Bird Species Diversity in the Royal Forest Reserve in Eggua Southwestern Nigeria

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Abstract

The 350-hectare privately-owned Royal Forest Reserve, Eggua in Southwestern Nigeria is under threat from anthropogenic activities. The abundance and diversity of avian species should be known so as to create the awareness on the need for conservation of the forest reserve. This study was carried out to assess the abundance and diversity of birds in the reserve. The reserve was divided into two blocks based on land use type. The point count method was used to collect data on bird species diversity in five counting stations per block for six months at three months in the dry season (November, February, and March) and three months in the wet season (June, August, and September) in 2015. There were 483 individual birds spread across 64 different species and 27 families. The dominant family was *Ploceidae*, comprising *8* bird species, followed by *Accipitridae* and *Pycnonotidae* with 7and 6 bird species respectively. The relative abundance of bird species was higher in the woodland block (0.26 and 0.22) than in forest block (0.15 and 0.13) in both seasons of the year. The diversity index showed that bird species were more diverse in the dry season (3.89) than the wet season (3.81) in the study area.

Keywords: Home range, avian species, habitat fragmentation, diversity, conservation

Introduction.

Forest conservation is a major challenge in West Africa countries because the forest resources are sources of livelihood for the rural dwellers and given the rapid population growth which increased demands for these resources the trend is likely to continue(Fargioneet al.,2009). The creation of protected areas has been the conventional methodology for conservation planners and has through which 11.5% of the earth surface was successfully created for this purpose. Despite this achievement, the existing protected areas are insufficient when consideration is given to both species and habitat representativeness (Rodrigues et al., 2006) even as prospects for the expansion of the protected areas are almost nonexistent in the near future (Musters *et al.*, 2000).

Agricultural expansion and increased intensification of the production process have brought associated impacts on bird habitats. The recent increases are the major drivers in the loss of birds and biodiversity globally through destruction and degradation of habitats (Norris, 2008). Thus, research began to focus on understanding how bird populations can be conserved within farmlands (Askins *et al.*, 2007).Currently, a key societal challenge is how to produce the needed food, fibre, and energy while sustaining bird populations and other biodiversity.

Out of 902 threatened birds that utilize forest ecosystems, 93% occur exclusively in the tropics (Bird Life International, 2000). Therefore, tropical forests harbouring the maximum number of endemic bird areas are also home to the highest range-restricted bird species in the world (Fahrig, 2003). Unfortunately, the tropical rainforest of West Africa is facing serious threat from anthropogenic activities as over 70% of the rural inhabitants are heavily dependent on it for sustenance.

The Royal Forest Reserve is a privatelyowned forest reserve located in Eggua in Yewa Local Government Area, Ogun State, Nigeria. There serve has not been adequately studied with regards to the faunal biodiversity. Popoola (2007) proposed the need to study the Royal Forest Reserve as was attempted in 1977 but to which the donor agency could do nothing due to the political situation on ground then. Preliminary information indicates that the Royal Forest Reserve is richly endowed with renewable natural resources: plant species and wildlife (terrestrial, aquatic and avian) which must be conserved to enhance the development of the reserve and the adjoining communities. In view of the impact of biodiversity conservation on quality of life, economic development, and sound environment, there is need to embark on studies to provide baseline information for strategic development of the reserve (Popoola, 2007). This study was, therefore, carried out to assess the bird species diversity of the Royal Forest Reserve, Eggua in southwestern Nigeria.

