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TREES OUTSIDE FORESTS AND PEOPLE'S WELLBEING: A CASE STUDY OF FALLOW AND ON-FARM TREES/SHRUBS IN ORLU AGRICULTURAL ZONE OF IMO STATE, NIGERIA

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ABSTRACT

In order to determine the role that trees outside forests play in the people's wellbeing, a survey of trees/shrubs on fallow and farmlands was carried out in Orlu agricultural zone of Imo State Nigeria. The study was necessitated by the need to generate information that would guide government's reform agenda in the forestry sub-sector. Data were collected through formal survey of farmers, key informants and sample plot surveys. Results revealed that there was prevalence of trees/shrubs in the fallow and farmlands in the zone which were either deliberately planted up or protected by the farmers. The tree/shrub species were found to make valuable contributions to household food and income needs. On the average, 53.1% of all edible products collected from the trees/shrubs were consumed by the household members. This accounted for as much as 36.7% of the household food needs. Income from the sale of the remaining products accounted for 42.7% of the total household incomes. Thus, trees on fallow and farm lands play very important roles in people's wellbeing and contribute to environmental sustainability.

Keywords: Trees outside forests, Households, Compound farms, Fallow lands, Farmlands, Key informants, Sample plots.

INTRODUCTION

Over the years, farmers have tried to retain, protect, plant and manage trees on their farmlands. The role of these trees in providing a number of locally important goods and services such as cheap food supplements, poles, timber, fuel wood, fibers, herbal medicines, and fodder and erosion control is well recognized and documented (Okafor, 1980; Arnold, 1990). But these trees and their important functions have been overlooked and ignored. Instead, more attention has always been focused on trees in forests which are viewed as resources and as a store of biological diversity (Food and Agricultural Organization, 2001).

In recent times however, the interest of local and international communities have been awakened to the importance of these trees as evidenced by its increasingly featuring on the agenda of scientific, economic and policy discussions. This according to the Food and Agricultural Organization (2001), is a direct outcome of environmental and development history. During the 1970's for instance, environmental degradation provoked a rush of aid to countries hit by drought and desertification. Following this in the 1980's was a plethora of agroforestry research that recognized the major role of trees in rural development and soil fertility. Within the same period, rainforests threatened through logging and agricultural expansion

received unprecedented consideration and tree planting was encouraged. In the 1980's, interest also mounted in Non-Timber Forest Products (NTFPs) which were previously relegated to the status of minor products. It was at this time that trees especially '*trees outside the forest*' (T.O.F), a phrase coined in 1995, (Food and Agricultural Organization 2001), began to be considered in terms of their contribution to the well-being of people and their environment.

Trees outside forests refer to trees located on lands other than forest lands, such as farmlands, human settlements and bare lands (Food and Agricultural Organization, 2001). The many uses and services of trees outside forests are obvious but data on these important resources are scanty. This study was therefore undertaken to generate data on the importance of TOF. Orlu Agricultural Zone in Imo State Nigeria was chosen for the study because high population pressure has led to virtual disappearance of most forests in the zone; hence the people are increasingly relying on TOF, mainly in form of fallow and on-farm trees, for the continued provision of forest goods and services. The study is a response to the concern over lack of data on TOF expressed by experts at a consultation on this issue held in Kotka, Finland in 1996.

MATERIALS AND METHODS

The study area

The Orlu Agricultural Zone in Imo state Nigeria is bounded on the North by Anambra State, in the South-West, East and south–East by Owerri and in the North, East and South-East by Okigwe zones (Fig 1).

