	1,300 - 1,500	185	13°C	31°C	22°C	1,200
Mambilla Plateau (Montane)	1,500 - 1,800	200	10°C	30°C	20°C	1,500 - 1,850
Sudan Savannah	800 - 1,000	90	14°C	38°C	27°C	300- 700
Southern Guinea Savannah	900 - 1,200	200	18°C	36°C	27°C	150- 200
Northern Guinea Savannah	1,000 - 1,300	180	14°C	35°C	25°C	600-700
Sahel Savannah	200 - 400	80	13°C	40°C	27°C	300- 700

Source: NAERLS 1992

### Classification of non-wood forest product in Nigeria.

There is no complete list of non-wood forest products in Nigeria because most biotic species from which forest products are derived are not well documented. Moreover the diversity of biotic resources and their utilization among different ethnic groups made the assignment of plants to different loci along NWFP continuum in considerable disarray.

The classification of NWFP remain somewhat problematic because some plants fit in more than one category such as food, medicine, forage, alcohol, industrial and edible oil, nuts, spices and mat weaving (*Elaeis guineensis*, *Afromomum melagueta* and *Xylopia aethiopica*).

In the savannah ecozones of Nigeria, Etkin and Ross (1994) documented about 119 plants as foods out of the 374 medicinal plants they identified. Yet in a different study, Okafor et al (1994) identified 8 NWFP from the

mangrove swamp, 19 traded products from the moist forest, 17 from the southern guinea savannah, 12 in the Sudan savannah and 56 for the whole country.

### Forest foods derived from floral products

The forest foods which are either eaten raw or processed form the major intake of proteins, vitamins, minerals fats and carbohydrates among the majority of rural communities in the country (Okafor et al, 1994). The forest foods are in the form of vegetables, fruits, nuts, tubers, seeds, oils, mushrooms, spices and drinks (alcoholic and non-alcoholic). The forest food producing species have varied phenological characteristics, however, the production of fruits are seasonal in most species. Some plants, like *Elaeis guineensis*, fruit throughout the year but with seasonal peak of fruiting occurring between March and May. While some plants are in off-season others are in on season thereby giving security to the rural communities that depend on them for sustenance.

**Table 3 NWFPs - Forest foods in Nigeria (floral resources)**

Type of products	Scientific names	Habitat	Utilization	Present status		
				Social	Ecological	
Foods –fruits	1	<i>Afromomu daniellii</i>	Forest	Food	R	A
	2	<i>Afromomu Sceptrum</i>	"	"	R	A
	3	<i>Amblygonocarpus andongensis</i>	"	"	R	A
	4	<i>Ananas comosus</i>	"	"	L	A
	5	<i>Angyloalyx oligopyllus</i>	"	"	L	A
	6	<i>Annona muricata</i>	"	"	L	M
	7	<i>Annona reticulate</i>	"	"	L	M
	8	<i>Annona senegalensis</i>	"	"	R	M
	9	<i>Annona Sequamosa</i>	"	"	L	M

	10	<i>Antrocaryon klaineianum</i>	"	"	L	M
	11	<i>Antrocaryon Micarster</i>	"	"	L	M
	12	<i>Balanites aegyptiaca</i>	Savannah	Food	R	S
	13	<i>Blighia Sapida</i>	Forest	"	R	S
	14	<i>Borassus aethiopum</i>	Savannah	"	N	S
	15	<i>Buryospermum parkii</i>	"	"	R	S
	16	<i>Canarium Schweinfurthoii</i>	Forest	Food	L	S
	17	<i>Carpolobia lutea</i>	Savannah	"	L	S
	18	<i>Chrysophyllum albidum</i>	Forest	Food	R	S
	19	<i>Cola Lepidota</i>	"	"	L	S
	20	<i>Cola Mollenii</i>	"	"	L	S
	21	<i>Cola Pachycarpa</i>	"	"	L	S
	22	<i>Dacryodes edulis</i>	"	"	R	S
	23	<i>Dennettia tripetala</i>	"	"	L	S
	24	<i>Desplatsia dewevrei</i>	"	"	L	S
	25	<i>Dialium guineense</i>	"	"	L	S
	26	<i>Icacinta trihantha</i>	Forest	Food	L	S
	27	<i>Landophia duleis</i>	"	"	L	S
	28	<i>Mamea Africana</i>	"	"	L	S
	29	<i>Megaphrynium Macrostachyum</i>	Forest	Sweetner	R	A
	30	<i>Myrianthus arboreus</i>	"	Food	R	A
	31	<i>Napoleonaea vogellii</i>	"	"	R	A
	32	<i>Phonix rectinata</i>	"	"	R	A
	33	<i>Pseudospondias monocarpa</i>	"	"	R	A
	34	<i>Selerocarya birrea</i>	"	"	R	A
	35	<i>Spondias Mobin</i>	"	"	R	A
	36	<i>Strophanthus hispidum</i>	"	"	R	A
	37	<i>Tamarindus indica</i>	Savannah	Food	R	M
	38	<i>Thaumatococcus danielli</i>	Forest	"	R	M
	39	<i>Treculia Africana</i>			N	S
	40	<i>Vitellaria paradoxa</i>	Savannah	"	N	A
	41	<i>Vitex doniana</i>	"	"	N	M
	42	<i>Zinziphus selerocaryabirrea</i>	Forest	"	L	M
Vegetables	1	<i>Albizia zygia</i>	Forest	Soup	R	S
	2	<i>Bombax Costatum</i>		"	R	M
	3	<i>Cochorus Olitorus</i>		"	R	M
	4	<i>Cucumis melo</i>		"	N	S
	5	<i>Ceiba pentandra</i>		"	R	M
	6	<i>Gongronema latifolium</i>		"	R	S

