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HABITAT USE STRATEGY OF VERTEBRATES IN AN EMERGING NATURE RESERVE

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ABSTRACT

The habitat use strategy of vertebrates in Alabata Strict Nature Reserve was studied. Twenty (20) sample plots of 25m x 25m (0.062ha) were laid at random over the total area of the study site for data collection. King Census and Line Transect methods were modified for this study using direct and indirect modes of wildlife stock assessment for an accurate collection of data due to the dense nature of the vegetation in some areas. One hundred and twenty-one vertebrate species, belonging to fifty-six families were recorded. Twenty-seven families were represented by just a single species each, while thirteen families had two species each. The family *Colubridae* was represented by ten species, while *Rattudae* and *Sciuridae* had a single species respectively. Birds were the most encountered (more than 60%) followed by mammals (more than 20%) while the Order *Reptalia* constitutes the remaining (less than 20%). Food and cover requirements abound in the study area, which explains the availability of a variety of fauna species. There is a strong association between the environmental variables and animal species thus; distribution, performance and survival of the species are directly influenced by these variables. The Principal component analysis and Ordination shows that the ecosystem of the study site is not stable yet. This can be observed from the clustering of the animal species together in an attempt to make the best use of the environment. The maintenance of a healthy ecosystem is largely dependent on its management and control of activities of man and animals.

INTRODUCTION

Strict nature reserves and wilderness areas are protected areas that are created and managed mainly for the purposes of research or for the protection of large, unspoiled areas of wilderness. Their primary purpose is the preservation of biodiversity and as essential reference areas for scientific work and environmental monitoring (IUCN).

Protection of biodiversity can be achieved in strict nature reserve, ecological reserves, etc. These are areas created for the conservation of natural values, usually the known habitat of endangered species, threatened ecosystem, or representative samples of widespread communities.(Shotuyo, 2011).

The breaking up of terrestrial habitats is widespread in most parts of the world, and its negative effects have been well documented (e.g. Saunders *et al*., 1991). Native species are lost from habitat fragments because of deforestation-related disturbance,

restriction of population size, reduced immigration, edge effects and invasion of exotic species (Turner, 1996). Management of remaining undisturbed fragments has received detailed attention as the primary means for enhancing the conservation status of fauna in the fragmented landscape. This has been particularly true for forest fragments, which may contain localized or threatened biota and source populations for recolonizing rehabilitated lands (Saunders *et al*., 1987; Turner and Corlett, 1996). Implicit in most discussions of fragment conservation is the assumption that habitat fragments provide food and shelter resources needed for the long-term maintenance of populations, even if the surrounding environment is not entirely hostile to movement and supports populations of some species at low densities (Dickman and Doncaster, 1989; Hansson *et al*., 1995).

This study examines the survival strategies of vertebrate resources in Alabata Nature reserve, which allows them to cope with the prevailing emerging conditions of a nature reserve undergoing regeneration.

METHODOLOGY

The study area

The study area is contained in the 9,700 hectare land of the University of Agriculture, Abeokuta, situated north-eastern of Abeokuta, along Alabata road, (fig.1). The site is located between latitude 7o and 7o 58! And Longitude 3o 3! And 3o 37!. The site falls within the humid tropical lowland region with two distinct seasons. The longer wet season lasts for eight (8) months, from March – October and the shorter dry season lasts for four (4) months from November – February. The area normally witness high rainfall at two periods of the year, i.e the peak period of June – July and September – October. It has a mean annual rainfall of 1250 to 2500mm.

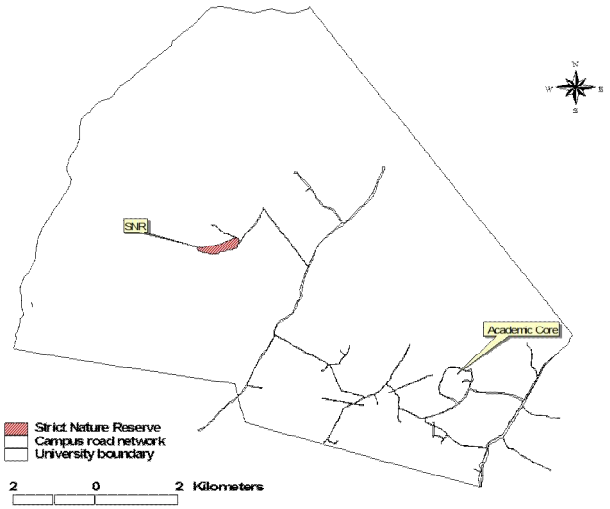

Fig. 1: Map Of the University of Agriculture showing the Study Area

The mean monthly temperature ranges between 25.7°C in July and 30.2°C in February. The lowest temperature is recorded in June and September. The relative humidity is high all year round. The most humid months coincides with the rainy season and the figure ranges between 60% and 80% from December to February.

Sampling Procedures

Twenty (20) sample plots of 25m x 25m (0.062ha) were laid based on observed richness in vegetation cover over the total area of the study site for data collection. For accuracy and ease in data collection, each plot of 25m x 25m was further partitioned into 5 quadrates of equal sizes at the left and right sides of the centerline of each plot.

Animal (Vertebrates) Survey

King Census and Line Transect methods were modified for this study using direct and indirect modes of wildlife stock assessment for an accurate collection of data due to the dense nature of the vegetation in some areas. Direct count method was used for all animals sighted during the laying of plots. Animal survey was carried out within the plots and a checklist of all animal species found in the study area was made. The indirect method of sampling was also used. All indicators of animal presence or activities in the plots sampled were recorded.

Vegetation Survey

Total enumeration was carried out in each sample plot for all the trees and shrubs. These provided the floristic data for the study. The specimens that cannot be identified on the field were taken to a standard herbarium (Forestry Research Institute Ibadan) for proper identification.All ground flora with height below 1m and dbh of $\leq$ 5cm were enumerated for their percentage abundance in each plot.

RESULT AND DISCUSSION

One hundred and eighteen (118) plant species (Table 1) being members of fifty-three families were found to constitute the major vegetation of the study site. The Gramineae contain the most number of species (nineteen) followed by Papilionaceae (nine) and Euphorbiaceae with eight species (Table 2). Thirty-one shrub species (Table 3) were collected indicating the modification of the vegetation to a derived savannah ecosystem. Dicotyledons accounted for more than 80 percent of the ecosystem (Figure 3). Trees like *Blighia sapida*, *Cordia millenii* and *Daniella oliveri* etc provides shades and comforts in quite many parts of the Nature Reserve.

One hundred and twenty-one (121) vertebrate species, belonging to fifty-six (56) families were recorded. (table 4). Twenty-seven families were represented by just a single species each, while thirteen families had two species each. (table 5). The family *Colubridae* was represented by ten species, while *Rattudae* and *Sciuridae* had a single species respectively. Birds were the most encountered (more than 60%) followed by mammals (more than 20%) while the other *Reptalia* constituted the remaining (less than 20%).

Table 1: Plant Species Identified in the Study site

S/N	Botanical Name	Family	Local Name
1.	Acridocarpus smeathmannii	Malphighiaceae	Gbogbori, Ogo-Igbo
2.	Acroceras zizanioides	Gramineae	Iye-Etu
3.	Agelaca oblique	Connaraceae	Esura, Okun
4.	Aidia genipiflora	Rubiaceae	
5.	Albizia zygia	Mimosaceae	Ayinre-weere,Ayunre
6.	Alternanthera pungens	Amaranthaceae	Danguro
7.	Alternanthera sessilis	Amaranthaceae	Danguro
8.	Amgylocalryx menostrachyus	Labiatae	
9.	Andropogon gayanus	Gramineae	Eruwa-funfun
10.	Andropogon tectorum	Gramineae	Eruwa-dudu
11.	Annona senegalensis	Annonaceae	Abo
12.	Argyreia nivosa	Convolvulaceae	
13.	Blepharis maderaspatensis	Acathaceae	Ojusaaju
14.	Blighia sapida	Sapindaceae	Isin
15.	Blighia unijugata	Sapindaceae	Ako-isin
16.	Brachiaria atrovirens	Gramineae	Yoyoka
17.	Brachiaria villosa	Gramineae	Agbado-esin
18.	Caesalpina bonduc	Caescalpiniaceae	Sayo, Ayo
19.	Cajanus cajan	Papilionaceae	Otili
20.	Canna bidentata	Cannaceae	Ido

