TREE/SHRUBS SPECIES DIVERSITY OF EHOR FOREST RESERVE IN UHUNMWODE LOCAL GOVERNMENT AREA OF EDO STATE, NIGERIA

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Abstract: Tropical forests are the richest and the most diverse ecosystem on earth but are unsustainably over exploited despite legislation to control their exploitation. This study was therefore undertaken to assess the effects of such uncontrolled exploitation on the tree/shrub diversity of Ehor Forest Reserve. Five sample plots of 30 m x 30 m were laid out in each of compartments 81, 95 and 112 of 160 hectres each. Ninety-eight species of trees/shrub distributed in 87 genera and 36 families were identified. Fifteen of these families were monospecific while the others had two or more species. *Fabaceae* was the most diverse with 18 species. Ninety-one percent of all the species encountered were trees while the remaining nine percent were shrubs. Compartment 81 had the highest number of species (61) while compartment 95 had the least (54 species). Twenty-four species were common to the three compartments. *Celtis zenkeri* was the most abundant with 157 tree stands out of the 2064 stands encountered. The inverse of Simpson's diversity indices calculated for compartments 81, 95 and 112 were 25.0, 31.3 and 21.7 indicating some measure of heterogeneity within the compartments. The Sorensen's similarity indices were 45.3%, 41.4% and 43.6% for paired compartments of 81 and 95, 95 and 112 and 81 and 112 respectively. These values indicated that there is no much variability between the compartments of study. The presence of monospecific families and the low density of the species also showed that a number of these species are under threat of extinction. So exploitation should be drastically reduced to allow the Ehor Forest Reserve to regenerate itself. [Researcher 2010:2(2):37-49] (ISSN: 1553-9865).

Keywords: Diversity index, similarity index, monospecific, exploitation, compartment.

Introduction

Biological diversity has currently taken the centre stage in the field of science as a result of the rate of exploitation of our natural resources. Biodiversity is the relationship between species and their pattern of richness (Young and Swiacki, 2006). Any change in the diversity of plant population will result in changes in the diversity of all other organisms present within the ecosystem.

According to Cunningham *et al.* (2005), biodiversity can be viewed from three perspective:-

i. Genetic diversity which is a measure of the variety of different versions of the same genes within the individual species.
ii. Ecological diversity which assess the richness and complexity of a biological community including the number of niches, trophic levels and ecological processes that captures energy, sustains food

webs and recycles materials within the system and

iii. Species diversity which described the number of different kinds of organisms within individual community or ecosystem. It has two components: evenness (how evenly abundance or biomass is distributed among species). High evenness can increase invasion resistance, total and below ground productivity and can reduce local plant extinction rates (Sterling and Wilsey 2001; Wilsey and Polley 2002, 2004; Smith *et al*., 2004 in Dong *et al*., 2007).

Diversity is also a measure of heterogeneity of a site taking into consideration the number and density of individual species (Ogunleye *et al.,* 2004). The focus of this paper is on the third aspect of biodiversity on the tree population of Ehor Forest Reserve.

The tropical forests are great assets to mankind because they are the richest and most diverse terrestrial ecosystem on the earth. Though they now occupy less than ten percent of the earth's land surface, these forests contain more than two-thirds of all higher plant biomass and at least one-half of all plants, animals and microbial species in the world. Their wanton destruction in a bid to extract one forest product or the other at this time when researches are still going on to determine the uses of their numerous resources (particularly the floral components) and potentials will deny both present and future generations of these benefits (Ojo, 2004 and Cunningham *et al*. 2005). It is our aim therefore to evaluate the effects of such destruction/exploitation on the tree/shrub diversity of Ehor Forest Reserve which is one of the most commonly exploited reserve in Edo State, Nigeria.

