International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Relative Abundance of Birds and Vegetation Composition within the Grassland Region of Lekki Conservation Centre, Nigeria

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Abstract: ***This study assessed the species composition, relative abundance and vegetation of avian found in grassland habitats. Two transect lines was established Transect A and Transect B. A total of 15 Orders, 30 families and 73 species were observed and recorded at the study area. Family Nectariniidae had the highest number of bird species (ten species) and (nine species) along Transect A and Transect B respectively. Followed by Estrildidae (six species) along Transcet A and Ploceidae (five species) along Transect B. The family Pycnonotidae had the highest number of birds in the study area with 21.06 % (N=1516) followed by Columbidae 19.38 % (N=1395). Cisticolidae and Sylviidae had the lowest number of species 0.04 % (N=3). Chrysobalnus icaco and Syzygium owariense were widely distributed in the habitat and the major grasses were Andropogon gayanus and Anadelphia afzeliana.***

Keywords: Species Composition, Habitats, Avian and Grassess

1. Introduction

Birds have been considered as useful biological indicators because they are ecologically versatile and inhabit all kinds of habitats Sivaperuman and Jayson (2006). Accessing and monitoring bird's population, distribution and activities reflect the ecosystem's quality and status (Ismail *et al.*, 2012). Relative abundance of species is one of the most fundamental aspects of community structure Sugihara (1980). The bird's abundance within an ecosystem in terms of both numbers of individuals and species indicate the availability of food resources (Tilahun *et al.*, 2001; Mengesha and Bekele, 2008). This was determined by the flush of vegetation and subsequently of insect herbivores. Moreover, harsh environmental conditions have substantial effect on separable group of bird community (Thomson *et al.*, 2003). Occurrence of bird species correlates with vegetation structure (Roth 1976; Finch 1989, 1991).

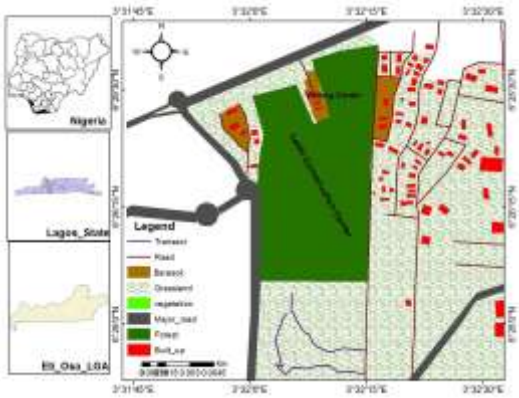
Habitat loss can threaten wildlife populations and can eventually lead to their extinction while deforestation is the major form of habitat loss and reduces population (Harris & Pimm 2004).

This study aims at providing information on the abundance of birds and the type of vegetation's in the sampled area.

2. Materials and Method

Study Area

The study was carried out in the Lekki Conservation Centre, Lekki, which lies on Latitude 6°26'30.0"N and Longitude 3°32'08.0"E. According to Köppen-Geiger climate classification, Lagos state has a tropical climate with summers much rainier than the winters. The average temperature is 27.0 °C. The average annual rainfall is 1693 mm and least amount of rainfall occurs in December with an average of 21 mm (BBC, 2011). The sampled area covered both forest area and grassland region. The forest area had a mangrove terrain, swamp and secondary re-growth while the grassland is dominated majorly with grasses, sparse distribution of trees and shrubs. The animals commonly found in the region include cane rats (grass cutters) wild rabbits, duikers, wild dogs, monkeys, birds and snakes.



Bird Survey

A preliminary survey was done by walking in a straight line as possible through the study area (Walsh and White, 1999) with an experienced wild life officer as a guide. Two transect Lines was set and 21 points and 31 points cutting across the fish ponds and boundaries of the forested area was taken along Transect A and B respectively. Transects were walked as quietly as possible between the hours of (06:50-10:30) am and (03:50-6:00) pm when birds were notably most active and therefore easier to detect (Butyls and Mwangi, 1994) which also helped to avoid sighting birds directly against the sun which might introduce bias in terms of correct identification. Birds was observed by the use of binoculars (Panorama: 10 x 50mm), picture of birds was captured by the use of Canon 30 D (18-200mm).