	7	<i>Ficus species</i>	savannah	"	R	M
	8	<i>Gnetum Africana</i>	Forest	"	N	S
	9	<i>Gnetum bucholzium</i>	"	"	N	S
	10	<i>Heinsta crinata</i>	"	Food	R	M
	11	<i>Kigelia Africana</i>	"	"	L	M
	12	<i>Lasianthera africana</i>	"	"	R	M
	13	<i>Moringa oleifera</i>	"	"	R	M
Vegetables	14	<i>Ocimum gratissimu</i>	Forest	Soup	L	M
	15	<i>Pterocarpus aerenasious</i>	"	"	L	M
	16	<i>Pterocarpus soyauxii</i>	"	Soup	L	M
	17	<i>Adansonia digitata</i>	"	Soup	N	M
	18	<i>Vernonia amygdalins</i>	savannah	Soup	R	M
	19	<i>Vitex doniana</i>	"	"	R	M
	20	<i>Thonningia sanguinea</i>	Forest	"	R	M
Spices	1	<i>Afromomum melegueta</i>	"	food/ medicine	N	E
	2	<i>Afrostryax lepidophyllus</i>	"	"	R	M
	3	<i>Capsicum chinensi</i>	"	"	R	M
	4	<i>Gongronema latifolium</i>	"	"	R	M
	5	<i>Luffa cylindrical</i>	"	"	L	S
	6	<i>Monodora brevipes</i>	forest	"	R	M
	7	<i>Monodora myristica</i>	Forest	"	R	M
	8	<i>Ocimum gratissimum</i>	forest	"	R	M
	9	<i>Piper guineense</i>	"	"	N	E
	10	<i>Tetrapluera tetraptera</i>	"	"	N	S
	11	<i>Xylophia aethiopica</i>	Forest	"	N	E
	12	<i>Zingiber officinale</i>	Forest	"	N	S
Edible mushrooms	1	<i>Agaricus campestris</i>	Forest	Food	R	M
	2	<i>Alueria aurantia</i>	"	"	R	M
	3	<i>Cookenia sulsipes</i>	"	"	R	M
	4	<i>Coprinus micaceus</i>	"	"	R	M
	5	<i>Chlorophyllum molybditis</i>	Forest	Food	R	S
	6	<i>Marasmius arborescens</i>	"	"	R	M
	7	<i>Mycena prolifera</i>	"	"	L	M
	8	<i>Phlebopus silvaticus</i>	"	"	L	M
	9	<i>Pholiota dura</i>	"	"	R	M
	10	<i>Lentitus tuberregium</i>	"	"	L	M
	11	<i>Pleuronis squanosalus</i>	"	"	L	A
	12	<i>Polyporus determoporus</i>	Forest	Food	L	A
	13	<i>Pleurotus tuberosus</i>	"	"	L	A

	14	Ramaria Moelleriana	"	Food/ Medicine	L	M
	15	Termitomyces globulus	"	"	L	M
	16	Termitomyces Mammiformis	"	Food	L	A
	17	Termitomyces microcarpus	"	"	L	A
	18	Volvariella escalanta	"	"	L	A
Seeds	1	Afzelia Africana	Savannah	Soup	N	M
	2	Afzelia bipindesis	Forest	"	R	M
	3	Brachyztegia eurycoma	"	"	R	M
	4	Cola acuminata	"	Ceremonies & food	N	S
	5	Garcinia Kola	"	"	N	S
	6	Irvingia gabonensis	"	Soup	N	E
	7	Irvingia grondifolia	"	"	N	M
	8	Mucuna sloanei	"	"	R	A
	9	Parkia bicolor	Savannah	"	R	M
	10	Parkia biglobosa	Forest	"	N	M
	11	Pentadethra macroplyll	Forest	Soup	R	A
	12	Plukenetia conophorum	"	Food	R	A
	13	Poga oleosa	Forest/ Savannah	Snacks	R	A
	14	Ricinodendon africanum	Forest	Soup	R	A
Oil	1	Baillonella toxisperma	Forest	Food	L	M
	2	Elaeis guineensis	"	"	N	M
	3	Ricinus Communis	"	"	L	M
Alcoholic drinks	1	Elaeis guineensis	Forest/ Savannah	Relaxation/ ceremonies	N	M
	2	Raphia hookeri	"	"	N	M
	3	Dialium guineense	"	"	N	M
	4	Hibiscus sabdaniffa	"	"	R	A
	5	Tamarindus indica	"	"	R	M
	6	Treculia africana	"	"	N	M

**Notes on present status of species:**

(i) **Social Status:** N = Nationwide, R = Regional, L = Localized,

(ii) **Ecological Status:** A = Abundant, M = Moderate, S = Scarce, E = Endangered

Source –Various.

Most trees and shrubs from which forest food are derived are harvested by women and children both from the wild and on farms (*Parkia biglobosa*, *Chrysophyllum albidum*). In palms (*Elaeis guineensis* and *Raphia hookeri*), the harvesting for wine and the fruits for oil are carried out by men who are professionals and harvested to generate income.

**Forest Foods Derived From Fauna Resources**  
Virtually all fauna species, except those forbidden by

taboos, folklores and found not suitable for consumption, are used for food (Osemeobo, 1994). The use of fauna resources for food varies among the various communities in accordance with the species occurring in their environment. The faunal products are in form of worms, insects, frogs, reptiles, molluscs, fish, mammals, birds and others. The list of fauna products used for food by various communities is presented in Table 4.

**Table 4: Forest foods in Nigeria (faunal resources)**

Types of products wildlife		Scientific names	Habitat	Utilization	Present status	
					Social	Ecological
(i) Worms for food	1	Anaphe infracta	Forest	Food	R	E
	2	Anaphae venata	"	"	R	E
	3	Anaphae molenyi	"	"	R	E
(ii) Land snails for food	1	Archachatina marginata	Forest	Food	N	S
	2	Achatina achatina	"	"	N	S
	3	Helix Pomatia	"	"	R	S
	4	Limicolaria aurora	"	"	R	S
(iii) Food (Bushmeat)	1	Atherurus Africana	Forest	Food	R	S
	2	Thryanomys swinderianus	Savannah	"	N	S
	3	Cricetomy gamianus	"	"	N	M
	4	Xerus erythropus	"	"	R	M
	5	Protexerus stangeri	Savannah/Forest	"	N	M
	6	python sebae	"	"	L	E
	7	Tragelapus spekei	"	"	N	M
	8	Ceropithecus sclater	"	"	N	M
	9	Mumida meleagris	"	"	N	M
	10	Guttena edourdi	"	"	N	M

**Notes on Species Status**

R = Regional, E = Endangered, N = National, S = Scarce, L = Localized, M = Medium

Source: various.