Materials and Method

Study Location

Ehor Forest Reserve occupies an area of 7,680 hectares of land in Uhunmwode Local Government Area of Edo State, Nigeria. It is located between latitudes 6^0 $34^'$ N and 6^0 $38^'$ N and longitudes 5^0 $54^'$ E and 5^0 $58^'$ E; about fifty-six kilometres north of the state capital, Benin City. It is divided into forty-eight compartments of 160 hectares each. Farming is commonly practiced within the reserve which is situated in the lowland rainforest zone. The Orhionmwon River runs through the reserve. Though there are no settlements within the reserve, it is surrounded by nine villages viz:- Ohe, Eguaholor, Egbisi, Ugieghudu, Uhi, Iriwe, Erhue, Evbowe and Ekudo. It was originally subdivided into the west and east areas of 16/1 and 16/2 respectively but the later has been dereserved. This study was carried out in area 16/1. It had a sizeable number of timber species which made it attractive to logging companies. Apart from logging, cassava production which is the second main cause of forest destruction and soil degradation (WWFM, 1992) is the most commonly encountered crop in the reserve.

Survey Method

Three compartments of 160 hectares each making up 6.25% of the forest reserve were sampled for this study. They were 81 on the western side, 95 which is centrally located and 112 at the eastern end of the reserve (Fig. 1). This is to have an adequate representation of the whole forest reserve. Five sample plots of 30 m x 30 m were laid out in a randomized complete block design in each compartment using improvised wooden pegs according to the method of Inegbedion (2008).

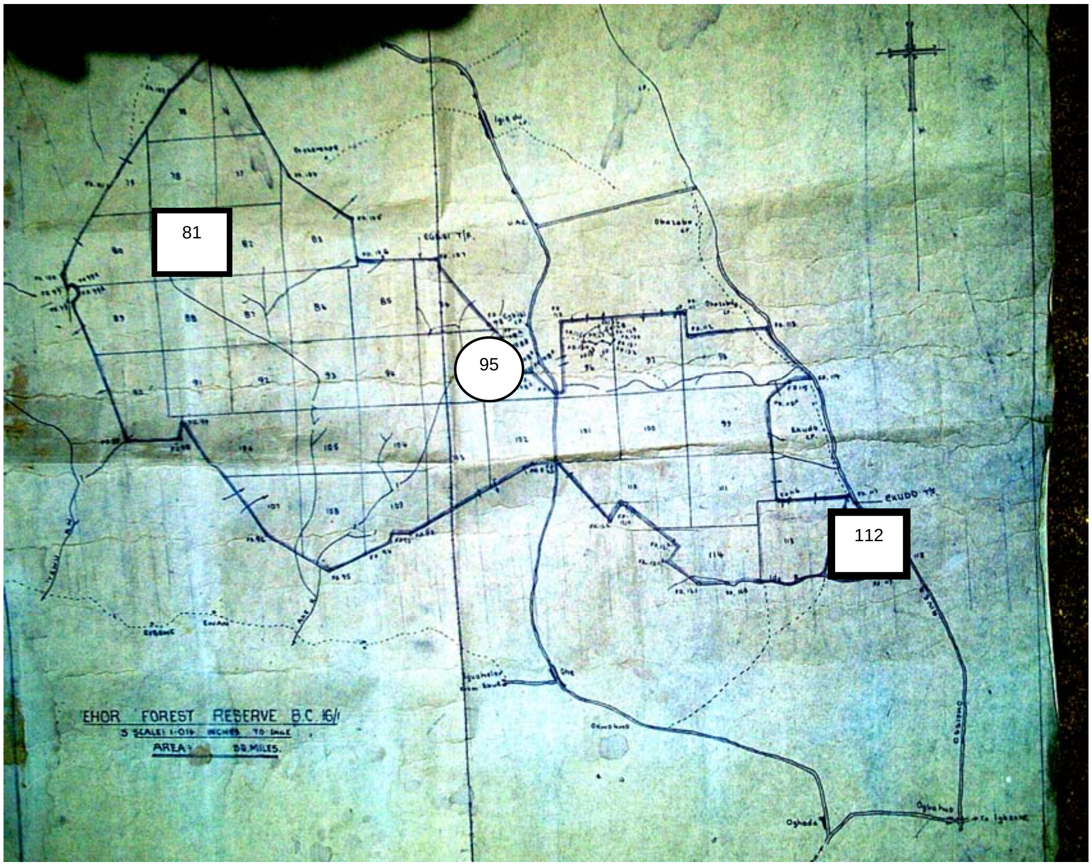

Fig. 1: Map of Ehor Forest Reserve showing Compartments of Study
Source: Ministry of Agriculture, Edo State