21.	Cassia rotundifolia	Ceasalpinaceae	Epa ile
22.	Cassia tora	Ceasalpinaceae	Eru asunundegbe
23.	Ceratotheca sesamoidea	Pedaliaceae	Eku
24.	Chassalia kolly	Rubiaceae	Tutugbo
25.	Chochlospermum planchoni	Cochlospermaceae	
26.	Chrysophylum albidum	Sapotaceae	Agbalumo
27.	Cinna indica	Cannaceae	
28.	Cissampelos owariensis	Menispermaceae	Jenjokoo
29.	Cissus araliodies	Vataceae	Abeekonna marun-un
30.	Codianum veriegatum	Euphorbiaceae	
31.	Combretum racemosum	Combretaceae	Ogan-ibule
32.	Combretum smeathmanii	Combretaceae	Okan
33.	Comelina nigritana	Commelinaceae	Iyetakoko
34.	Cordia millenii	Boraginaceae	Omo
35.	Cordia platythrsa	Boraginaceae	Akoledo
36.	Costus afer	Zingiberaceae	Ireke-Omode
37.	Crotolaria retusa	Papilionaceae	Saworo
38.	Cyathula prostrate	Amaranthaceae	Sewerepepe
39.	Dactyloctenium aegytium	Gramineae	
40.	Dalbergia hostiles	Papilionaceae	Ogun-aja
41.	Dalbergiella welweitchi	Papilionaceae	Elemosoo
42.	Daniella oliveri	Papilionaceae	Iya
43.	Desmodium riflorum	Papilionaceae	Emo
44.	Digitaria horizontalis	Gramineae	Eeran oko
45.	Discorea preussi	Discoreaceae	Ewo
46.	Ehretia cymosa	Boraginiaceae	Jaoke
47.	Eleusine indica	Gramineae	Gbegi
48.	Emilia praetermisa	Astraceae	Odundun
49.	Entada abyssinicca	Mimosaceae	Gbengbe
50.	Eragrostis tremula	Gramineae	Agbado-esin
51.	Eriosema glomeratum	Papilionaceae	Roro

52.	Erythrina senegalensis	Lpapilionaceae	Ologbosere
53.	Euphorbia hyssopifolia	Euphorbiaceae	Oro adete
54.	Ficus ingens	Moraceae	Oba-Odan
55.	Ficus mucuso	Moraceae	Obobo
56.	Funtumia Africana	Apocynaceae	Ire
57.	Furcraea gigantean	Agavaceae	
58.	Glyphaea brevis	Tiliaceae	Atori
59.	Gossypium barbadense	Euphorbiaceae	Owu-elepa
60.	Hisbiscus sabdarrifa	Malvaceae	Isapa
61.	Holoptelia grandis	Ulmaceae	Ayo
62.	Hymonocardia acida	Hymnenocardiaceae	Orupa
63.	Hyparrhenia involucrate	Gramineae	
64.	Hyparrhenia subplumosa	Gramineae	
65.	Icacina tricantha	Icacinaceae	Gbegbe
66.	Impereta cylindrical	Gramineae	Ekan
67.	Ipomoea heterotricha	Convolvulaceae	Jeminhoo
68.	Jassminum obtusifolium	Olaceae	
69.	Jatropha mullifida	Euphorbiaceae	Lapalapa
70.	Laggera pterodonta	Astraceae	Oorungo
71.	Mallotus subulatus	Euphorbiaceae	Apaluwore
72.	Manihot glaziovii	Euphorbiaceae	Igi-isana
73.	Mariscus alternifolius	Cyperaceae	Ikeregun
74.	Merrennia kentrocaulis	Convolvulaceae	Atewegbore
75.	Mitracarpus scaber	Rubiaceae	Irawo-ile
76.	Mondora tennifolia	Annonaceae	Lakosin
77.	Newbouldia laevis	Bignonaceae	Akoko
78.	Ochra afzeli	Ochroceae	
79.	Panicum brevifolium	Gramineae	Eeran-esin
80.	Parinari curatelifolia	Chrysobalanaceae	Abo-idofin
81.	Parquetina nigrecens	Periplocaceae	Ogbo
82.	Passiflora foetida	Passifloraceae	
83.	Pedilanthus tithymalodies	Euphorbiaceae	

84.	Pennisetum polystachon	Gramineae	Ilosun
85.	Pennisetum purpureum	Gramineae	Eesu
86.	Petiveria alliacea	Phytolaceae	Awogba
87.	Physalis micrantha	Solanaceae	Efopo
88.	Polycarpaea linearifolia	Euphorbiaceae	Eyin-ire
89.	Pouzolzia guineensis	Urticaceae	Abolokopiran
90.	Rhigiocarya racemifera	Menispermaceae	Lagbolagbo
91.	Rhynchelytrum repens	Gramineae	Eeran-eye
92.	Ritchiea longipedicellata	Capparidaceae	Ologbe-kuyan
93.	Rothamannia urcelliformis	Rubiaceae	Buje
94.	Rottboellia exaltata	Gramineae	Holo
95.	Sanseviera trifasciata	Agavaceae	Oja-ikooko
96.	Schizachrium sanguineum	Gramineae	Bere
97.	Schrankia leptiocarpa	Mimosaceae	
98.	Scleria depressa	Cyperacae	Emee
99.	Secamone afzeli	Asclepiadaceae	Arilu
100.	Securidaca longepedunculata	Polygalaceae	Ipeta
101.	Senna alata	Caesalpiniaceae	
102.	Senna hirsute	Caesalpiniaceae	
103.	Solenostemon monostachyus	Labiatae	Aranpolo
104.	Sorindeia warneckei	Anacardiaceae	Afunsese
105.	Spilanthes filicaulis	Compositae	Awerepepe
106.	Spondias monbin	Anacardiaceae	Iyeye
107	Sporobolus pyramidalis	Gramineae	
108.	Stachytarpheta cayennesis	Verbernaceae	Agogo igun
109.	Striga mucrantha	Scrophulariaceae	
110.	Strychnos spinosa	Loganiaceae	Atako
111.	Thevetia peruviana	Apocynaceae	Olomiojo
112.	Triplochiton scleroxylon	Sterculiceae	Arere
113.	Triumfetta rhomboidea	Tiliaceae	Boko-pupa
114.	Uraria picta	Papilionaceae	Alupayida
115.	Vigna racemosa	Papilionaceae	Gbomogungi
116.	Vigna triloba	Papilionaceae	Eree
117.	Vitellaria paradoxa	Sapotaceae	Emi
118.	Wassadula amplissima	Malvaceae	Ewefuru

Table 2: Distribution of Species according to Families

Family	Number of Species
Acathanceae	1
Agavaceae	2
Amaranthaceae	3
Anacardiaceae	2
Annonaceae	2
Apocynaceae	2
Asclepiadaceae	1
Astraceae	2
Bignonaceae	1
Boraginaceae	3
Caesalpinaceae	3
Capparidaceae	1
Ceasalpinaceae	2
Chrysobalanaceae	1
Cocchlospermaceae	1
Combretaceae	2
Commelinaceae	1
Compositae	1
Connaraceae	1
Convolvulaceae	3
Cyperaceae	2
Discoreaceae	1
Euphorbiaceae	8
Gramineae	19
Hymnenocardiaceae	1
Icacinaceae	1
Labiatae	2
Loganiaceae	1
Lpapilionaceae	2
Malvaceae	2

Malvaceae	2
Merispermaceae	2
Mimosaceae	3
Moraceae	2
Ochroceae	1
Olaceae	1
Papilionaceae	9
Papsifloraceae	1
Pedaliaceceae	1
Periplocaceae	1
Phytolaceae	1
Polygalaceae	1
Rubiaceae	4
Sapindaceae	2
Sapotaceae	2
Scrophulariaceae	1
Solanaceae	1
Sterculiceae	1
Tiliaceae	2
Ulmaceae	1
Urticaceae	1
Vataceae	1
Verbernaceae	1
Zingiberaceae	1