**Medicinal Benefits of Forest Food/Fruits to Humans**

Having classified forest food/fruits as non- wood forest products (NWFP), (Osemeobo, 1993) reports that over 90% of Nigerians in rural areas and about 40% in the

urban areas depend partly or wholly on traditional medicine. In the use of NWFP, traditional medicine and traditional religion are inseparable as both rely on soil minerals, flora and fauna resources. The table below summarizes the Flora Products of Medicinal Value.

**Table 5: NWFP used for modern and traditional medicine**

<i>S/no</i>	<i>Name</i>	<i>Habitat</i>	<i>Utilisation</i>	<i>Processing</i>	<i>Present status</i>
1.	Vitellaria Paradothum	Savannah	- Ointment extract from seed/fruits used in carrying surface wounds	- extraction of ointment from seed	- depleting due to deforestation - Ointment is market commodity
2.	Vernonia amydelia	Forest Savannah	-The liquid from leaves is a health drink for alleviating hypertension	- removal of sand and dust from leaves - washing and squeezing of the leaves in bowl containing little water - serving of the water to obtain a filtrate, which is the health drink	- It exists commonly in home gardens of rural and urban areas. - In compound farms - market commodity (both fresh and washed leaves).
3.	Garcinia Kola	Forest	Branch sticks also used as chew sticks to clear the mouth Seed eaten ordinarily to cure cough nagal - congestion - hepatitis - to alleviate hypertension - to improve mouth odour and cleanse the mouth as well	- Depulping of fruit to extract seeds - removal of seed outer coat to chew the cotyledons	- found mostly in rural areas near - homesteads and compound farms - breeding improvement - trials minimal - seeds are market commodity
4.	Tetrapeura tetraptera	Forest derived Savannah	Fruit pulp used for cooking for a nearly delivered woman for stomach cleansing.	- cutting of the fruit pod in bits before immersing in cooking soup	- depleting due to deforestation - breeding trials are - not signified in urban areas.
5.	Tetrapheura tetrayptera	Forest	Spicing fruit chewed to improve mouth odour		- See mainly in their natural stands. - domestication has proved difficult to achieve beyond the seedling stage.
6.	Prosopis africana	Savannah	- bark used to treat fever	- debarking using hatchets	- depleting due to deforestation
7.	Khaya Senegalensis	Savannah	bark used to treat fever	bark boiled for drinking	depleting due to lack of regeneration
8.	Azadiractha Indica	Savannah	Filtrate from leaves cooked in water solution is drunk for malaria fever.	- leaves are plucked from the tree - They are immersed in pots containing water and boiled for few hours	- Exotic species -Exists in the Savannah zone where it serves for . windbreaks . soil protection . shelterbelts - Commonly observed in rural and urban settings.



9.	a. <i>Xylopia</i> spp b. <i>Harungana madagascanesin</i>	Forest	- Fruit part added to soups which is drunk to cure fever. - Fruit ground and used to cane open wounds	- Sometimes crushed before adding to soups or main meals - Drying before grinding	- depleting due to deforestation - sighted mostly in rural areas
10.	<i>Monodora mynsitica</i>	Forest	- Fruit part is added to main meals to be eaten with a view to curing + stomach pain + pile + childbirth rigours	- fruit can be roasted before use - shelling can be done to remove the back of the seed	- depleting due to deforestation - sighted mostly in rural areas
11.	<i>Pycnanthus angotensin</i>	- moist forest	- mouth wash	roast to remove bark	depleting due to deforestation
12.	<i>Enanthis chlorantha</i>	- moist forest	- care for yellow fever	roast seed	depleting
13.	<i>Alstonia boonei</i>	moist forest	- used against malaria fever	roast seed	depleting
14.	<i>Kigelia Africana</i>	- Forest	bark used in treating septic wounds	- Peel of bark and grinding	depleted considerably in natural forests
15.	<i>Newbouldia laevis</i>	Forest	Septic wounds	peel bark and grind	depleting due to deforestation
16.	<i>Cassytha filiformis</i>	- Guinea Savannah	- thread-like parasite training plat issued for treatment of diarrhoea in cattle	squeezed for the cattle to eat	depleting due to deforestation
17.	<i>Acacia Senegal</i>	- Sudan Savannah	- gum aradoic used for treatment of diarrhoea	- bores are made on the stem of the plant to extract excidate (gum)	depleting due to - desertified conditions in the zone - poor tapping practices of the gum
18.	<i>Nshillea latifolia</i>	Forest	- used for malaria treatment		moderate
19.	<i>Alstonia boonei</i>	forest	- used for malaria treatment		depleting
20.	<i>Cassia alata</i>	forest	- used for treating skin disorders - ring worm		abundant
21.	<i>Lonchrocapins cyanescens</i>	forest	- used for treating skin disorders		depleting
22.	<i>Irvingia gabonensis</i>	Forest - Derived and - Guinea savannah	Bitter fruit pulp used as worm expellant		abundant
23.	<i>Elaeis guineensis</i>	- Forest - Savannah	- Oil from Kernel is administered as cure for various internal disorders		moderate

