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DISTRIBUTION AND DIVERSITY OF FLORA AND FAUNA SPECIES IN IKWE FOREST RESERVE, BENUE STATE, NIGERIA

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ABSTRACTS

The occurrence of plants and animals in any habitat is crucial to man and other components of the ecosystem. Thus, the study examined the distribution and diversity of plant and animal species at the Ikwe Forest Reserve; It was aimed at assessing the numbers of woody plant and occurrence of animal species. The methods adopted include: floristic survey of plant species (DBH \geq 10cm) within 27 sampling plots of 25m X 25m laid at 500m interval along the line transect); fauna (direct/indirect assessment and oral interview). Data were analyzed with the use of descriptive statistics, diversity indices and ANOVA. Forty-two woody plant species belonging to 17 families were found in the area. The common tree species found in the area were *Isobertinia doka*, *Maranthes polyandra* and *Burkea africana*. The most abundant families among them were Mimosoideac, Cacasalpinioideac and Rubiaceae, respectively. Tree species richness, evenness and diversity varied from site to site, even though it was generally low in all the sites. Also there was no significant difference in tree species diversity and composition across the sites at ($\alpha_{0.05}$). Thirty species of wild animals belonging to 22 families were also indicated, majorly through indirect assessment/information. Birds' species form the major components of the animal species in the reserve. It is suggested that harvesting of woody plants in these reserves be controlled through monitoring and enlightenment.

Key words: Ecology, species diversity, animal distribution, game reserve

INTRODUCTION

The occurrence of plants and animals in any habitat is crucial to man and other components of the ecosystem as they are valuable for one purpose or the other. One of the most striking features of the earth biota is its extraordinary diversity both in flora/ fauna species and other environmental resources (Malik *et al.*, 2016). The entire universe has been so closely tied to plants and animals that it is difficult to imagine human existence without them (Jimoh *et al.*, 2009). In recent years, forest products especially the non-timber forest product (NTFPS) have attracted considerable global interest (Cavendish, 2001). This is as a result of their importance to human needs for improved rural livelihood; household food security and nutrition, employment opportunities and economic value product derives from wild plants and as derived from Game reserves and other protected areas contributes in many ways to combating malnutrition, climatic change among other Importance (Isichei, 2005; Balemie and Kebebew, 2006; Jimoh and Haruna, 2009).

Nature reserves are adjudged based on the number and different type of species found in them (Ali *et al.*, 2016). Assessment of plants and animal populations, distribution and their ecology is an important way to assess the sources and impacts of human activities on natural environment and to understand the rates of biodiversity decline (Balmford *et al.*, 2003). Biodiversity is the degree of variation of life forms within a given ecosystem, biome, or entire planet (Uno and Moore, 2001). It is now being viewed more against the background of sustainable development which offers opportunities for poverty reduction, human well-being and socio-cultural integrity of people, particularly, in developing countries (Balmford *et al.*, 2001; Oteng-Yeboah, 2004 and Butler, 2005). It is estimated that over 80% of people in developing countries depends on biodiversity for their primary health care (WHO, 2005).

Diversity within species, between species, and of ecosystem is the treasures of nature; which must be preserved. Generally, Nigeria's plant and animal' species are of diverse categories, taxas and communities. Most of the species are situated in the wildlife parks and tropical forest of the country (Gillespie *et al.*, 2004; Al-amin, 2013). Nigeria is rich in biodiversity, the country is well endowed with a variety of plants and animal species found in the boundless forests and grass lands (Emma-Okafor, *et al.*, 2010). However, numerous endemic species are threatened with extinction and only small proportion of the area is protected (Swingland, 2003; Norris *et al.*, 2010). The resources are faced with extreme pressures resulting from anthropogenic and natural activities (Imeht and Adebobola, 2001). Flora and fauna species in the country have been classified as rare, vulnerable, endangered, threatened and extinct. It is therefore, essential to preserve and manage the genetic reservoir of the natural heritage of biodiversity in all their unaltered state to meet man's future needs through conservation and management measures to rehabilitate the deforested areas (Omogoriola, *et al.*, 2012). It is worthy of note that, forest reserves and National Parks serves as the reservoirs for wildlife resources and can be enhanced if properly managed. These designated areas are the remaining strong-holds where such plants and animals have large populations and breeding occurs (Aquatic plants and wetland wildlife resources of Nigeria,