Analysis of Field Data

The following parameters were studied

1. Species identification and families represented using Hopkins (1974) Hutchinson and Daziel (1963); Keay (1953); Keay *et al.*, (1964); Gledhill (1981) and Gill (1992).
2. Frequency of occurrence of each species in each sample plot which is the number of sample plots in which a species is found (Omorogbe, 2004).
3. Relative diversity which is the number of species in each family represented.
4. Similarities between the compartments were calculated using Sorensen's similarity index according to the method of Ogunleye *et al.*, (2004).

$$S.I = \frac{a}{a + b + c \text{ or } d} \times \frac{100}{1}$$

Where S.I. = Sorensen's similarity index

a = No of spp. common to all compartments

b = No of spp. peculiar to only compartment 81.

c = No of spp. peculiar to only compartment 95.

d = No of spp. peculiar to only compartment 112.

S.I. for compartment 81 and 95

$$= \frac{a}{a + b + c} \times \frac{100}{1}$$

S.I. for compartment 95 and 112

$$= \frac{a}{a + c + d} \times \frac{100}{1}$$

S.I for compartment 81 and 112

$$= \frac{a}{a + b + d} \times \frac{100}{1}$$

5. Biodiversity index was calculated by using Simpson's Diversity index (Odum, 1971) thus:

$$\text{Simpson's index (D)} = \frac{\Sigma n\,(n-1)}{N\,(N-1)}$$

Where n = Total no. of plants of a particular sp.

N = Total no. of plants of all spp.

For easier understanding, the inverse I/D of Simpson's index was used.

Results

A total of 98 species distributed into 87 genera and 38 families encountered are presented in Table I. Fifteen of these families were monospecific. Fabaceae with 18 species recorded the highest number of species. This was followed by meliaceae and sterculiaceae with seven and six species respectively. The density of each species is also presented in Table I. *Celtis zenkeri* was the most abundant with 157 tree stands out of a total of 2,064 tree stands in the 3 compartments. This translates into 0.269 stand per hectare and 7.6% of the total tree stands. Eighteen species were represented by only one tree stand in the whole area surveyed which also translate to 0.002 stand/hectare (Table I).

Species peculiar to the various compartments and those common to all the compartments of study are presented in Table II. Similarity index calculated for paired compartments 81 and 95, 95 and 112 and 81 and 112 were 45.3%, 41.4% and 43.6% respectively while Simpson's reciprocal index for the various compartments were 25.0, 31.3 and 21.7 for compartment 81.95 and 112 respectively.

Table I: Species identified their density, habits and families represented.