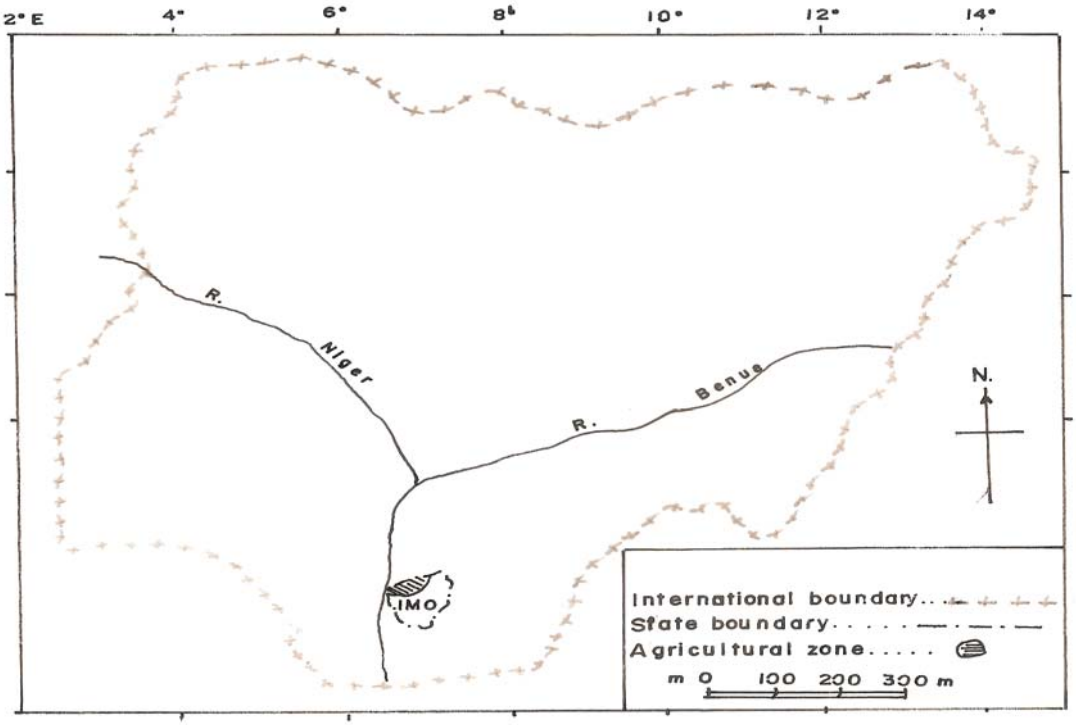

Fig I: Map of Nigeria Showing the location of Imo State and Orlu agricultural Zone of the State, the study area

Orlu has a tropical climate with two distinct seasons, rainy and dry seasons in the year. The rainy season covers a period of about seven months, from April to October, while the dry season lasts for about five months. The mean annual rainfall for Imo state ranges between 2000mm and 2500mm (Federal Department of Agriculture and Land Resources, 1985). The mean annual temperature ranges between 26^0C and 28^0C.

With a total land area of only 935.90km^2 and a population of 1,322,052 (FGN, 2009), the zone has a very high population density of 1,413 people/km^2. The population is predominantly rural and is Agricultural based.

Data collection and analysis

Formal survey of farmers and key informants using a set of questionnaires as well as sample plot surveys were carried out to generate data. To ensure a more representative sampling, a four stage sampling technique was adopted based on the Imo State Agricultural Development Programme (ADP) administrative zoning arrangement. Under this administrative framework, each Zone is divided into blocks and each of the blocks further divided into smaller units called cells. Thus, sampling involved all the Zones, 50% of the blocks and 25% of the cells. Based on this arrangement, five blocks and eight cells were randomly selected from 10 blocks and 33 cells. In each of the selected cells, eight farmers were randomly selected from the list of 64 contact farmers kept by the ADP to constitute the respondents thus, giving a total of 64 respondents representing 12.5% of the contact farmers. This was complemented by sampling one key informant per selected cell. Those surveyed under the key informant surveys included village heads,

Teachers and agricultural extension agents, who have lived in the study areas long enough to be very familiar with the tree components in their farming systems.

The information obtained through the formal and key informant surveys were verified through sample plot surveys of selected fallow and farmlands involving one sample plot per selected cell. The plot sizes were not standardized because of the natural differences in farm sizes as dictated by the level of fragmentation of holdings. The data were organized into tables and summarized using simple statistics namely: percentages, frequencies and mean values.

