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EVALUATION OF RANGE FLORA AND FAUNA COMPOSITION OF A COMMUNITY FOREST IN NORTH-CENTRAL NIGERIA

EVALUACIÓN DE LA FLORA DE ÁREA Y LA COMPOSICIÓN DE FAUNA DE UN BOSQUE COMUNITARIO EN NORTE-CENTRAL DE NIGERIA

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ABSTRACT

Forest structure assessment is vital in ensuring environmental functions such as habitat provision for biodiversity and soil conservation. This study was carried out to assess the flora and fauna composition of a community forest. The systematic line plot technique was used for the establishment of sampling plots for floristic survey of woody trees species, shrubs, climbers and herbs. Direct observation and in-depth interview was adopted to acquire information on fauna species in the forest. The abundance and diversity of flora and fauna species in the forest was analyzed. The results revealed a total 18 species in 13 families were recorded for woody plants, 12 species in 9 families were recorded for shrubs, 7 species in 6 families were recorded for climber and 16 species in 8 families were recorded for herbaceous plants. *Pseudocedrela kotschyi*, *Chromolaena odorata*, *Opilia celtidifolia* and *Desmodium adscendens* were the most abundance species for both trees, shrubs, climbers and herbaceous species respectively. Forty one species of fauna species within the class mammalian, aves, and reptile were indicated. Bird species form the major component of the animal species in the forest. It is suggested that the reserve be protected from resource exploitation through monitoring and conservation education.

Keywords: Assessment, abundance, diversity, flora and fauna species.

RESUMEN

La evaluación de la estructura forestal es vital para garantizar las funciones ambientales, como la provisión de hábitat para la biodiversidad y la conservación del suelo. Este estudio se llevó a cabo para evaluar la composición de la flora y la fauna de un bosque comunitario. La técnica sistemática de trazado de líneas se utilizó para el establecimiento de parcelas de muestreo para el estudio florístico de especies de árboles leñosos, arbustos, escaladores y hierbas. La observación directa y la entrevista en profundidad se adoptaron para adquirir información sobre especies de fauna en el bosque. Se analizó la abundancia y diversidad de especies de flora y fauna en el bosque. Los resultados revelaron un total de 18 especies en 13 familias se registraron para las plantas leñosas, 12 especies en 9 familias se registraron para los arbustos, 7 especies en 6 familias se registraron para escalador y 16 especies en 8 familias se registraron para las plantas herbáceas. Pseudocedrela kotschyi, Chromolaena odorata, Opilia celtidifolia y Desmodium adscendens fueron las especies de mayor abundancia para árboles, arbustos, escaladores y especies herbáceas, respectivamente. Cuarenta y una especies de especies de fauna dentro de la clase de mamíferos, aves y reptiles fueron indicadas. Las especies de aves forman el componente principal de las especies animales en el bosque. Se sugiere que la reserva esté protegida de la explotación de los recursos a través del monitoreo y la educación para la conservación.

Palabras clave: evaluación, abundancia, diversidad, especies de flora y fauna.

INTRODUCTION

One of the most important step in designing conservation management strategies of any protected area is the assessment of range resources such as plant composition, herbaceous species, soil condition and fauna species. These are vital baseline data which can be utilized to assess success of conservation effort over time, both current and future habitat condition (Chukwu *et al*., 2017). Nature reserves however, are judged base on the condition of the range parameters such as the number and different types of species found in them especially birds, mammals, aquatic species and plants (Ali *et al.,* 2016). Public view over range resources assessment has grown over the decades. This concern stems from our increasing dependence on renewal natural resources and the increasing rate of extinction of plant and animal species. Many range forest communities support unique flora and fauna species making them important sites in terms of wildlife habituation and other scientific interest. Forest also encompasses great variety of trees, shrubs, climbers and herbs that provide food to wild animals. They are the stock of trees

that can improve environmental conditions and quality of life in by providing multiple ecosystem services

Rangelands are the most extensive land cover in the world, providing about 91% of grazing lands on which 1–2 billion people rely for part of their livelihoods (Sayre *et al*., 2013; Reid *et al*., 2014). They are geographical regions which occupy about 18-23% of the world land area in which the Antarctica is being excluded that either native or non-native plant species are to be grazed by either wildlife or livestock (Gail, 2002). They are home to a good number of mammals, birds and plant species with a high value in leisure (ecotourism) (Gail, 2002). Range forest resources originally had unique characteristics which were later affected more or less intensively by anthropogenic activities and other natural occurrences. Almost one third of land on the earth surface is now under urban area development and cultivation for producing food and raw materials with the greatest loss being to conversion into arable agricultural areas (Robin *et al.*, 2000). There is no doubt that, there has been large destruction and mismanagement of protected ecosystem of Nigeria. Ecological disasters and climatic changes have resulted in loss of soil fertility and have greatly reduced biological vegetation and animal population.

