

PROJECT REPORT

**THE BIRDS OF ELIZADE UNIVERSITY FOREST AND SURROUNDING HABITATS: A
STEP TO THE CONSERVATION OF ELIZADE ECOSYSTEM**

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EXECUTIVE SUMMARY

There is much information on global biodiversity; however, our knowledge remains highly incomplete with far less data from tropical Africa and sub-regions which experience inexorable loss in natural habitats and biodiversity. In order to salvage the remaining diversity on earth, aggressive conservation of potential key biodiversity area is eminent. Birds for example, are important component of the ecosystems but remained highly threatened due to habitat destruction. The conservation of certain bird diverse area can indirectly extended protection to many other species in that area. However, implementing conservation programmes can be daunting tasks due to logistics and some human factors and/or interest in potentially diverse area. Moreover, identification of conservable area depends on assessment of such areas for diversity and occurrence of important species. The main goal of this project was to study birds of Elizade University Forest in southwest Nigeria with the objective to determine its avian species composition, embark on local community biodiversity conservation education and awareness; and training of individuals and young scholars in conservation techniques and research skills. Birds were surveyed morning and evening using 35 line transects (each 1000 meters) spread across the study area; and repeated for dry and wet seasons. Birds were also trapped periodically i.e. once every two months during the study. The result showed high avian species composition in the study area which is due to species specific difference in bird between the study sites (Ilara-Mokin, Mariwo, Ikota and Eti). Bird diversity differed significantly between sites. Also, the result showed that certain Guinean-Congo Biome Restricted Bird species occur and utilize the area. In addition, the result showed the area is a suitable wintering ground for Palearctic migrants as observed from misting activities and general bird surveys. The general conclusion therefore is that, the forest patch referred to as the Elizade University Forest is an important forest for the conservation of bird species. This study stands as an important conservation steps for this area.

INTRODUCTION

Recent assessment of the status of >91000 species of plants, animals and fungi revealed that 28% are threatened (IUCN 2001). Notably, the highest concentration of globally threatened species occurs in the forested tropical areas.

In tropical Africa, the forests in the entire southern part of West Africa and into Central Africa comprised the Guinean Forest of West Africa Biodiversity Hotspots, divided into the Upper Guinea Forests (from Guinea – Benin) and the Lower Guinea Forests (Southern Nigeria – Southwestern Cameroun) (*sensu* Mittermeier et al. 1998). These areas constitute the remaining blocks of intact forest refugia for high level species richness and endemism and therefore among world's top priority area for biodiversity conservation (Oates 2011).

However, the 'status quo' for biological species richness as often ascribed to hotspots remains a challenging concern for conservation across this continuum. Severe threats from anthropogenic activities due to expanding human population and increasing demand for housing, food and industrialization have resulted to deforestation and the loss of >85% native Guinea Forest cover, and with the remaining being degraded forest isolates (Fairhead and Leach 1996, Mittermeier et al. 1998, Geist and Lambin 2002). This problem is further compounded by prevailing incidence of poverty, political instability, civil conflict and land ownership (Vansina 1990, Agbu 2004, International Crisis Group 2012, Pouliot et al. 2012, Nwanegbo and Odigbo 2013).

Biodiversity is distributed across a hierarchical continuum of ecological scales categorized into species; sites; and corridors which interlock geographically through the occurrence of species at sites and species and sites within corridors. These culminate into key biodiversity areas (KBA) and represent catchments for conservation initiatives in order to mitigate loss of biodiversity. More also protecting certain selected species help to indirectly protect many other species of the ecological community of its habitat; these so called umbrella species are usually the target in any conservation programme.

Most bird species belong to the umbrella species group. Also, the avifauna diversity– which is integral to the ecosystems–is currently one of the most threatened by escalating pressures of environmental change and habitat conversion, destruction and loss globally. About 13.4 % (1469) of bird species are threatened with extinction; most vulnerable species are those with fragmented ranges, tiny and declining population (Bennett and Owens 1997, BirdLife International 2015).

In Nigeria, the southwest axis lies within the Lower Guinea Forests Hotspot with Omo Forest Reserve and IITA Forest Reserve being important KBAs and strongholds for important bird, e.g. Ibadan malimbe, *Malimbus ibadanensis*, an endangered bird restricted to limited forest patches southwestern Nigeria. Perhaps for lack of information and data, most forest patches within this southwest are potential KBAs on their own. An example is the 'Elizade University Forest' located within the Ifedore Local Government Area of Ondo State. It is within the forests of West Africa Hotspot; one of the remaining, unprotected, heterogeneous forest blocks in the region; and contiguous to the three protected sites in the state. This area is not exempted from illegal logging pressures and expanding agricultural practices (BirdLife International 2015). The goal of this project was to investigate birds of Elizade University

Forest and surrounding habitats in order to inform the conservation of the area. The goal was achieved through, specific study and monitoring of the avian diversity; execution of biodiversity conservation education and awareness among local communities; and training of individuals and young scholars in conservation techniques and research skills.