The determination of species abundances in fallow and farmlands and uses/products obtained from the trees, were carried out in accordance with the formulae as given by Franzel S, H. Jaemicke and W. Janssen (1996), as follows:

$$\text{Percentage occurrence of species} = \frac{\text{No of times species was mentioned}}{\text{No. of interviews conducted.}} \times \frac{100}{1}$$

$$\text{Percentage freq of uses/products} = \frac{\text{No of times product was mentioned}}{\text{No of times species was mentioned}} \times \frac{100}{1}$$

$$\text{Average rank order value} = \frac{\text{sum of rank order value of species}}{\text{No. of interviews undertaken}}$$

RESULTS AND DISCUSSIONS

Farmer's socio-economic characteristics

Results revealed that about 16.0% of the farmers were young (age range of 30-40years), 27.02% were middle aged (age range of 40-50 years), while old aged farmers (age range of 50years and above) constituted about 57.0%. About 90.2% of the farmers could read and write and 60.8% have household sizes of between 6 and 10 members. Also, 58.8% of the respondents have had at least 11years experience in farming (Table l).

Availability of tree/shrub species on fallow and farm lands

Tree planting is a dominant feature of farming systems in the study area. According to the respondents, a greater percentage of these trees were planted deliberately (51.7%), while others were retained on farmlands by farmers (45.3%). Deliberate tree planting was more pronounced in the compound farms than in the other farm types. For instance, whereas 71.4% of the trees were planted, the proportion decreased to 47.8% and 36.5% in farmlands which are close and far from households (Table 2)

Table 1: Distribution of farmers by age, education, experience and household size

S/N	Variables	Categories	Frequency	Percentage
i.	Age (years)	<30	3	5.9
		31-40	5	9.8
		41-50	14	27.5
		51-60	20	39.2
		61-70	7	13.9
		>71	2	3.9
Total			**51**	**100.0**
ii.	Level of education	No formal education	5	9.8
		Primary school	20	39.3
		Secondary school	16	31.4
		Tertiary education	10	19.6
Total				**100.0**
iii.	Household size	1-5	15	29.4
		6-10	31	60.8
		11-15	5	9.8
		16 and above	-	-
Total			**51**	**100.0**
iv.	Experience in farming	0-5 years	6	11.8
		6-10years	15	29.4
		11-15 years	7	13.7
		16 and above	23	45.1
Total				**100.0**

Source: Field Survey, 2007

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Table 2: Proportion of on-farm tree/shrub species planted as against those that regenerated naturally.

Formal survey					**key informant survey**			
PT			TGN		PT		TGN	
Farm type	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Compound farm	165	71.43	66	28.57	89	68.99	25	31.65
Near-field farm	95	47.26	106	52.74	34	48.57	36	51.43
Far-field farm	31	36.47	54	63.52	6	33.33	18	66.67
Mean PT/TGN		**51.70**		**48.30**		**53.32**		**46.68**

PT = planted trees; TGN = Trees growing naturally

Source: Field Survey, 2007

Species abundance on fallow and farm lands

To measure this variable, the respondents were asked to list all the different species of trees/shrubs found in the farmlands. They were further asked to indicate the farm types in which each of the listed species were found. Then applying the formula "**Percentage occurrence of species**" the result as contained in Table 3 was obtained. Columns 1,2 and 3 express the abundance of each tree/shrub species in each of the three farm types (i.e. compound, near and far-field farms) respectively while the 4th column expressed the mean abundance of each species on fallow and farmlands in the zone. The species list is presented according to their order of abundance on the farmlands. Thus, number one on the table signifies the most abundant species on farmlands.