Table 3: Habit of Plant Species

Botanical Name	Habit
Acridocarpus smeathmannii	Shrub
Acroceras zizanioides	Grass
Agelaca oblique	Climber
Aidia genipiflora	Tree
Albizia zygia	Tree
Alternanthera pungens	Herb
Alternanthera sessilis	Herb
Amgylocalryx menostrachyus	Shrub
Andropogon gayanus	Grass
Andropogon tectorum	Grass
Annona senegalensis	Tree
Argyreia nivosa	Climber
Blepharis maderaspatensis	Herb
Blighia sapida	Tree
Blighia unijugata	Tree
Brachiaria atrovirens	Grass
Brachiaria villosa	Grass
Caesalpina bonduc	Herb
Cajanus cajan	Shrub
Canna bidentata	Herb
Cassia rotundifolia	Herb
Cassia tora	Shrub
Ceratotheca sesamoidea	Herb
Chassalia kolly	Shrub
Chochlospermum planchoni	Shrub
Chrysophylum albidum	Herb
Canna indica	Shrub
Cissampelos owariensis	Climber
Cissus araliodies	Climber
Codianum veriegatum	Shrub
Combretum racemosum	Climber

Combretum smeathmanii	Scrambling Shrub
Commelina nigritana	Herb
Cordia millenii	Tree
Cordia platythrsa	Tree
Costus afer	Herb
Crotolaria retusa	Herb
Cyathula prostrate	Herb
Dactyloctenium aegytium	Grass
Dalbergia hostilis	Scrambling Shrub
Dalbergiella welweitchi	Scrambling Shrub
Daniela olliveri	Tree
Desmodium riflorum	Shrub
Digitaria horizontalis	Grass
Discorea preussi	Climber
Ehretia cymosa	Herb
Eleusine indica	Grass
Emilia praetermisa	Herb
Entada abyssinicca	Tree
Eragrostis tremula	Grass
Eriosema glomeratum	Shrub
Erythrina senegalensis	Tree
Euphorbia hyssopifolia	Herb
Ficus ingens	Tree
Ficus mucuso	Tree
Funtumia Africana	Tree
Furcraea gigantean	Shrub
Glyphaea brevis	Shrub
Gossypium barbadense	Shrub
Hisbiscus sabdarrifa	Herb
Holoptelia grandis	Tree
Hymonocardia acida	Tree
Hyparrhenia involucrate	Grass
Hyparrhenia subplumosa	Grass

Icacina tricantha	Shrub
Impereta cylindrical	Grass
Ipomoea heterotricha	Creeping Herb
Jassminum obtusifolium	Scrambling Shrub
Jatropha mullifida	Shrub
Laggera pterodonta	Herb
Mallotus subulatus	Shrub
Manihot glaziovii	Shrub
Mariscus alternifolius	Sedge
Merrennia kentrocaulis	Creeping Herb
Mitracarpus scaber	Herb
Mondora tennifolia	Tree
Newbouldia laevis	Tree
Ochra afzeli	Shrub
Panicum brevifolium	Grass
Parinari curatelifolia	Tree
Parquetina nigrecens	Climber
Passiflora foetida	Creeping Herb
Pedilanthus tithymalodies	Herb
Pennisetum polystachon	Grass
Pennisetum purpureum	Grass
Petiveria alliacea	Herb
Physalis micrantha	Herb
Polycarpaea linearifolia	Herb
Pouzolzia guineensis	Herb
Rhigiocarya racemifera	Climber
Rhynchelytrum repens	Grass
Ritchiea longipedicellata	Shrub
Rothamannia urcelliformis	Tree
Rottboellia exaltata	Grass
Sanseviera trifasciata	Herb
Schizachrium sanguineum	Grass
Schrankia leptiocarpa	Herb

Scleria depressa	Herb
Secamone afzeli	Climber
Securidaca longepedunculata	Tree
Senna alata	Shrub
Senna hirsute	Shrub
Solenostemon monostachyus	Shrub
Sorindeia warneckei	Scrambling Shrub
Spilanthes filicaulis	Herb
Spondias monbin	Tree
Sporobolus pyramidalis	Grass
Stazchytarpheta cayeneesis	Herb
Striga mucrantha	Herb
Strychnos spinosa	Tree
Thevetia peruviana	Tree
Triplochiton scleroxylon	Tree
Triumfetta rhomboidea	Shrub
Uraria picta	Shrub
Vigna racemosa	Climber
Vigna triloba	Climber
Vitellaria paradoxa	Tree
Wassadula amplissima	Shrub

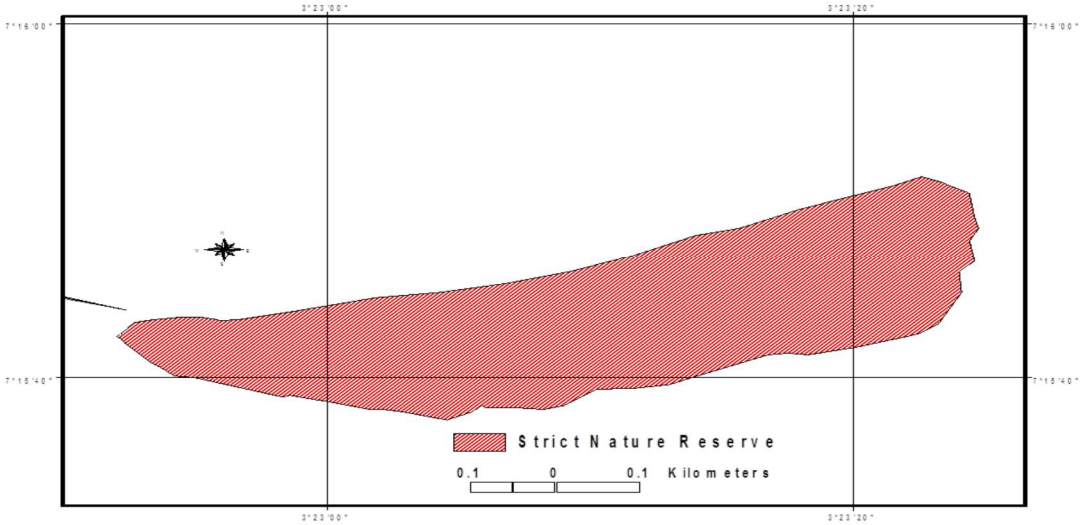

Fig. 2: Map of Study Area

Table 4: Names, Code And Taxonomic Characteristics Of Animal In The Study Site

COUPLET NO.	SCIENTIFIC NAME	ENGLISH NAME	CODE	CLASS	FAMILY
1	Actophilomis africana	Lily rotter	**ACAF**	**Birds**	**Jacanidae**
2	Agama agama	Agama lizard	AGAG	Reptiles	Agamidae
3	Ardea cinera	Grey heron	ARCI	Birds	Ardeidae
4	Arvicanthus niloticus	Nile rat	ARNI	Mamamal	Rattus
5	Artheris chloraechis	Brown snake	ARCH	Reptiles	Colubridae
6	Anthus leucophrys	Plainbacked pipit	ANLE	Birds	Motacillidae
7	Bitis gabonica	Gabon viper	BIGA	Reptiles	Viperridae
8	Bostrichia hagedash	Hadada ibis	BOHA	Birds	Threskiomithidae
9	Bothropthalmus ,ineatum	Sidestripe brown snake	BOLI	Reptiles	Colubridae
10	Bulbulcus ibis	Cattle egret	BUIB	Birds	Ardeidae
11	Burhinus senegalensis	Senegal thick snale	BUSE	Birds	Burhinidae
12	Carprimulgus spp	Night jar	CASP	Birds	Caprimulgidae
13	Centropus grilli	Black coucal	CEGR	Birds	Cuculidae
14	Centropus senegalensis	Senegal coucal	CESE	Birds	Cuculidae
15	Cephalophus maxwellii	Maxwell duiker	CEMA	Mamamal	Cephalophinae
16	Cephalophus rufilatus	Red flanked duiker	CERU	Mamamal	Cephalophinae