During the transect walk, the observer recorded data on the sightings of bird species, number of individuals sighted and perpendicular distance (taken with the use of laser range finder) from the line at which the species was sighted. Only those observations lying within 50m of either side of the transect line were recorded. Observed species were identified and recorded on data sheet prepared for the

purpose. Photographs of the birds was taken and identified to species level with standard identification keys prepared by Borrow and Demey (2004) and Serle and Morel (1977). The experience of conservation experts was also used in the identification of some birds. The vegetation structure was determined using the Distance at Breast Height (DBH) and quadrant of 20 mx20 m was set along each transect line.

Microsoft Excel was used to calculate the relative abundance of species and vegetation composition birds in the sampled area.

Table 1: Total Number of Birds.

S/N	Grassland Habitat	TO	TF	TS	TI
1	Transect A	13	29	68	3877
2	Transect B	15	30	67	3322
Sum					**7199**

TO-Total Order, TF-Total Families, TS-Total Species, T.I-Total Individual

A total of 7199 birds was found in the sampled area which was grouped into two Transects A and B. Total bird species along Transect A and B were 68 and 67 respectively

3. Results

Table 2: Checklist of Birds in the Sampled Area

S/N	Common Name	Order	Families	Species
1	African Harrier Hawk	Accipitriformes	Accipitridae	*Polyboroides typus*
2	African Pied Hornbill,	Bucerotiformes	Bucerotidae	*Tockus fasciatus*
3	African Palm Swift	Apodiformes	Apodidae	*Cypsiurus parvus*
4	African Thrush,	Passeriformes	turdidae	*Turdus pelios*
5	African Pied Wagtail	Passeriformes	Motacillidae	*Motacilla aguimp*
6	Blue-breasted Kingfisher,	Coraciiformes	Alcedinidae	*Halcyon malimbica*
7	Bar-breasted Firefinch	Passeriformes	Estrildidae	*Lagonosticta rufopicta*
8	Broad-billed Roller	Coraciiformes	Coraciidae	*Eurystomus glaucurus*
9	Black Kite,	Accipitriformes	Accipitridae	*Milvus migrans*
10	Bronze Mannikin,	Passeriformes	Estrildidae	*Spermestes cucullata*
11	Black-necked Weaver,	Passeriformes	Ploceidae	*Ploceus nigricollis*
12	Barn Owl	Strigiformes	Tytonidae	*Tyto alba*
13	Barn Swallow	Passeriformes	Hirundinidae	*Hirundo rustica*
14	Blue-spotted Wood Dove,	Columbiformes	Columbidae	*Turtur afer*
15	Buff-throated sunbird,	Passeriformes	Nectariniidae	*Chalcomitra adelberti*
16	Black-and-white Mannikin	Passeriformes	Estrildidae	*Spermestes bicolor*
17	Carmelite Sunbird	Passeriformes	Nectariniidae	*Chalacomitra adelberti*
18	Common Bulbul,	Passeriformes	Pycnonotidae	*Pycnontus barbatus*
19	Chestnut-breasted Negrofinch,	Passeriformes	Estrildidae	*Nigrita bicolor*
20	Cattle Egret,	Ciconiiformes	Ardeidae	*Bubulcus ibis*
21	Common Kestrel,	Falconiformes	Falconidae	*Falco tinnunculus*
22	Collared Sunbird,	Passeriformes	Nectariniidae	*Hedydipna collaris*
23	Copper Sunbird	Passeriformes	Nectariniidae	*Cinnyris cupreus*
24	Double-toothed Barbet,	Piciformes	Capitonitidae	*Lybius bidentatus*
25	Ethiopian Swallow	Passeriformes	Hirundinidae	*Hirundo aethiopica*
26	Flappet Lark,	Passeriformes	Alaudidae	*Mirafra rufocinnamomea*
27	Grey-headed Kingfisher	Coraciiformes	Alcedinidae	*Halcyon leucocephala*
28	Green Hylia	Passeriformes	Sylviidae	*Hylia prasina*
29	Green-headed Sunbird	Passeriformes	Nectariniidae	*Cyanomitra verticalis*
30	Grey kestrel	Falconiformes	Falconidae	*Falco ardosiaceus*
31	Little Bee-eater,	Coraciiformes	Meropidae	*Merops pusillus*
32	Laughing Dove,	Columbiformes	Columbidae	*Streptopelia senegalensis*
33	Little Greenbul	Passeriformes	Pycnonotidae	*Andropadus virens*
34	Long-tailed Comorant	Pelecaniformes	Phalacrocoracidae	*Phalacrocorax africanus*
35	Long-tailed Night Jar,	Caprimulgiformes	Caprimulgidae	*Caprimulgus climacurus*
36	Mottled Spinetail	Apodiformes	Apodidae	*Telacanthura ussheri*
37	Northern grey-headed Sparrow,	Passeriformes	Passeridae	*Passer griseus*
38	Olive-bellied Sunbird	Passeriformes	Nectariniidae	*Cinnyris chloropyguis*
39	Osprey	Accipitriformes	Accipitridae	*Pandion haliaetus*
40	Orange-cheeked Waxbill	Passeriformes	Estrildidae	*Estrilda melpoda*
41	Orange Weaver,	Passeriformes	Ploceidae	*Ploceus aurantius*
42	Olive Sunbird,	Passeriformes	Nectariniidae	*Cyanomitra olivaceus*
43	Plain-backed Pipit,	Charadriiformes	Charadriidae	*Anthus leucophrys*
44	Pied Crow,	Passeriformes	Corvidae	*Corvus albus*
45	Piping Hornbill,	Bucerotiformes	Bucerotidae	*Bycanistes fistulator*
46	Pied Kingfisher,	Coraciiformes	Alcedinidae	*Ceryle rudis*
47	Palm-nut Vulture	Accipitriformes	Accipitridae	*Gypohierax anglolensis*
48	Pin-tailed Whyday,	Passeriformes	Viduidae	*Vidua macroura*
49	Pale-winged Indigobird,	Passeriformes	Viduidae	*Vidua wilsoni*
50	Red-eyed Dove,	Columbiformes	Columbidae	*Streptopelia semitorquata*