The table shows that *Elaeis guineensis* is the most abundant species on farmlands fallowed by *P. macrophylla*, *D. edulis* and *T.africana* etc while the least was *Irvingia gabonensis*. The table also show that not only were the species containing edible parts or have food values found more in abundant on farmlands but that these group of species were found more in the compound farms and least in the far-field farms. This shows that the ability of the trees/shrubs to provide food for the people was the most important consideration in the choice of tree/shrub species for planting and or protection on farmlands in Orlu agricultural zone of Imo state.

Table 3: Species abundance per farm type and per farmland

		C.F	N.F	F.F	Mean
1	*Elaeis guineensis*	67.4	78.0	80.0	75.1
2	*Pentaclethra macrophylla*	37.2	61.0	16.0	39.8
3.	*Dacryodes edulis*	60.5	43.9	40.0	38.9
4.	*Treculia Africana*	25.6	51.2	40.0	38.9
5.	*Citrus sinensis*	55.8	26.8	4.0	28.9
6.	*Cocos nucifera*	48.8	24.4	8.0	27.1
7.	*Kola sp.*	53.5	22.0	4.0	26.5
8.	*Mangifera indica*	30.2	31.7	8.0	23.3
9.	*Raphia hookeri*	30.2	22.0	4.0	18.7
10.	*Persea Americana*	20.9	4.9	4.0	9.9
11.	*Milicia excels*	4.7	9.8	12.0	8.8
12.	*Dactyladenia barteri*	-	14.6	8.0	7.5
13.	*Psidium guajaya*	11.6	2.4	4.0	6.0
14.	*Garcinia cola*	9.3	7.3	-	5.5
15.	*Pterocarpus soyauxii*	11.6	-	4.0	5.2
16	*Musa sp.*	11.6	2.4	-	4.7
17.	*Dennetia tripetala*	9.8	3.9	-	4.6
18.	*Anarcardium occidentale*	4.7	4.9	4.0	4.3
19.	*Chrysophyllum albidium*	2.3	7.3	-	3.2
20	*Carica papaya*	4.7	-	-	2.3
21.	*Annona muricata*	4.7	-	-	1.6
22.	*Bambusa sp*	-	-	4.0	1.3
23.	*Cassia siamea*	-	-	4.0	1.3
24.	*Newbouldia laevis*	2.3	-	-	0.8
25.	*Irvingia gabonensis*	2.3	-	-	0.8

Source: Field Survey, 2007

Products obtained from the fallow and on-farm trees/shrubs.

To measure this variable, respondents were provided with a table containing list of possible products that can be obtained from trees/shrubs. They were then asked to indicate the products obtained from each of the species identified in their farmlands. Applying the formula of percentage frequency of uses/products obtained from each of the species, the results as shown in Table 4 were obtained. Majority of the species had more than one useful product. One important observation in the result was that almost all the species were used for fuel wood. The only exceptions were plantain/banana and paw-paw. Another important observation was that those species that were more in abundance also had more number of products. For instance, oil palm which ranked first in their order of abundance also had more useful products from it.

Importance of the products obtained from the fallow and on-farm trees/shrubs to household nutrition.

According to Bergeret and Ribot (1990), trees outside forest area are major food sources; hence they are referred to as "nurse trees". This has been confirmed in this study as about 82.4% of the respondents claimed to consume between 26.0% and 75.0% of the products from fallow and on-farm trees/shrubs. The mean percentage consumption was however found to be 53.1% as obtained from the formal survey and 50.1% from key informants' surveys (Table 5). This constituted about 36.7% of household food requirement provision (Table 6). Therefore, fallow and on-farm tree/shrub species make valuable contributions to household's food needs both as major foods and supplements. This is in agreement with the findings of Food Agricultural Organization (1990), that trees left on fallow and farm lands in the West African Humid Forest Zone are those valued for their food.