			- palm oil is applied on boils and external wounds		
23.	Massularia acuminanta	- Mangrove - Moist prat	- chewing sticks	- cutting of breakles and shaping into sticks of favourable size for chewing	moderate
24.	Garaning manni	Moist forest Freshwater swamp	"	"	moderate
25.	Acacia nilotica				depleting
26.	Tamasindus				moderate
27.	Badanites acgyptiais	Sudan Savannah			depleting due to deforestation
28.	Anogeissus laocarpus	"			depleting
29.	Mitragyna thermis	"			depleting
30.	Acacia seyal	"			depleting
31.	Guiera senegalensis	"			depleting
32.	Momordica chlorantia	"			depleting
33.	Scherocarya birrea	"			depleting
34.	Azadirachta Indica	Forest Savannah	- Produces toxius (Pesticides)	- extraction from the fruit	exotic species ford both in rural and urban settings
35.	Macarnga Sp	Forest Zone	Medicinal		
36.	Trenia guineensin	"	"		

Sources: Obot (1996): various

Virtually all native species of plants are used for the treatment of one aliment or another. These involve traditional medical use for despoil, preventive, curative and magical purposes. Within the same plants the use of parts varies in the treatment of aliment. This may be due

to mystical beliefs but it is known that differences exist in the drug or nutrient contents of plants according to the species, types, age of plant the part of plant utilized, the time of the day and season of the plant (Osemeobo, 1992a).

**Table 6: The utilization of the oil palm (*Elaeis guineensis*) products for traditional medicine**

<i>Parts used</i>	<i>Used in traditional medicine</i>	<i>Uses in traditional culture/religion</i>
Apical Leaves	* Cure of dysentery * Magical purposes for good luck and to overcome difficulties	* Worship of Ogun the iron of god * Design of Masquerade (Igoh in Edo/Ondostates) * To ward-off evil spirits.
Late(Wine)	* Used in concoctions to treat convulsion in children.	* Liberation in Cultural festivals and ceremonies. * Worship of Ogun the iron god
Palm Kernel Oil	* Treatment of rheumatism. * used to prepare concoctions to cure metal patients. * Treatment of poison	* Design of masquerades
Palm Oil	* Cure of body rashes * Treatment of Poisons from concoctions * Treatment of mental problems	* Worship of Ogun the iron god * To appease the gods

Palm Kernel shells and Underdeveloped inflorescence	* Soap made from them is used to cure skin disease.	* To make fire for ritual
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Source Osemeobo 1999.

Four major types of plant processing exist in traditional medical preparation. These are:

- (i) Blending, squeezing, and grinding of fresh plants.
- (ii) Indoor and outdoor drying of plants.
- (iii) Boiling of plants to extract the drugs.
- (iv) Powdering of plants so as to add the materials into food as in the treatment of epilepsy with the leaves of *Uraria picta* and *Alternanthera repens*.

### Fauna Resources of Medicinal Value

A lot of faunal resources not accepted for food and those not socially accepted because of taboos are used for traditional medicine. Moreover, the animals hunted for food and also used for traditional medicine are presented in Table 7, while Table 8 gives a typical wild animal used for food and traditional medicine.

**Table 7: Faunal resources used for food and medicine**

S/no	Name	Habitat	Utilisation	Processing	Present status
1.	Termites	All vegetation	- eaten ordinarily-eater with main meals	- dewinged mechanically - fried in dry pots	- Destruction of termite during farming has reduced the availability of this meat product.
2.	Antelope	- Forest - Savannah	- eaten ordinarily - eaten with main meals	- roasting - cooking - frying	- Population grossly reduced partly due to harsh economic conditions. - deforestation
3.	Rodents	- Forest - Savannah	- eaten ordinarily - eaten with main meals	- roasting - cooking - frying	depleted due to hunting
4.	Grasshoppers	- Forest Zone - Savannah Zone	- eaten ordinarily	- roasting	- occurrence reduced
7.	Periwinkles	Freshwater swaning mangrove	- eaten with main meals	- shelling - cooking	- Oil spillage pollution of the water bodies in the coastal areas has adversely affected the availability of these products.
8.	Crustaleaus	- mangrove - Fresh water	- eaten ordinarily - eaten in main meals	- cooking - extraction	depleting due to habitat destruction
9.	Molluscs & fishes	mangrove Fresh water swamp	- eaten ordinarily - eaten in main meals	- extraction from shell and - cooking	depleting due to oil pollution in the habitat
10.	Pungoline	Mangrove	eaten as bush meat	- de-skinning - cooking - roasting	depleting due to deforestation
11.	Gazella rufirom	Sudan Savannah	Bushmeat	Cooking	Depleting
12.	Cephlophus Spp (duiker) Veranus nifofica (monitor lizard) Phacochoerus	Sudan Savannah and Guinea Savannah	Food	roasting cooking	Birds, include: <i>Peleconus onocrotalus</i> (pelican) <i>Numida meleagris</i> (guinea fowl) <i>choriotis kori</i> (bustard) <i>Francholinus</i> spp fishes like <i>T.lepia tilapia</i> <i>Protoptemus</i>

	aethiopicus (warthog) Xerus spp (grand squirrel) pelecanus onocro				annectens (Tungfish) melapterurus sp (cat fish) insects like grasshopper.
13.	Monkeys	Forest	eaten as meat ordinarily and in meals	- roasting - cooking - spraying	depleting due to deforestation
14.	Tortoise	Forest/Savannah	Medicine	roasting cooking	depleting
15.	Pakara	Guinea Savannah	Food	Roasting	depleting
16.	Oysters (dams)	Mangrove forest	Food	roasting cooking	Shellfish in valves with fix firmly on roots of mangrove bees.
17.	Crabs	Forest	food	roasting	depleting
18.	Mudskipper	Mangrove	Food	roasting cooking	Fishes living in muddy waters
19.	Edible caterpillar of Beetle	Mangrove	larvae eaten before it changes to adult	Roasting	Becoming scarce due to destruction of raphia vegetation
20.	Snakes	fresh water swamp forest	eaten as meat	roasting cooking	depleting
21.	Archachatina Forest species	Swamp	food/medicine	cooking	depleting