17	Cephalophus spp	Duiker	CESP	Mamamal	CCephalophinae
18	Cercopitheecus mona	Mona monkey	CEMO	Mamamal	Cercopithecidae
19	Ceryle rudis	Pied king fisher	CERD	Birds	Alcedinidae
20	Ciconia abdmii	Abdim stork	CIAB	Birds	Ciconidae
21	Cisticola cantan	Lanceolated warbier	ICA	Birds	Sylvidae
22	Cisticola galactotes	Grass wabler	CIGA	Birds	Sylvidae
23	C,amator glandarius	Great spottted cukoo	CAGL	Birds	Campephagidae
24	Clamator jacobinus	Jaccobin cukoo	CLJA	Birds	Campephagidae
25	Clamator levallanti	Levaillant african cukoo	CLLE	Birds	Campephagidae
26	Coracias abysinica	Abysinia roller	COAB	Mamamal	Coraciidae
27	Coracias cyanogaster	Bleud bellied roller	COCY	Mamamal	Coraciidae
28	Corvinella corvine	Long tail shrike	COCO	Mamamal	Laniidae
29	Corvus albus	Pied cow	COAL	Mamamal	Corvidae
30	Corythaeola cristata	Blue plantain eater	COCR	Mamamal	Musophagidae
31	Cricetomys gambianus	Giant rat	CRGA	Mamamal	Cricetidae
32	Crinifer piscator	Grey plantain eater	CRPI	Birds	Musophagidae
33	Cypsiuurus parvus	African palm swift	CYPA	Birds	Apodidae
34	Dendroaspis virindis	Green mamba	DEVI	Reptiles	Elapidae
35	Dendrocygna viduata	White faced tree duck	DEVD	Birds	Anatidae
36	Dendrohyrax dorsalis	Tree hyrax	DEDO	Mamamal	Provaviidae
37	Dendropicos fuscescens	Cardinal woodpecker	DEFU	Birds	Picidae
38	Epixerus ebii	Red headed tree squirrel	EPEB	Mamamal	Sciuridae
39	Erythrocebus patas	Patas monkey	ERPA	Mamamal	Cercopithecidae
40	Estrilda melpoda	Orange cheeked waxbill	ESME	Birds	Estrildae
41	Euplectes orix	Red bishop	EUOR	Birds	Estrildae
42	Euplectes macrourus	Yellow mantle whydah	EUMA	Birds	Ploceidae
43	Francolinus bicalcaratus	Francolin (Bush fow)	FRBI	Birds	Phasiannidae
44	Fraseria ocreata	Fraser forest flycatcher	FROC	Birds	Mucicapidae

45	Genetta macullatta	Forest genet (Maloko)	GEMA	Mamamal	Viverridae
46	Genetta trigrina	Serval cat (Ogbo)	GETR	Mamamal	Viverridae
47	Gypohierax angolensis	Plamnut vulture	GYAN	Birds	Accipitiridae
48	Halcyon leucocephala	Grey headed kingfisher	HALE	Birds	Alcedinidae
49	Halcyon malimbica	Blue breasted kingfisher	HAMA	Birds	Alcedinidae
50	Hacyon senegalensis	Sengal kingfisher	HASE	Birds	Alcedinidae
51	Haliatus vocifer	Fish (River) Eagle	HAVO	Birds	Accipitiridae
52	Heliosciurus puncatus	Small forest swallow	HEPU	Birds	Sciuridae
53	Hirundo semirufa	Rufuos chested swallow	HISE	Birds	Hirundidae
54	Hirundo senegalensis	Mospue swallow	HISG	Birds	Hirundinidae
55	Hylochoerus minertzhageni	Giant Forest hog	HYMI	Mamamal	Suidae
56	Hystrix cristata	Crested porcupine	HYCR	Mamamal	Hysricidae
57	Indicator indicator	Greater honey guide	ININ	Birds	Indicatoridae
58	Indicator minor	Lesser honey guide	INMI	Birds	Indicatoridae
59	Kaupifalco monogrammicus	Lizard Buzzard	KAMO	Birds	Accipitiridae
60	Logonosticta senegala	Senegal fire finch	LASE	Birds	Fringilidae
61	Lamptotornis spp	Glossy starlings	LASP	Birds	Sturnidae
62	Laniarus artoflavus	Yellow billed shrike	LAAR	Birds	Laniidae
63	Lemniscormys striatus	Spotted grass mouse	LEST	Mamamal	Rattus
64	Lepus capensis	Hare	LECA	Mamamal	Leporidae
65	Lonhura bicolor	Black and white manikin	LOBI	Birds	Estrildae
66	Lonchura cucullata	Bronse manikin	LOCU	Birds	Estrildae
67	Lophuromys sikapusi	Rufuos bellied rat	LOSI	Mamamal	Rattus
68	Lybius veilliot	veilliot barbet	LYNE	Birds	Capitornidae
69	Macronyx crocent	Yellow throated long claw	MACR	Birds	Motacillidae
70	Merops albicolis	White throated bee eater	MEAL	Birds	Meropidae
71	Merops malimbicus	Rosy bee eater	MEMA	Birds	Meropidae
72	Merops muellenii	Black headed bee eater	MEMU	Birds	Meropidae
73	Merops nubicus	Carmine bee eater	MENU	Birds	Apodidae

74	Micropus caffer	White rumped swift	MICA	Birds	Apodidae
75	Milvus migrans	Black kite	MIMI	Birds	Accipitiridae
76	Motacilla flava	Yellow wagtail	MOFL	Birds	Motacillidae
77	Mungos obsciurus	Long nose mongoose	MUOB	Mamamal	Viverridae
78	Mus minutoides	Pigmy mouse	MUMI	Mamamal	Rattus
79	Musophaga violacea	Violet plantain eater	MUVI	Birds	Musophagidae
80	Naja melanoleuca	Black cobra	NAME	Reptiles	Elapidae
81	Numida meleagris	Giunea fowl	NUME	Birds	Phasiannidae
82	phoeniculus atterimus	Lesser (Green) wood hoope	PHAT	Birds	Upupidae
83	Phylloscopus trochillus	Wilow warbler	PHTR	Birds	Sylvidae
84	Ploceus cucullatus	Village weaver bird	PLCU	Birds	Ploceidae
85	Ploceus melanocephalus	Black headed weaver	PLME	Birds	Ploceidae
86	Pogonileus subsulpheus	Yellow rumped tinker bird	POSU	Birds	Pogonidae
87	Poicephalus senegalus	Senegal parrot	POSE	Birds	Psittacidae
88	Polyboroides radiates	Harrier hawk	PORA	Birds	Accipitiridae
89	Procavia ruficeps	Rock hyrax	PRRU	Mamamal	Procaviidae
90	Protexerus aubinni	Slender tailed squirrel	PRAU	Mamamal	Sciuridae
91	Protexerus strangerii	Gaint forest squirel	PRST	Mamamal	Sciuridae
92	Psamophis sibilans	Yellow stripe snake	PSSI	Reptiles	Colubridae
93	Psamophis sibilans philipsii	Yellow snake	PSSP	Reptiles	Colubridae
94	Pyconotus barbatus	Common garden bulbul	PYBA	Birds	Pyconotidae
95	Python sebae	Rock python	PYSE	Reptiles	Boidae
96	Rattus natalensis	Muiltimammate rat	RANA	Mamamal	Rattus
97	Rousethus smithii	Fruit bat	ROSM	Mamamal	Chiroptera
98	Schoenicola platyura	Fan tailed swamp barbler	SCPL	Birds	Timalidae
99	Scopus umbretta	Hammerkop	SCUM	Birds	Scopidae
100	Sphenoeacus mentalis	Moustached grass warbler	SPME	Birds	Sylvidae

