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Prospects for Sustainable Utiltization of Flora and Fauna Resources of Amahor Forest Reserve, Edo State, Nigeria.

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Abstract: The flora and fauna resources of Amahor forest reserve, Edo State, Nigeria were identified and enumerated and how these resources could be managed, conserved and utilized by a community-based forest management system was examined. The woody plant species in the reserve (≥ 1 meter) high were identified, enumerated and classified into economic, ethno-botanical and food tree species. Also, wildlife species in the reserve were identified and enumerated using standardized procedures. Plants and wildlife diversity, evenness and richness were calculated. Baseline socio-economic study was conducted in two selected communities (Amahor and Ugun) adjoining the forest reserve. The results revealed that 24 tree families were recorded in the reserve including *Mimosoideae, Sterculiaceae, Ceasalpinioideae, Euphorbiaceae, Ebanaceae* and *Olaceae* amongst others representing 47 woody plant species. Plant diversity, evenness and richness were 3.684, 0.832 and 1.021 respectively. Also, 13 families of wildlife were recorded including *Felidae, Canidae*, *Bovidae, Rodentia* and Cercipithcidae amongst others representing 33 wildlife species. Socio-economic structure of Amahor and Ugun showed that 75% and 70% of respondents were farmers respectively, while only 3% and 5% had their annual income more than ₦20,000 respectively. About 88% and 85% of the respondents in Amahor and Ugun respectively indicated desire to accept community based forest management policy, while only 20% in both communities were aware of the community based forest management system. Measures to improve economic activities in the adjoining communities are discussed.

Key words: forest, sustainable utilization, diversity, economy, community, enterprises.

INTRODUCTION

Nigeria has a total forest area of between 9.7 and 13.5 million hectares with a closed natural forest of 4.4 million hectares and an estimated permanent forest estate of 4.11 million hectares, comprising of 2.72 million hectares of natural production forest and 375,000 hectares of planted forest[6]. The permanent forest estate covers less than 5% of Nigeria's total land area[6]. The three major forest types in Nigeria include lowland, freshwater and mangrove. Among these are tree, woodland, shrubs and riparian forests. Furthermore, out of the 2.72 million hectares of natural production forest in Nigeria about 1.06 million hectares are allocated to concession and only 0.65 million hectares have management plans[6]. Edo State forest area decreased from 613,900 hectares in 1978 to 439,000 hectares in 1995 [4].

The forest estate of Edo State is comprised of 48 forest reserves covering an area of 572,373 hectares, which is about 30% of the State's total land area[2]. About 133,124 hectares of the forest estate has been ceded through dereservation over the years mainly for agricultural and infrastructural purposes. This has brought the current area of the forest estate to about 439,139 hectares or about 23% of the total land area of the State.

Furthermore, Nigeria has an estimated 147 mammalian species comprising of 42 families and 133 genera, over 20,000 insect species, 839 bird species, 109 snake species and over 20 species of primates[5]. However, the potentials of these flora and fauna resources are limited due to threats from various factors including over exploitation, deforestation, poor implementation of forest and wildlife laws, indiscriminate burning of vegetation, habitat loss, poaching, and desert encroachment amongst others. There is therefore, the need to encourage community based conservation and sustainable utilization of forest and wildlife resources so that future generations of Nigerians will continue to benefit from the natural endowment.

Community based forest management (CBFM) has generated several forest enterprises which have invested more in the local economy with returns of between 10% and 15% from timber and non timber forest

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products enterprises[1]. Community based forest management has been reported to create new sources of employment, community skills, increased consumption of traditional foods, medicinal products and crafts[1].

The objectives of the study are to identify, enumerate and classify the status of both flora and fauna species of the forest reserve and how these renewable natural resources could be sustained, conserved and utilized by the communities adjoining the reserve and other stakeholders.

MATERIALS AND METHODS

Study site: Amahor forest reserve lies between latitude 6^0 45' and 6^0 48' E and longitude 6^0 12' and 6^0 14' N; with an area of 15.31 km^2. The reserve is a lowland rainforest located in Amahor community in Igueben local government area of Edo State, Nigeria. The reserve is drained by Eban, Orhionmwon Rivers and Agbokoi stream.