3	<i>Annona senegalensis</i>	Annonaceae	0	0	1.37	0	0	1.27	0	0	2.64
4	<i>Bridelia ferruginea</i>	Euphorbiaceae	3.57	8.06	1.37	2.78	3.85	0.63	6.35	11.91	2.00
5	<i>Burkea africana</i>	Caesalpiniaceae	8.93	1.61	5.48	4.17	0.64	5.06	13.01	2.25	10.54
6	<i>Combretum nigrum</i>	Combretaceae	0	1.61	0	0	0.64	0	0	2.25	0
7	<i>Daniella oliveri</i>	Caesalpiniaceae	0	1.61	0	0	0.64	0.63	0	2.25	0.63
8	<i>Detarium microcarpum</i>	Caesalpiniaceae	8.93	1.61	1.37	6.94	5.13	0.63	15.87	6.74	2.00
9	<i>Entada africana</i>	Mimosaceae	1.79	1.61	2.74	0.69	2.56	1.27	2.48	4.18	4.01
10	<i>Erythrina senegalensis</i>	Mimosaceae	0	0	2.74	0	0	1.90	0	0	4.64
11	<i>Ficus asperifolia</i>	Moraceae	3.57	3.23	1.37	2.78	1.92	1.90	6.35	5.15	3.27
12	<i>Ficus sur</i>	Moraceae	1.79	3.23	0	0.70	2.56	0	2.48	5.79	0
13	<i>Gardenia aqualla</i>	Rubiaceae	0	4.84	0	0	1.92	0	0	6.76	0
14	<i>Gardenia rubescens</i>	Rubiaceae	0	1.61	0	0	0.64	0	0	2.25	0
15	<i>Hanona undulate</i>	Simaroubaceae	3.57	1.61	1.37	2.78	1.28	0.63	6.35	2.89	2.00
16	<i>Isoberlinia doka</i>	Caesalpiniaceae	14.29	12.90	9.59	25	17.95	15.20	39.29	30.85	24.78
17	<i>Khaya senegalensis</i>	Maliaceae	0	3.23	1.37	0	2.56	1.90	0	5.79	3.27
18	<i>Lannea schimperiana</i>	Combretaceae	0	3.23	4.11	3.47	1.92	3.16	3.47	5.15	7.27
19	<i>Lophira lanceolate</i>	Ochnaceae	3.57	4.84	5.48	4.17	8.33	10.13	7.74	13.17	15.61
20	<i>Maranthes polyandra</i>	Chrysobalanaceae	8.93	3.23	0	10.42	2.56	0	19.35	5.79	0
21	<i>Mitragyna inermis</i>	Rubiaceae	0	0	4.11	0	0	3.16	0	0	7.27
22	<i>Parinari curatelliflora</i>	Chrysobalanaceae	1.79	0	1.37	0.69	0	1.27	2.48	0	2.64
23	<i>Parkia biglobosa</i>	Mimosaceae	3.57	0	0	2.08	0	0	5.65	0	0
24	<i>Pavetta crassipes</i>	Rubiaceae	0	0	1.37	0	0	0.63	0	0	2.00
25	<i>Pericopsis laxiflora</i>	Papilionaceae	3.57	1.61	5.48	4.17	1.28	4.43	7.74	2.89	9.91
26	<i>Piliostigma thonningii</i>	Mimosaceae	0	1.61	2.74	0	1.28	1.27	0	2.89	4.00
27	<i>Prosopis africana</i>	Mimosaceae	3.57	0	6.85	2.08	0	3.80	5.65	0	10.65
28	<i>Pseudocedrela kotschyil</i>	Meliaceae	0	0	1.37	0	0	1.90	0	0	3.27
29	<i>Pterocarpus erinaceus</i>	Papilionaceae	5.36	6.45	2.74	4.86	3.21	2.53	10.29	9.66	5.27
30	<i>Sarcocephalus latifolius</i>	Rubiaceae	3.57	6.45	4.11	2.08	8.97	2.53	5.65	15.42	6.64
31	<i>Sterculia setigera</i>	Meliaceae	0	0	1.37	0	0	0.63	0	0	2.00
32	<i>Stereospermum kunthianum</i>	Bignoniaceae	0	3.23	4.11	0	3.85	6.33	0	7.07	10.44
33	<i>Strychnos innocua</i>	Loganaceae	0	0	2.74	0	0	3.16	0	0	5.90
34	<i>Strychnos spinosa</i>	Loganaceae	1.79	3.23	1.37	1.39	4.49	1.90	3.17	7.71	3.27
35	<i>Syzygium guineense</i>	Myrtaceae	0	1.61	2.74	0	1.92	3.16	0	3.54	5.90
36	<i>Terminalia avicennoides</i>	Combretaceae	3.57	1.61	0	4.17	0.64	0	7.74	2.25	0
37	<i>Terminalia</i>	Combretaceae	1.79	1.61	1.37	2.77	1.92	2.53	4.56	3.54	3.90