Most studies on range parameters especially vegetation structures often involved nature system or those that have not been disturbed for a long time, which are important and serve as ideals for conservation management (Ogunjemite *et al*., 2007). The effective and efficient management of nature resources requires the understanding of their functioning to arrest the further degradation and this can only be achieved through knowledge of their species composition and arrangement. An understanding of range requirements is an integral part of any wildlife management. More so, for all wildlife species defining habitat requirement always involves at least two kinds of evidence available habitats (vegetation composition) and animal present associated with these habitat.

Indigenous people have used range resources, but it is controversial whether their impact alone depletes these resources (Levi *et al.,* 2009). In such remote areas, these direct drivers of resources depletion can vary associated to socioeconomic variation in human communities (Sirén *et al*., 2006; Godoy *et al*., 2010; De la Montaña *et al*., 2015). However, the conservation practices implemented on range resources produce a variety of direct and indirect economic and social effects. So, basic ecological relationships and varying degrees of natural resource management determine the magnitude and quality of goods and services produce (Fox *et al*., 2009). The objectives of the present study were: first, to: determine the floristic composition and structure and also the fauna species in the study area.

MATERIALS AND METHODS

Study Area: The research was carried out at Akopi Community Forest in Ukum/Mbadwem kindred in Guma Local Government Area of Benue State, Nigeria. The Akopi community forest lies between 07° 55' 28.6'' N and 008° 43' 36.9'' E with an elevation of 102m. It has an area of approximately 28.260 hectares of land. The soil is very fertile, poorly drained and clay loam. The dominant vegetation in the area is composed of grasses, herbs and woody plants and shrubs species.

Data Sampling and Collection: The systematic line plot sampling technique (Avery and Burkhart, 2002) was used for the establishment of seven sample plots of 50 x 50 m in the forest. Two 2 km transect lines placed 409 m apart were laid. At 409m intervals, four sample plots were laid along the first transect and three samples were laid along the second transect. The coordinates of each plot was taken, at the plot centre, with a global positioning system (Garmin GPSMAP 78). All woody plants in the sample plot with stem diameter at breast height of ≥ 5 cm were identified and measurements taken for stem diameter at breast height (DBH), total tree height (*THT*), tree crown diameter (CD) and tree crown height (CH). In each sample plot, 10 x 10 m subplots were laid for the enumeration of Shrubs and climbers (Turyahabwe and Tweheyo, 2010). All the herbaceous cover was enumerated using a $1m^2$ quadrat frame within the 10 x 10 m sub-plots. The identification of flora samples was carried out using flora field guides by Akobundu and Agyakwa (1998) and Arbonnier, (2004).

Fauna species list was determined by direct observation along two transects of 2.0 km by 10 m broad (0.1ha) distributed randomly as described by Osunsina *et al.,* (2012) and indirect indices as well as through information from hunters and elders who live in the area over 30 years.

Data Analysis: The abundance and diversity of herbaceous cover, climbers species as well as woody plant composition was analyzed using Species Relative Density (*RD*), Relative Frequency (*RF*), Species Relative Dominance (RDo), Species Importance Value Index (*IVI*), Shannon-Wiener Species Diversity Index (*H*) and Pielou Evenness Index (*E*):

$$RD = \frac{Number\ of\ a\ species}{Total\ Number\ of\ all\ species} \times 100$$

$$RF = \frac{Frequency\ of\ a\ species}{Total\ frequency\ of\ all\ species} \times 100$$

$$RD_0 = \frac{Summation\ basal\ area\ of all\ trees\ of\ a\ species}{Summation\ of\ basal\ area\ of\ all\ trees} \times 100$$

$$IVI = \frac{(RD + RF + RDo)}{3}$$

$$H = -\sum_{i=1}^{s} p_i \, ln \, p_i$$

$$E = \frac{H}{lnS}$$

Where *s* is the total number of species p_i is the proportion of individuals in the ith species, and *ln* is the natural logarithm, *H* is the Shannon–Wiener function and *S* is the total number of species.