**Table 8: The utilization of the African giant land snail (*Archachatina marginata*) for traditional medicine**

<i>Parts of the body used</i>	<i>Uses in traditional medicine</i>	<i>Uses in traditional culture/region</i>
Fluid	<ul style="list-style-type: none"> <li>* Cure of headache</li> <li style="padding-left: 20px;">* Prepared in concoction for curing new babies' sickness</li> <li>* Cure of malaria</li> <li style="padding-left: 20px;">* Used for blood clotting during circumcision and to stop bleeding in a cut or wound.</li> <li>* Treatment of dysentery</li> <li>* Suppression of high blood pressure.</li> <li>* To cure eye problems</li> <li>* Cure of small –pox</li> </ul>	<ul style="list-style-type: none"> <li>* Sacrific to idols of iron(ogun) idols of oracle (ifa) and thunder (sango)</li> <li>* Sacrifice during New yam festival</li> </ul>
Shell	<ul style="list-style-type: none"> <li>* Treatment of dysentery</li> <li>* Treatment of stomach-ache</li> <li>* Anti-rheumatic</li> <li>* Storage of magical charms and against body pains</li> </ul>	<ul style="list-style-type: none"> <li>* Used for festival (ovosun in Ondo State).</li> </ul>
Meat	<ul style="list-style-type: none"> <li>* Used to prepare talisman for protection</li> <li>* Treatment of infertility in woman</li> <li>* Cure of convulsion in new babies</li> <li>* Treatment of bone fracture.</li> <li>* Cure of anaemic patient</li> </ul>	<ul style="list-style-type: none"> <li>* To ward off evil spirits.</li> <li>* To appease the gods.</li> </ul>

Sources: Agbelusi and Ejidike (1990), Osemeobo (1992a)

The utilization of faunal products is clearly based on small part utilization-skins, claws, feathers, bones, faeces, scales, fur and others. Despite this however, some animals are specifically hunted for traditional medicine, particularly for protective, curative and magical powers.

#### **POLICY IMPLICATION OF FOREST FOOD/FRUITS TO HUMAN WELL-BEING**

The extent to which people benefit from forests is strongly influenced by government action, including the type of benefits people have access to, who benefits, and how much. Moreover, policies have to be adjusted to changes in demand for the socioeconomic benefits of forests. These demands are expected to grow – and shift. Not only is world population increasing dramatically, but many young people are growing up very differently from their parents.

**Table 9: Forest-related measures in Poverty Reduction Strategy Papers (PRSPs) issued since 2007**

<b>Forest-related measures in PRSPs</b>	<b>Countries</b>
Implementation of sustainable forest management techniques to satisfy demand for forestry products and other measures to support forestation (including REDD)	Afghanistan, Albania, Bangladesh, Democratic Republic of the Congo, Gambia, Ghana, Haiti, Madagascar, Togo, Uganda
Improvement in the forest revenue system and tax law reform	Lao People's Democratic Republic, Liberia, Madagascar, Malawi
Access and creation of markets for forest products	Bangladesh, Gambia, Liberia, Madagascar, Malawi, Republic of the Congo, Zambia
Use of forests for tourism development	Albania, Bangladesh, Ghana, Kyrgyzstan, Liberia, Uganda
Involvement of private sector in sustainable management of natural resources, improved investments, provision of loans/credits to sustainable forest-based enterprises	Albania, Bangladesh, Ghana, Kyrgyzstan, Lao People's Democratic Republic, Liberia, Malawi, Mali, Nicaragua, Republic of the Congo, Uganda, Zambia
NWFPs as income generator and food security	Bangladesh, Gambia, Liberia, Mali, Republic of the Congo, Uganda, Zambia
Decentralization and community forest management	Albania, Bangladesh, Democratic Republic of the Congo, Gambia, Ghana, Lao People's Democratic Republic, Liberia, Mali, Republic of the Congo, Togo
Promotion of energy from wood and carbon sequestration in Forests	Bangladesh, Guinea, Haiti, Republic of the Congo, Rwanda
Increasing of employment and income generation from forests including through afforestation/reforestation	Afghanistan, Bangladesh, Gambia, Liberia, Mali, Republic of the Congo, Rwanda
Creation of new opportunities for women in the forest sector	Bangladesh, Liberia, Mali
Reforms in land policy, including forests	Bangladesh, Democratic Republic of the Congo, Liberia

**Source: National Forest Programmes and National Forest Policies issued since 2007 (FAO NFP/forest policy document database)**

#### **The National Forest Policy of the Federal Republic of Nigeria on non-timber forest products (NTFPs) and non-wood forest products (NWFPs) Policy Statement:**

Promote the development and conservation of NTFPs in all the ecological zones for the benefits of the present and future generations and to increase NTFPs' contribution to the national economy.

**Objectives:**

- (i) To promote community partnership in NTFPs management.
- (ii) To mobilize the community for sustainable management, multiplication, packaging and marketing of NTFPs.

**Strategies**

- (i) Undertake surveys and studies to identify and assess the distribution and economic viability of NTFPs.
- (ii) Carry out in situ and ex situ conservation, resource valuation, conscious management and development of NTFPs.
- (iii) Carry out multiplication/breeding of NTFPs for enhanced economic production, food security and development of viable opportunities in the rural community.
- (iv) Sustain training and empowerment building e.g. (facilitates the formation of forestry committees, action groups and watch groups).
- (v) Facilitate and improve local processing and packaging of NTFPs as well as identify other alternative uses.

- (vi) Create improvement in the socio-economic well being of the communities.

**SOCIO-ECONOMIC IMPLICATIONS OF FOREST FOOD/FRUITS TO HUMAN WELL-BEING**

Today, fruits command an enviable market in Nigeria. With increased enlightenment and sensitization of the citizenry on useful dietary habits, more people are eating fruits either before or after meals.

Forest food and forestry-based enterprises create employment opportunities. These opportunities are made possible through the establishment industries, forest food processing plants and markets where these forest foods are sold. When these employment opportunities are created to the benefit of rural inhabitants, they forestall migration of rural youth to the urban area i.e. rural-urban drift. The income gained from such employment can be gainfully channeled into other economic ventures for the development of the area.