Table 4: Products obtained from trees/shrubs found on fallow and farmlands

	Tree/shrub species	*Fuel wood*	Pole/stakes	Timber	Utensils	Vegetables	Fruits	Edible nut/seed oil	Seasoning/ Condiment	medicine	Fodder	Thatch	Resin/latex	Fibre	Wine
1	*E.guineensis*	43	32	18	X	X	58	88	8.3	9.5	43	37	X	25	43
2	*P.macrophylla*	74	24	8.1	19	X	31	81	23	15	19	X	X	X	X
3	*D.edulis*	64	9.1	21	X	X	85	12	X	X	27	X	9.1	X	X
4	*T.africana*	49	14	23	X	X	43	51	X	X	29	X	2.9	X	X
5	*C.sinensis*	39	X	X	Z	X	86	X	X	18	7.1	X	X	X	X
6	*C.nucifera*	59	33	52	7.4	X	67	77	19	33	7.4	30	X	X	X
7	*Kola spp*	18	7.1	7.1	X	X	25	79	X	18	7.1			X	X
8	*M.Indica*	47	13	13	9.4	X	97	6.3	X	22	19	X	X	X	X
9	*R.hookeri*	50	17	X	X	X	X	X	X	X	X	56	11	39	56
10	*P. Americana*	46	X	X	X	X	68	X	X	X	23	X	X	X	X
11	*M.excelsa*	44	8.7	87	X	X	X	X	X	X	26	X	X	X	X
12	*D.barteri*	57	50	X	13	X	17	X	X	13	30	13	X	X	X
13	*P.guajava*	42	X	X	X	X	83	X	X	8.3	8.3	X	X	X	X
14	*G.cola*	42	15	35	25	X	18	88	6.7	67	X	X	X	X	X
15	*P.soyauxii*	35	18	12	X	100	X	X	X	X	12	X	X	X	X
16	*Musa spp*	X	X	X	X	X	100	X	X	X	17	X	X	X	X
17	*D.Tripetala*	67	X	X	X	X	67	67	X	X	X	X	X	X	X
18	*A.ocidentale*	36	X	X	X	X	86	36	X	19	X	X	X	X	X
19	*C.albidium*	43	14	14	14	X	36	X	X	14	X	14	X	X	X
20	*C.papaya*	X	X	X	X	X	86	X	X	X	X	X	X	X	X
21	*A.muricata*	33	X	X	X	X	100	X	X	X	X	X	X	X	X
22	*Bambusa sp*	33	83	X	X	X	X	X	X	X	X	X	X	X	X
23	*C.siamea*	80	X	X	X	X	X	X	X	X	X	X	X	X	X
24	*N.laevis*	25	X	X	X	X	X	X	X	X	X	X	X	X	X
25	*I.gabonensis*	25	X	X	X	X	60	60	75	X	X	X	X	X	X

Source: Field Survey, 2007

Table 5: The percentage consumption of the on-farm tree/shrub products by household members.

Percentage	Formal Survey		Key Informant Survey	
Consumption	**Freq**	**%**	**Freq**	**%**
0-25	5	9.8	1	12.5
26-50	14	27.5	2	25.0
51-75	28	54.9	4	50.0
96-100	4	7.8	1	12.5
Mean		**53.1**		**50.0**

Source: Field Survey, 2007

Table 6: The extent of contribution of on-farm tree/shrub products to the family food needs.

	CF		NF		FF	
Contribution	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
0-25	16	37.20	13	34.20	10	41.70
26-50	15	34.90	15	39.50	7	29.20
51-75	10	23.30	10	26.30	3	12.65
76-100	2	4.65	-	-	4	16.60
Total	43		38		24	-
Mean %C/FT	35.43		35.86		38.83	-
Mean %C/FH			36.71			

Mean % C/FT = Mean percentage contribution per farm type

Mean % C/FH = Mean percentage contribution per farm household.

Source: Field Survey, 2007

Contributions made by the product of the fallow and on-farm trees/shrubs to household income.

