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Determining the Local Importance of Non-Timber Forest Products Using Two Different Prioritization Techniques

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Abstract Among the key uncertainties in the sustainable management of forest for non-timber forest products (NTFPs) is the high diversity of species and paucity of information on indigenous use pattern. In designing appropriate strategies for sustainable management of non-timber forest products, therefore, it is important to identify species with high local importance with the potential for sustainable and profitable extraction in a managed system. In this study, we assessed the use of two quantitative techniques including the Use-Value index (Phillips and Gentry, 1993) and Assigned-Value approach (Adeola *et al.,* 1994), as procedures for prioritization of NTFP species in a tropical lowland rainforest ecosystem, Omo Forest Reserve (OFR), southwest Nigeria. A simple random sampling approach was employed to obtain data on the uses of NTFP species through semi-structured interview of 81 households in four communities within the reserve. Descriptively, the data were analyzed using frequency distribution, tables, chart and percentages. The Spearman correlation coefficient was employed to test for relationship between the values obtained for each of the two techniques. Results obtained for both techniques were fairly positively correlated ($\rho = 0.59$; $P < 0.01$), suggesting a cautious interchangeable use of the techniques for the same end. Based on our findings, we posit that in evaluating forest and NTFPs for local importance and use, the end objectives of such evaluation must be critically examined in the light of the interest of the different respondents' group.

Keywords Tropical Rainforest, Non-Timber Forest Products, Use-Value, Assigned-Value and Prioritization

1. Introduction

There is a plethora of literature on the socio-economic potentials of Non-Timber Forest Products (NTFPs) as an important component of the livelihood strategies of people living in or adjacent to forest areas[1-5]. The growing number of reports has suggested that hundreds of millions of people world-wide currently derive a significant portion of their subsistence needs and livelihoods from gathered plant and animal products. For most of the world's rural households, NTFPs provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials, mulch and non-farm income. It was estimated by the Food and Agriculture Organization of the United Nations that the total value of internationally traded NTFPs for the year 2002 was about 5.56 trillion US Dollars for fifty five species assessed[6].

Despite the known and substantial economic value of few individual NTFPs, and the unknown, but likely high economic value of NTFPs in aggregate, forest managers have historically not included them as important factors in forest management. But not only do NTFPs comprise a significant part of the biological diversity of forest ecosystems, they are integral element of sustainable forestry[7]. Non-Timber Forest Products are particularly important in ensuring food security, maintaining nutritional balance in people's diets and contributing to health care system. They are also essential to human survival during famine and 'hungry season' (period when most agricultural crops are not yet matured)[5]. At other times, NTFPs serve and support income-earning activities in both rural and urban economies.

Forest management for NTFPs can provide a continuing source of livelihood and help to maintain the forest resource for future generations. It has been argued that establishing extractive reserves for the sustainable harvest of marketable NTFPs has the potential to unite economic and conservation goals by promoting nature conservation while maximizing long-term economic returns per unit area[8-10]. Nonetheless, it is noteworthy that the management of forest lands is complex, and this is never more so than when considering many competing and non-complementary uses for the same area of forest.

Among the key uncertainties in the sustainable management of forest for NTFPs is the high diversity of species and paucity of information on indigenous use pattern. For instance, there are indications that Nigeria has more than six thousand NTFPs growing in the wild[11]. However, there is no complete list of NTFPs in the country because most biotic species from which forest products are derived are not well

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documented[2]. Increasing population coupled with large scale depreciation as a result of shifting cultivation, bush burning, logging and forest conversion have continued to pose concern about the sustainability and need for conservation of these species. Similarly, inadequate information on the ecological productivity, growth forms, life history and maintenance of the various species used as NTFPs further complicate management scenarios and the setting of conservation priorities for this category of forest products[12]. Therefore, in the design of appropriate strategies for sustainable management of non-timber forest products, it is important to identify species with the potential for sustainable and profitable extraction in a managed system.

Since the economic importance of NTFPs are often reflected in the social and cultural values placed on the products, in this study we carried out a socio-economic survey of NTFPs commonly utilized and found within the tropical lowland rainforest of Omo Forest Reserve, southwestern Nigeria. The rainforest of Omo has been identified as of high priority for conservation attention on a continental scale[13]. In addition to being a reservoir of an enormous quantity of plant and animal species, the forest reserve also constitute an integral part of the rural economies within which it subsists. Given that the importance of NTFPs is location-specific and dynamic, and because local use of non-timber forest resource varies greatly, there is the need to conduct a survey that will provide a checklist of non-timber resources in the study area so that forest management plans consider all relevant information. We also conducted a prioritization of the NTFPs following the method of Adeola *et al.,*[14] and the Use-Value index proposed by Phillips and Gentry[15]. Then we examined the relationship between the two prioritization procedures. This is with a view to determining the reliability of the different indices as substitutes to be used for the same end.