	<i>schimperiana</i>										
38	<i>Uapaca togoensis</i>	Euphorbiaceae	3.57	0	0	4.86	0	0	8.43	0	0
39	<i>Vitellaria paradoxa</i>	Sapotaceae	0	4.84	2.74	0	5.77	1.27	0	10.61	4.01
40	<i>Vitex doniana</i>	Verbenaceae	3.57	1.61	8.22	4.17	3.21	10.76	7.74	4.82	18.98
41	<i>Vitex latifolia</i>	Verbenaceae	1.79	4.84	1.37	1.39	3.21	0.63	3.17	8.04	2.00
42	<i>Ximenia Americana</i>	Olacaceae	0	0	2.74	0	0	1.27	0	0	4.00

Source: Field survey 2016

Key: RF= Relative Frequency, RD=Relative Density, IVI=Most Dominant Species

Table 2: Check list of Fauna Species and Mode of Identification in the Ikwe Forest Reserve

S/n	Common Name	Scientific Name	Family	DS	IA	IF
Birds						
1	African thrush	<i>Turdus pelios</i>	Turdidae	+	-	-
2	Black shouldered kite	<i>Elanus caeruleus</i>	Accipitridae	+	-	+
3	Black kite	<i>Milvus migrans</i>	Accipiteridae	+	-	-
4	Common bulbul	<i>Pycnonotus barbatus</i>	Pycnonotidea	+	-	-
5	Grey-breasted helmet guinea fowl	<i>Numida meleagris</i>	Numididae	+	-	+
6	Green wood hoopoe	<i>Phoeniculus purpureus</i>	Phoeniculidae	+	-	+
7	Helmeted guinea fowl	<i>Numida meleagris galeatus</i>	Numididae	-	-	+
8	Laughing dove	<i>Streptopelia senegalensis</i>	Columbidae	+	-	+
9	Mourning dove	<i>Stroptopelia decipiens</i>	Columbidae	+	-	-
10	Plain nightjar	<i>Caprimulgus inornatus</i>	Caprimulgidae	+	-	-
11	Senegal coucal	<i>Centropus senegalensis</i>	Cuculidae	+	-	-
12	Senegal parrot	<i>Polcephalus senegalus</i>	Psittacidae	+	-	+
13	Western grey plantain- eater	<i>Crinifer piscator</i>	Musophagidae	+	-	-
14	Village weaver	<i>Ploceus cucullatus</i>	Ploceidae	+	+	-
15	Violet turaco	<i>Musophaga violacea</i>	Musophagidae	+	-	-
Mammals						
16	African goshawk	<i>Accipiter tachiro</i>	Accipitridae	-	-	+
17	African manatee	<i>Trichechus senegalensis</i>	Trichechidae	-	-	+
18	Bush buck	<i>Tragelaphus scriptus</i>	Bovidae	-	-	+
19	Cane rat	<i>Thryonomys swinderianus</i>	Thryonomyidae	-	+	+
20	Fruit bat	<i>Pteropus vampyrus</i>	Pteropodidae	+	-	-
21	Grey duiker	<i>Sylvicapra grimmia</i>	Bovidae	-	-	+
22	Hunting dog	<i>Lycaon pictus</i>	Canidae	-	-	+
23	Kob	<i>Kobus kob</i>	Bovidae	-	-	+
24	Mona monkey	<i>Cercopithecus mona</i>	Cercopithecidae	+	-	+
25	Nile grass rat	<i>Arvicantis niloticus</i>	Muridae	+	-	+
26	Red patas monkey	<i>Erythrocebus patas</i>	Cercopithecidae	+	+	+
27	Squirrel	<i>Heliosciurus gambianus</i>	Sciuridae	+	-	+
28	Tantalus monkey	<i>Cercopithecus tantalus</i>	Cercopithecidae	+	-	+
Reptiles						
29	Agama lizard	<i>Agama agama</i>	Agamidae	+	-	-
30	Mali cobra snake	<i>Naja katiensis</i>	Elapidae	+	-	-

Source: Field Survey, 2016

Key: DS = Direct Sighting, IA = Indirect Assessment (Faecal Dropping, Foot Prints and Hole Creation). IF = Information. + = Present and - = absent.