RESULTS

Range Floristic Structure and Composition:

The growth variables for tree species presented in (Fig. 1 to 4 and Table 1) indicate the mean value of tree species for Diameter at breast height (DBH) as 23.2 cm, Tree Total Height (THT) as 12.7 cm, Crown Height (CH) as 6.9m, and Crown Diameter (CD) as 6.3m and Basal Area as 0.054m 2. However, Table 2 revealed a total 18 species in 13 families of which one species was unknown for woody plants. *Pseudocedrela kotschyi* had the highest value for relative frequency, relative density, species relative dominance and species value index, while the lowest occurring species were *Rauvolfia vomitoria, Annona senegalensis, Maytenus senegalensis* and *Piliostigma thonningii* respectively.

Table 3 reveals 12 species in 9 families recorded for shrubs species assessed among which the Malvaceae was dominant family. *Chromolaena odorata* had the highest percentage of 11.97% followed by *Cyathula prostrate* (11.02%) and *Ludwigia decurrens* had the least with (3.13%). Table 4 indicate 7 species in 6 families recorded for climber, Vitaceae been the dominant family. Furthermore, *Opilia celtidifolia* had the highest percentage value of 26.17%, followed by *Discorea dumetorum* with (24.30%) and *Cissus populnea* had the lowest value of (7.48%). Table 5 present herbaceous species estimated using a $1m^2$ quadrat of which 16 species in 8 families were recorded, the family Poaceae had the highest number of species. However, *Desmodium adscendens* had the highest percentage of 10.24%, followed by *Desmodium scorpiurus* (9.87) while *Paspalum scrobiculatum* had the least (2.95%).

The result of diversity indices for woody plants, shrubs, climbers and herbaceous species shown in Table 6 indicates that, the highest species richness was recorded among woody plants MI = 3.06 while the lowest was recorded among climber MI = 1.28. Also, shrub recorded the highest species evenness E= 0.95, the lowest species evenness was recorded in woody plants E =0.76. The highest species diversity was recorded

among herbs species, H= 2.71 with the lowest recorded among climber species (H =1.83).

Fauna Species Assessment

Forty-one fauna species within the class mammalian, aves, and reptiles were indicated (Table 7). Class mammalian had 16 species in 12 families, six species for class reptiles in 6 families and 19 species in class aves in 12 families. Bird species form the major component of the animal species in the forest.