2. Materials and Methods

2.1. The Study Area

Omo Forest Reserve (OFR) is located between Latitudes 6^{o} 35' - 7^{o} 05'N and Longitudes 4^{o} 19' - 4^{o} 40'E in the Ijebu East and North Local Government Areas of Ogun State, southwestern Nigeria (Figure 1). The Reserve covers an area of about 130,500 hectares forming common boundaries with Osun, Ago-Owu and Shasha Forest Reserves in Osun State and Oluwa Forest Reserve in Ondo State. It also shares some common natural endowments with these forest reserves. The Nigerian Government legally gazetted it a forest through Order No. 10 Gazette No. 40 of 7th May 1925 which was amended in 1952[16]. The forest was originally ceded to Government for reservation on the 8th of October, 1918 via an agreement made between the District Officer, Ijebu Ode on behalf of the British Colonial government and the Awujale of Ijebu Ode on behalf of the Ijebu Native Administration. The government in 1946 established a 460 ha Strict Nature Reserve (SNR) within Omo Forest Reserve. This was upgraded to a Biosphere Reserve (BR) in 1977 by UNESCO[17;18].

The rainy season in OFR usually commences in March. The mean annual rainfall in the area ranges from about 1600 to 2000 mm with two annual peaks in June and September. The driest months are November and February[19]. Temperature ranges from 32.15^{0}C to 21.40^{0}C and a minimum relative humidity of 76.34 %[20]. The vegetation of the Reserve is a mixed moist semi-deciduous rainforest. Earlier works in Omo reported by Okali and Ola-Adams[17] distinguished a dry forest in the northern part and a humid forest in the southern part. The plant families with the most abundant individuals include Araceae, Compositae, Ebenaceae, Lilliaceae, Papilionoideae, Poaceae, Rubiaceae and Violaceae. The most common tree species are *Diospyros spp., Drypetes spp., Strombosia pustulata, Rinorea dentata and Voacanga africana*[21]. Most of the forests are disturbed with a substantial parts converted to monoculture plantations of *Gmelina arborea* in a programme assisted by loans from the World Bank and the African Development Bank to provide material for a pulp mill at Iwopin.

For effective management, the reserve was subdivided into areas or sectors called J1, J3, J4 and J6. These subdivisions were apportioned to enclave dwellers in isolated villages or camps. In addition to these settlements (which have continued to grow), large numbers of migrant farmers have moved into the reserve, some of them encouraged as taungya farmers to help create the Gmelina plantations. Within the various sectors, there are several settlements (both legal and illegal enclaves). Estimated total population in the area is between 20,000 and 25,000. Farming, fishing, hunting and NTFPs gathering are the predominant occupations for the majority of the enclaves' population.

2.2. Data Collection and Analysis

Socio-economic survey of NTFPs was carried out in the J4 sector of the reserve. Using a simple random sampling technique, four enclaves were selected for household survey. Data were obtained on the ethnobotanical uses of NTFP species through semi-structured interview. A total of 81 households were sampled. To complement information from the household survey, focus group discussion (FGD) was also conducted in each of the sampled community. This provided forum for weighing the relative importance of identified NTFPs and opportunity for more reliable data to be generated.

The ethnobotanical data generated were subjected to descriptive statistics using frequency distribution, tables, and percentages. For the ranking and prioritization exercise, we followed the method of Adeola *et al.,*[14] and the Use-Value index proposed by Phillips and Gentry[15]. Using the technique of Adeola *et al.,* each respondent was to list ten most important NTFPs derived from the forest in their order of importance. The list of NTFPs was then scored in ascending order from 1 – 10. The first most important product was

scored 1 while the least was scored 10. The scores for all the respondents were pooled for all the identified NTFPs and the mean for each species calculated. Products with the least mean score was ranked highest and the trend continued in that order. To establish the final position of an NTFP species in the ranking exercise, the following parameters were calculated; i. number of times each NTFP was mentioned (a), ii. Mentioned Value (b), iii. Average Ranking (for a particular NTFP) by respondents (c), iv. Rank Value (d) and; v. Final Assigned Value (e). The number of times a particular NTFP was mentioned (a) was computed to obtain its Mentioned Value (b). Average Ranking (c) of each NTFP was calculated as a function of the sum of its assigned ranking by each respondents divided by the number of respondents. The Rank Value (d) was obtained by the tabulation and ordering of the position of the individual NTFP. Assigned Value (e) was determined by adding up Mentioned Value and the Rank Value and thereafter dividing the result by 2 i.e. e = b+d÷2.