MATERIAL AND METHODS

Study area

The study was conducted in the Elizade Forest (Plate 1 and 2) bordered by four communities (Ilara-mokin, Ikota, Eti, and Mariwo) in Ifedore Local Government Area, Ondo State, Nigeria. It lies on latitude 07°22'N and longitude 05°10'E; within the Guinean Forests of West Africa Hotspot and the Tropical Lowland Rainforest belt of Nigeria. The region experiences distinct wet (April - October) and dry (November - March) seasons with total annual rainfall is approximately 1800 millimetres; mean monthly temperature range from 27°C to 30°C; and mean monthly relative humidity less than 70%. The vegetation composed trees of economic importance such as *Triplochiton scleroxylon*, *Elaeagnus guineensis*, *Theobroma cacao*, *Terminalia ivoriensis* and *Mahogany* spp. The area is generally interspersed with hills and rocky outcrops. Prior to this study the size and map of the study were unknown; therefore, we generated the map and estimated the size using Global Positioning System (GPS Garmin), Geographic Information System (GIS) and Google tools.



Plate 1 A section of the study area towards Ikota community (Photo: Omotoriogun T.C)



Plate 2 A hilltop view of the study area from Mariwo community (Photo: Omotoriogun T.C)

Bird survey techniques

Birds were counted using a total of 35 lines transect (Bibby et al. 1998) (c. Bibby et al., 2000) of one kilometre each laid on existing foot tracks and access road traversing the study area. Length of transects was determined using Global Positioning System (GPS Garmin). All birds both seen and heard were identified to species level, counted and recorded. Birds were identified using a pair of binoculars (Savannah Pro 8x42), Telescope (Grandview 16-48x65mm) and the Field Guide of the Birds of Western Africa (Borrow and Demey 2001). Bird surveys were carried out in the morning (0600 -1000 hours GMT) and evening (1600—1830 hours GMT). Transects were visited and bird survey repeated for both dry and wet seasons. Birds were trapped with interlocking networks of mist-nets (9 meters, 12 meters and 18 meters) mounted at edges and corridors within the forest during the early morning between 0600 - 1100 hours GMT. During this period, mist nets were regularly checked for any trapped bird every 30 minutes interval. This technique was carried out for a period of 15 days during the dry season.

Vegetation measurement

10m x10m quadrants were laid at four locations along each transect to measure number of: trees with ≥ 10 cm and/or ≤ 10 cm diameter at breast height (DBH) and number of sapling (shrubs and climbers) and stumps. Percentage canopy cover to nearest 5%, i.e. with objective lens of the binoculars, percentage grass cover, percentage litter cover were also estimated.

Statistical analysis

Analyses were performed in R Statistical Software (version 3.4. 1; R Development Core Team 2017). The Vegan Package (Oksanen et al. 2017) was used to estimate cumulative trend of

species recorded across the study area. The Shannon-Weiners Diversity Index was applied to calculate diversity of birds seen and heard by transects grouping, different time of day and habitat-use types.

$$H = - (\sum P_i * \ln P_i)$$

Where $\sum P_i$ is the proportion of the sum of the individual species to the total number of species and $\ln P_i$ is the natural log of P_i .

Linear models were used for the analysis of data to detect best predictors of diversity of birds in the study area.

OUTCOMES

RESULTS AND DISCUSSION

Size of study area

One of the challenges and information required during application for this project was the size and map of study area. Now the estimated size is 15.07km² (1507 hectares) and lies on latitude 07°22'N and longitude 05°10'E. The map of the area is presents in Figure 1 below.