Forest Inventory: Woody plant species (≥ 1 meter) high were identified and enumerated along 2 line transects of 1,000 meters with effective study area of 0.15 km^2 each. Woody plants were identified using standard keys[8,9] and were classified as follows: economic plant species, ethno-botanical plant species and food tree species. Botanical inventory was used to estimate indices of biological diversity, evenness, richness and frequency, using Shannon-Weiner Functions (H^1) according to[10].

Wildlife inventory: Wild animal species were identified and enumerated along 2 line transects of 1,000 meters with effective study area of 0.15 km^2 each. Both direct and indirect techniques of wild animals' census were used. Wild animals were identified as described and classified by [7]. The following animal indices were used for indirect census; footprints, calls and nests as described by [11]. The transects were traversed with an average walking speed of 1.0 km/hr. Periods of walking were interspersed with period of silence, watch and wait in order to increase the possibility of determining animals that might hide or flee upon the approach or movement of the observers. Animal diversity, evenness, richness and frequency were calculated using Shannon-Weiner functions (H^1) according to[10].

Socio-economic survey: The baseline socio-economic study included identification of stakeholders, community infrastructure survey and consultative fora using appropriate questionnaires. The study stratified forest communities and administered one hundred questionnaires to inhabitants of Amahor comprising six quarters (Eguare, Ukpeko, Idumodin, Obodeko, Idunmogo, and Waterside) and Ugun; 93% and 91% of the questionnaires were retrieved from Amahor and Ugun communities respectively. The study was conducted between the months of March 2007 and March 2008.

RESULTS AND DISCUSSION

Diversity of Woody Species: Twenty four (24) tree families were recorded in the forest reserve including *Mimosoideae, Sterculiaceae, Ceasalpinioideae, Euphorbiaceae, Ebanaceae*, and *Olaceae* amongst others, which were represented by 22, 19, 16, 11, 10, and 9 woody species respectively. These families represent 48 woody plant species including *Nesogordonia papaverifera, Strombosia pustulata*, *Berlinia confusa, Piptadeniastrum africanum, Terminalia superba* and *Diospyros dendo* amongst others, with frequency of occurrence of 14, 9, 9, 8, 6 and 5 respectively (Table, 1).

The logs including *Alstonia boonei, Ceiba pentandra, Distemonanthus benthmianus, Terminalia ivorensis, Terminalia superba, Petersianthus macrocarpum* and *Pentaclehra macrophylla* among others were of mean diameter of 50 cm and 80 cm. Nineteen (19) useful plant species were recorded in the reserve; the main types of uses were classified into timber, medicine/ethno-botanical and food trees. Fourteen (14) woody species were classified as timber and medicinal uses, while 6 woody species were classified as medicinal and food uses and 2 woody species were classified as medicinal uses only. These classifications included *Amphimas pterocarpoides, Alstonia boonei, Distemonanthus benthmianus, Musanga cecropoides, Nauclea diderrichii* and *Morinda lucida* amongst others (Table, 1). Indices of plant species diversity, evenness and richness were 3.684, 0.832 and 1.021 respectively. These values indicated high plant species diversity of 149 individuals, representing 48 species and 24 families. This could be attributed to reduced anthropogenic activities within the forest reserve.

Wildlife Abundance and Diversity: A total of 13 families including *Bovidae, Suidae, Felidae, Canidae, Rodentia* and *Cercipithcidae* amongst others were recorded in the reserve. These represent 33 wildlife species and 63 individuals including *Trangulaphus spekii, Potamochoerus porcus, Heterohydrax brucei, Felis lybica, Otocycon megalitis, Pan troglodytes, Crocodilus niloticus,* and *Viverra civetta* amongst others (Table, 2). Wild animal species diversity, evenness and richness indices were 3.127, 0.892 and