The technique of Use-Value is based on the number of uses and the number of people that cite a given plant, indicating the species that are considered most important by a given population. We used the formula, $UV = \sum U_i/n$[22] to calculate the Use-value. Where: U_i = the number of uses mentioned by each informant for a given species, n = the total number of informants. For instance, if a species has 6 uses as mentioned by respondent A and the same species has 8 uses as mentioned by respondent B, then the Use-Value (UV) of that species would be: number of uses for the species divided by total number of respondents/informants citing the species (6+8/2). In this case, we have the UV as 7. Thus, the Use-Value of a given plant is determined by the number of uses locally attributed to it in relation to the number of informants.

We examined the correspondence between the above-stated techniques. To test for relationship between the values obtained for each of the two indices, the Spearman correlation coefficient was employed using the Statistical Package for Social Sciences (SPSS v. 15.0) software.

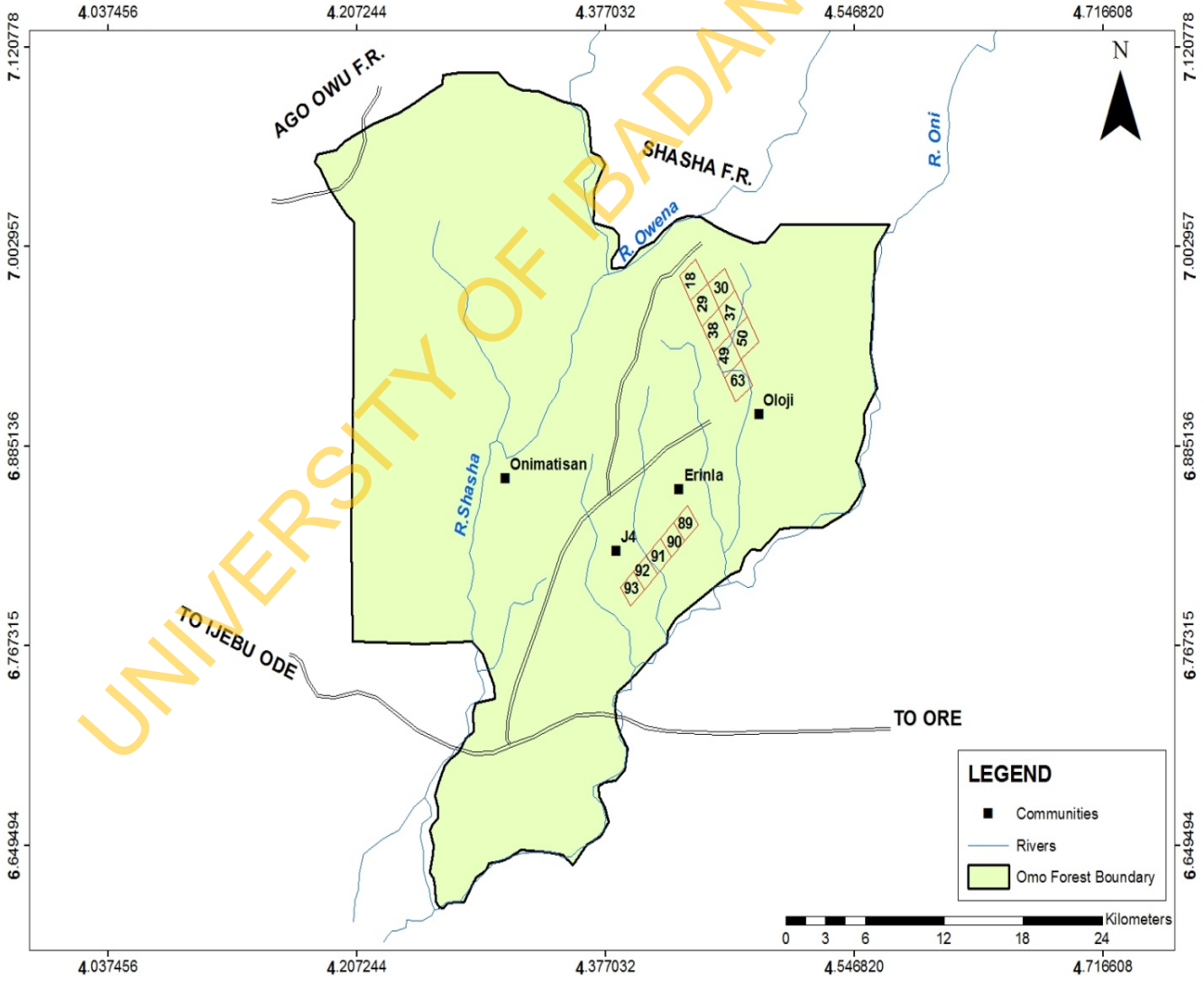

Figure 1. Map of Omo Forest Reserve Showing Sampled Communities

Table 1. Checklist of NTFPs in J4 Sector of Omo Forest Reserve

S/N	Family	Species	Local Name	Habit	Use(s)	Part(s)used
1	Alliaceae	Allium sativum, L.	Ayuu (Garlic)	Creeper	Medicine	Fruit
2	Anacardiaceae	Spondias mombin L.	Iyeye	Tree	Medicine, Snacks	Fruit, Leaf
3	Annonacae	Monodora myristica (Gaertn) Dunal.	Ariwo	Tree	Medicine	Seed, Bark
4		Annickia (syn. Enantia) chlorantha (Oliv.) Setten & Maas	Awopa (Yaani)	Tree	Medicine	Bark
5	Apocynaceae	Rauvolfia vomitoria Afzel.	Asofeyeje	Tree	Medicine	Leaf
6		Alstonia boonei De Wild.	Awun	Tree	Medicine	Bark
7		Hunteria umbellata (K. Schum)	Eerin	Tree	Medicine	Fruit
8		Picralima nitida (Stapf) Th. & H. Dur	Erin	Tree	Medicine	Seed, Bark
9	Asclepiadaceae	Mondia whitei (Hook.f.) Skeels	Isigun	Herb	Soup	Root
10		Gongronema latifolium Benth.	Iteji	Shrub or Tree	Soup	Leaf