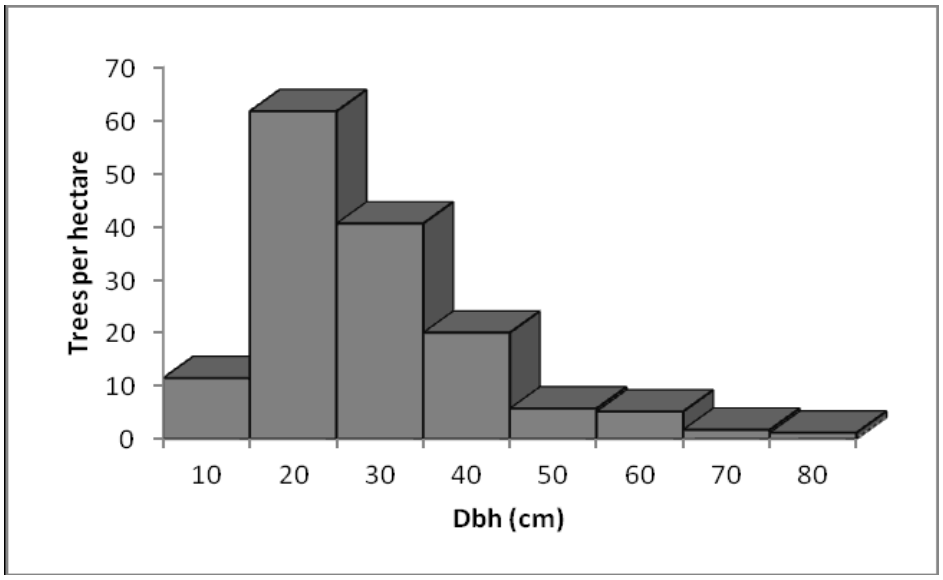

Fig. 1. Stem Diameter Distribution of Trees Species in Akopi Community Forest

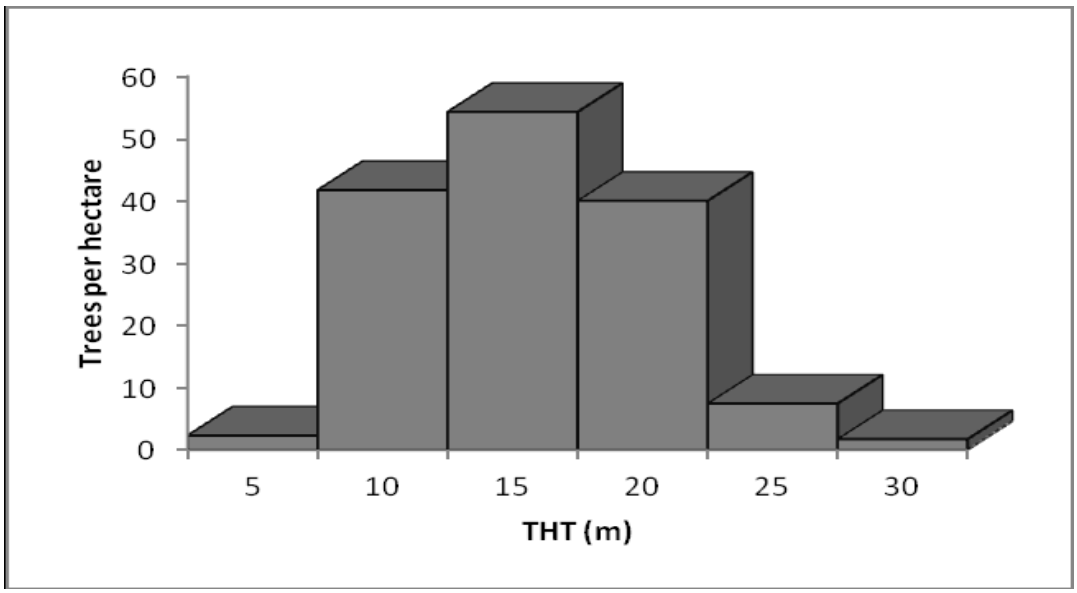

Fig.2. Total Height Distribution of Trees Species in Akopi Community Forest

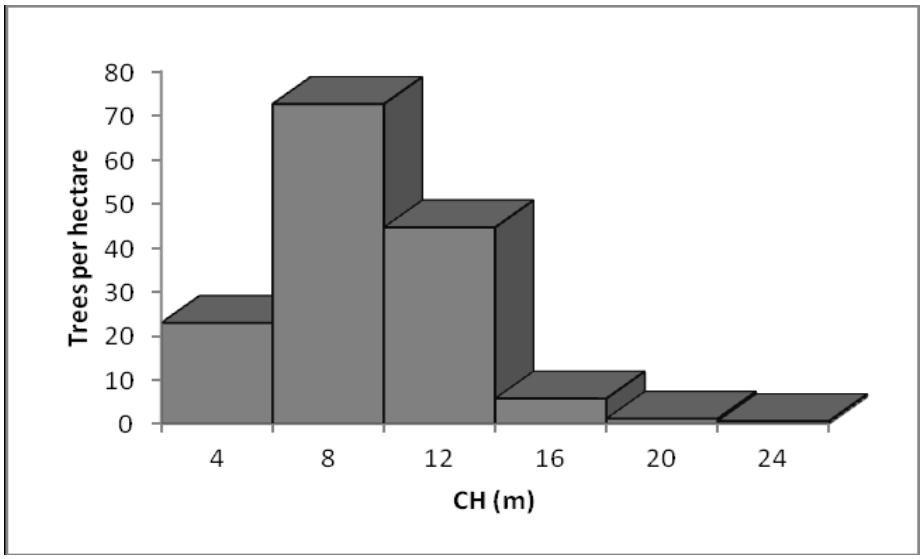

Fig.3. Crown Height Distribution of trees Species in Akopi Community Forest

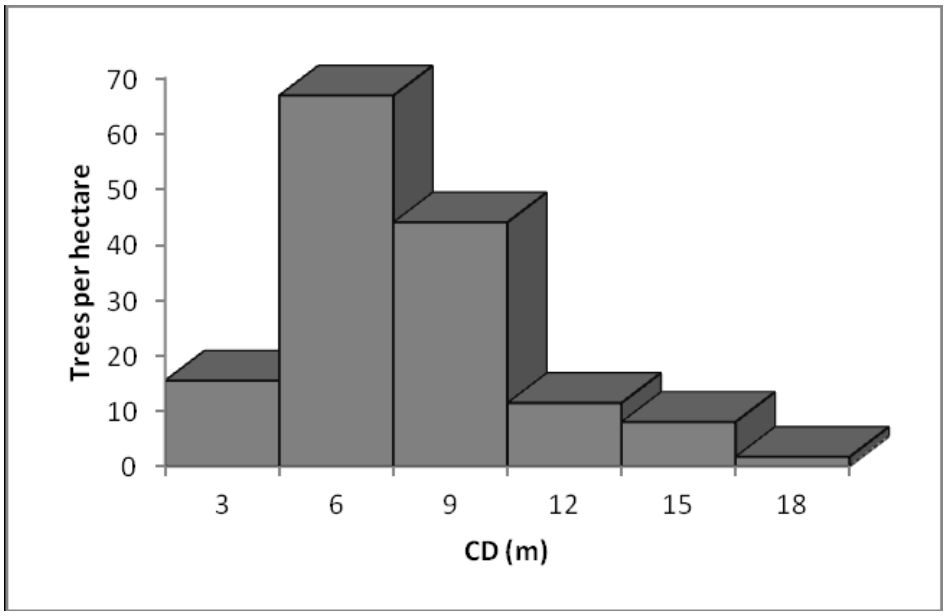

Fig.4. Crown Diameter Distribution of Trees Species in Akopi Community Forest

Table 1. Summary Statistics on Growth Variables for Tree Species in Akopi Community Forest

	DBH (cm)	THT (m)	CH (m)	CD (m)	BA(m^2)
Mean	23.2	12.7	6.9	6.3	0.054
Standard Deviation	12.5	4.7	2.9	3.0	0.067
Minimum	5.7	4.1	2.1	2.1	0.003
Maximum	78.1	28.2	20.1	16.9	0.479

Key: DBH-= Diameter at breast height, THT= Tree Total Height, CH= Crown Height
CD = Crown Diameter and BA = Basal Area

Table 2. Tree Species Composition and Abundance in Akopi Community Forest

S/NO	SPECIES	Family	N	N/ha	RF(%)	RD(%)	RDo(%)	IVI
1	*Acacia nilotica* (Linn.) Wild	Leguminosae	16	9	9.43	6.20	2.75	6.13
2	*Acacia polyacantha*. Willd.	Leguminosae	10	6	7.55	3.88	5.05	5.49