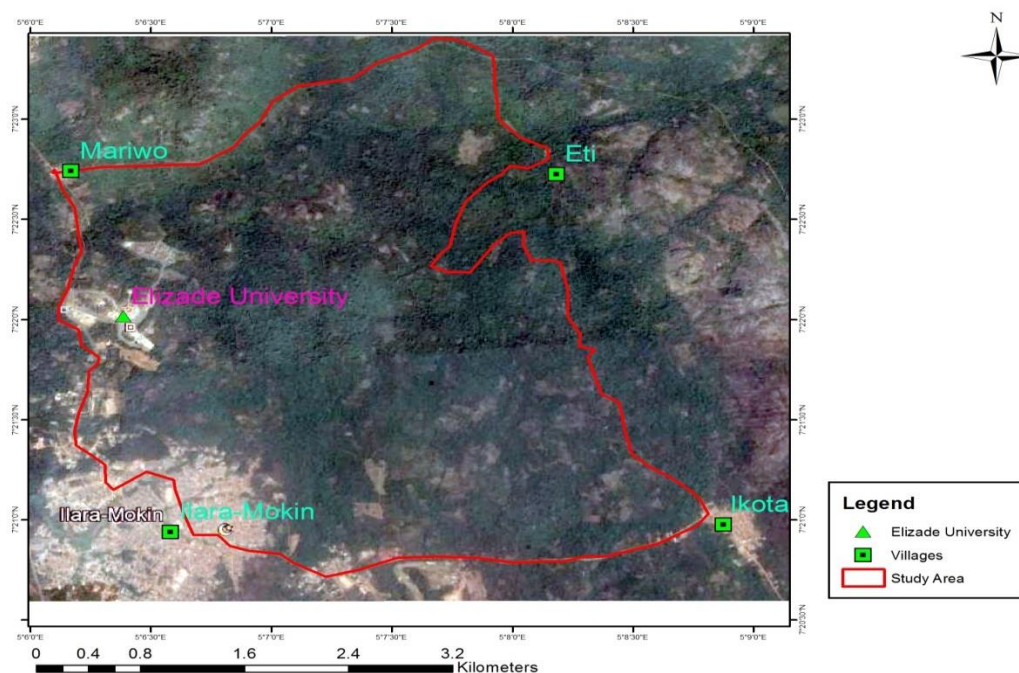


Figure 1 The map of the study area imposed on satellite imagery showing forest interlocked within the communities/four study sites in Ifedore L.G.A, Ondo State.

Survey effort

A total of 7967 individuals of birds in 142 species and 38 families were recorded using 126 line transects during the survey. Appendix I contains the checklist of bird species recorded in the study area with sites and their associated species richness. Sixteen species were recorded outside line transects (see Appendix II). Survey effort showed that about 116 bird species were recorded in the area before transect 20 during the dry season. Only 5 more

species were added thereafter (Figure 2). In the rainy season, 70 species were recorded before transect 15 (Figure 2). In both cases no levelled asymptote was attained suggesting the presence of other bird species unrecorded. There a detectability problems using line transects especially in forest habitat; most species escape observer. It is therefore, noteworthy that the list of bird species as obtained from the survey does not suggest all bird species in the area were recorded.

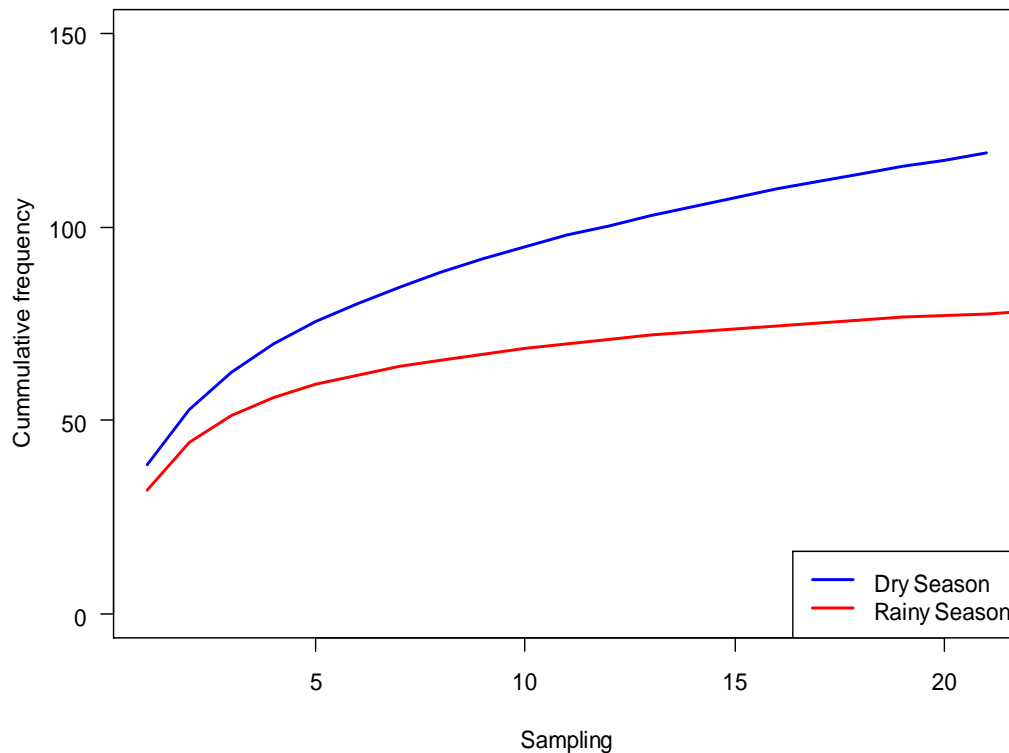


Figure 2 Bird species effort curve for the dry and rainy seasons surveys

Avian abundance and diversity

The abundance of species varies significantly across sites but most differences occurred between Mariwo and Eti ($df=3$, $p=0.006$) and also between Mariwo and Ikota ($df=3$, $p=0.016$). Abundance and diversity index were however higher in Ilara-Mokin (abundance 33.97 ± 0.92 , diversity=3.80) and lowest at Eti (mean abundance= 16.10 ± 0.67 , Diversity=3.3921) (Table 1).

Table 1 Bird abundance (\pm Standard Error) and diversity index across sites in the study area.

Sites	Abundance(\pm SE)	Total observation	Species	Density index
Ilara-Mokin	33.97 ± 0.92	3839	113	3.80
Mariwo	23.70 ± 0.71	2086	87	3.74
Ikota	20.02 ± 0.68	1221	61	3.55
Eti	16.10 ± 0.67	821	51	3.39

There was significant variation in avian species richness across study sites ($\chi^2=29.95$, $P<0.001$). Ilara-Mokin (113 species) recorded the highest species richness relative to Mariwo (87 species) Ikota (61 species) and Eti (51 species) respectively (Table 1 and Fig. 3).