11		Parquetina nigrescens (Afzel.) Bullock	Ogbo	Twine	Medicine	Leaf
12	Asteraceae	Crassocephalum crepidioides (Benth.) S. Moore	Ebolo	Herb	Soup	Leaf
13		Ageratum conyzoides, L.	Imi esu	Herb	Medicine	Leaf
14		Erigeron floribundus (Kunth) Sch.Bip.	Olowojeja	Herb	Medicine	Leaf
15	Bignoniaceae	Newbouldia laevis (P. Beauv.) Seem. ex Bureau	Akoko	Tree or Shrub	Medicine, Traditional rite	Leaf
16		Kigelia africana (Lam.) Benth.	Pandoro	Tree	Medicine	Fruit
17	Boraginaceae	Cordia millenii, Baker	Omo	Tree	Medicine	Bark
18	Caesalpiniaceae	Gossweilerodendron balsamiferum (Verm.) Harms	Agba	Tree	Medicine	Bark
19		Brachystegia eurycoma Harms, B.	Akporachi (EKU)	Tree	Soup	Seed
20		Afzelia Africana Sm.	Apa	Tree	Soup, Fodder	Seed, Leaf
21		Dialium guineense Willd.	Omoyin	Tree	Sweets	Fruit
22	Capparaceae	Buchholzia coriacea Engl.	Kokoroi-jemu/Obiikoro	Tree	Medicine	Seed
23	Celastraceae	Hippocratea indica Willd.	Mawole	Climbing shrub	Medicine	Root
24	Chrysobalanaceae	Parinari excelsa Sabine	Abere	Tree	Medicine, Traditional rites	Fruit, Bark
25	Clusiaceae	Garcinia kola, Heckel.	Orogbo	Tree	Snacks	Seed
26	Combretaceae	Terminalia ivorensis A. Chev.	Afara dudu	Tree	Medicine	Bark
27	Connaraceae	Cnestis ferruginea, DC	Gboyin-gboyin	Tree	Medicine	Leaf
28	Cucurbitaceae	Momordica foetida Schumach.	Ejinrin	Herb	Medicine	Leaf
29		Momordica angusticephalas, Harms	Kainkan	Climber	Washing	Fruit
30	Dichapetalaceae	Dichapetalum pallidum	Marigbo	Tree	Soup	Leaf
31	Euphorbiaceae	Euphorbia hirta L	Tomide	Herb	Fodder	Leaf
32		Tetracarpidium conophorum (Mull.Arg.) Hutch.& Dalziel	Asala	Climbing shrub or Liana	Snacks	Fruit
33	Fabaceae	Erythrina senegalensis D.C	Ilaka ile	Tree	Soup	Leaf
34		Abrus precatorius, L.	Ojuologbo	Tree	Medicine	Seed
35	Irvingiaceae	Irvingia gabonensis (Aubry-Lecomte ex O'Rorke) Baill	Aapon (Ogbono)	Tree	Soup	Seed
36		Irvingia wombulu	Ooro	Tree	Snacks	Fruit
37	Labiatae	Ocimum basilicum L.	Igi ota	Shrub	Medicine, Chew-stick	Stem, Branch
38	Lamiaceae	Culcasia saxatilis, A.Chev.	Agunmona	Herb	Medicine	Fruit
39	Lauraceae	Beilschimiedia mannii, (Meisn.) Benth. & Hook. f	Gbokoniga	Tree	Soup	Leaf