FAMILIES	SPECIES	DENSITY/ HECTARE	HABIT
Anacardiaceae	*Antrocaryon micraster* A. Chev.	0.008	Tree
	Lannea welwitschi (Hiern) Engl.	0.019	Tree
Annonaceae	*Anonidium mannii* (Oliv.) Engl.and Diels	0.027	Tree
	Cleistopholis patens (Benth.) Engl. And Diel	0.050	Tree
	Polyalthia suaveolens Engl. And Diels	0.021	Tree
	Polyceratocarpus parviflorus (Bak. F) Chesq.	0.008	Tree
	Uvariopsis dioica (Diels) Robyn and Chesq.	0.133	Tree
	Xylopia aethiopica (Dunal) A. Rich	0.002	Tree
Apocynaceae	*Alstonia boonei* De Wild.	0.040	Tree
	Funtumia elastica (Preuss) Stapf.	0.056	Tree
	Hunteria umbellata (K. Schum) Hailier	0.067	Shrub
	Rauwolfia vomitoria Afzel.	0.002	Shrub
	Tabernaemontana pachysiphen Stapf.	0.019	Tree
Arecaceae	*Elaeis guineensis* Jacq.	0.006	Tree
Asteraceae	*Albizia ferruginea* (Guill. and Perr.) Benth.	0.045	Tree
	Albizia lebbeck (L.) Benth.	0.004	Tree
	Albizia zygia (DC.) J.F. Machr.	0.002	Tree
Bignoniaceae	*Newbouldia laevis* (P.Beauv.) Seeman ex Bureau	0.046	Tree
	Spathodea companulata P.Beauv	0.046	Tree
Bombacaceae	*Bombax brevicuspe* Sprague	0.002	Tree
	Ceiba pentandra (L.) Garten	0.004	Tree
Boraginaceae	*Cordia millenii* Bak.	0.002	Tree
Burseraceae	*Canarium schweinfurthii* L.	0.023	Tree
	Dacryodes edulis. (G. Don.) H.J. Lam	0.002	Tree
Clusiaceae	*Allanblackia floribunda* Oliv.	0.006	Tree
	Garcinia kola Heckel	0.002	Tree
	Pentadesma butyracea Sabine	0.010	Tree
Combretaceae	*Terminalia ivorensis.* A. Chev.	0.002	Tree
Ebenaceae	*Diospyros alboflavescens* (Gurke) F. White	0.045	Tree
	Diospyros dendo Welw. Ex Hien.	0.006	Tree
	Diospyros mesipiliformis Hochst ex D. AC	0.017	Tree
Euphorbiaceae	*Hevea brasiliensis* (Knuth.) Muell. Arg.	0.002	Tree
	Maesobotrya bateri (Baill.) Hutch.	0.008	Tree
	Ricinodendron heudelotii (Baill.) Pierre	0.104	Tree
	Tetrorchidium didymostemon (Baill.) Pax and K. Hoffm	0.027	Tree
Fabaceae	*Afzelia africana* Sm.	0.002	Tree
	Amphimas pterocarpoides Harms	0.029	Tree
	Angylocalyx zenkeri Harms	0.010	Tree
	Anthonotha macrophylla P. Beauv.	0.069	Shrub
	Baphia nitida Lodd.	0.156	Tree
	Berlinia grandiflora (Vahl.) Hutch. And Dalz.	0.088	Tree
	Brachystegia nigerica Hoyle and A.P.D Jones	0.169	Tree
	Cylicodiscus gabunensis Harms	0.006	Tree

	Daniellia ogea (Harms) Rolfe ex Holl. *Distemonanthus benthamianus* Baill. *Gossweilorodendron balsaminiferum* (Verm.) Harms *Guibourtia sp.* Benn. *Hymenostegia afzelii* (Oliv.) Harms *Lonchocarpus griffonianus* (Baill.) Dunn. *Pachyelasma tessmannii* (Harms) Harms *Pentaclethra macrophylla* Benth. *Piptadeniastrum africanum* (Hook F.) Brenan *Pterocarpus osun* Craib	0.094 0.006 0.004 0.013 0.048 0.013 0.006 0.140 0.027 0.006	Tree Tree Tree Tree Tree Shrub Tree Tree Tree Tree
Irvingiaceae	*Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) *Irvingia grandifolia* (Engl.) Engl.	0.002 0.004	Tree Tree
Lecythidaceae	*Combretodendron macrocarpum* (P.Beauv.) Keay	0.046	Tree
Melastomataceae	*Memocylon blakeoides* G. Don.	0.21	Tree
Meliaceae	*Entandrophragma angolense* (Welw.) C.DC *Guarea cedrata* (A. Chev.) Pellgr. *Khaya grandifoliola* C. DC. *Khaya ivorensis* A. Chev. *Lovoa trichilioides* Harms *Trichilia lanata* A. Chev. *Trichilia prieuriana* A. Juss.	0.013 0.121 0.002 0.056 0.006 0.036 0.002	Tree Tree Tree Tree Tree Tree Shrub.
Moraceae	*Antiaris welwitschii* Engl. *Bosqueia angolensis* Ficalho *Milicia excelsa* (Welw.) C.C. Berg *Musanga cecropioides* R. Br *Myrianthus arboreus* P. Beauv.	0.042 0.054 0.002 0.142 0.013	Tree Tree Tree Tree Tree
Myristicaceae	*Pycnanthus angolensis* (Welw.) Warb. *Staudtia stipitata* Warb.	0.069 0.015	Tree Tree
Ochnaceae	*Lophira alata* Banks ex Gaertnf.	0.023	Tree
Octoknemataceae	*Okoubaka aubrevillei* Pellgr. And Norman	0.127	Tree
Olacaceae	*Olax subscorpioidea* Oliv. *Strombosia postulate* Oliv.	0.002 0.102	Shrub Tree
Pandaceae	*Panda oleasa* Pierre	0.002	Tree
Polygalaceae	*Carpolobia lutea* G. Don.	0.017	Shrub
Rhamnaceae	*Maesopsis eminii*. Engl.	0.004	Tree
Rhizophoraceae	*Anopyxis klianeana* (Pierre) Engl.	0.017	Tree
Rubiaceae	*Nauclea diderrichii* (De Wild and Th. Dun.) Merrill *Rothmannia hispida* (K. Schum) Fagerlind *Pausinystalia macroceras* (K. Schum) Pierre ex Beille	0.002 0.115 0.023	Tree Tree Tree
Rutaceae	*Fagara macrophylla* Engl.	0.060	Tree
Sapindaceae	*Blighia sapida* Konig.	0.108	Tree
Samydaceae	*Homalium aylmeri* Hutch and Dalz.	0.063	Tree
Sapotaceae	*Chrysophylllum albidum* D. Don.	0.017	Tree