51	Red Kite	Accipitriformes	Accipitridae	*Milvus milvus*
52	Reichenbach's Sunbird,	Passeriformes	Nectariniidae	*Anabathims reichenbachii*
53	Red-vented Malimbe	Passeriformes	Ploceidae	*Malimbus scutatus*
54	Rose-ringed Parakeet	Psittaciformes	Psittacidae	*Psittacula krameri*
55	Senegal Coucal	Cuculiformes	Cuculidae	*Centropus senegalensis*
56	Shinning-Blue Kingfisher	Coraciiformes	Alcedinidae	*Alcedo quadribrachys*
57	Splendid Glossy Starling,	Passeriformes	Sturnidae	*Lamprotornis splendidus*
58	Simple Leaflove	Passeriformes	Pycnonotidae	*Chlorocichla simplex*
59	Swamp Palm bulbul,	Passeriformes	Pycnonotidae	*Thescelocichla leucopleura*
60	Splendid Sunbird	Passeriformes	Nectariniidae	*Cinnyris coccinigastrus*
61	Speckled Tinkerbird	Piciformes	Capitonitidae	*Pogoniulus scolopaceus*
62	Spur-winged Lapwing	Charadriiformes	Charadriidae	*Vanellus spinosus*
63	Vieillot's Black Weaver,	Passeriformes	Ploceidae	*Ploceus nigerrimus*
64	Variable Sunbird,	Passeriformes	Nectariniidae	*Cinnyris minullus*
65	Village Weaver	Passeriformes	Ploceidae	*Ploceus cucullatus*
66	White-crested Hornbill	Burcerotiformes	Bucerotidae	*Tropicranus albocristatus*
67	Winding Cisticola	Passeriformes	Cisticolidae	*Cisticola galactotes*
68	White-faced Whistling-duck	Passeriformes	Ardeidae	*Dendrocygna viduata*
69	Western Grey Plantain-eater	Musophagiformes	Musophagidae	*Crinifer piscator*
70	White-throated Bee-eater,	Coraciiformes	Meropidae	*Merops albicollis*
71	Yellow bill	Cuculiformes	Cuculidae	*Ceuthmochares aereus*
72	Yellow-billed Turaco,	Musophagiformes	Musophagidae	*Tauraco macrorhynchus*
73	Yellow White-eye,	Passeriformes	Zosteropidae	*Zosterops senegalensis*