40	Malvaceae	Ceiba pentandra, (L.) Gaertn.	Eegun	Tree	Medicine, Soup	Leaf
41		Sida veronicifolia, Lam.	Esi-ile	Creeper	Sweet	Fruit
42	Malvaceae-Sterculoidae	Cola acuminata Schott & Endl.	Obi Abalaye	Tree	Traditional rites	Fruit
43	Marantaceae	Thaumatococcus daniellii (Benn.) Benth.	Ewe eeran	Herb	Packaging leaves	Leaf
44	Meliaceae	Trichilia rubescens, Oliv	Kurere	Tree	Medicine	Stem, Branch
45		Khaya ivorensis A. Chev.	Oganwo	Tree	Medicine	Bark
46	Menisper-maceae	Cissampelos owariensis, P. Beau	Jenjoko	Climber	Medicine, Soup	Leaf, Bark
47	Mimosaceae	Piptadeniastrum africanum, (Hook.f.) Brenan	Agboin	Tree	Medicine	Root
48		Tetrapleura tetraptera (Schumach. & Thonn.) Taub.	Aidan	Tree	Medicine	Fruit
49	Moraceae	Treculia africana Decne.	Afon	Tree	Medicine, Food, Snacks	Fruit, Seed
50		Musanga cecropioides R.Br.	Aga	Tree	Medicine	Stem, Branch
51		Artocarpus altilis (Parkinson) Fosberg	Berefuutu	Tree	Food	Fruit
52		Ficus exasperata Vahl	Ipin	Tree	Medicine	Leaf
53	Nyctaginaceae	Boerhavia diffusa, L.	Etiponnla	Herb	Soup	Leaf
54	Ochnaceae	Lophira alata Banks ex Gaertn.	Pahan	Tree	Medicine	Bark
55	Palmae	Raphia hookeri G.Mann & H.Wendl.	Ako (Raffia palm)	Palm	Beverage, Con-struction	Stem, Leaf
56	Phytolaccacea	Pativera alliaceae, L.	Awogba	Herb	Medicine	Leaf
57	Piperaceae	Piper guineense Schumach. & Thonn.	Iyere	Liana	Spices	Seed, Leaf
58	Poaceae	Chloris pilosa Schumach.	Eeran	Grass	Medicine	Leaf
59	Poaceae	Bambusa vulgaris Schrad.	Oparun	Grass	Construction	Stem, Leaf
60	Polygalaceae	Carpolobia lutea G. Don	Osunsun/Sanda	Shrub	Animal care	Stem
61	Rubiaceae	Mitragyna ciliata, Aubrév. & Pellegr	Abura	Tree	Medicine, Packaging	Leaf, Bark
62		Nauclea diderrichii (De Wild. & T.Durand) Merrill	Opepe	Shrub	Medicine	Leaf
63		Gardenia erubescens, Stapf & Hutch.	Orunwo	Shrub or Tree	Medicine	Leaf
64		Morinda lucida Benth.	Oruwo	Tree	Medicine, Con-struction	Leaf, Bark
65		Massularia acuminata (G Don) Bullock	Pako	Shrub or Tree	Chew-stick	Stem, Branch
66	Rusca-ceae-Agavaceae	Sansevieria trifasciata, Prain.	Oja ikoko	Creeper	Medicine	Leaf
67	Rutaceae	Zanthoxylum zanthoxyloides, (Lam.) Zepern. & Timler	Igi ata	Shrub	Spices	Leaf, Root, Bark
68	Sapindaceae	Blighia sapida, K.D.Koenig	Isin	Tree	Medicine, Snacks	Fruit, Leaf, Bark
69	Sapotaceae	Chrysophylum albidum, G. Don	Agbalumo	Tree	Snacks	Fruit
70		Synsepalum dulcificum (Schumach. & Thonn.) Daniell	Agbayun	Shrub	Snacks	Fruit
71	Solanaceae	Capsicum spp.	Ata ijosi	Shrub	Spices	Fruit
72	Varies	Edible mushrooms	Ataase (Olu)	Fungi	Food supple-ment	Whole fungus
73	Zingiberaceae	Aframomum sceptrum (Oliv. & Hanb.) K Schum.	Ata oguro	Herb	Spices	Fruit, Seed
74		Aframomum melegueta K. Schum.	Ataare	Herb	Medicine	Fruit, Seed
75		Zingiber officinale, Roscoe	Ata-ile (Ginger)	Tuber	Spices	Root