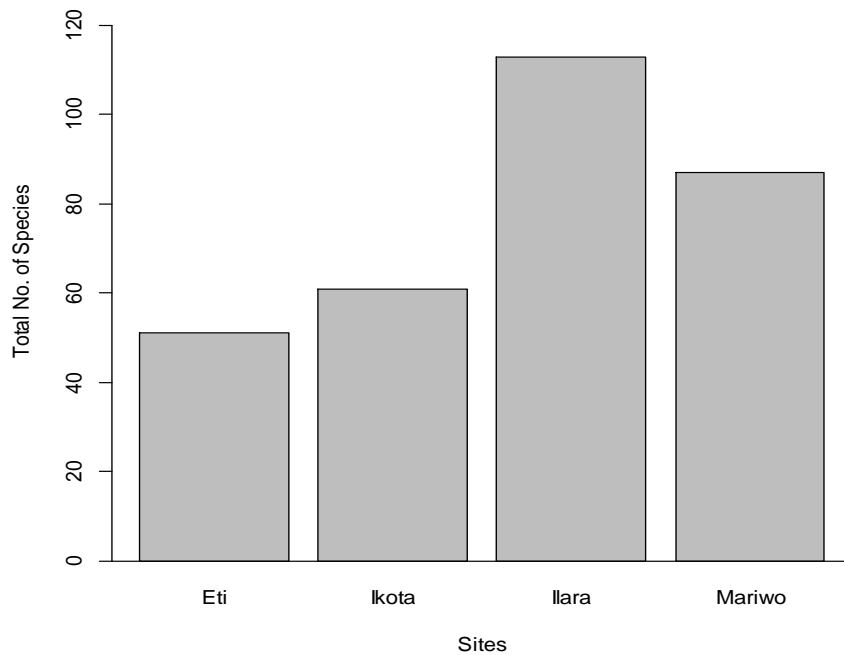


Figure 3 Bird Species richness distribution across sites

Time of day and seasons

There was significant difference in avian diversity between morning and evening ($t=296.71$, $df=2863$, $p<0.0001$). Higher diversity was recorded in the evening relative to morning surveys (Fig. 4). However, there was no significant difference in avian species diversity between dry and wet seasons ($t=319.93$, $df=2863$, $p=0.41$). Diversity indexes in both cases were same.

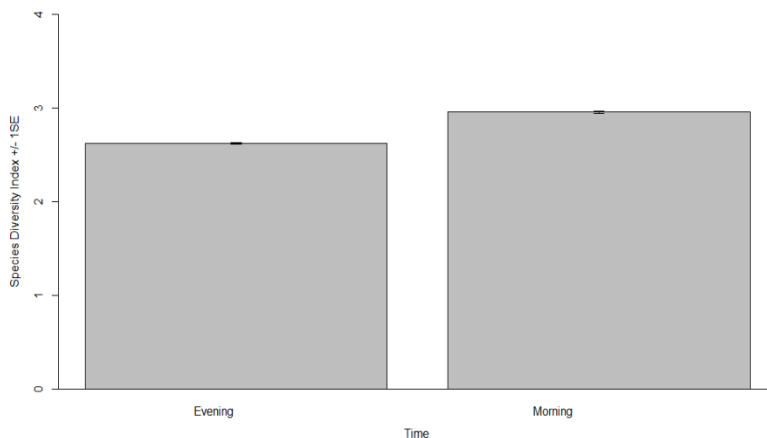


Figure 4 Species diversity indexes for time of the day

There was significant difference in avian species diversity between and across sites. Eti ($t=14.51$, $df=2861$, $p<0.001$) was significantly different from Mariwo ($t=17.76$, $df=2861$, $p=0.001$). Diversity indexes in the case of Ikota ($t=15.06$, $df=2861$, $p=0.581$) showed no significance in the model. However, there was significant difference in avian diversity at Ilara-Mokin ($t=16.92$, $df=2863$, $p=0.015$) contributed in the model.

There was significant difference in avian species diversity between and across habitat types. Farmland ($t= 250.23$, $df=2861$, $p<0.001$) was significantly different from Forest ($t=241.99$,

df=2861, $p < 0.001$). Diversity index for Plantation ($t=236.98$, df=2861, $p < 0.001$) was also significant. There was also significant difference in avian diversity for Residential area ($t=242.96$, df=2863, $p < 0.001$).