101	Streptopelia decipens	African (morning) dove	STDE	Birds	Colubridae
102	Streptopelia senegalensis	Laughing dove	STSE	Birds	Colubridae
103	Streptopelia semitorquata	Red Eyed dove	STSQ	Birds	Colubridae
104	Streptopelia turtur	European turtle dove	STTU	Birds	Colubridae
105	Streptopelia vinacea	Veinaceous dove	STVI	Birds	Colubridae
106	Tateri kempi	Kemps gerbil	TAKE	Mamamal	Rattus
107	Thryonomys swinderianus	Grasscutter	THSW	Mamamal	Thryonomidae
108	Tockus erthorhyncus	African hornbill	TOER	Birds	Bucerotidae
109	Tockus nasutus	Afrcan grey hornbill	TONA	Birds	Bucerotidae
110	Tragelaphus scriptus	Bush buck	TRSC	Mamamal	Tragelaphidae
111	Teron australis	Green pigeon fruit	TRAU	Birds	Colubridae
112	Turdoides reinwardii	Black cap barbler	TURE	Birds	Timalidae
113	Turdus Pelios	West African thrush	TUPE	Birds	Turbidae
114	Tyto alba	Owl	TYAL	Birds	Strigidae
115	Veranus examthematicus	Short tailed Nile monitor	VEEX	Reptiles	Veramidae
116	Veranus niloticus	Monitor lizard	VENI	Reptiles	Veramidae
117	Viverra civetta	Civet cat	VICI	Mamamal	Viverridae
118	Vidua macroura	Pin tailed whydah	VIMA	Birds	Ploceidae
119	Xerus erythropus	White stripe ground squirel	XEER	Mamamal	Sciuridae
120	Xerus sp	Plain body ground squirel	XESP	Mamamal	Sciuridae
121	Zosterops senegalensis	Yellow white eye	ZOSE	Mamamal	Zosterpidae

Table 5: Distribution of Vertebrate Species according to Families

Family	Number of Species
Accipitridae	5
Agamidae	1
Alcedinidae	4
Anatidae	1
Apodidae	3
Ardeidae	2
Boidae	1
Brogonidae	2
Bucerotidae	2
Burhinidae	1
Campephagidae	3
Capitornidae	1
Caprimalgidae	1
Cephalophinae	3
Cercopithecidae	3
Chiroptera	1
Ciconidae	1
Colubridae	10
Coraciidae	2
Corvidae	1
Cuculidae	2
Elapidae	2
Estrildae	4
Fringilidae	1
Hirundinidae	2
Hysricidae	1
Indicatoridae	2
Jacanidae	1
Laniidae	2
Meropidae	3
Motacillidae	3

Mucicapidae	1
Musophagidae	3
Phasiamidae	2
Picidae	1
Ploceidae	4
Procaviidae	1
Psittacidae	2
Pyconotidae	1
Rattudae	7
Sciuridae	6
Scopidae	1
Strigadae	1
Sturnidae	1
Suidae	1
Sylvidae	4
Threskiomithidae	1
Thryonomidae	1
Timalicae	2
Tragelaphidae	1
Turbidae	1
Upupidae	2
Varamidae	1
Viperridae	1
Viverridae	4
Zosterpidae	1

The level of species diversity recorded for plants and animals in the study area is high; one hundred and eighteen (118) plant species from 44 families and 40 animal species from 31 families. According to Richards (1952), the humid tropical forest has the richest and most heterogeneous faunal and floristic diversity which developed largely because of the favourable conditions of climate and other factors that favours the abundance of species in all seasons. The study area has the diversity of plants recorded because it is free from hunting pressures, thus serving as a refuge for the animals. Onadeko and Meduna (1985) reported abundance of animals in the protected sites than sites that were unprotected. Also the high plant species diversity recorded in the study area (table 6) can be attributed to the absence of agricultural practices and other development activities. Grasscutters (*Thryonomys swinderianus*) and giant rats (*Cricetomys gambianus*) were most abundant in the study area because there were favourable food resources as well as cover adequate for their requirments were present.

The results of this study indicate that *Daniella oliveri, Anona senegalensis, Bridelia micrantha* and

Ficus capenssis were the most abundant tree species. According to Kupchella and Hyland (1993), the edaphic, climatic and topographic factors determine the type and distribution of plant species that will survive in an area. The plants in turn control these factors and create a microclimate that ensures a normal physical environment that promotes their survival. Happold (1987), also reported that in certain cases, the animals present in a vegetation could be a major determinant of the type of vegetation that will persist in an area because of their mode of utilization of the plants for food and cover. Therefore, the relationship that exists between most of the plants and animals indicated by the biplots promotes a stable ecological system for their survival.

Animals in the order rodentia, especially cane rat (*Thryonomys swinderianus*), giant rat (*Cricetomys gambianus*) and ground squirrel (*Xerus erythropus*) were the most abundant in the study area. Indices of their activities include feeding remains, droppings and burrows.

The Maxwell duiker (*Cephalopus maxwelli*) was also recorded in appreciable number. Happold (1973) and Roberts (1986) stated that the trophic ecology and need for protection against predators of animal species in an area explains the basis for their habitat distribution.

Dasmann (1985) also reported that the availability of food, water and cover are the major determinants of wild animal occurrence and distribution in an area. This explains the distributions of animals on the biplot based on their feeding and cover requirements.

The Cane rats were predominant in areas with dense grasses and rampant herbaceous vegetation where there is also good cover. They feed on thick stemmed grasses and occasionally on tree barks (Happold, 1987) as shown by their runways, feacal droppings and feeding remains. The Giant rat (*Cricetomys gambianus*) feed on fruits, vegetables, seeds, maize, yams, and oil palm nuts and this explains their abundance because some of these requirements are in abundant supply in the study area.

Also, the Ground squirrel, found widely in the study area live habitually on the ground especially in burrows and feed on seeds, roots and bulbs (Ewer, 1969). The areas where they are mostly found in the study area is rich in these requirements. The Maxwell duiker lives in wooded and grassland savanna where there are small thickets and undergrowth where they can seek cover (Happold, 1973). Their diet consists of leaves and herbs and young plant. These food and cover requirements abound in the study area where they browse on the young stems of these trees and shrubs and hide in the dense undergrowth.

The Hares (*Lepus capensis*) live in drier habitats where the vegetation is heavily grazed and grasses are short and spouting (Happold, 1987). They are found to predominate in such vegetation on the study site. This habitat preference causes them to live in areas otherwise uninhabitable for other browsers and grazers and explains the large dispersion of their position on the northern portion of the study site where they occur away from the other wildlife species occurring in the dense wooded vegetation at the southern part of the study site.

The Principal component analysis (fig. 3) and Ordination (fig. 4) shows that the

ecosystem of the study site is not stable yet. This can be observed from the clustering of the animal species together in an attempt to make the best use of the environment. This may be due to the fact that the Strict Nature Reserve is recently demarcated and requires some time to settle away from the previous land use pattern of the area. The bulk of animal species wthin transects, combed during the survey were encountered during the dry season. This could be due to the fact that the environment is more open at this time of the year, enabling more sightings of the animals, while few were encountered during the wet season. Along the transects, gradients, distribution of most of the species were closely tied to the season and are related either in the movement or other activity pattern, but some other also show a wide dispersion from the effect of the major component i.e dry season. Animals such as *Cephalopus species*, *Lepus capensis*, some *Arvicauthus niloticus* and *Thryonomys swinderianus* are in this group. These were found at the extremes of dry and wet season within the space.