3	*Annona senegalensis*. Pers	Annonaceae	1	1	1.89	0.39	0.10	0.79
4	*Anogeissus leiocarpa* (DC.) Guill & per	Cambretaceae	66	38	9.43	25.58	13.25	16.09
5	*Bridelia scleroneura*. Mull.-Arg	Euphorbiaceae	4	2	3.77	1.55	0.63	1.99
6	*Combretum nigracans* Lepr.	Cambretaceae	13	7	7.55	5.04	1.52	4.70
7	*Ficus exasperate* Vahl	Moraceae	2	1	1.89	0.78	2.89	1.85
8	*Lannea schimperi* (Hochst.) Engl.	Anacardiaceae	11	6	9.43	4.26	12.08	8.59
9	*Maytenus senegalensis* (Lam.) Exell	Celastraceae	1	1	1.89	0.39	0.10	0.79
10	*Mitragyna inermis* (Willd.) O Ktze.	Rubiaceae	32	18	5.66	12.40	10.40	9.49
11	*Piliostigma thonningii* (Schumach.) Milne-Redh	Fabaceae	4	2	1.89	1.55	0.34	1.26
12	*Pseudocedrela kotschyi* (Schweinf.) Harms	Meliaceae	66	38	11.32	25.58	22.46	19.79
13	*Rauvolfia vomitoria* Afzel	Apocynaceae	1	1	1.89	0.39	0.06	0.78
14	*Sterculia setigera* Del.	Sterculiacae	7	4	3.77	2.71	14.07	6.85
15	*Stereospermum kunthianum* Cham.	Bignoniaceae	3	2	5.66	1.16	1.00	2.61
16	*Terminalia avicennioides* Guil. & per.	Combretaceae	16	9	11.32	6.20	9.93	9.15
17	*Terminalia schimperiana* Hochst.	Combretaceae	3	2	3.77	1.16	1.37	2.10
18	*Unknown*	-	2	1	1.89	0.78	1.99	1.55
	Total		258	148	100	100	100	100