	Chrysophyllum delevoyi De Wild.	0.015	
Simaroubaceae	*Hannoa klaineana* Pierre and Engl. *Pierreodendron africanum* (Hook F.) Little	0.045 0.004	Tree Tree
Sterculiaceae	*Cola acuminata* (P. Beauv.) Schott and Engl. *Mansonia altissima* A. Chev. *Nesogordonia papaverifera* (A.Chev.) R. Capuron *Sterculia oblonga* Mast. *Sterculia tragacantha* Lind. *Triplochiton scleroxylon* R. Schum.	0.006 0.002 0.023 0.035 0.013 0.008	Tree Tree Tree Tree Tree
Tiliaceae	*Desplatsia subericarpa* Bocq.	0.004	Shrub
Ulmaceae	*Celtis mildibraedii* Engl. *Celtis zenkeri* Engl.	0.002 0.269	Tree Tree

Table II: Distribution of Species in the various compartment of Study

COMMON TO ALL COMPARTMENTS	PECULIAR TO EACH COMPARTMENT OF STUDY		
	Compartment 81	Compartment 95	Compartment 112
1) *Antiaris welwitschii*	1) *Afzelia Africana*	1) *Albizia ferruginea*	1) *Albizia lebbeck*
2) *Baphia nitida*	2) *Anonidium mannii*	2) *Canarium schweinfurthii*	2) *Albizia zygia*
3) *Berlinia grandiflora*	3) *Cordia millenii*	3) *Chrysophyllum delevoyi*	3) *Angylocalyx zenkeri*
4) *Blighia sapida*	4) *Cylicodiscus gabunensis*	4) *Combretodendron macrocarpum*	4) *Bombax brevicuspe*
5) *Bosqueia angolensis*	5) *Diospyros alboflavescens*	5) *Dacryodes edulis*	5) *Celtis mildbraedii*
6) *Brachystegia nigerica*	6) *Gossweilorodendron balsaminiferum*	6) *Lovoa trichilioides*	6) *Cola acuminata*
7) *Celtis zenkeri*	7) *Lonchocarpus griffonianus*	7) *Maesopsis eminii*	7) *Diospyros dendo*
8) *Cleistopholis patens*	8) *Milica excelsa*	8) *Rauwolfia vomitoria*	8) *Garcinia kola*
9) *Daniella ogea*	9) *Myrianthus arboreus*	9) *Spathodea campanulata*	9) *Guibourtia sp.*
10) *Distemonanthus benthamianus*	10) *Pachyelasma tessmannii*	10) *Sterculia oblonga*	10) *Hevea brasiliensis*
11) *Entandrophragma angolense*	11) *Panda oleasa*	11) *Terminalia ivorensis*	11) *Irvingia gabonensis*
12) *Fagara macrophylla*	12) *Pentadesma butyracea*	12) *Tetrorchidium didymostemon*	12) *Irvingia grandifolia*
13) *Funtumia elastica*	13) *Polyalthia suaveolens*		13) *Khaya grandifoliola*
14) *Guarea cedrata*	14) *Tabernaemontana pachysiphon*		14) *Lophira alata*
15) *Hunteria umbellata*	15) *Trichilia prieuriana*		15) *Mansonia altissima*
16) *Memocylon blakeoides*	16) *Xylopia aethiopica*		16) *Nauclea diderrichii*
17) *Musanga cecropioides*			17) *Olax subscorpioidea*
18) *Pentaclethra macrophylla*			18) *Pausinystalia macroceras*
19) *Pycnanthus angolensis*			
20) *Ricinodendron heudelotti*			
21) *Rothmannia hispida*			
22) *Strombosia postulata*			
23) *Trichilia lanata*			
24) *Uvariopsis dioica*			