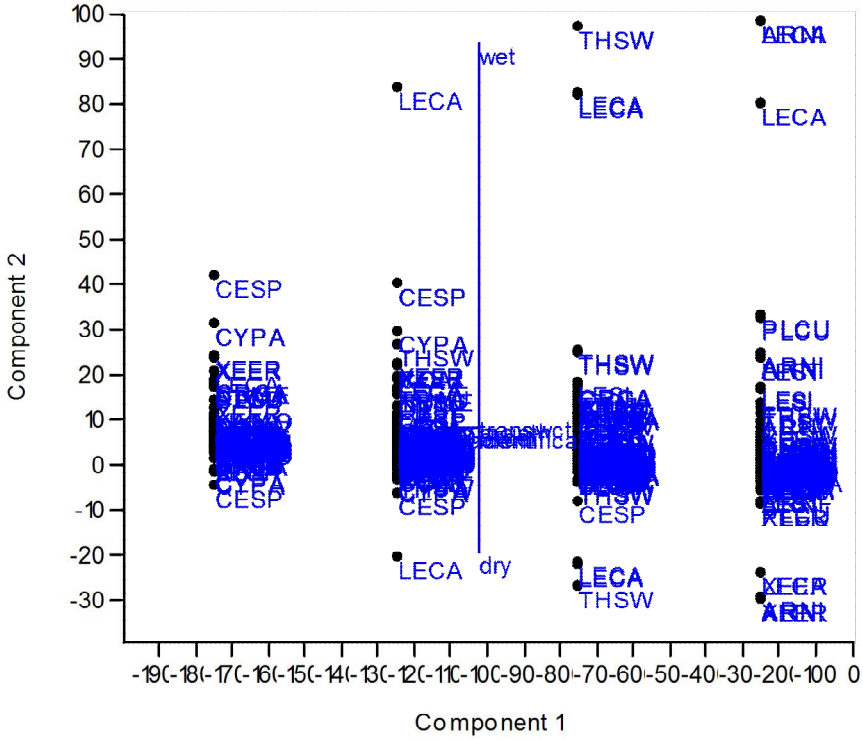

Fig.3: Principal Component Analysis of the distribution of Vertebrate species encountered in the Study Site

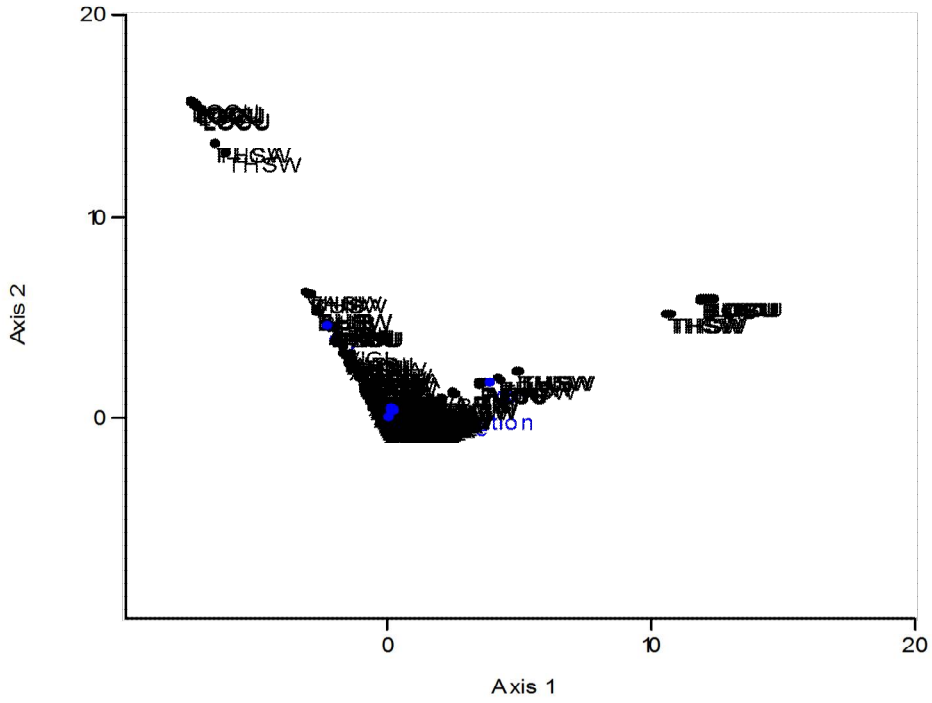

Fig.4: Ordination Diagram of Vertebrate in the Study Site

Ordination of animal species distribution in transects and season (fig. 5 and 6) revealed that the gradation is discontinuous but concentrated in the ordination space at around 12.0'clock and 3.0'clock and between 9-12 0'clock again. What this translates into is that every animal species that are found within the same quarter space are close and have almost the same factors influencing their distribution. Within the same quarter it was also noticed that *Lonchura cucullata* and *Thryonomys swinderianus* are closer and a bit separated from the bulk, thus it can be suspected that a kind of ecological or biological relationship is occurring between them. Relationship between the animal species and environmental variables measured (seasons) indicate a very strong association between the factors and animal species thus, distribution, performance and survival of the species may be directly influenced by these variables.

Gradient distribution of animal species in wet season indicative of the point of contact with the animal along the transect gradient as well as the abundance values of the animal species encountered. The least abundance value of animal species (5.0) was

encountered within the quadrant 1750 while the highest (102) was found in quadrant 250, so also in the dry season, the least (11.00) was encountered in quadrant 1750 but the highest abundance of (99.00) was found within 750 gradient.

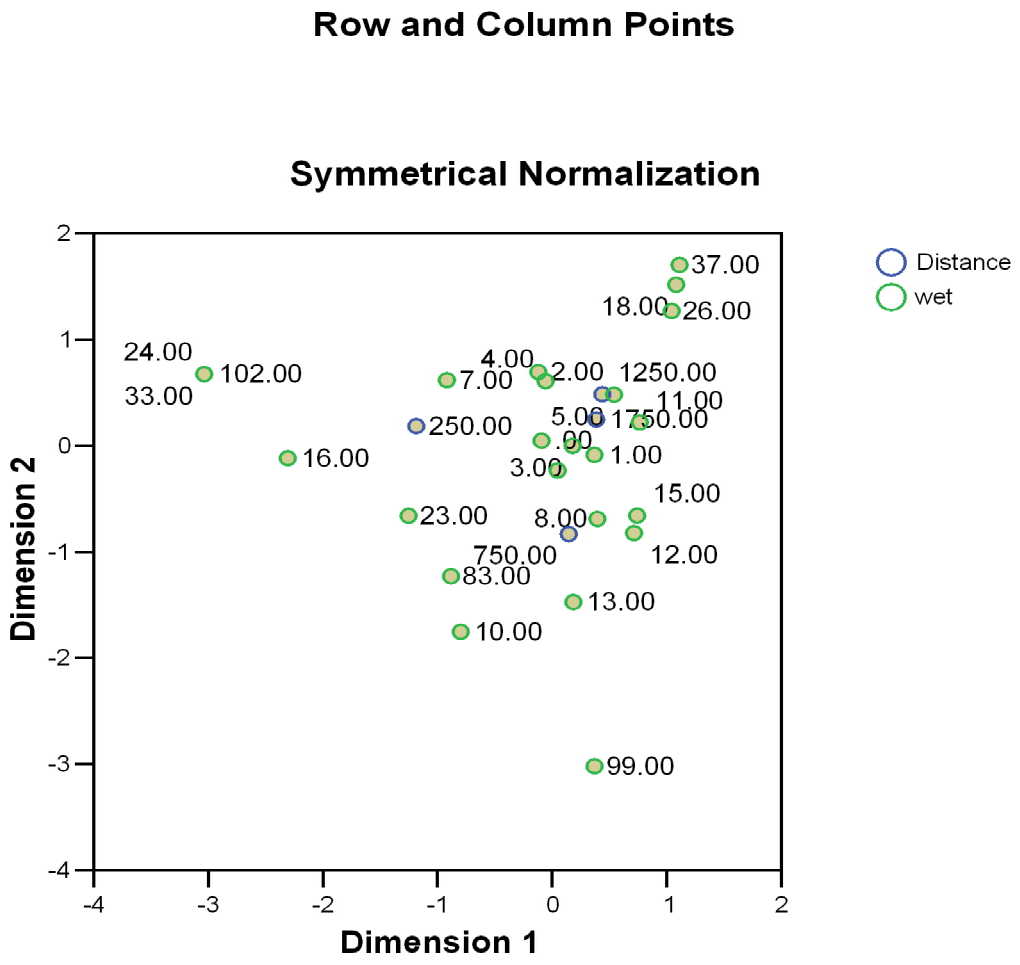

Fig.5: Sighting of Vertebrates According to Distance from Transects in the Wet Season