Table 2. Ranking and prioritization of NTFPs in J4 Omo Forest Reserve

S/N	Species	Local Name	Number of times Mentioned	Mentioned Value	Average Rank	Rank Value	Assigned Value (Adeola et al., 1994)	Use-Value (Phillip and Gentry, 1993)
1	Irvingia gabonensis	Aapon (Ogbono)	18	8	2.3	9	8.5	0.03
2	Tetracarpidium conophorum	Asala	39	4	3.8	13	8.5	0.06
3	Massularia acuminata	Pako	33	6	3.7	12	9	0.03
4	Anninckia chloranta	Awopa/Yaani	51	1	4.2	18	9.5	0.06
5	Piper guineense	Iyere	42	3	4.3	20	11.5	0.05
6	Bucholzia coriaceae	Kokoroijemu/Obiikoro (wonderful kola)	48	2	4.5	22	12	0.02
7	Edible mushrooms	Ataase (Olu)	18	8	4.8	25	13	0.02
8	Irvingia wombulu.	Ooro	15	15	3.3	11	13	0.07
9	Hippocrata indica.	Mawole	6	31	1.5	2	16.5	0.17
10	Aframomum melegueta	Ataare	6	31	2	3	17	0.17
11	Treculia africana	Afon	6	31	2	3	17	0.50
12	Zanthoxylum zanthoxyloides	Igi ata	6	31	2	3	17	0.33
13	Tetrapleura tetraptera	Aidan	9	20	4	14	17	0.11
14	Artocarpus artilis	Berefuutu	9	20	4	14	17	0.11
15	Momordica foetida	Ejinrin	12	17	4.5	22	19.5	0.08
16	Chrysophylum albidum	Agbalumo	9	20	4.3	20	20	0.11
17	Garcinia kola	Orogbo	36	5	5.3	35	20	0.03
18	Thaumatoccocus daniellii	Ewe eeran	6	31	3	10	20.5	0.17
19	Synsephalum dulcificum	Agbayun	12	17	4.8	25	21.0	0.08
20	Beilschimiedia mannii	Gbokoniga	18	8	5.5	36	22	0.06
21	Parinari excelsa.	Abere	9	20	5	26	23	0.17
22	Chloris pilosa	Eeran	18	8	5.8	38	23	0.11
23	Cola acuminate	Obi Abalaye	18	8	5.8	38	23	0.06
24	Monodora myristica	Ariwo	6	31	4.1	16	23.5	0.17
25	Bambusa vulgaris	Oparun	15	15	5.2	34	24.5	0.07
26	Allium sativum	Ayuu (Garlic)	3	50	1	1	25.5	0.33
27	Mitragyna ciliata	Abura	24	7	6.9	45	26	0.08
28	Crassocephalum crepidioides	Ebolo	3	50	2	3	26.5	0.33
29	Gardenia erubescens	Orunwo	3	50	2	3	26.5	0.33
30	Blighia sapida	Isin	3	50	2	3	26.5	1.00
31	Brachystegia spp.	Akporachi (EKU)	6	31	4.5	22	26.5	0.17
32	Aframomum sceptrum	Ata oguro	6	31	5	26	28.5	0.17
33	Momordica angusticephalas	Kainkan	9	20	5.7	37	28.5	0.11
34	Erythrina senegalensis	Ilaka ile	9	20	6	40	30	0.11
35	Alstonia boonei	Awun	18	8	7.3	54	31	0.06
36	Cissampelos owariensis	Jenjoko	3	50	4.1	16	33	0.33
37	Raffia hookeri	Ako (Raffia palm)	9	20	7	46	33	0.22
38	Trichilia rubescens	Kurere	6	31	5.5	36	33.5	0.17
39	Nauclea diderichii	Opepe	3	50	4.2	18	34	0.33
40	Piptedeniastrum africanum	Agboin	18	8	8	60	34	0.06
41	Spondis mombin	Iyeye	18	8	8	60	34	0.06
42	Ceiba pentadra	Eegun	12	17	7.5	56	36.5	0.08
43	Khaya ivorensis	Oganwo	9	20	7.3	54	37	0.11
44	Picralima nitida	Erin	3	50	5	26	38	0.33
45	Capsicum spp	Ata ijosi	3	50	5	26	38	0.33
46	Sida veronicifolia	Esi-ile	3	50	5	26	38	0.33
47	Ocimum basilicum	Igi ota	3	50	5	26	38	0.67
48	Carpolobia lutea.	Osunsun/Sanda	3	50	5	26	38	0.33
49	Afzelia Africana	Apa	6	31	7	46	38.5	0.33
50	Dialium guineense	Omoyin	6	31	7	46	38.5	0.17
51	Morinda lucida	Oruwo	9	20	7.7	59	39.5	0.11
52	Parquetina nigrescen	Ogbo	9	20	8.3	66	43	0.11
53	Abrus precatorius	Ojuologbo	6	31	7.5	56	43.5	0.17
54	Musanga cecropioides	Aga	3	50	6	40	45	0.33
55	Zingiber officinale	Ata-ile (Ginger)	3	50	6	40	45	0.33
56	Gossweilerodendron balsamiferum	Agba	3	50	6	40	45	0.33