My personal findings in some communities in Umuahia north local government area of my state (Abia State) where we have forest with large number of trees that produces fruits, middle aged and even aged women have been employed. They visit the forest early morning and evening to pick fruits. The table below summarizes the forest trees they usually pick fruits from. Some of these fruit trees, shrubs and herbs may be non-indigenous but due to anthropogenic activities, founds itself in the forest.

**Table 10: Important Forest Trees, Shrubs and Herbs in some communities in Umuahia North LGA, Abia State**

S/N	Scientific names	Common names/ Native names	Plant part used for food	Community/ locality
1	<i>Chrysophyllum albidum</i>	Star apple	<ul style="list-style-type: none"> <li>• Fruit for eating</li> <li>• Seed for cultural decoration</li> </ul>	Ibeku communities, Iikwuano communities Ohuhu communities
2	<i>Aframomum melegueta</i>	Alligator pepper	<ul style="list-style-type: none"> <li>• Fruits and seed</li> </ul>	“ “
3	<i>Dacryodes edulis</i>	African pear	<ul style="list-style-type: none"> <li>• Fruits</li> </ul>	“ “
4	<i>Elaeis guinensis</i>	Oil palm tree	<ul style="list-style-type: none"> <li>• Fruit for red oil</li> <li>• Seed for black cream</li> </ul>	
5	<i>Canarium schweinfurthii</i>	African canarium	<ul style="list-style-type: none"> <li>• Fruits for eating</li> <li>• Seed for</li> </ul>	“ “
6	<i>Spondias mombin</i>	Hug plum, yellow mombin	<ul style="list-style-type: none"> <li>• Fruit for eating</li> </ul>	“ “
7	<i>Pentaclethra macrophylla</i>	African oil bean	<ul style="list-style-type: none"> <li>• Seed for eating</li> </ul>	Ibeku communities
8	<i>Pterocarpus osun</i>	African padauk	<ul style="list-style-type: none"> <li>• Leaves for eating</li> </ul>	Ibeku communities, Iikwuano communities Ohuhu communities
9	<i>Pterocarpus mildbraedii</i>	White camwood	<ul style="list-style-type: none"> <li>• Leaves for eating</li> </ul>	“ “
10	<i>Ivingia gabonensis</i>	Bush mango	<ul style="list-style-type: none"> <li>• Fruit and seed for eating</li> </ul>	“ “
11	<i>Brachystegia eurycoma</i>	Achi	<ul style="list-style-type: none"> <li>• Seed for eating</li> </ul>	“ “

12	<i>Treculia Africana</i>	African breadfruit	• Seed for eating	“ “
13	<i>Gnetum africanum</i>	Ukazi, afang	• Leaves for food	“ “

Source: Personal Research

### ENVIRONMENTAL IMPLICATION OF FOREST FOOD/FRUIT TO HUMAN WELL-BEING

The development of the fruit farm no doubt can stimulate the establishment of cottage industries to can the fruits, prepare marmalade, jam or fruit drinks. Whether grown commercially or traditionally the fruit farms will be managed to address issues of food security, windbreak, soil fertility maintenance, pole, fodder, timber, fuelwood in addition to other products and services.

Some forest fruit trees that undergo abscission in their early stage of development can help in adding nutrient to the soil when decayed. Abscission may be as a result of poor growth condition or poor pollination.

Other environmental implications regarding forest food/fruits include the tendency of insects like bees feeding on fruits which helps them in honey production. Pollination do also take place as forest fruit trees serve as food to insects and other wildlife alike.

Wastes from forest foods/fruits are biodegradable when acted upon by micro-organisms. No special treatment is required to aid in their decomposition, as such reduces cost of recycling if it were to be non-biodegradable.

Forest foods/fruits are best eaten natural without additives, unlike the processed food that contains a lot of preservatives which may be unhealthy for the body.

In addition, forest foods do not contaminate the environment.

### FOREST FOOD AND HUMAN WELFARE

The forest as an organic entity is a store-house of innumerable benefits. The benefit ranges from the quantifiable to the unquantifiable, both of which have considerable impact on human welfare. An attempt will be made to survey the vast array of benefits rendered to human and animal by forest food.

**A. Fruits and seeds:** The number of edible tropical fruits is enormous. Onyeagocha (1977) stated that in the rural areas where the popular food eaten is mainly carbohydrates, indigenous fruit trees fulfill a very useful role in improving food quality by providing protein, minerals, vitamins, and fats. The rural areas eat more fresh vegetables, indigenous fruit trees, fresh bush meat and fresh oil. An important feature of these fruit trees serving as a source of food is that many of them are available during the “hungry” periods when most of the staple foods are out of season. For example *Dacryodes edulis*, *Treculia africana* *Irvingia gabonensis*, and *Canarium schweinfurthii* are in fruit during rainy season when yam and cocoyams are not due for harvesting. Etukudo (2000). Okafo (1978) prepared a list of 150 edible indigenous woody plants. Okafo and Okolo (1974) also examined the chemical content of some fruits and found as follows:

**Table 11: Chemical Content of Some Indigenous Fruit Trees**

Names of plant	Percentage Fat	Percentage Protein
<i>Irvingia gabonensis</i>	71.77	8.65
<i>Dacryodes edulis</i>	43.99	4.47
<i>Pentaclethra macrophylla</i>	23.04	28.40
<i>Treculia Africana</i>	10.27	17.23

Source: Okafo and Okolo (1974)

**B. Vegetables:** Technically all plants are vegetables. But as used here “vegetable is the flesh edible portion of a plant consumed in either raw or cooked form” Encyclopedia Britannica (1975). The food value of vegetables is comparatively low, owing to the large amount of water present 70 to 95%, (Hill 1951). Okafo and Encyclopedia Britannica (1975) confirms that vegetables contains low quantities of proteins, carbohydrates, fats and oil, but high content levels of vitamins and minerals including lysine, calcium, potassium,

thiamine, riboflavin, ascorbic acid, tryptophan, niacin, carotene, vitamin A,C amongst others.