Habitat heterogeneity is one of the major determinants of bird diversity (Stein et al. 2014). With increase habitat parameters, the amount of habitat types, resources and structural complexity should increase available niche space and permit more species coexistence (Tews et al. 2004). Heterogeneous areas help species to circumvent adverse environmental conditions and therefore promote species persistence (Kallimanis et al. 2010, Fjeldså et al. 2012). Generally, an increase in available niche space, provision of refuges and opportunities for isolation and divergent adaptation are thought to enhance species coexistence, persistence and diversification. Most birds in the 'generalist group' use a wide range habitat in contrast to habitat specific species which are restricted to favourable habitat patches. Farming practices provide different matrix of farmlands and hedge inducing edge effect. The species specific avian diversity observed across study sites reflects the unique characteristics of those sites in the studied area. These collectively give the avian diversity observed in the area. Diversity differed across the sites; Ilara-Mokin had the highest diversity of birds. Time of day also influences avian diversity in the study area; higher diversity and abundance of birds were recorded in the morning than evening. Most birds' singing or calling can be strongly biased towards the early morning therefore resulting to more bird record in the morning than other periods of the day. This is not a surprise, it corroborate previous studies (Manu and Cresswell 2007). Similarly, the season of the year also influence bird diversity. In this study, dry period had higher avian species than wet period. This period usually coincide with the arrival of Palearctic migrants and return of intra-African Migrant. Certain periods of the year and environmental conditions dictate site suitability for some species (Haddad et al. 2015). Vegetation characteristics also drive the diversity of bird and could determine the abundance of the feeding guilds e.g. granivores, frugivore, nectarivore etc.

Guinea-Congo Forest Biome Restricted Species

Guinea-Congo Forest Biome Restricted bird species were recorded. Ahanta Francolin *Francolinus achantensis* which is rear and believed to be nocturnal was heard calling at Ilara-Mokin. Grey parrot *Psittacus erithacus* endangered was seen in flight and in perch; once with a group of four individuals at Ilara-Mokin. Green Turaco *Tauraco persa* was often heard seen few times. Black Bee-eater *Merops gularis* were seen perched at Ilara-Mokin. Fire-bellied Woodpecker *Dendropicops pyrrhogaster* was also recorded in the study sites.

Table 4 Checklist of bird species recorded for the study area indicating sites and their associated species richness

Species	Binomial	Family	Eti	Ikota	Ilara-Mokin	Mariwo
African Emerald Cuckoo	<i>Chrysococcyx cupreus</i>	Cuculidae	√	√	√	√
African Goshawk	<i>Accipiter tachiro</i>	Accipitridae	-	√	√	-
African green Pigeon	<i>Treron calvus</i>	Columbidae	√	√	√	√
African Harrier Hawk	<i>Polyboroides typus</i>	Accipitridae	-	-	√	-
African Morning Dove	<i>Streptopelia decipiens</i>	Columbidae	√	√	√	√
African Palm Swift	<i>Cypsiurus parvus</i>	Apodidae	-	-	√	-
African Paradise Flycatcher	<i>Terpsiphone viridis</i>	Monarchidae	√	√	√	√
African Pied Hornbill	<i>Tockus fasciatus</i>	Bucerotidae	√	√	√	√
African Pied Wagtail	<i>Motacilla aguimp</i>	Motacillidae	-	√	√	√
African Thrush	<i>Turdus pelios</i>	Turdidae	-	-	√	-
African Wood Owl	<i>Strix woodfordii</i>	Strigidae	-	-	√	-
Ahanta Francolin	<i>Francolinus ahantensis</i>	Phasianidae	-	-	√	-
Black Bee-eater	<i>Merops gularis</i>	Meropidae	-	-	√	-
Black Dwarf Hornbill	<i>Tockus hartlaubi</i>	Bucerotidae	-	√	-	-
Black Sparrowhawk	<i>Accipiter melanoleucus</i>	Accipitridae	√	√	√	-
Black-and-white Mannikin	<i>Spermetes bicolor</i>	Estrildidae	-	-	√	√
Black-and-white-casqued Hornbill	<i>Bycanistes subcylindricus</i>	Bucerotidae	-	-	√	-
Black-necked Weaver	<i>Ploceus nigricollis</i>	Ploceidae	-	-	√	√
Blue-breasted Kingfisher	<i>Halcyon malimbica</i>	Alcedinidae	√	√	√	√
Blue-headed Coucal	<i>Centropus monachus</i>	Cuculidae	√	√	√	√
Blue-headed Crested Flycatcher	<i>Trochocercus nitens</i>	Monarchidae	-	-	√	√
Blue-spotted Wood Dove	<i>Turtur afer</i>	Columbidae	√	√	√	√
Blue-throated Brown Sunbird	<i>Cyanomitra cyanolaema</i>	Nectariniidae	√	√	√	√
Bristle-nosed Barbet	<i>Gymnobucco peli</i>	Capitonidae	-	-	-	√
Broad-billed Roller	<i>Eurystomus glaucurus</i>	Coraciidae	-	√	√	√
Bronze Mannikin	<i>Spermetes cucullatus</i>	Estrildidae	√	-	√	√
Buff-throated Apalis	<i>Apalis rufogularis</i>	Sylviidae	√	√	√	√
Buff-throated Sunbird	<i>Chalcomitra adelberti</i>	Nectariniidae	√	√	√	√