Table 3: Relative Abundance of Species according to the Families

Families	Number of Species Per Transects				Relative Abundance (%)
	A	T.I	B	T.I	
Accipitridae	4	70	4	85	2.15
Alaudidae	1	11	1	20	0.43
Alcedinidae	4	40	3	29	0.96
Apodidae	1	71	2	100	2.36
Ardeidae	3	110	2	67	2.46
Bucerotidae	2	46	3	56	1.42
Capitonitidae	2	29	2	24	0.74
Charadriidae.	1	2	1	3	0.07
Caprimulgidae	-	-	1	4	0.06
Columbidae	3	658	3	737	19.34
Cisticolidae	-	-	3	3	0.04
Coraciidae	1	4	-	-	0.06
Corvidae	1	126	1	127	1.75
Cuculidae	2	7	2	3	1.86
Estrildidae	6	282	4	197	3.96
Falconidae	2	60	2	44	3.57
Hirundinidae	2	29	2	75	1.01
Meropidae	2	75	2	113	2.08
Motacillidae	1	33	2	32	2.03
Musophagidae	2	55	1	122	1.21
Nectariniidae	10	451	9	427	7.96
Passeridae	1	89	1	32	7.17
Phalacrocoracidae	1	7	1	8	0.54
Ploceidae	5	557	5	242	7.85
Psittacidae	1	26	-	-	3.72
Pycnonotidae	4	865	4	651	21.05
Sturnidae	1	31	1	11	0.58
Sylviidae	1	2	1	1	0.04
Turdidae	1	49	1	23	1.00
Tytonidae	-	-	1	9	0.13
Viduidae	2	77	2	45	1.69
Zosteropidae	1	15	1	32	0.65
Total	68	3877	67	3322	100

Note: T.I means Total Individual

Table 3 shows that the Family Pycnonotidae (21.05 %) is abundant in the study area followed by the Columbidae (19.34 %). Nectariniidae had the highest number of species with 10 and 9 in transect A and B respectively.

Table 4: Some of the Common species in the sampled area

Families	Common Name	Relative Abundance (%)
Pycnonotidae	Common Bulbul	17.54
Columbidae	Red-eyed Dove	18.78
Estrildidae	Bronze Mannikin	4.75
Ploceidae	Black-necked Weaver	3.58
Nectariniidae	Collared Sunbird	4.13
Corvidae	Pied Crow	3.51
Musophagidae	Western Grey Plantain-eater	2.29

Table 4 shows that Red-eyed Dove had the highest value of 18.78 % followed by Common Bulbul 17.54 %. Bronze Mannikin had relative abundance value of 4.75 % followed by 4.13 %. Western Grey Plantain-eater had 2.29 %.

Table 5: Population Density of some birds in the Centre

Species	Density Per Transect Area	
	Transect A (per m2)	Transect B (per m2)
Red-eyed Dove	0.0234	0.0266
Common Bulbul	0.0860	0.0441
Collared Sunbird	0.0268	0.0178
Bronze Mannikin	0.0327	0.0148
Vieillot's Black Weaver,	0.0140	0.0251

Table 5 shows the population density of five (5) birds' species sighted along Transect A which placed the Common Bulbul with the highest value of 0.0860 The Vieillot's Black Weaver had the least value of 0.0140. Along Transect B, Common Bulbul had the highest density value of 0.0441 followed by Red-eyed Dove with 0.0266. The Bronze Manikin had the least value of 0.0148.

Table 6: Vegetation Composition of the Sampled area.