Discussion

Density

Celtis zenkeri was the most abundant with 157 tree stands and occuring in the 13 of the 15 sampled plots though none of the stand encountered was of merchantable size. They were all wildlings because *Celtis zenkeri* is one of the most sought after timber (Isichei, 1995), so the mature ones have all been harvested. Omorogbe (2004) also observed the abundance of *Celtis zenkeri* in the slightly degraded area of Sokponba Forest Reserve. *Celtis zenkeri* was followed by *B. nitida*, *M. cecropiodes, P. macrophylla* and *U. diocia* with 75, 68, 67 and 64 stands respectively.

Baphia nitida, Funtumia elastica and *Strombosis postulata* were among the 24 trees common to all the compartments. Oduwaiye and Ajibode (2005) also observed these three tree species as common to the three transects they worked on in Onigambari Forest Reserve. Only one stand each was encountered for *A. zygia, B. breviscupe, M. excelsa, C. millenii, D. edulis, G. kola, H. brasiliensis, I. gabonensis, K. grandifolioa, N. diderrichii, O. subscorpioidea, P. oleasa, R. vomitoria, T. ivorensis, T. prieuriana* and *X. aethiopica*. Ogunleye *et al.* (2004) found four of the above listed species: *M. excelsa, O. subscorpioidea* and *T. ivorensis* rare while *N. diderrichii* was absent in Olokemeji Forest Reserve. *M. excelsa, N. diderrichii* and *T. ivorensis* are known timber plants in high demand while *Olax subscorpioidea* is popular for its use as chewing sticks. The implication could be that these plants are over exploited and if urgent steps are not taken, could go into extinction. *D. edulis* has been domesticated in many communities in Edo State as a means of conserving the plant due to its depletion in the forest. The density of all species enumerated in this work was quite low. No plant species translates to one stand per hectare because of the mindless rate of exploitation. This has left the forest sparsely populated.

The density of species was higher in compartment 95 than the other two compartments because it was the most disturbed also resulting in a high population of herbs. This compartment was the most degraded probably because of all the compartments, it is the closest to human settlement (Egbisi village) one of the villages surrounding the reserve. This made it easily accessible for exploitation of forest products by the villagers.

Relative Diversity

The 98 species identified in the study locations belong to 36 families and 87 genera, of these species, eighty-eight (88) are trees while ten (10) shrubs. The trees made up 91% of the total plants encountered. Ogunleye *et al.* (2004) sampled 0.102% of Olokemeji Forest Reserve and identified 107 plants made up of sixty-nine trees and 36 shrubs. The trees at the Olokemeji Forest Reserve make up 65.7% of the total number of plants they encountered. On the other hand Omorogbe (2004) identified 85 trees/shrubs distributed into 30 families from Sakponba Forest Reserve while Oduwaiye and Ajibode (2005), identified 35 trees, 15 shrubs and 8 climbers in 33 families from Onigambari Forest Reserve. Compartment 95 being the most disturbed had the highest number of stands though compartment 81 had the highest number of species.