**C. Fats and oil plants:** A few indigenous plants yield fats and oil. They are stored up in large amounts in seeds. To a less extent they are found in fruits, tubers, stems and other plant organs. Important sources of fat and oil are *Elaeis guinensis*, *Dacryodes edulis*, *Pentaclethra macrophylla*, *Vitellaria paradoxa*, *Glycine max*.

**D. Beverages and drinks:** Several trees yield alcoholic drinks. Some of these are *Raphia hookeri* and *Elaeis guineensis* whose wines are known respectively as raffia wine and palm wine. The raffia wine is the raw material used to manufacture local gin. It should be noted that whenever *Elaeis guineensis* and *cocos nucifera* are tapped for wine, the trees rarely bear fruits. Palm wine is also tapped from *Borassus flabellifer* and *Phoenix dactylifera*.

*Cola nitida*, *Spondias mombin*, *Vitex doniana*, *Parkia clappertoniana*, *Myrianthus arboreus*, *Treculia africana* are sources of sweet beverages.

**E. Sweeteners:** For a long time, the sugarcane (*Saccharium officinarum*) remained the only sweetening material. Sugar unfortunately does not go down well with diabetics. Luckily between 1965-1976, other sweetening have been found. They are not only far sweeter than sugar but also very good with diabetics. They include *Synsepalum dulcificum* (magic plant), *Dioscoreophyllum cumminsi* (Serendipity berry) and *Thaumatococcus daniellii* (Miraculous plant). Opeke (1987) says the sweetness of *Synsepalum dulcificum* is due to the presence of a protein-based substance called "Miraculin". The berry of this shrub when eaten is apparently tasteless, but the sweetness hidden in the tastebuds of the tongue lingers on for up to 18 hours. The sweetness of *Dioscoreophyllum cumminsi* derives from the chemical "molenin" while "thaumatin" is responsible for the sweetness of *Thaumatococcus daniellii*.

**F. Mushroom, Snail, Honey:** Mushroom represents the reproductive state of certain higher fungi. They occur naturally in field and forests. Many wild edible mushrooms are delicacies but care must be taken to distinguish mushrooms from toad-stools. Hill (1951) says that the food value of mushroom is low: water 91%, protein 3.75%, carbohydrates 3.5% and fats only 0.20%.

African giant snail (*Archachatina marginata*) are also collected from the wild for eating and for sale. Snaileries gardens where snails are reared are coming up as more awareness spread through the society on the nutritional value, hypertension curing tendency, and economic importance of snails. The smaller and more abundant type of snail-*Limicolaria aurora* is also a delicacy; from the swamp of mangrove forest are *Gassatrea gazar* (Oyster) and *Pachymolania fusca* (periwinkle).

From the forest too comes honey which is made by the bees. The bees are attracted to flowers by the presence of nectar. Nectar is made up of sucrose with some fructose and glucose. The bees convert nectar by intricate mechanisms to honey comprising mainly dextrose and laevulose (about 70% of honey). Okeke et al (1986) quoting Crompton say that honey is useful for patients with severe abdominal disorder as it requires no digestion but passes straight into the blood stream. Honey is used as a stimulant, tonic and as a component of many medicines. It is mixed with herbs to treat whooping cough, asthma, influenza, jaundice and pile.

### Conclusion

Although various animal and mineral products contribute to the welfare of man, plant kingdom is the most essential to his well-being. Primitive man had few needs other than food and little shelter. Civilization however has brought with it an ever-increasing complexity, and has increased man's requirement to an amazing degree.

While we appreciate the painstaking efforts of our scientist and giant pharmaceutical industries in the manufacturing of drugs to address man's health challenges, we also acknowledge the fact that forest food/fruits has played a fantastic role in helping man live a healthy and long life. However, this is more prolific as dietary approach of treatment can be used along conventional, alternative and other forms of medicine. Based on my personal inquiry and observation, forest food/fruits have played a pivotal role in elongating the lives of our aged rural dwellers that depend on forest food for their livelihood.

The damaging pattern of the modern diet is embedded in social and industrial development-since the turn of the century, greater wealth has led to increased consumption of processed, high-fat foods, foods that were once regarded as luxuries. Forest food/fruits can be a better choice even in this advanced and modern world.

Employment and income are twin social requirement which are needed by modern man for security and better quality of life. Forestry sector and especially forest foods is an important employer of labour in Nigeria outstandingly in the rural areas

### REFERENCE

- Adeyoju, S. Kolade. "Our forests and our welfare." *Inaugural lecture. University of Ibadan, Ibadan, Nigeria* (1981).
- Agbelusi, E.A. and Ejidike, B. N.(1990) Utilization of the African giant land snail (*Archachatina marginata*) in the humid area of Nigeria, 8pp