Plant Species	Transect A		Transect B	
	Status	PC	Status	PC
Anacardium occidentale	+	4.48	+	9.90
Chrysobalnus icaco	+	29.85	+	30.69
Elaesis guineensis	+	7.46	+	6.93
Khaya invorensis	+	1.49	-	-
Napolonia vogeli	+	7.46	+	7.92
Nauclea latifolia	+	1.49	+	0.99
Parkia bicolor	+	4.48	+	3.96
Spondias mobin	+	4.48	+	4.95
Syzygium owariense	+	11.94	+	5.94
Tetracera alnifolia	+	4.48	+	15.84
Vitex doniana	+	22.39	+	12.87
Andropogon gayanus	+	Widely Distributed	+	Widely Distributed
Anadelphia afzeliana.	+	Widely Distributed	+	Widely Distributed

+means Present; - means Absents. PC-Percentage Composition

Table 6 shows that *Chrysobalnus icaco* had the highest percentage composition along Transect A and B with percentage composition value of 29.85 % and 30.69 % respectively. *Khaya invorensis* was found only along Transect A. while *Nauclea latifolia* had the least percentage composition of 1.49 and 0.99 % along A and B respectively. Two major grasses that dominated the grassland region were *Andropogon gayanus* and *Anadelphia afzeliana*.

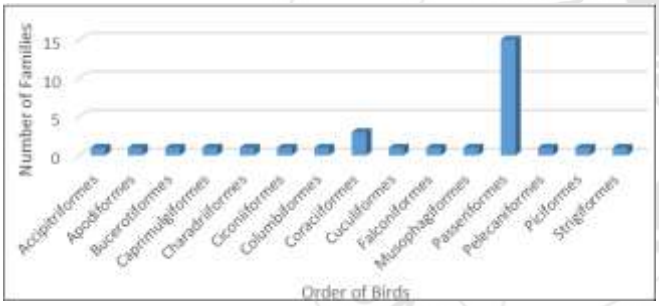


Figure 2: Frequency of Occurrence of Bird Families in each order in the study Area

The Passeriformes had the highest number of 15 families followed by the Coraciformes. Other Orders are made up of one family.

4. Discussion

Dominance results when one or several species control the environment and conditions that influence associated species. The ability of birds of family Pycnonotidae to feed on diverse food materials such as fruits, berries, buds, nectars, insects and spiders might have led to their abundance in the sampled area. This was supported by the findings of (Mengesha and Bekele, 2008) where the food avaliabity have a positive effect on species abundance and distribution.

The availability of food make birds with a feeding guild of a highly abundant food to dominate the area (Welsh, 1987). The abundance of bird's species recorded in the sampled area were influenced by the presence of diverse vegetation structures such as *Chrysobalnus icaco* while the presence of *Raphia sp.* might have led to the presence of Palm-nut Vulture in the region. Birds like Pied kingfisher was found most times at the pond where he catches fish in split second. The Barn Owl in the sampled area was found in the newly constructed gazebos which was in agreement with the findings of Odewumi *et al*., who reported that infrastructural development can lead to changes in bird species composition and abundance. Cattle Egret and Great Egret was found mostly when the sampled area was flooded with water. Cattle Egret fed on the insects and small vertebrates on the floating vegetation. This can be attributed to the heterogeneity of the habitat which is in support of what Weins (1997) stated in his research that the species composition of a specific area is inter-linked to the available resources in the area which includes physical structures of the habitat, food availability and biotic factors. The Pied Crow fed on the palm seed most times during the sighting period.

The vegetation structure, composition and richness of food resources are the major driving factors that influence the distribution and diversity of birds directly or indirectly. Vegetation heterogeneity, abundance of food resources and habitat diversity may lead to avian abundance Malavasi, *et al.,* (2008), which might be responsible for the richness of the birds in the sampled area.

Vegetation Complexity is clearly associated with the structure of the avian community Wilson (1974). Points where trees were located in the sampled site have more species of birds. Common Kestrels, Grey Kestrels, the Hornbills, are found mostly on tall trees.

Conclusively, habitat suitability and availability of food, vegetation structure played major influence on the abundance of birds in Lekki Conservation Centre.

5. Recommendations

Human activities that could be detrimental to the conservation of bird should be discouraged in the area. Regular monitoring of the sites should be carried out so as to control changes in the state of the Conservation Centre.

6. Acknowledgement

We thank all the members of Nigeria Conservation Foundation, Lekki Conservation Centre for providing various facilities to carry out this study.

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