Table 1: Check list of woody plant species of Amahor forest reserve

Family	Plant species	Uses	Frequency	Total /family
Annonaceae	*Cleistopholis patens*	M	2	2
Apocynaceae	*Alstonia boonei*	T,M	1	
	Voacanga africana		3	4
Anacardiaceae	*Lannea welwitschii*		2	2
Burseraceae	*Canarium schweinfurthii*		1	1
Bombacaceae	*Ceiba pentandra*	T,M	1	1
Ceasalpinioideae	*Amphimas pterocarpoides*		1	
	Berlinia confuse		9	
	Anthonotha macrophylla	T,M	3	
	Afzelia spp		1	
	Brachystegia eurycoma		1	
	Distemonanthus benthmianus	T,M	1	16
Combretaceae	*Terminalia ivorensis*	T,M	4	
	Terminalia superba	T,M	6	10
Ebanaceae	*Diospyros dendo*		5	
	Diospyros crassiflora		1	
	Diospyros suaveolens		4	10
Euphorbiaceae	*Alchornea cordifolia*	M	1	
	Macaranga barteri		2	
	Ricinodendron heudelotii	M,F	8	11
Lecythidaceae	*Petersianthus macrocarpum*	T,M	2	2
Longeniaceae	*Anthocleista vogelii*		3	3
Melastomataceae	*Spatrandra blakcoides*	M	1	1
Meliaceae	*Entandrophragma angolense*		3	
	Guarea thompsonii		3	6
Mimisoideae	*Albizia lebbeck*		1	
	Albizia adianthifolia		4	
	Albizia zygia	M	2	
	Pentaclehra macrophylla	T,M	5	
	Piptadeniastrum africanum		8	22
Moraceae	*Antaris toxicaria*		3	
	Melicia axcels	T,M	2	
	Musanga cecrepioides		2	7
Myristicaceae	*Pycnanthus angolense*	T,M	4	4
Olaceae	*Strombosia pustulata*		9	9
Palmae	*Calamus spp*		4	
	Raphia hookeri		3	7
Rubiaceae	*Hollea ciliate*		4	
	Morinda lucida	T,M	1	
	Nauclea diderrichii	T,M	2	7
Rutaceae	*Xanthoxylon gilletii*	M	2	2
Sapotaceae	*Tieghemella heckelii*	T,M	1	1
Simaroubaceae	*Hannoa klaineana*		1	1
Sterculiaceae	*Sterculia oblanga*		3	
	Triplochiton scleroxylon		2	
	Nesogordonia papaverifera		14	19
Verbenaceae	*Vitex grandifolia*		1	1

T – timber, M – medicinal, F - food

Table 2: Checklist of wildlife species in Amahor forest reserve

Family	Wildife species	Frequency	Total/family
Bovidae	*Kobus defassa*	2	
	Trangulaphus spekii	1	
	Sylviarpra grimmia	3	
	Traqelaphus scriptus	1	
	Chephalophus maxwellii	2	
	Chephalophus rafilatus	1	10
Suidae	*Potamochoerus porcus*	2	
	Potamochoerus aethiopicus	1	
	Hyplochoerus mesnertzhageni	2	5
Procovidae	*Heterohydra brucei*	1	
	Dendrohydrax arbuoreus	2	
	Procavia johnstoni	1	4
Felidae	*Felis lybica*	1	
	Lycaon pictus	2	3
Canidae	*Otocycon megalotis*	1	1

Table 2: Continue

Cercopithcidae	*Cercopithecus mona*	1	
	Galago sengalensis	2	
	Galago crasicudutus	1	4
Pangidae	*Pan troglodytes*	1	1
Rodentia	*Thryonomis swinderianus*	1	
	Xerus erytropus	3	
	Myomys daltoni	3	
	Mus ministoides	4	
	Hystrerix crstata	2	
	Funiscurius anerythrus	2	
	Crictomys gabianus	6	24
Crocodylidae	*Crocodylus niloticus*	2	
	Crocodylus cataphractus	2	4
Alligatoridae	*Melanosuchus niger*	1	
	Alligator sirensis	1	
Pholidae	*Mani gigantean*	1	1
Logomorphae	*Lepus capensis*	2	2
Viverridae	*Viverra civetta*	2	2

1.246 respectively. High values of wildlife biodiversity indexes recorded may be attributed to less destructive human activities such as logging, poaching, encroachment into the conservation area, illegal grazing and bush burning which usually leads to wildlife habitat loss and decimation of wild animal population [3].

Socio-economic Structure: In Amahor and Ugun communities 75 and 70% of respondents were farmers respectively, while only 6 and 10% of respondents were hunters respectively. Also, only 3 and 1.5% of the respondents were civil servants in Amahor and Ugun respectively (Figure, 1). Figure 2 revealed the income status of Amahor and Ugun, 50 and 32% of the respondents had their annual income below N5,000 respectively. While, 15 and 32% of the respondents had their annual income between N5,000 and N9,999 respectively. Only 3 and 5% of the respondents in Amahor and Ugun had their annual income more than N20,000 respectively (Figure 2). This indicated that the rural inhabitants are low income earners and there is therefore the need to improve their income through sustainable utilization of forest products.