Materials and Methods Study area

The study was conducted in Royal Forest Reserve, Eggua (6° 55'-7° 20' N and 3° 45'-4°32' E) located in Yewa North Local Government Area, Ogun State along the Benin-Nigeria border. The reserve occupies a land area of 350 hectares (ha) and falls within the semi-seasonal equatorial climatic zone characterized by distinct wet and dry seasons with mean annual rainfall of 1,940 mm and average minimum and maximum temperature of 27.80°C and 30.17°C respectively. The relative humidity is high all the year and generally above 80% during the wet season but between 60-80% during the dry season. The soils are predominantly ferruginous tropical, typical of the variety found in intensively-weathered areas of basement complex formations in the rainforest zone of South-western Nigeria. The soils are welldrained, mature, red, stony and gravely in the upper parts of the topo sequence. The texture of topsoil in the reserve is mainly sandy loam (Onyekweluet al., 2008). The natural vegetation is tropical rainforest characterized by emergent trees with multiple canopies and lianas. Some of the most commonly found trees include African teak(Meliciaexcelsa),pod mahogany (Afzeliabipindensis), bark cloth tree (Antiaris africana), Brachystegia nigerica, ironwood (Lophiraalata), African walnut (Lovoatrichiliodes), Terminalia ivorensis, black afara (Terminalia superba), and African whitewood(Triplochitonscleroxylon).



Figure 1: Map of the Study Area

Bird survey methods

The reserve was divided into two blocks based on land use type. The Forest block (150 ha and the Savannah woodland block (150 ha) were mapped and the Point count method (Sutherland, 2009) was used to collect data on bird species diversity and abundance in the blocks. Counting bands of 50m radius were used in the stations and the minimum distance between two counting stations was 200 m. In all, 10 counting station were used at 5 stations per block. On arrival at the sites, there was a waiting period allowed for the birds to settle before recording the birds seen or heard for a predetermined time (usually 20 minutes). Bird calls were also recorded with a voice recorder and played back later for confirmation. Physical features of birds sighted but could not be identified immediately were taken and Field Guidebook of West African Birds (Burrow and Demey, 2013) was used for identification of the species while bird calls were used to confirm the presence of nocturnal bird species. Data were collected within 2 days in a week for six months

covering three months in the dry season (November, February, and March) and three months in the wet season (June, August, and September) in 2014.

Data analysis

The data collected were subjected to analysis with descriptive statistics and the computer PAST Model Version 3 (Hammer *et al.*, 2001) was used to determine bird species diversity.

Results

Table 1 shows the checklist of bird species in the Royal Forest Reserve, Eggua. Three hundred and eighty-three(383) individual birds consisting of 235 and 148 in the dry and wet seasons respectively spread across 65 species and 27 families were recorded. The family *Ploceidae* had the highest number (8) of bird species followed by *Accipitridae* and *Pycnonotidae* with 7and 6 bird species respectively (Fig. 2). The relative abundance of bird species was higher in the dry season (0.26 and 0.22) than in the wet (0.15 and 0.13) respectively (Fig.3).

| Family | Scientific names | Common Name | Habitat Type |
|---------------|----------------------------|-----------------------------|-----------------|
| Accipitridae | Polyboroides typus | African Harrier Hawk | Forest/Woodland |
| | Avicedacuculoides | African Cuckoo Hawk | Forest/Woodland |
| | Stephanoaetuscoronatus | Crowned Eagle | Woodland |
| | Micronisusgobar | Gabar Goshawk | Woodland |
| | Kaupifalcomonogramicus | Lizard Burzard | Forest/Woodland |
| | Gypoheiraxangolensis | Palm Nut Vulture | Forest |
| | Milvusaegyptius | Yellow Billed Kite | Forest/Woodland |
| Alcedinidae | Halcyon senegalensis | Senegal Woodland Kingfisher | Woodland |
| | Alcedocristata | Malachile Kingfisher | Woodland |
| Apodidae | Cypsiurusparvus | African Palm Swift | Forest |
| | Telacanthura melanopygia | Black Spinetail | Forest |
| Ardeidae | Bubulcus ibis | Cattle Egret | Woodland |
| Bucerotidae | Tockus nastus | African Grey Hornbill | Woodland |
| | Tockus fasciatus | African Pied Hornbill | Forest |
| | Bycanistesfistulator | Piping Hornbill | Forest |
| Capitonidae | Pogoniuluschrysocomus | Yellow Fronted Tinkerbird | Forest |
| | Pogoniulusbilineatus | Yellow RumpedTinkerbird | Woodland |
| Caprimulgidae | Caprimulgusnigriscapularis | Black Shouldered Nightjar | Wetland |
| Cisticonidae | Camaroptera brachyuran | Grey Backed Camaroptera | Woodland |
| | Eremomelapusilla | Senegal Eremomela | Woodland |
| | Priniasubflava | Tawny Flank Prinnia | Woodland |
| | Cisticolalateralis | Whistling Cisticola | Woodland |
| | | | |