According to Arnold (1996), trees outside forests have market value and may indeed be essential for resource poor peasants. This has also been confirmed by this study as majority of the respondents (68.6%) indicated having obtained between 26.0% and 75.0% of their household

incomes from the sale of their fallow and on-farm tree/shrub products. The mean percentage contribution of these tree/shrub products to the total household Income was found to be 42.37% (Table 7). A related study carried out in rural Madhya Pradesh, India showed that Non - timber, forest products provided 40 - 63% of total annual income (Tewari and Campbell 1996), while in Zimbabwe, their subsistence (non-market) values contributed 35.0% of total household income (Cavendish 1997).

Table 7: Percentage contributions of the fallow and on-farm tree/shrub products to the household incomes.

	Formal Survey		Key Information survey	
Income	Frequency	Percentage	Frequency	Percentage
0-25	13	25.5	1	12.5
26-50	19	37.2	4	50.0
51-75	16	31.4	3	37.5
76-100	3	5.9	-	-
Total	51		8	
Mean		42.37		44.94

Source: Field Survey, 2007

CONCLUSION AND RECOMMENDATION

The study has shown that trees outside forests play very important roles in the nutritional and economic [illegible]e of the people. There is no doubt that with continued growth in populations, coupled with shrinking forests, and degraded [illegible]cosystems, trees outside the forest are bound to play a much greater local and global role in meeting the challenges of resou[illegible]e sustainability, poverty reduction and in contributing to food security. The ever presence of the product of these trees in b[illegible]n local, regional and national markets and increasing exportation of some of the products like palm oil, coconuts and timbe[illegible]o other African and European markets attest to that. As Food and Agricultural Organization (2001) has noted, these trees are unquestionably in a very strong position to substantially relieve the pressure on forest resources, conserve farmlands, boost agricultural productivity, blunt the harmful impact of urban growth on the environment, boost food supplies and supply local, national and even international markets. The various levels of government in the country are therefore called upon to pay serious attention to the trees outside the forest in their reform agenda in the forestry sub - sector of the economy.

REFERENCES

Arnold J.E.M (1990): *Tree components in farming Systems. Unasylva* 160, Vol. 41 p35.

Arnold J. E. M (1996): Economic factors in farmer adoption of forest product activities. In. Leakey, R.R.B; Melnyk, M. and Vantomme, P. (eds). Domestication and commercialization of non-timber forest products in agro- forestry systems. Proc. of International Conf. held in Nairobi, Kenya, 19-23 February 1996. Non-wood Forest Products 9, FAO, Rome . 131-144

Bergeret, A and Ribot J. (1990): H'arbre nourricier en pays Sahelien. editions de la maison des Sciences del homme, Paris: 237 pp.

Cavendish, W. (1997): The economics of natural resource utilization by communal area farmers of Zimbabwe. PhD thesis, Oxford University,

Food and Agricultural Organization (1990): *Major significance of minor forest products: The local use and the value of forests in the West African humid forest zone. Community forestry note* (6). Editor: Carla R.S. Koppell. FAO. Rome. P13.

Food and Agricultural Organization (2001): *Trees outside forests. Towards rural and urban integrated resources management: Contribution to the forest resources assessment 2000 report. Forest conservation research and education service:* Forestry Department. FAO, Rome. 1- 13.

Federal Department of Agriculture and Land Resources (FDALR) (1985): The reconnaissance soil survey of Imo State Nigeria 1:25,000 report, Kaduna. 67- 70.

Federal Government of Nigeria (FGN) (2009): 2006 population census (Final figures). Annexure B: Population by state and sex. Federal Republic of Nigeria, Official Gazette No 2, Abuja, 2nd February, 2009. Vo1.96: p20.

Franzel S, H Jaemicke and W. Janssen (1996): *Choosing the right trees: Setting priorities for multipurpose tree improvement. ISNAR Research Report No 8*.ISNAR, The Hague, 1987. 130-140

Okafor J.C. (1980): *Edible indigenous woody plants in the rural Economy of the Nigerian Forest Zone*. *Forest Ecology and Mgt:* 3.1: 45- 54.

Tewari, D.O. and J.Y Campbell (1996): *Increased development of non-timber forest products in India: Some issues and concern*. *Unasylva* 47: 26-31.

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