Forest Management System: Forest management system of Amahor forest reserve indicated that 88 and 83% of the respondents in Amahor and Ugun communities indicated to accept community based forest management policy respectively. Only 20% of the respondents in both communities were aware of community based forest management. However, 80% of the respondents in both communities were ready to adopt community based forest management system (Figures, 3 and 4).

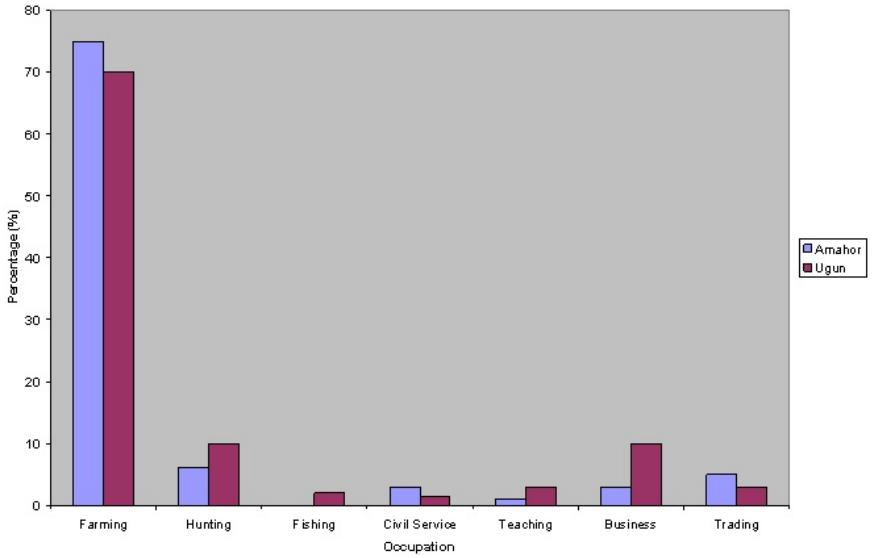

Fig. 1: Occupational structure of Amahor and Ugun communities

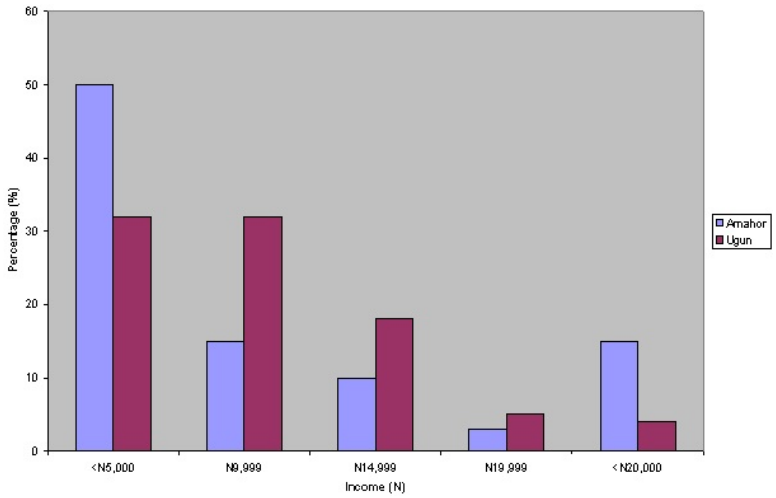

Fig. 2: Income structure of Amahor and Ugun communities

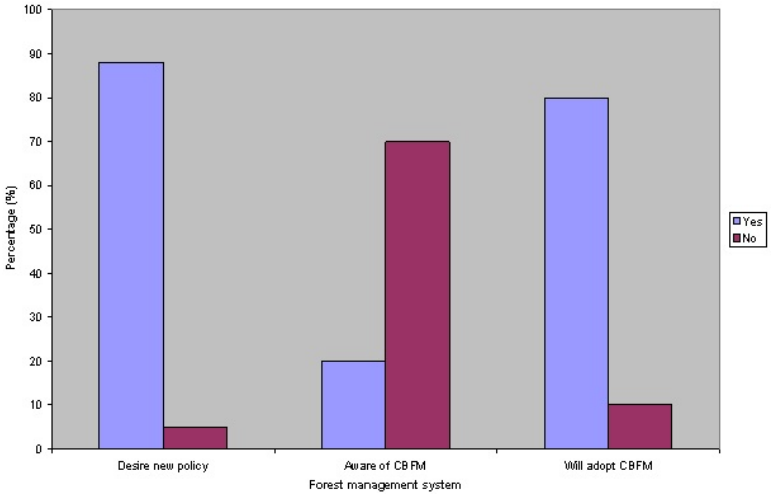

Fig. 3: Acceptance of new CBFM(Community based forest management) policy in Amahor