Fabaceae has the highest diversity of eighteen species in this study. Omorogbe (2004) reported fourteen species from this same family in Sakponba Forest Reserve; it also had the highest species diversity. Fabaceae was distantly followed by Meliacea with seven (7) species, Annonaceae (6) and Sterculiaceae with six (6) species respectively. Moraceae and Apocynaceae had five species each while Euphorbiaceae had four. These were the dominant families represented. Apocynaceae, Sterculiaceae, Euphorbiaceae, Ebenaceae, Olacaceae and Rubiaceae were reported by Ojo (2004) as forming 86% of the stands in Abeku sector of Omo Forest Reserve. Osunde (2004) in an unpublished work on Okomu Forest Reserve also reported high species diversity in Fabaceae, Meliaceae and Apocynaceae. The preponderance of species in families with high diversity in this Ehor Forest Reserve may be due to their methods of seed dispersal. Where explosive mechanism and wind disperse the seeds, they are carried far away from the mother tree where they germinate when conditions are suitable but where dispersal is such that the seeds are close to the mother tree, such seedling may die due to competition for nutrients. Ogunleye et al. (2002) reported the dominance of Fabaceae and Meliaceae in Olokemeji Forest Reserve because of easy wind dispersal which enhanced their spread in the study location. Soladoye et al. (2005) also observed that dispersal mechanisms play a strong role in addition to climatic conditions and soil types in the preponderance of species of Fabaceae, Euphorbiaceae and Rubiaceae on the Olabisi Onabanjo University permanent site. On the other hand, fifteen families had poor species diversity at the Ehor Forest Reserve. They all had only one species each. Even though compartment 81 has the highest species of 62, it is represented by 27 families while the other two compartments 95 and 112 have 54 and 57 species distributed into 28 families each. Diversity is comprised of two components: the variety of species present and the relative abundance of those species (Young and Swiacki, 2006). Hence, compartment 95 could be said to be the richest in terms of plant population because of its high relative abundance compared to the other 2 compartments. The species diversity in the three compartments studied could be attributed in my own opinion to the intensity of logging. This is because only a few trees of merchantable size are left standing in the study locations. As a result, the study sites were populated mainly with wildings. Brown and Gurevitch (2004) reported that the impact of logging did not only negatively affect forest diversity but that it exposes the forest to invasive species which was also a major predictor of reduced native species diversity thereby preventing the recolonization of native species. This could be the case with compartment 95 where we have fewer species but more abundant stands.

Sorensen's similarity index between paired compartments

The similarity index values between compartments 81 and 95, 81 and 112 and 95 and 112 were 45.3%, 41.4% and 43.6% respectively. These values indicated that there was little variability in the species composition between the compartments of study. The higher the values, the lower the variability. Ogunleye *et al.* (2004) recorded low values of 9.68%, 17.14% and 13.16% for zones 1 and 2, 1 and 3 and 2 and 3 respectively at the Olokemeji Forest Reserve indicating a high variability between the zone while Devi and Yadava (2006) recorded a high value of 50% between two forest sites of Manipur North-West India implying low variability. The lower the values of the similarity index, the higher the heterogeneity. In addition to the twenty-four species common to all the compartments, compartments 81, 95 and 112 have sixteen, thirteen and eighteen species respectively peculiar to them. These peculiar species account for the little variability observed and since these species are not many compared to the total number of species encountered in the compartments of study (sixty-two species for compartments 81, fifty-four species for 95 and fifty-seven species for 112) not much heterogeneity is expected between them. Compartment 95 had the fewest species but with the highest population of plants which must have affected the two (2) paired compartments where 95 is present.

Simpson's Diversity Index

The values for the reciprocal indices obtained were 25.00 for compartment 81, 31.30, for compartment 95 and 21.70 for compartment 112. Compartment 95 had the highest diversity value because it was the most densely populated. This was in agreement with Young and Swiacki (2006) who stated that diversity was made up of the variety of species present and the relative abundance of those species. The higher the values, the higher the diversity (Ojo 2004). Compartment 112 had the lowest diversity index showing that it was less heterogenous compared to the other two compartments. The diversity of plants within each compartment could be said to be high with low density.