Table 1: The Checklist of Bird Species of Royal Forest Reserve, Eggua

| Columbidae | Treroncalva | African Green Pigeon | Forest |
|-----------------|--------------------------|------------------------------|-----------------|
| | Turtur afer | Blue Spotted Wood Dove | Woodland |
| | Streptopeliasemitorquata | Red Eyed Dove | Woodland |
| | Streptopeliavinacea | Vinaceous Dove | Woodland |
| Cucunidae | Centropussenegalensis | Senegal coucal | Woodland |
| | Ceuthcharesaereus | Yellowbill | Forest/Woodland |
| Dicruridae | Dicrurusadsimilis | Fork Tailed Drongo | Forest |
| Estrididae | Spermestescucullatus | Bronze Mannikin | Forest/Woodland |
| | Estrildamelpoda | Orange Cheeked Waxbill | Woodland |
| Falconidae | Falco ardosiaceus | Grey Kestrel | Woodland |
| | Falco tinnunculus | Common Kestrel | Woodland |
| Meropidae | Meropsalbicollis | White Thraoted Bee Eater | Forest/Woodland |
| - | Meropspusillus | Little Bee Eater | Forest/Woodland |
| Motacillidae | Anthusleucophrys | Plain Backed Pipit | Forest |
| | Motacillaflava | Yellow Wagtail | Woodland |
| Muscicapidae | Terpsifhonerufiventer | Red Bellied Paradise | Woodland |
| Musophagidae | Tauracopersa | Green Turaco | Forest |
| masophagiaae | Musonhagaviolacea | Violet Turaco | Forest |
| Nactariniidaa | Hedudinnacollaris | Collard Suppird | Forest |
| rectaminude | Cuanomitraverticalis | Green Headed Sunbird | Woodland |
| | Cinnuriscoccinigaster | Splandid Sunhird | Woodland |
| Numididae | Numidamalagaris | Halmantad Guinaa Foul | Woodland |
| Phasianidas | Francolinushicalcaratus | Double Spurred Francoling | Forest |
| Ploceidae | Plocausmalanocaphalus | Black Headed Weaver | Forest |
| Tiocelude | Malimbusscutatus | Red Vanted Malimba | Forest |
| | Malimbus cruthrogaster | Red Headed Malimbe | Forest |
| | Funlactocafor | Vallow Crownad Bishop | Woodland |
| | Eupleciesajer | Northern Red Rishen | Woodland |
| | Euplecies/ranciscanus | Northern Red Bishop | Woodland |
| | Ampluoomingalhifuono | Compact weaver | Woodland |
| | Ambiyospizaaibijrons | | Forest/woodiand |
| Deitte eide e | | Same and Darmat | Forest |
| Psittacidae | poicepnaiussenegaius | Senegal Parrot | Woodland |
| Pycnonotidae | Andropadusansorge | AnsorgesGreenbull | Forest |
| | Pycnonotusbarbatus | | Forest/Woodland |
| | Phyllastrephalusiterinus | Icterine Green Bull | Forest |
| | Pryrrhurusscandens | Leatlove | Woodland |
| | Chlorocichla simplex | Simple Greenbull | Forest |
| | Nicatorchloris | Western Nicator | Forest |
| Strigidae | Strixwoodfordii | Atrican Wood Owl | Forest |
| <u>Turdidae</u> | Turdus pelios | West African Thrush Woodland | |
| Viduidae | Vidua chalybeate | Village Indigobird | Woodland |
| | Viduamacroura | Pin Tailed Whydah | Forest/Woodland |