Cameroon Sombre Greenbul	<i>Andropadus curvirostris</i>	Pycnonotidae	-	-	√	-
Cardinal Woodpecker	<i>Dendropicos fuscescens</i>	Picidae	-	-	√	-
Cassin's Honeyguide	<i>Prodotiscus insignis</i>	Indicatoridae	-	-	√	-
Cattle Egret	<i>Bubulcus ibis</i>	Ardeidae	-	-	√	-
Chestnut Wattle-eye	<i>Dyaphorophya castanea</i>	Platysteiridae	√	√	√	√
Chestnut-capped Flycatcher	<i>Erythrocercus mccallii</i>	Monarchidae	-	-	√	√
Collared Sunbird	<i>Hedydipna collaris</i>	Nectariniidae	√	√	√	√
Common Bulbul	<i>Pycnonotus barbatus</i>	Pycnonotidae	√	√	√	√
Common Kestrel	<i>Falco tinnunculus</i>	Falconidae	-	√	√	√
Didric Cuckoo	<i>Chrysococcyx caprius</i>	Cuculidae	-	√	√	√
Double-spurred Francolin	<i>Francolinus bicalcaratus</i>	Phasianidae	-	-	√	√
Dusky Crested Flycatcher	<i>Elminia nigromitrata</i>	Monarchidae	-	-	√	-
Ethiopian Swallow	<i>Hirundo aethiopica</i>	Hirundinidae	-	-	-	√
Finsch's Flycatcher Thrush	<i>Stizorhina finschi</i>	Turdidae	√	√	√	√
Fire-bellied Woodpecker	<i>Dendropicos pyrrhogaster</i>	Picidae	√	√	√	√
Forest Chestnut-winged Starling	<i>Onychognathus fulgidus</i>	Sturnidae	-	-	√	√
Green Crombec	<i>Sylvietta virens</i>	Sylviidae	√	√	√	√
Green Turaco	<i>Tauraco persa</i>	Musophagidae	√	√	√	√
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	Pheonculidae	-	-	√	√
Grey Heron	<i>Ardea cinerea</i>	Ardeidae	-	-	√	-
Grey Kestrel	<i>Falco ardosiaceus</i>	Falconidae	-	√	-	√
Grey Parrot	<i>Psittacus erithacus</i>	Psittacidae	-	-	√	√
Grey-backed Camaroptera	<i>Camaroptera brachyuran</i>	Sylviidae	√	√	√	√
Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	Alcedinidae	-	-	-	√
Grey-headed Negrofinch	<i>Nigrita canicapillus</i>	Estrildidae	√	√	√	√
Hairy-breasted Barbet	<i>Tricholaema hirsute</i>	Capitonidae	√	√	√	√
Icterine Greenbul	<i>Phyllastrephus icterine</i>	Pycnonotidae	-	-	√	-
Jacobin Cuckoo	<i>Oxylophus jacobinus</i>	Cuculidae	√	-	-	-
Klaas's Cuckoo	<i>Chrysococcyx klaas</i>	Cuculidae	√	√	√	√
Leaflove	<i>Pyrrhurus scadens</i>	Pycnonotidae	-	-	√	√

Lesser Stripped Swallow	<i>Hirundo abyssinica</i>	Hirundinidae	-	√	√	√
Little Bee-eater	<i>Merops pusillus</i>	Meropidae	-	√	√	√
Little Greenbul	<i>Andropadus virens</i>	Pycnonotidae	√	√	√	√
Little Grey Greenbul	<i>Andropadus gracilis</i>	Pycnonotidae	-	√	√	-
Little Swift	<i>Apus affinis</i>	Apodidae	-	-	√	√
Lizard Buzzard	<i>Kaupifalco monogrammicus</i>	Accipitridae	√	√	√	√
Long-crested Eagle	<i>Lophaetus occipitalis</i>	Accipitridae	-	-	-	√
Long-tailed Nightjar	<i>Caprimulgus climacurus</i>	Caprimulgidae	-	-	√	-
Maxwell's Black Weaver	<i>Ploceus albinucha</i>	Ploceidae	-	-	√	-
Naked-faced Barbet	<i>Gymnobucco calvus</i>	Capitonidae	√	√	√	√
Narrow-tailed Starling	<i>Poeoptera lugubris</i>	Sturnidae	-	-	√	-
Northern Grey-headed Sparrow	<i>Passer griseus</i>	Passeridae	-	-	√	√
Olive Sunbird	<i>Cyanomitra olivacea</i>	Nectariniidae	√	√	√	√
Olive-bellied Sunbird	<i>Cinnyris chloropygius</i>	Nectariniidae	√	√	√	√
Olive-green Camaroptera	<i>Camaroptera chloronota</i>	Sylviidae	-	-	√	√
Orange-cheeked Waxbill	<i>Estrilda melpoda</i>	Estrildidae	-	-	√	-
Pale-fronted Negrofinch	<i>Nigrita luteifrons</i>	Estrildidae	√	√	√	√
Pied Crow	<i>Corvus albus</i>	Corvidae	-	-	√	√
Piping Hornbill	<i>Bycanistes fistulator</i>	Bucerotidae	-	-	√	-
Plain-backed Pipit	<i>Anthus leucophrys</i>	Motacillidae	-	-	√	-
Purple Glossy Starling	<i>Lamprotornis purpueus</i>	Sturnidae	-	-	√	-
Red-bellied Paradise Flycatcher	<i>Terpsiphone rufiventer</i>	Monarchidae	-	-	√	-
Red-billed Helmet-shrike	<i>Prionops caniceps</i>	Prionopidae	√	√	√	√
Red-cheeked Wattle-eye	<i>Dyaphorophyia blissetti</i>	Platysteiridae	-	-	-	√
Red-chested Cuckoo	<i>Cuculus solitaries</i>	Cuculidae	-	-	√	-
Red-eyed Dove	<i>streptopelia semitorquata</i>	Columbidae	√	√	√	√
Red-headed Malimbe	<i>Malimbus rubricollis</i>	Ploceidae	-	√	√	√
Red-rumped Tinkerbird	<i>Pogoniulus atroflavus</i>	Capitonidae	√	√	√	√
Red-shouldered Cuckoo-shrike	<i>Campephaga phoenica</i>	Campephagidae	-	-	-	√
Red-vented Malimbe	<i>Malimbus scutatus</i>	Ploceidae	√	√	√	√