- Ambrose-Oji, B. "The contribution of NTFPs to the livelihoods of the 'forest poor': evidence from the tropical forest zone of south-west Cameroon." *International forestry review* 5.2 (2003): 106-117.
- Arnold, J.E.M. 2008. Managing ecosystems to enhance the food security of the rural poor. A situation analysis prepared for IUCN, Gland.
- Arnold, J.E.M. & Dewees, P.A. 1997. Farms, trees and farmers: responses to agricultural intensification. London, Earthscan.
- Arnold, M., Powell, B., Shanley, P. & Sundernald, T.C.H. 2011. Forests, biodiversity and food security. *International Forestry Review*, 13(3): 259-264.
- Babulo, Bedru, et al. "The economic contribution of forest resource use to rural livelihoods in Tigray, Northern Ethiopia." *Forest Policy and Economics* 11.2 (2009): 109-117.
- Erakhrumen, Andrew Agbontalor. "State of forestry research and education in Nigeria and sub-saharan Africa: implications for sustained capacity building and renewable natural resources development." *Journal of Sustainable Development in Africa* 9.4 (2007): 133-151.
- Etukudo, I.G. et al (1994), Element of forestry
- Etukudo, G Inyang. (2000), Forests, Our divine treasure, published by Dorand publishers P.O. Box 1350 Uyo, Akwa Ibom State.
- Ndoye, Ousseynou, and J. C. Tieguhong. "NTFPs and services for sustainable livelihoods in Central Africa." *Search of common grounds: adaptative collaboration management in Cameroon. Center for International Forestry Research (CIFOR), Bogor* (2009): 353-378.
- FAO. 1995. Non-wood forest products and nutrition. In Report of the International Expert Consultation on Non-Wood Forest Products. Non-Wood Forest Products Paper No. 3, FAO.
- FAO. 2000. Global forest resources assessment 2000. Rome, FAO.
- FAO. 2010. Global forest resources assessment 2010: progress towards sustainable forest management. Rome, FAO (Available at: [www.fao.org/docrep/013/i1757e/i1757e.pdf](http://www.fao.org/docrep/013/i1757e/i1757e.pdf)).
- FORMECU (1995) an assessment of land use and vegetation changes in Nigeria 1978 - 1995. Geomatis, Ontario, Canada.
- FORMECU (1997) A Study on Non Timber Forest Products in Wada Taye Forest Reserve of Borno State.
- Hladik, C.M., Hladik, A., Linares, O.F., Oagezy, H., Semple, A. & Hadley, M., eds. 1993. Tropical forests, people and food: biocultural interactions and applications to development. Paris/Carnforth, UK, UNESCO/Parthenon Publishing Group.
- Jamnadass, R.H., Dawson, I.K., Franzel, S., Leakey, R.R.B., Mithöfer, D., Akinnifesi, F.K. & Tchondjeu, Z. 2011. Improving livelihoods and nutrition in sub-Saharan Africa through the promotion of indigenous and exotic fruit production in smallholders' agroforestry systems: a review. *International Forestry Review*, 13(3): 338-354
- Millennium Ecosystem Assessment. 2005. Ecosystems and human well-being: health synthesis and biodiversity synthesis. Geneva: WHO (World Health Organization), World Research Institute.
- NAERLS (1992), Trees and Shrubs species for fodder in Nigeria. Extension Bulletin 57(3):1-27
- Obot, E. A. (1996) Ethnobotanic Survey of Okwangwo Division of Cross River National Park Workshop on the Rainforest of South Eastern Nigeria, 16pp
- Okafor, J.C. (1980) Trees for food and fodder in the savannah areas of Nigeria, The International Tree Crops Journal 1: 131-141
- Okafor, J.C. (1987) Development of forest tree crops for food supplies in Nigeria. Forest Ecol. Management 1:235-247
- Okafor, J.C. (1989) Agroforestry aspects appendix 2 of Cross River National parks Oban Division Godalming UK, 90pp.
- Okarfor, J.C. et al (1994) Non -Timber Forest Products, Nigeria. Tropical Forestry Action Programme FORMECU, Fed. Dep. of Forestry, Abuja, Nigeria.
- Osemeobo, G. J. (1990) Poaching in wildlife conservation: The experience in Nigeria, The Nigerian Journal of Forestry 20 : 36-40
- Osemeobo G.J. (1991) Effects of Common Property Resources Utilization on wildlife conservation in Nigeria, Geojournal 23:241-148
- Osemeobo, G.J. (1992a) Land use issues on wild plant conservation in Nigeria, Journal of Env. Mang. 36: 17-26
- Osemeobo, G. J. (1992b) Effects of land use and Collection on the Decline of the African Giant Snails in Nigeria, Env. Con. 19: 153-159
- Osemeobo, G. J. (1992c) Fuel-wood Exploitation from Natural Ecosystems in Nigeria: Socio-

- Economic and Ecological Implications, *Journal of Rural Development* 11:102-108
- Osemeobo, G.J. (1992d) Religious Practices and Biotic Conservation in Nigeria: conflict or Compromise? *Geojournal* 27: 331-338
- Osemeobo, G. J. (1993) The Hazards of Rural Poverty: Decline in Common Property Resources in Nigerian Rainforest Ecosystems, *Jour. of Env. Mang.*38:201-212
- Osemeobo, G. J. (1994) The Role of Folklore in Environmental Conservation Evidence from Edo State ,Nigeria *Int. Jour. of Sustain. Dev.and World Ecology* 1:48-55
- Osemeobo, G..J. (1996) Natural Resources Management and in situ Plant Genetic Conservation in Nigerian Arid Zones International Plant Genetic Resources Institute Kenya, 144pp
- Osemeobo, G, J. (1998) Community Participation in Biodiversity Conservation: a case study of Community Herbal Heritage Center Otun - Ekiti South - west Nigeria, FEPA, Abuja.
- Osemeobo, G. J. (1999) An impact Assessment of cultural Practices on in situ Conservation of Oil - palms in Nigeria *Nigeria Journal of Forestry:* 28 (in Press)
- Tanushree Podder (2013), *You are What You Eat* published by Beulahland publications, 10 Owoseni street Benin city Edo State. Pp 1-170
- Salau, A.(1991) *Ecology and Economics: Economic Strategies for Natural Resources Conservation in Nigeria*, 8pp
- Sunderland, T.C.H., & Pottinger, A.J.(eds). 2011. Special Issue: Forests, Biodiversity and Food Security. *The International Forestry Review*, Vol. 13(3).
- World Bank (1996) *Nigeria Poverty in the Mist of Plenty : the Challenge of Growth with inclusion*, World Bank Washington D C 129pp
- Sofowora, A, (1993) *Medical Plants and Traditional Medicine in Africa*, Spectrum Books Ltd., Ibadan.289pp
- Ujor, G. C. (1997), *The Role and Potentials of Non Timber Products in Nigeria*. Workshop on Participatory Forest Reserve Management Calabar, 18-19 Feb. 1997.
- Vinceti, B., Eyzaguirre, P. & Johns, T. 2008. The nutritional role of forest plant foods for rural communities. In C.J.P. Colfer, ed. *Human health and forests: a global overview of issues, practice and policy*. London: Earthscan (Chapter 4).