The bird species diversity index of the study area is shown in Table 2. Bird species were more diverse in the dry season compared to the wet season. Shannon diversity index was higher (3.89) in the dry season than 3.81 in dry season. Also, there were slightly more dominant bird species during the wet seasons (0.030) than the wet season (0.029) while Evenness index was somewhat close at 0.75 in the dry season and 0.77 in the wet season.

Table 2: Diversity indices of Bird Speciesof Royal Forest Reserve, Eggua, OgunState

| | Woodland | |
|------------------|----------|------------|
| | Dry | Wet season |
| | season | |
| Taxa_S | 65 | 59 |
| Individuals | 235 | 148 |
| Dominance_D | 0.029 | 0.030 |
| Shannon H | 3.89 | 3.81 |
| Evenness e ^ H/S | 0.75 | 0.77 |



Family

Figure 2: Families of Bird Species of Royal Forest Reserve, Eggua, Ogun State



Figure 3: Relative abundance of Bird Species of Royal Forest, Eggua.

Discussion

The study established that Royal Forest Reserve, Eggua harbours a sizable number of bird species in the vegetation types ranging from the wetland, forest and savannah woodland resulting from the transformation of the landscape by anthropogenic activities. Most of the bird species encountered appeared to have expanded their home range because of the ability to exploit and utilize more than one habitat type and become abundant (Makelainen *et al.,* 2016). This pattern of bird species distribution was shown by the difference in species abundance within the two blocks.

Some woodland/savanna bird species, most of whom are seed eaters, were observed in the forest blocks suggesting that a lot of changes were taking place in the habitats. This is consistent with Cody (1985) who reported that the level of distribution of bird species in a habitat is normally as a result of an occurrence of plant species which support their population and to variation in species-specific requirements in the choice of habitats. In the forest block, rare species were observed that did not utilize the other vegetation blocks(Bas et al., 2009). Thus, different groups of bird species seem to show variable responses to land uses. Insectivores are indicators of noticeable responses to land use. This result agrees with Matlock et al. (2003) that forest patches and protected areas in Sao Tome retained more bird species than agricultural landscapes. Furthermore, it has been reported that the multi-strata tropical agroforestry systems support higher bird diversity and populations than arboreal vegetation (Fariaet al., 2007; Boset al., 2009). Similarly, the observation by Herkert (2009) that the loss of habitats to urbanization reduced the quality of the remaining vegetation and this must have affected the population of avian species in the study area.

The higher relative abundance of avian species within the woodland agrees with Kormar

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(2006) that higher abundance of bird species in cultivated areas due to increased food availability. Some savanna bird species were encountered in the forest area suggesting ongoing human disturbance in the woodland area. Therefore, land use changes would result in the decline of rare species in the area (Manu, 2000). This is consistent with the findings of MacArthur and MacArthur (2001) that avian diversity increases with vegetation complexity. Pearson (1997) also observed that tropical wet evergreen forests support rarer bird species than other habitats. This is because the availability of nesting sites is one of the principal factors that determine the structure of bird community in the agricultural landscape (Söderstrom et al., 2003).

Conclusion and Recommendation

The Royal Forest Reserve, Eggua is surrounded by settlements of agrarian communities whose residents engage in logging and conversion of forest land to crop farms as the major components of the on-going deforestation and forest degradation. However, these activities have the tendency to increase the extinction risk for many threatened and endangered bird species. Besides, urban settlements are catching up with the forest reserve from all directions making it look like an island in trouble. The management focus must concern the programmes designed to discourage bush burning, livestock grazing, deforestation and illegal farming in the Forest Reserve

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