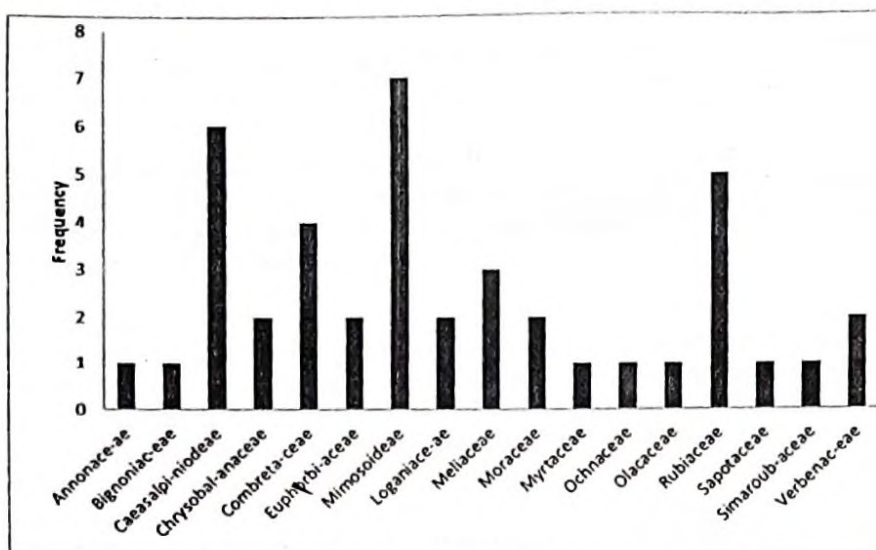


Fig. 1: Frequency of Family Representation of Tree Species in Ikwe game Reserve.

Table 3: Diversity Indices of Trees Species for the three Sites in the Ikwe Game reserve

Variable	Site A	Site B	Site C
Taxa	24	29	33
Individuals	144	156	158
Shannon_H	2.762	3.007	3.088
Evenness_c^H/S	0.660	0.697	0.665
Margalef	4.628	5.545	6.321

Table 4: The ANOVA Table for tree species in Ikwe forest reserve

	Sum of Sq.	Df	Mean square	F	p- value
Between groups:	2.73016	2	1.36508	0.04597	0.9551
Within groups:	3652.48	123	29.6949		
Total:	3655.21	125			

There is no significant difference at 0.05%

DISCUSSION

Analysis of the woody plant diversity indices computed was generally low in all the sites, although the result indicated that site C was more diverse and rich. This could be attributed to the fact that the site lie along the major drainage tributaries thus retained water for longer period and did not support agricultural activities like farming because of the terrain. However, site B was more even in terms of species distribution. This could be attributed to varying levels of exploitation within the reserve. Like many primary forest/reserve in the tropical region of the world, the original vegetation of the study area have been extensively modified (Jimoh *et al.*; 2009; Egwumah and Egwumah, 2014). One of the most important factors known to influence the use of land and other natural resources including forest, wildlife /game reserve is human' population growth and their activities (Coomes *et al.*, 2000). Hence, the fair result obtained for tree species richness and diversity in the area may have been influenced by degradation of the vegetation through human impact, negligence by the Government and several years of continuous arable cropping. Kamweya *et al.*, (2012) and Ahmed; (2013) equally observed that habitat loss/fragmentation is responsible for biodiversity loss and ultimate extinction of species. Generally, *Isobertinia doka* had the highest value for both relative frequency and relative density and has been the most dominant tree species in the reserve. It appears that, clearance for edible cropping by the local community on both sites over the years has neglected this tree species also supported for its high occurrence and distribution in West Africa (Yorou *et al.*, 2001), and been difficult to work on in timber industry (Yorou *et al.*, 2001). Tree species such as *Pavetta crassipes*, *Pseudocedrela kotschyii*, *Sterculia setigera*, *Daniella oliveri*, *Acacia nitotica*, and *Combretum nigrican* show low indices of occurrence across the sites. It could be that they were more harvested either during farm preparation or for fire wood. This agrees with the findings of Jimoh *et al.*, (2009). The most dominant families among the tree species sampled were Mimosoideae and Caesalpinaceae and the least were Annonaceae, Bignoniaceae, Meliaceae, Olacaceae and Sapotaceae, respectively. However, there was no significant difference in tree species diversity and composition across the sites at 0.05%. A total of thirty animal species within the class mammalian, aves and reptile were recorded. Most of the animal species especially the mammals were confirmed by hunters through oral interview and other assessment indices. However, birds' species form the major components of species in the reserve, being that at moment the habitat

can at least support their existence. Generally there seems to be paucity of animals' species in the area. This is the reflection of habitat destruction through human activities on the vegetation of the area as it has been modified and could not give support to fauna species especially the class mammalian. This is in line with the findings of Egwumah and Egwumah, (2014).

CONCLUSION

The low diversity of woody plant and fauna species in Ikwe game reserve obviously, was due to human disturbance in the area through activities such as logging, hunting, and land clearing/burning for farming. Basic knowledge of species richness patterns and species distribution within a region is a necessary starting point to predict species extinction under habitat loss and also to understand the potential impacts on biodiversity, as well as to prioritize conservation efforts and designing conservation areas. It is therefore recommended that the nature reserve be protected from over exploitation its resources which may lead to more degradation; Its management should be based on sound ecological principles and serious efforts be made to rehabilitate the reserve to promote conservation and yield to the demand for ecotourism site in the state.

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