57	Cnetis ferruginea	Gboyin-gboyin	3	50	6	40	45	0.33
58	Newbouldia laevis	Akoko	6	31	8	60	45.5	0.17
59	Culcasia saxatilis	Agunmona	6	31	8	60	45.5	0.17
60	Mondia whitei	Isigun	6	31	8	60	45.5	0.17
61	Gongronema latifolium	Iteji	9	20	9.3	72	46	0.22
62	Terminalia ivorensis	Afara dudu	3	50	7	46	48	0.33
63	Hunteria umbellata	Eerin	3	50	7	46	48	0.33
64	Cordia millenii	Omo	3	50	7	46	48	0.33
65	Ficus exasperata	Ipin	3	50	7	46	48	0.33
66	Pativera alliaceae	Awogba	3	50	7	46	48	0.33
67	Ageratum conyzoides	Imi esu	6	31	8.5	67	49	0.17
68	Lophira alata	Pahan	6	31	8.5	67	49	0.17
69	Dichapetalum pallidum	Marigbo	6	31	10	73	52	0.17
70	Boerhavia diffusa	Etiponnla	3	50	8	60	55	0.33
71	Sansevieria trifasciata	Oja ikoko	3	50	8	60	55	0.33
72	Erigeron floribundus	Olowojeja	3	50	8	60	55	0.33
73	Kigelia africana	Pandoro	3	50	9	69	69.5	0.33
74	Rauvolfia vomitoria	Asofeyeje	3	50	10	73	69.5	0.33
75	Euphorbia hirta.	Tomide	3	50	10	73	69.5	0.33

3. Results

3.1. Checklist of NTFPs

Respondents mentioned a total of seventy five non-timber forest product species distributed in forty three families in the study area (Table 1). The dominants families were Rubiaceae, Apocynaceae, Asclepiadaceae, Asteraceae, Caesalpiniaceae and Zingiberaceae. Products were extracted from trees, shrubs, herbs, fungi and lianas. Local end-uses include food and food supplements, snacks/sweets, soup/soup ingredients/spices, beverages (consumptive plants), packaging leaves, chew-sticks, washing items, construction materials, medicine, traditional rites, and animal feed and care. The most frequently mentioned uses of plants were medicine (n=42; 50.00%), consumptive (n=30; 35.71%), house construction (n=3; 3.57%), traditional rites (n=3; 3.57%) and animal feed and care (n=3; 3.57%). Other uses of listed NTFPs include use as chew-stick (n=2; 2.38%), packaging leaves (n=2; 2.38%), and item for washing and bathing (n=1; 1.19%) (Figure 2).