Conclusion

The compartments of study were populated by the same plants except for a few variables, hence the fairly high similarity index between paired compartments. On the other hand, each of the compartments were rich in different plant species hence the high diversity values showing heterogeneity. Though the various compartments were rich in different species of plants, the abundance of each of the species were quite low. To prevent the extinction of some families particularly the monospecific ones, the forest reserve should be restocked with species having only one stand and exploitation of forest products be drastically reduced to allow the forest to regenerate itself.

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REFERENCES

[1] Brown KA, Gurevitch J. Long-term impacts of logging on forest diversity in Madagascar. Proceedings of the National Academy of Sciences of the United States of America (PNAS) 2004; 101 (16): 6045 – 6049.

[2] Cunningham PW, Cunningham MA, Saigo B. Environmental Science: A global concern. 2005; 8th Edition. McGraw Hill 600p.

[3] Devi SL, Yadava PS. Floristic diversity assessment and vegetation analysis of tropical semi ever green forest of Manipur, North-east India. Tropical ecology 2006;*47 (1)*: 89 – 98.

[4] Dong SK, Cui BS, Yang ZF, Liu J, Wang J, Ding ZK, Guo LN, Zhab SQ. Species composition, plant cover and diversity of recently reforested wild lands near Dabao highway in Longitudinal Range, Gorge Region of Ynnan Province, China. African Journal of Biotechnology 2007; *6(24)*: 2810 – 2820.

[5] Gill LS. Ethnomedical uses of plants in Nigeria. 1992; University of Benin press, Benin City 276p.

[6] Glenhill D. West African Trees. 1981; Longman. UK 72p.

[7] Hopkins B. Forest and Savanna. 1974; 2nd Edition, Heinemann Press, Ibadan, 154p.

[8] Hutchinson J. and Daziel JM. Flora of West Tropical Africa. 1963; Crown Agent for Overseas Governments and Administration, London. 544p.

[9] Inegbedion JO. Timber Resource Status of Ehor Forest Reserve, Uhunmwode Local Government Area of Edo State. 2008; Ph.D thesis. Ambrose Alli University, Ekpoma. Nigeria 113p.

[10] Isichei AO. Omo biosphere reserve, current status, utilization of biological Resources and sustainable management. South-South corporation programme on environmentally sound socio-economic development in the humid tropics. 1995; Working paper No 11.

[11] Keay RWJ. An outline of Nigerian vegetation. 1953;Colonial Forest Resources of Nigeria. 15p.

[12] Keay RWJ, Onochie CFA, Stanfield DP. Nigerian Trees. 1964; Vols. 1 and 2; Department of Forest Research, Ibadan. 334p and 495p.

[13] Odum EP. Fundamentals of Ecology. 1971; 3rd Edition. Saunders company, Philadelphia USA. 574p.

[14] Oduwaiye EA, Ajibode MO. Composition of tree species and regeneration potentials at Onigambari Forest Reserve, Ibadan, Oyo State, Nigeria. Journal of Raw Materials Research: 2005; *2(1)*: 4 – 13.

[15] Ogunleye AJ, Adeola AO, Ojo LO, Aduradola AMImpact of farming activities on vegetation in Olokemeji Forest Reserve, Nigeria. Global Nest: the International Journal. 2004; *6(2)*: 130 – 139.

[16] Ojo LO. The fate of a tropical rainforest in Nigeria: Abeku sector of Omo Forest Reserve. Global Nest: the International Journal 2004; *6(2)*: 116 – 130.

[17] Omorogbe RU. Status of flora biodiversity and exploitation of biological resources in Sakponba Forest Reserve Edo State. 2004; M.Sc. thesis. Ambrose Alli University, Ekpoma. 133p.

[18] Soladoye MO, Sonibare MA, Nadi AO, Alabi DA. Indigenous

Angiosperm biodiversity of Olabisi Onabanjo University Permanent Site. African Journal of Biotechnology 2005; *4(5):* 554 – 562.
[19] WWFN World Wild Fund for Nature Cross River National Park project. Unpublished Report. WWFN, 1992; Goldaming. United Kingdom 15p.
[20] Young S, Swiacki LN. Surveying the Forest Biodiversity of Evansburg State Park: Plant Community Classification and Species Diversity Assessment. International Journal of Botany 2006; *2(3)*: 293 – 299.

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