Red-winged Warbler	<i>Heliolais erythropterus</i>	Sylviidae	-	-	-	√
Senegal Coucal	<i>Centropus senegalus</i>	Cuculidae	√	√	√	√
Shikra	<i>Accipiter badius</i>	Accipitridae	√	-	√	-
Shinning Dronngo	<i>Dicrurus atripennis</i>	Dicruridae	-	-	-	√
Simple Leaflove	<i>Chlorocichla simplex</i>	Pycnonotidae	√	√	√	√
Slender-billed Greenbul	<i>Andropadus gracilirostris</i>	Pycnonotidae	-	-	√	-
Snowy-crowned Robin Chat	<i>Cosspha niveicapilla</i>	Turdidae	-	-	√	-
Speckled Tinkerbird	<i>Pogoniulus scolopaceus</i>	Capitonidae	√	√	√	√
Splendid Glossy Starling	<i>Lamprotornis splendidus</i>	Sturnidae	-	-	√	-
Splendid Sunbird	<i>Cinnyris coccinigastrus</i>	Nectariniidae	-	√	√	√
Spotted Flycatcher	<i>Muscicapa striata</i>	Muscicapidae	-	-	-	√
Spotted Greenbul	<i>Ixonotus guttatus</i>	Pycnonotidae	√	√	√	√
Standard-winged Nightjar	<i>Macrodipteryx longipennis</i>	Caprimulgidae	-	-	√	-
Superb Sunbird	<i>Cinnyris superbus</i>	Nectariniidae	√	√	√	√
Swamp Nightjar	<i>Caprimulgus natalensis</i>	Caprimulgidae	-	-	√	-
Swamp Palm Bulbul	<i>Thescelocichla leucoplura</i>	Pycnonotidae	√	√	√	√
Tambourine Dove	<i>Turtur tympanistria</i>	Columbidae	√	√	√	√
Tawny-flanked Prinia	<i>Prinia subflava</i>	Sylviidae	-	-	√	√
Tit-Hylia	<i>Pholidornis rushiae</i>	Paridae	-	-	√	√
Tree Pipit	<i>Anthus trivialis</i>	Motacillidae	-	-	-	√
Variable Sunbird	<i>Cinnyris venustus</i>	Nectariniidae	-	√	√	√
Velvet-mantled Drongo	<i>Dicrurus modestus</i>	Dicruridae	√	√	√	√
Village Weaver	<i>Ploceus cucullatus</i>	Ploceidae	-	-	√	√
Western Black-headed Oriole	<i>Oriolus brychyrhynchus</i>	Oriolidae	√	√	√	√
Western Grey Plantain-eater	<i>Crinifer piscator</i>	Musophagidae	-	-	√	√
Whinchat	<i>Saxicola rubetra</i>	Turdidae	-	-	√	√
White-bellied Kingfisher	<i>Alcedo leugogaster</i>	Alcedinidae	-	-	√	-
White-breasted Negrofinch	<i>Nigrita fusconotus</i>	Estrildidae	-	-	-	√
White-crested Hornbill	<i>Tropicranus albocristatus</i>	Bucerotidae	-	-	√	-
White-headed Wood-hoopoe	<i>Phoeniculus bollei</i>	Phoeniculidae	-	-	√	-

White-throated Bee-eater	<i>Merops albicollis</i>	Meropidae	-	√	√	√
Willow Warbler	<i>Phylloscopus trochilus</i>	Sylviidae	√	-	√	√
Woodland Kingfisher	<i>Halcyon senegalensis</i>	Alcedinidae	√	√	√	√
Yellow-billed Kite	<i>Milvus migrans</i>	Accipitridae	√	√	√	√
Yellow-breasted Apalis	<i>Apalis flavida</i>	Sylviidae	√	-	√	-
Yellow-mantled Weaver	<i>Ploceus tricolor</i>	Ploceidae	√	√	√	√
Yellow-throated Tinkerbird	<i>Pogoniulus subsulphureus</i>	Capitonidae	√	√	√	√
Yellow-whiskered Greenbul	<i>Andropadus latirostris</i>	Pycnonotidae	√	√	√	√