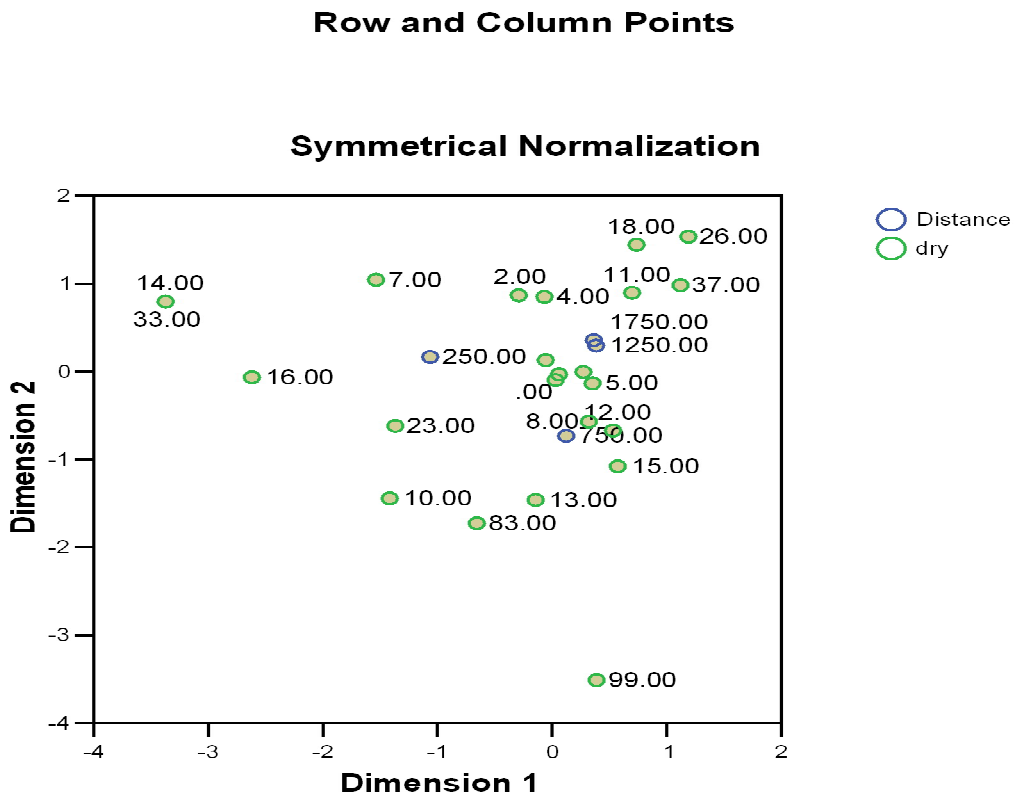

Fig.6: Sighting of Vertebrates According to Distance from Transects in the Dry Season

Table 6: Average Frequency of Plants in the Study Area

Plant Specie	Frequency	Percent	Valid Percent	Cumulative Percent
Acalypha ciliate	8	.7	.7	.8
Afzelia Africana	10	.9	.9	1.8
Albizia lebeck	2	.2	.2	1.9
Albizia zygia	1	.1	.1	2.0
Alchornea cordifolia	10	.9	.9	3.0
Alstonia boonei	14	1.3	1.3	4.3
Amaranthus hybridus	20	1.9	1.9	6.1
Anacardium occidentalis	2	.2	.2	6.3
Anchomaiamis difformis	15	1.4	1.4	7.7
Andropogon gayanus	22	2.0	2.0	9.7
Andropogon tectorum	22	2.0	2.0	11.8

Annona senegalensis	5	.5	.5	12.2
Anogeisus leiocarpus	5	.5	.5	12.7
Anthoclesta vogelii	3	.3	.3	13.0
Antiaris Africana	6	.6	.6	13.5
Aspilia Africana	18	1.7	1.7	15.2
Astonia boonei	4	.4	.4	15.6
Azadirachta indica	1	.1	.1	15.6
Barhania monodora	3	.3	.3	15.9
Bidiens pilosa	8	.7	.7	16.7
Blighia welwetchii	8	.7	.7	17.4
Boerhavia coccinea	14	1.3	1.3	18.7
Boerhavia diffussa	8	.7	.7	19.4
Borreria veticulata	4	.4	.4	19.8
Bridelia ferruginea	1	.1	.1	19.9
Bridelia feruguinea	30	2.8	2.8	22.7
Bridelia micrantha	16	1.5	1.5	24.2
Bridellia micrantha	6	.6	.6	24.7
Canthium volgeri	2	.2	.2	24.9
Carica papaya	6	.6	.6	25.5
Carpolobia lurea	11	1.0	1.0	26.5
Casia mimosoides	2	.2	.2	26.7
Casia podocarpa	6	.6	.6	27.2
Cassia mimosoides	9	.8	.8	28.1
Cassia podocarpa	9	.8	.8	28.9
Ceiba pentandra	1	.1	.1	29.0
Centrosema puebescen	15	1.4	1.4	30.4
Chromolaena odoratum	25	2.3	2.3	32.7
Cissampelos micronantha	6	.6	.6	33.2
Cissus arguata	1	.1	.1	33.3
Cleome viscose	11	1.0	1.0	34.4
Cnestis ferruginea	1	.1	.1	34.4
Cochlospermum planchonii	2	.2	.2	34.6
Coehlospermum planchoni	16	1.5	1.5	36.1
Cola millenii	8	.7	.7	36.9
Combretum hispidum	12	1.1	1.1	38.0
Combretum molle	18	1.7	1.7	39.6
Combretum nigerica	2	.2	.2	39.8
Combretum racemosum	6	.6	.6	40.4
Combretum zenkerii	8	.7	.7	41.1

Commelina benghalensis	8	.7	.7	41.9
Commelina nodiflora	15	1.4	1.4	43.2
Corchorus olitoriuos	9	.8	.8	44.1
Cussonia barterii	9	.8	.8	44.9
Cymbopogon giganteus	6	.6	.6	45.5
Cynodon dactylon	4	.4	.4	45.8
Cynometra megallophylla	8	.7	.7	46.6
Cyperrus articularius	7	.6	.6	47.2
Daniella olliveri	21	1.9	1.9	49.2
Delonix regia	4	.4	.4	49.5
Desmodium salutolium	6	.6	.6	50.1
Detarium macrcapum	2	.2	.2	50.3
Diplazium samatii	7	.6	.6	50.9
Elaeis guineensis	2	.2	.2	51.1
Eleusine indica	13	1.2	1.2	52.3
Entada abicinica	1	.1	.1	52.4
Entanda Africana	4	.4	.4	52.8
Eragrostis tremula	4	.4	.4	53.1
Euphorbia hirta	4	.4	.4	53.5
Euphorbia laterflora	5	.5	.5	54.0
Ficus capensis	17	1.6	1.6	55.6
Ficus exasperate	21	1.9	1.9	57.5
Ficus sur	1	.1	.1	57.6
Ficus sycommorus	9	.8	.8	58.4
Funfumia elastic	6	.6	.6	59.0
Gardenia aqualla	4	.4	.4	59.4
Gardenia rubiscens	3	.3	.3	59.6
Holarrhena floribunda	3	.3	.3	59.9
Hymenocardia acida	12	1.1	1.1	61.0
Hypocrata pallens	1	.1	.1	61.1
Hyptis suaveolens	1	.1	.1	61.2
Imperata cylindrical	17	1.6	1.6	62.8
Indigofera capitata	4	.4	.4	63.1
irvingia wombolu	10	.9	.9	64.1
Jatropha curcas	7	.6	.6	64.7
Lantana camara	6	.6	.6	65.3
Lantema camoma	7	.6	.6	65.9
Lonchocarpus cyacems	3	.3	.3	66.2
Lonchocarpus sericens	1	.1	.1	66.3
Macarange barrteri	7	.6	.6	66.9
Magaritaria discoides	4	.4	.4	67.3
Malacantha alnifolia	2	.2	.2	67.5