Table 3. Shrub Species Enumerated within the Subplots

	Shrubs Species	Family	Number of individuals sampled								
			SP1	SP2	SP3	SP4	SP5	SP6	SP7	N	RD
1	*Chromolaena odorata* (L.) R.M. King & H. Rob.	Asteraceae	12	15	15	09	15	19	03	88	11.97
2	*Cyathula prostrate* (Linn.) Blume	Amaranthaceae	12	07	18	13	02	12	17	81	11.02
3	*Flueggea virosa* (Roxb. Ex Wild.) Dalzell	Phyllanthaceae	12	08	13	16	18	09	04	80	10.88
4	*Urena lobata* (L.)	Malvaceae	15	07	13	03	12	19	10	79	10.75
5	*Triufetta rhomboidea* (Jacq.)	Malvaceae	03	17	15	07	09	13	12	76	10.34
6	*Hibiscus asper* (Hook. f.)	Malvaceae	04	07	11	15	13	09	14	73	9.93
7	*Lepidagathis cuspidate* (Nees.)	Acanthaceae	03	12	07	03	13	09	05	52	7.07
8	*Cochlospermum planchonii* Hook. f. ex Planch	Cochlospermacea e	03	12	07	06	03	11	09	51	6.94
9	*Sida acuta* (Burm. f.)	Malvaceae	02	05	07	10	08	06	09	47	6.39
10	*Tephrosia densiflora* (Hoof. f.)	Fabaceae	09	02	07	06	00	10	11	45	6.12
11	*Byrsocarpus coccineus* (Schumach. & Thonn.)	Connaraceae	02	05	07	00	11	06	09	40	5.44
12	*Ludwigia decurrens* (Walter)	Onagraceae	00	03	04	02	03	11	00	23	3.13
	TOTAL		77	100	124	90	107	134	103	735	100

Key: SP = Subplots

Table 4. Climbers Species Enumerated within the Subplots

S/No	Climber Species	Family	Number of individuals sampled								
			SP1	SP2	SP3	SP4	SP5	SP6	SP7	N	RD
1	*Opilia celtidifolia (Guill & Perr.) Endl*	Opiliaceae	4	6	0	6	1	8	3	28	26.17
2	*Discorea dumetorum (Kunth) Pax*	Discoreaceae	1	0	2	4	8	9	2	26	24.3
3	*Cissus populnea Gill & Perr.*	Vitaceae	3	2	1	4	0	1	3	14	13.08
4	*Mucuna pruriens var. utilis (Linn.).DC*	Leguminosae	1	0	4	0	2	1	3	11	10.28
5	*Paullinia pinnata Linn.*	Sapindaceae	2	0	2	1	2	1	2	10	9.35
6	*Canthium venosum (Oliv.) Hiern*	Rubiaceae	3	4	0	0	1	2	0	10	9.35
7	*Cissus repens Lam.*	Vitaceae	3	1	3	0	0	0	1	8	7.48
	Total		17	13	12	15	14	22	14	107	100

Key: SP = Subplots

Table 5. Herbaceous Species enumerated within the quadrants

S/N	Species	Family	$1m^2$ Quadrant within the sample plots								
			SP1	SP2	SP3	SP4	SP5	SP6	SP7	N	RD (%)
1	*Desmodium adscendens* (Sw.) DC.	Fabaceae	00	09	27	08	13	32	22	111	10.24
2	*Desmodium scorpiurus* (SW.) Desv	Fabaceae	00	12	17	11	21	33	13	107	9.87
3	*Loudetia annua* (Stapf) C.E, Hubb.	Poaceae	56	00	17	09	00	12	05	99	9.13
4	*Monechma ciliatum* (Jacq.) Milne Redh.	Acanthaceae	13	17	05	00	11	21	23	90	8.30
5	*Andropogon tectorum* (Schumach. & Thonn.)	Poaceae	23	17	19	09	12	06	00	86	7.93
6	*Commelina erecta* (Chapm.)	Comelinaceae	12	09	16	13	08	11	00	69	6.37
7	*Sporobolus pyramidalis* (P. Beauv.)	Poaceae	00	12	18	00	19	07	12	68	6.27
8	*Nelsonia canescens* (Lam.) Spreng.	Acanthaceae	13	09	15	17	05	00	09	68	6.27
9	*Acanthus hispidum* (L.)	Acanthaceae	00	13	07	00	09	11	20	60	5.54
10	*Pennisetum pedicellatum* (Trin.)	Poaceae	06	13	15	00	00	18	06	58	5.35
11	*Calopogonium mucunoides* (Desv)	Fabaceae	00	00	07	17	08	07	12	51	4.70
12	*Hyptis suaveolens* (L.) Poit	Lamiaceae	09	11	08	00	08	00	13	49	4.52
13	*Corchorus tridens* (L.)	Malvaceae	07	11	00	00	18	09	00	45	4.15
14	*Rottboellia cochinchinensis* (Lour.) Clayton	Poaceae	11	07	12	06	00	00	08	44	4.06
15	*Scleria verrucosa* (Wild.)	Cyperaceae	11	00	08	15	00	09	00	43	3.97
16	*Paspalum scrobiculatum* (L.)	Poaceae	00	00	12	00	13	07	00	32	2.95
	Total		161	140	203	105	145	185	145	1,084	100