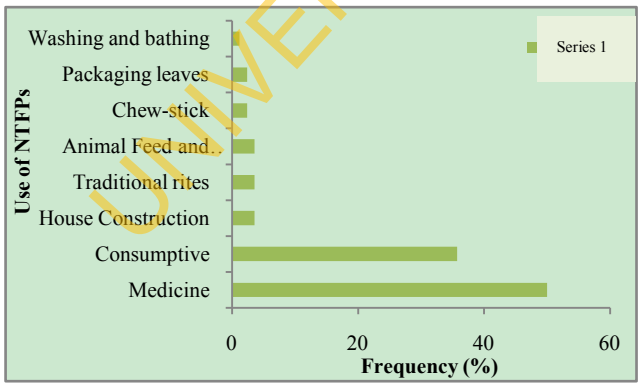

Figure 2. Uses of NTFPs and Frequency in Sampled Communities

3.2. Ranking and Prioritization of NTFPs

Using the Assigned-Value method developed by Adeola *et al.,*[14] and described in the data analysis section, Apon (*Irvingia gabonensis*), Asala (*Tetracarpidium conophorum*), Pako (*Masssularia acuminata*), Awopa/Yaani (*Annickia chloranta*) and Iyere (*Piper guineense*) ranked as the five top priority species (Table 2). Applying the Use-Value index; Isin (*Blighia sapida*), Igi ota (*Ocimum basilicum*), Afon (*Treculia africana*), Igi ata (*Zanthoxylum zanthoxyloides*) and Ayuu (*Allium sativum*) were the five top priority species. Conversely, on the Use-Value index Apon ranked 71st, Asala 63rd, Pako 72nd, Awopa/Yaani 64th and Iyere 70th. On the other hand, Isin (*Blighia sapida*) ranked 30th, Igi ota (*Ocimum basilicum*) 47th, Afon (*Treculia africana*) 11th, Igi ata (*Zanthoxylum zanthoxyloides*) 12th and Ayuu (*Allium sativum*) 26th when applying the Assigned-Value method. A general comparison of the two indices shows a fairly positive correlation ($\rho = 0.59$; $P < 0.01$) between them. When the correlations were further analyzed considering the values obtained for each technique versus the number of times a given species was mentioned, there was a strong negative correlation for the two, being greater for the Use-Value technique ($\rho = -0.95$; $P < 0.01$) than Assigned-Value method ($\rho = -0.65$; $P < 0.01$). In other words, there is a general inverse relationship between the number of times a given species was mentioned and its value/ranking in both techniques.

4. Discussion

The results of the two quantitative techniques have shown a fairly positive correlation ($\rho = 0.59$; $P < 0.01$) between the two, suggesting a cautious interchangeable use of the techniques for the same end. According to Philips *et al.,*[23], the Use-Value reflects the importance of a species to the respondent objectively. However, Use-Value places more emphasis on species that have many uses, even if these uses are only known to a few people[22; 24]. The number of uses is therefore the principal factor in this technique. Nonetheless, the technique may indicate how knowledge about a certain plant is distributed in a community[24]. Our findings suggest that the Use-Value, more often than not, gives a higher ranking to species that are more widely used for sub-

sistence or consumptive value. This is contrary to the submission of Philips *et al.,*[23] that Use-Value could be used simultaneously for evaluating species with direct subsistence and commercial value. On the other hand, however, the Assigned-Value gives priority to species that have more commercial value being the major consideration of its inventors. The importance of a plant may therefore, not derives from the different ways it is used. Conversely, the local importance of NTFPs would need to take into account various combinations of objectives such as the species role in subsistence, commercial and socio-cultural activities. While Albuquerque *et al*.,[22] have rejected the association of the Use-Value with questions of conservation (i.e. the most important species will suffer the greatest harvesting pressure), the Assigned-Value may support the view that species with high commercial value often face increased exploitation. From the foregoing, it seems both the Use-Value and the Assigned-Value does not capture the same aspect of traditional ecological knowledge of a species. Thus, in evaluating forest types for relative importance and use, the end objectives of such evaluation must be critically examined in the light of the interest of the different respondents' group.

5. Conclusions

The use of quantitative techniques has received increasing attention in ethnobotanical studies. Identifying NTFP species with the potential for sustainable and profitable extraction in a managed system may however, not lend easily to quantitative approaches found in the ethnobotanical literatures. Quantitative techniques used in Ethnobotany often reflect cultural value systems than conservation concern or priority of species for socio-economic development. Therefore, determining NTFPs with top priority concern will require the development of criteria for species selection such as economic importance, level of use, species habit and population status. Unlike the setting of approach by experts in ethnobotanical studies, thus, determining the local importance of NTFPs must necessarily be based on participatory resource appraisal.

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