Mangifera indica	1	.1	.1	67.6
Mucuna prurens	1	.1	.1	67.7
Myrianthus arboreus	14	1.3	1.3	69.0
Nuclea latifolia	1	.1	.1	69.1
Occimum canon	4	.4	.4	69.4
Occimum gratissimum	8	.7	.7	70.2
Olax secopoides	7	.6	.6	70.8
Panieum maximum	13	1.2	1.2	72.0
Parinari glabra	6	.6	.6	72.6
Parinari polyandra	4	.4	.4	73.0
Parinari robusta	4	.4	.4	73.3
Parkia bicolor	17	1.6	1.6	74.9
Parkia biglobasa	7	.6	.6	75.6
Parkia biglobosa	8	.7	.7	76.3
Parkia biglobossa	6	.6	.6	76.9
Paspalum conjugatum	9	.8	.8	77.7
Paspalum nonathum	2	.2	.2	77.9
Pauridiantah hirttela	6	.6	.6	78.4
Pauridiantha hirttela	3	.3	.3	78.7
Pavetta corymbosa	1	.1	.1	78.8
Pennisetum pedicellatum	19	1.8	1.8	80.6
Prosopis Africana	8	.7	.7	81.3
Psarospermum febrifuga	8	.7	.7	82.0
Securidaea longipendicula	12	1.1	1.1	83.1
Sema hirsute	2	.2	.2	83.3
Senna hirsute	7	.6	.6	84.0
Sinolax crucicina	1	.1	.1	84.1
Smilax kruciana	3	.3	.3	84.4
Solanum eriantum	12	1.1	1.1	85.5
Solanum macrocarpum	6	.6	.6	86.0
Solenostrenum monostachyc	8	.7	.7	86.8
Spandias mombim	14	1.3	1.3	88.1
Sphenocentron jollyanum	6	.6	.6	88.6
Spondias mombim	2	.2	.2	88.8
Sterculia tragacantha	10	.9	.9	89.7

Stragia spp	5	.5	.5	90.2
Syndrella nodiflora	10	.9	.9	91.1
Tectona grandis	10	.9	.9	92.0
Tephrosia braceolata	10	.9	.9	93.0
Tephrosia pedicellata	10	.9	.9	93.9
Terminalia glaucescens	18	1.7	1.7	95.6
Vernonia amygdalina	10	.9	.9	96.5
Vipellaria paradoxa	8	.7	.7	97.2
Vitellaria paradoxa	4	.4	.4	97.6
Vitex doniana	9	.8	.8	98.4
Vittelaria paradoxum	1	.1	.1	98.5
Waltheria indica	16	1.5	1.5	100.0
Total	1080	100.0	100.0	

The disappearance of many plant species due to human activities is depleting the world's genetic resources and is putting man's heritage of biodiversity under serious threat. There is therefore the urgent need to preserve genetic diversity including plant resources of known and unknown economic importance which will guarantee the availability of all potentials for use in the benefit of our children and grandchildren (Olowokudejo, 1987). The human race in their quest for economic development and improvement of their conditions of life must come to terms with the realities of resource limitations and the carrying capacity of ecosystem must also take account of the needs of future generation. This is the central message to modern conservation.

Biological diversity must be treated seriously as a global resource, be indexed, used and above all preserved. Three circumstances make it imperative for this to be given an unprecedented urgency particularly in West Africa. Firstly, exploding human populations are seriously legion. Secondly, science is discovering new uses for plants and animals, thus encouraging the degrading of the environment at an alarming rate. Thirdly, much of the diversity is being irreversibly lost through extinction caused by the destruction of natural habitats, which occurs more in Africa than elsewhere (Wilson, 1988). Dasman *et al*., (1973) agreed that forest exploitation leads to the extinction of animals and plants whose genetic resources are of considerable value to future generations.

Forest depletion has destabilized the natural environment and eroded genetic resources throughout the southern part of Nigeria in order to meet the sustenance of the population and financial requirements of government i.e. the social, economic, demographic and political needs of the people. Exploitation of forests therefore appears to be split about vegetation depletion which is considered as inevitable considering the above. According to some scientists (Harvey and Hallet, 1977) it may not be beneficial to conserve resources for future generation at all costs because the future demands, aspirations, lifestyles and needs of rural people cannot be adequately defined now. Must we then wait for the needs to be defined before we conserve?

Definitely not, because all of these genetic resources would have disappeared before the needs are identified. As such, conservation is basic to human welfare and indeed to human survival.

Lack of conservation measures will amount to an increase in the number of endangered species and this will ultimately result in extinction, which is the gradual but sure elimination of taxa (Allaby, 2010). Many of the species that are already endangered are faced with the risk of eventual extinction if human activities such as land development, logging and pollution are not checked. Gbile et al. (1981) revealed that about four hundred and eighty plant species of the Nigerian flora have been described as endangered or rare, out of which many of these are being studied at the Forestry Research Institute of Nigeria, Ibadan.

CONCLUSION

The ecosystem of the strict nature reserve is not yet stable. More time is needed for the site to settle away from the previous land use pattern of the area. Food and cover requirements abound in the study area, which explains the availability of a variety of fauna species. The distributions of most of the vertebrate species were closely tied to the seasons. There is a strong association between the environmental variables and animal species thus; distribution, performance and survival of the species are directly influenced by these variables.

In other for the strict nature reserve to stabilize, human activities such as hunting, burning, cultivation etc that could put the resources under threat should be totally controlled.

REFERENCES

Allaby, M.2010. Oxford Dictionary of Ecology. New York. NY. Oxford University Press. 432pp

Dasmann, R. F. 1985. Commercial Use of Game Animals on a Rhodesian Ranch,*Wildlife* pp 7 -14.

Dasman, R. F., Milton, J. P., Freeman, P. H. 1992. Ecological principles for economic development. Wetlands Conservation Conference for Southern Africa. Proceedings of the Southern Africa Development Coodination Coference Held in Gaborone, Botswana, 3-5 June 1991. Matiza T and Chabwela H.N (Eds), IUCN, Gland Switzerland. X+224pp.

Dickman, C. R., Doncaster, C. P. 1989. The ecology of small mammals in urban habitats populations in a patchy environment. *J. Anim. Ecol*. 56, 629-640.

Ewer, D. W. 1969. Form and Function in the Grasscutter. Paul Eleck, London. Pp 1 – 27.

Gbile, Z. O., Ola-Adams, B. A., Spladoye, M. O. 1981. List of Rare \species of the Nigerian Flora. Research Paper (Forerst series). No. 47. Forest Research Institute of Nigeria, Ibadan.

Hansson, L., Fahrig, L and Merrian, G. 1995. Mosaic Landscapes and Ecological Processes. Chapman and Hall, London. Pages 1-26.

Happold, D. C. D. 1973. The distribution of Large Mammals in West Africa. Mammalian 37: 88-93.

Happold, D. C. D. 1987. Mammals of

Nigeria. Oxford University Press; pp 10-16.

Harvey, B., Hallett, J. D. 1977. Environment and Society: An Introductory Analysis. Macmillan. 163pages.

Kupchella, E. J., Hyland, M. C. 1993. Environmental Science. Prentice Hall Inc. N. J. 426pages.

Olowokudejo, J. D. 1987. 'Medicinal Plants Used as Vermifuges in Nigeria and their Conservation'. *Journal of Economic and Taxonomic Botany*. 9: 459-466.

Onadeko, S. A., A. J. Meduna 1985. Increasing Conflicts between Fulani Grazers and Wildlife protection Areas. *Proceedings of the 14th Annual conference of F. A. N.*(*O. O. Okoro and S. A. Afuwape (Ed)*). Pp 175-197

Richards, P. W. 1952. The tropical rainforest. Cambridge University Press. 450pages

Robberts, M. B. V. 1986. Biology. A functional Approach. Nelson Thomes. 693 pages.

Saunders, W. B., Davis, L. E., Knight, R. L. 1987. Sympatic species of *Nautilus* (*N. Pompilius* and *N. Serobiculatus*) in the Admiralty Islands, Papau New Guinea. *Nautilus* 101: 93-99

Saunders, D. A. , Hobbs, R. J., Margules, C.R. 1991. Biological Consequences of Ecosystems fragmentations, *Conservation Biology*, Vol. 5. No. 1. Pp. 18-32.

Shotuyo, A. L. A. 2011. Assessment of Vertebrate Diversity in Alabata Nature Reserve Abeokuta South West Nigeria. Unpublished, Ph.D. Thesis University of Ibadan. 189pages.

Turner, I. M. 1996. Species loss in fragments of tropical rainforest: a review of the evidence. *Journal of Applied Ecology* 33, 200-209.

Turner, I. M., Carllet, T. R. 1996. The Conservation value of small, isolated fragments of lowland tropical forest. *Trends. Ecol Evol*. 11 (8): 330-3.

Wilson, E. O. 1988. Biodiversity. The National Academic Press. 538pages.

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