Key: SP = Plots

Table 6. Results of Stocking and Diversity Indices of Flora in the Study Area

Parameters	Tress	Shrubs	Climbers	Herbs
Number of Species	18	12	7	16
Number of trees	258	735	107	1,084
Shannon-Wiener index	2.18	2.43	1.83	2.71
Pielou Evenness	0.76	0.95	0.89	0.94
Margalef Index	3.06	1.67	1.28	2.15

Table 7. Species List, Mode of Identification of Mammals, Reptiles and Birds in Akopi Community Forest

S/N	Common Names	Scientific Names	Family	DS	IND	INH
	Mammals					
1	African goshawk	*Accipiter tachiro*	Accipitridae	-	-	x
2	Bushbuck	*Tragelaphus scriptus*	Bovidae	X	-	x
3	Grey duiker	*Sylvicapra grimmia*	,,		X	x
4	Hunting dog	*Lycaon pictus*	Canidae	-	-	x
5	Tantalus monkey	*Chlorocebus tantalus*	Cercopithecidae	X	X	
6	Mona monkey	*Cercopithecus mona*	..	X	-	X
7	Red patas monkey	*Erythrocebus patas*	,,	X	-	X
8	Olive baboon	*Papio anubis*	,,	-	-	X
9	Spotted hyena	*Crocuta crocuta*	Hyenidae	-	-	X
10	Crested Porcupine	*Hystrix cristata*	Hystricidae	-	-	X
11	Pygmy rabbit	*Brachylagus idahoensis*	Leporidae	X	-	X
12	Giant ground pangolin	*Smutsia gigantea*	Manidae	-	-	X
13	African grass rat	*Arvicanthis niloticus*	Murinae	X	-	X
14	Forest giant pouched rat	*Cricetomys emini*	Nesomyidae	-	X	X
15	Striped ground squirrel	*Xerus erythropus*	Sciuridae	X	-	X
16	Greater cane rat	*Thryonomys swinderianus*	Thryonomyidae	X	-	X
	Reptiles					
17	Agama lizard	*Agama agama*	Agamidae	X	-	-
18	Northern alligator lizard	*Elgaria coerulea*	Alligatoridae	X	-	X
19	Northern green bush snake	*Philothemus iregularis*	Colubridae	X	-	X
20	Black and white spitting cobra	*Naja siamensis*	Elapidae	X	-	X
21	Royal python	*Python regius*	Pythonidae	-	-	X
22	Red adder	*Bitis rubida*	Viperidae	-	-	X
	Birds					
23	Yellow billed kite	*Milvus aegyptius*	Accipitridae	X	-	-
S/N	Common Names	Scientific Names	Family	DS	IND	INH
	Birds					
24	Black kite	*Milvus migrans*	,,	X	-	-
25	Goshawk hawk	*Accipiter africana*	,,	X	-	-
26	African dwarf-king fisher	*Ispidina lecontei*	Alcedinidae	X	-	-
27	African grey hornbill	*Tockus nasutus*	Bucerotidae	X	-	X
28	Common ringed plover	*Charadrius hiaticula*	Charadriidae	X	-	-
29	Laughing dove	*Spilopelia senegalensis*	Columbidae	X	-	X
30	Mourning collared dove	*Streptopelia decipiens*	,,	X	-	-
31	Yellow eyed-pigeon	*Columba eversmanni*	,,	X	-	-
32	Abyssinian roller	*Coracias abyssinicus*	Coraciidae	X	-	-