Appendix I Species sighted during the study but not during transect surveys with their scientific names and their families

Common name	Scientific name	Family
Common Whitethroat	<i>Sylvia communis</i>	Sylviidae
Dusky-blue Flycatcher	<i>Muscicapa cimita</i>	Muscicapidae
European Reed Warbler	<i>Acrocephalus scirpaceus</i>	Sylviidae
Garden Warbler	<i>Sylvia borin</i>	Sylviidae
Great Reed Warbler	<i>Acrocephalus arundinaceus</i>	Sylviidae
Melodious Warbler	<i>Hippolais polyglotta</i>	Sylviidae
Pin-tailed Whydah	<i>Vidua macroura</i>	Viduidae
Rock Martin	<i>Hirundo fuligula</i>	Hirundinidae
Sabin's Puffback	<i>Dryoscopus sabini</i>	Malaconotidae
Western Bluebill	<i>Spermophaga haematina</i>	Estrildidae
Western Nicator	<i>Nicator chloris</i>	Pycnonotidae
Mottle Spintail	<i>Telacanthura ussheri</i>	Apodidae
White-face Whistling Duck	<i>Dendrocygna viduata</i>	Anatidae
Little Grebe	<i>Tachybaptus ruficollis</i>	Podicipedidae
Long-tailed Cormorant	<i>Microcarbo africanus</i>	Phalacrocoracidae
Africa Jacana	<i>Actophilornis africanus</i>	Jacaniidae

Biodiversity conservation education and awareness

Community based conservation initiative is one of the most effective ways of conserving any ecosystem in areas experiencing human impact. We executed a biodiversity conservation education and awareness in the study community to sensitize and educate the populace especially secondary school students on the ecology and social values of birds, including threat to birds and habitats through videos and lecture presentation (Plate A). We held sessions for poster presentation and to demonstrate bird viewing techniques, getting participant involved (See plates B and C). Secondary schools were visited and letter of notification for the biodiversity conservation seminar circulated to the proprietors and principals informing them of the arrangement including date, time and activities to be held during the programme. Promotional materials such as t-shirt, polo, pens were customized for use during conservation education (See Plate D). The T-shirts had the inscription (SAVE: Biodiversity, Bird and Habitat at the back, and a photo of African Paradise Flycatcher *Terpsiphone viridis* and Rufford Logo in front). The pens had Rufford logo on them. The posters also had Rufford logo.



Plate A. During the biodiversity conservation education workshop in The Apostolic High School, Ilara-Mokin showing the video and presentation session (left), and project team members (right), Dr Momoh, me, Mr Lawal (front row); Dr Ojo, Mr Uwatt, and Mr Fadahunsi (hind row)



Plate B. During an outdoor demonstration session with one of team members illustrating the use of binoculars and telescope in The Apostolic High School (Left), and student looking through telescope and binoculars during demonstration session in The Community Comprehensive High School, Ilara-Mokin (Right)



Plate C. During the poster session explaining the morphology and beaks adaptation of the common bird of Elizade University Forest and surrounding habitats, The Apostolic High School (Left) and The Community Comprehensive High School (Right)



Plate D. Promotional materials used for the conservation education. T-shirt and polo (Left) with the photo of African Paradise Flycatcher and The Rufford logo in front, and save: biodiversity and birds and habitat at the back. Pens (Right) with The Rufford logo

Ornithological trainings and skills acquisition

We routed a memo to the Elizade University Management for the project; as soon as it was approved in January 2017, field activities and training of participant commenced. For the training of participants and to create awareness, the Bird Monitoring and Molecular Research Group (BMMRG), and Elizade University Bird Club (EUBC) were established. The BMMRG principally focused on collaborative research on birds in the Department of Biological Sciences. The EUBC focused on bringing together individuals, students, scientists and non-scientist who love and have interest for nature and biodiversity. It is one of the Nigerian Bird Atlas (NiBA) Project Initiatives for effective bird awareness creation adopted for use in the study; and for onwards monitoring of birds within the study area. The EUBC with its growing members (25 registered) observe periodic birdviewing expeditions around the surrounding; no doubt participants learn about birds, environment, biodiversity



Plate E. During an expedition around study area (Left), and group photograph of some of the members of the EUBC

CONCLUSION

The general conclusions and findings of this study are the Elizade University Forest is rich in avian species diversity, studied sites had species specific differences in bird diversity in the study area; some Guinea-Congo Forest Biome Restricted Birds species occur and utilize the study area; and mist netting activities showed that Palearctic migrants use the forest patch

as wintering ground in southwest Nigeria. Collectively, the Elizade University Forest is an important forest patch for the conservation of bird species. The report of this study is important for any conservation steps for this area. As already stated, the area is under threat from logging and housing, intervention from stakeholders is required to curb logging activities other illegal activities. A manuscript is under preparation for submission. A handbook of the birds of the study area (which is underway) is going to be available to the university library, and secondary schools' library in the community.

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