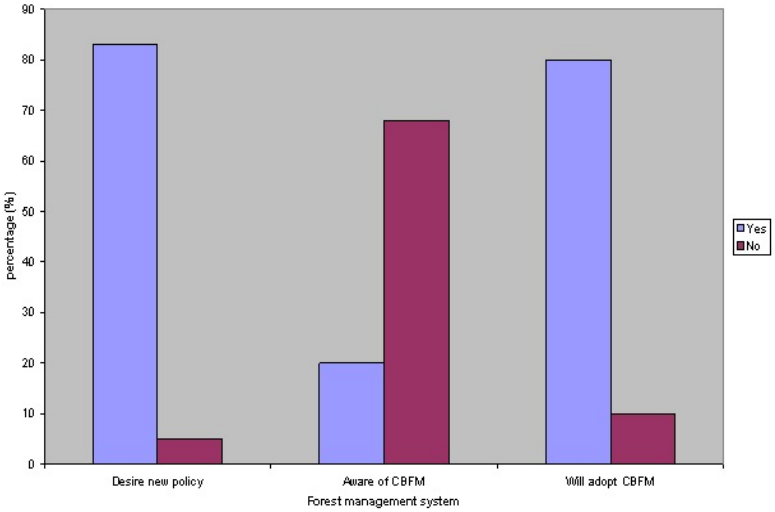

Fig. 4: Acceptance of new CBFM(Commmunity based forest management) policy in Ugun

Conclusion: It could be generally concluded that Amahor forest reserve is blessed with high abundance and diversity of woody plant and wildlife species. These renewable natural resources may be of high economic advantage to the local communities (Amahor and Ugun), if utilized at sustainable level to allow for continuous perpetuity of these resources. For instance the local communities should monitor and determine allowable cut, while participating in production and processing of non-timber forest products such as *Garcina kola, garbaya albidum, Calamus sp, Dialium guineense, Piper guineese and Aframonum meleguata* and domestication of wildlife species such as *Thryonomys swinderianus, Cricetomys gabianus, Kobus defassa*, *Chephalophus rufilatus* and *Archachatina marginata* so as to economically empower the local communities inhabitants to alleviate poverty.

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REFERENCES

1. Alberto, C., 2007. Introduction and global overview of contributions and constraints of community forest management and enterprises. ITTO 17(14): 7 – 11.
2. Azeke, I.E., 2002. Forestry contribution to Edo State economy. In: Forests, people and the environment. Ed. Labode Popoola. pp: 250.
3. Bernard, H., 2004. Effect of selected lgging on microhabitat use patterns of non-volant small mammals in Bornean tropical land mixed dipterocarp forest. Natural and Human activities, 8: 1 - 11
4. FORMECU, 1998. Forest resources study: Nigeria revised forest management plan Edo State. BEAK Consultants Ltd.
5. Happold, D.C.D., 2000. Nigeria mammals: The Nigerian Field., 65: 193 – 211.
6. IITO, 2006. Status of Tropical forest management. Tropical forest update.
7. Jean, D. and D. Pierre, 1972. A field guide to the large mammals of Africa. Collins St. James Publication London. pp: 287.
8. Keay, R.W.J., 1989. Trees of Nigeria. Oxford Science Publication New York. pp: 476.
9. Lowe, J. and M.O. Soladoye, 1996. Some changes and corrections names of Nigerian plants since publication of flora of West Africa 2nd and Nigerian trees. Nigerian Journal of Botany, 3: 1 – 24.
10. Magurran, A.E., 1988. Ecological diversity and its measurement 1st edition. Chapman and Hill Publications London.
11. Seber, G.A.F., 1994. The estimation of animal abundance and relative parameters 2nd ed. Macmillan New York.