S/N	Common Names	Scientific Names	Family	DS	IND	INH
	Birds					
33	Senegal coucal	*Centropus sensgalensis*	Cuculidae	X	-	X
34	Black throated coucal	*Centropus leucogaster*	,,	X	-	-
35	Violet turaco	*Musophaga violacea*	Musophagidae	X	-	X
36	Western plantain eater	*Crinifer piscator*	,,	X	-	-
37	Double-Spurred francolin	*Pternistis bicalcaratus*	Phansianiddae	X	-	X
38	Helmeted guineafowl	*Numida meleagris*	,,	X	-	X
39	Green woodhoopoe	*Phoeniculus purpureus*	Phoeniculidae	X	-	-
40	Common bulbul	*Phynonotus barbatus*	Phynonotidae	X	-	-
41	Senegal parrots	*Piocephalus senegalus*	Poicephalus	X	-	-

In the above table;

DS = Direct Sighting

IND = Indices (Animals sign and activities)

— = Absent

X = Present

DISCUSSION

Range forest stand composition and structure, can be easily and effectively described through distribution and abundance of floristic and animal species. Tree crown height, depth and diameter at breast height as well as basal area were considered. Woody plant productivity, forest species and health depends largely on crown dimensions and resistance to any environmental factor, thus forming major consistence of terrestrial wildlife habitat. Evaluation of range floristic structure and its fauna associate is useful in the field of wildlife management for describing stand structure and forest productivity for wildlife habitat management (Chima *et al.,* 2011).

The result of the study revealed a total number of 18 species in 13 families for woody plants, 12 shrub species in 9 families, while 7 climbers' species in 6 families and 16 herbaceous species in 8 families were recorded. Generally, *Pseudosedrela kotschyi* had the highest value for relative frequency, relative density, species relative dominance and species important value index. It appears that, the species strive/tolerant to the environmental condition of the area. This differs from the findings of Yager e*t al.,* (2017) reporting *Isoberlina doka* as the dominant tree species in Ikwe Forest Reserve Benue State. *Chromolaena odorata* had the highest percentage for shrubs species. The highest species occurrence among climbers was *Opilia celtidifolia* while *Desmodium adscendens* had the highest amount of herbaceous species. The diversity indices indicate that, the

highest species richness was recorded among woody plants species, but had the second lowest value for species diversity. This indicates that the species numbers were not evenly distributed among individual species. Shrubs species recorded the highest species evenness, more so, the highest species diversity was obtained among herbaceous species, which also shows second highest value for species richness and species evenness. This indicates that the composition of herbaceous species is relatively high in the study area compared to other forage resources and thus, helps in soil protection against soil erosion on the rangeland of the area. The high herbaceous composition also could be as a result of reduced composition of woody trees and shrubs through agricultural expansion. This was also reflected on the structure of the woody plant species, creating a less dense forest area as indicated by the mean values for growth variable. This result could give the wildlife manager an ideal of the land area cover, crown density as well as forest gaps. This could also inform management and conservation decisions, a less dense forest with trees of low crown area do allow sunlight penetration, in turn, promoting under growth (grasses, forbs and shrubs) which are very necessary for herbivores. Short, (1984) upheld the need for range management; stating that the composition of vegetation that the different habitat layers must contain in order to provide the necessary structure for wildlife use is unknown. Presumably, animal species react to the presence of a particular habitat layer when the structure is developed beyond some threshold value (Chukwu *et al.,* 2017).

Most of the animal species especially the mammal's recorded were confirmed by hunter, elders through in-depth interview and other assessment indices. However, bird's species form the major component of wild species in the forest, generally they seem to be paucity of animal species in the area, however, one possible explanation for a positive relationship between vegetation structure, food plant and animal species richness is that a greater number of plant species could potentially provide more niches for co-existence of animal species. Perrins *et al.,* (1991) equally ascertained that the composition and distribution of any specie is restricted by distribution of its habitat and within that habitat the availability of food and other resources.

As conclusion, the range floristic component and fauna assessment is an effective method of describing stand properties and diversity of individuals, because basic knowledge of species richness patterns and species distribution within a region is a necessary starting point to predict species extinction index, habitat lost and also to understand the potential impact on biodiversity, as well as to prioritized conservation effort and designing conservation areas. Although the forest site was apparently species fare, in both flora and fauna, but indicate high diversity among herbaceous species. Furthermore, vegetation composition and structure especially tree crown dimensions

have a high value in forest ecosystem management, where the forest structure, wildlife habitat suitability, fruit and seed production and shedding potentials is considered high for wild animals' habit management. Hence, it was suggested that, the forest reserve be protected from resource exploitation (land clearing for agriculture, logging and hunting activities) therefore, its management should be based on sound ecological principles.

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