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# ABUNDANCE AND DIVERSITY OF WILD BIRDS SPECIES IN THE BUFFE ZONE OF OLD OYO NATIONAL PARK, NIGERIA

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## *ABSTRACT*

***The study estimated the relative abundance and diversity of wild birds' populations in the buffer zone of Old Oyo National Park. Point count method was used to estimate wild birds' species abundance in both wet and dry seasons. Ecological data on wild birds' resources were subjected to diversity indices analysis using PAleontological STatistics (PAST). The results showed that 21 families representing 30 species of birds were recorded in wet and dry seasons. In Ogun-Tede range, Tockus nasatus (6.70±1.65)/km$^2$ had the highest relative abundance in both wet and dry seasons respectively. While in Marguba range, Motacilla flava (4.14±1.02)/km$^2$ had the highest relative abundance in both wet and dry seasons. The diversity indices for wild birds were higher (D=0.95; H=3.2) in wet season. Ecosystem values of wild birds and their roles in ecological processes would be lost if we do not take seriously the effective conservation and management of the study area.***

**Keywords:** Wild birds, Buffer zone, Diversity, Abundance, Old Oyo National Park

## INTRODUCTION

Birds form an integral part of the ecosystem as they serve as mobile-links within the vast food chains and webs that exist (Nason, 1992) in terrestrial and aquatic ecosystems. Wild birds could be both prey and predator; serving as biological control; eating insects (Mols and Visser, 2002) like grasshoppers and locusts which are agricultural pests, also birds of prey help to control populations of harmful rodents (Brown and Kotler, 2004) whilst vultures act as natural rubbish disposers by clearing up the carcasses of dead animals and human refuse (Prakash *et al*, 2003).

They have several scientific, ecological, economic and cultural values (Diamond, 1987); they serve as pollinators of flowers. Birds like sunbirds help to pollinate flowers as they pass from one plant to another, seeking nectar, in the same way as bees carry out pollination. This enables man's vegetative food supplies to flourish (Nabhan and Buchmann, 1997; Narang *et al*, 2000). Birds serve as seed dispersal agents (Greenberg et al, 1995; Wenny and Levey, 1998). They convey exotic species, as they carry certain organisms from one place to another where they do not exist and in some cases, they become invasive (Gibson and Wheelwright, 1995). The droppings of some species of birds mainly seabirds serve as a source of fertilizer for farmers as the droppings popularly called 'guano' are rich in sulphate and phosphate (Croll *et al*, 2005).

There is scarcity of literatures on the abundance and diversity of wild birds on buffer zones or lands adjacent most of the protected areas in Nigeria, hence the importance of this study. This study

estimated the relative abundance and diversity of wild birds' populations in the buffer zone of the Park.

## MATERIALS AND METHODS

### Study Area

Old Oyo National Park (OONP) derives its name from the ruins of Oyo-Ile, (Old Oyo) the ancient political capital of Yoruba Empire. The abundance of cultural features in and outside the Park with a combination of ecological and biodiversity sites places the Park in a very unique and advantageous position as a potential tourism destination. The Park has a total land mass of 2512 km$^2$ (making it the fourth largest National Park in Nigeria) and is located in the South Western part of Nigeria, specifically Northern part of Oyo State. OONP is geographically located between latitudes 8$^o$ 15' and 9$^o$.00'N of the equator and longitudes 3$^o$ 35' and 4$^o$ 42'E of the Greenwich meridian (Oladeji *et al*, 2012).

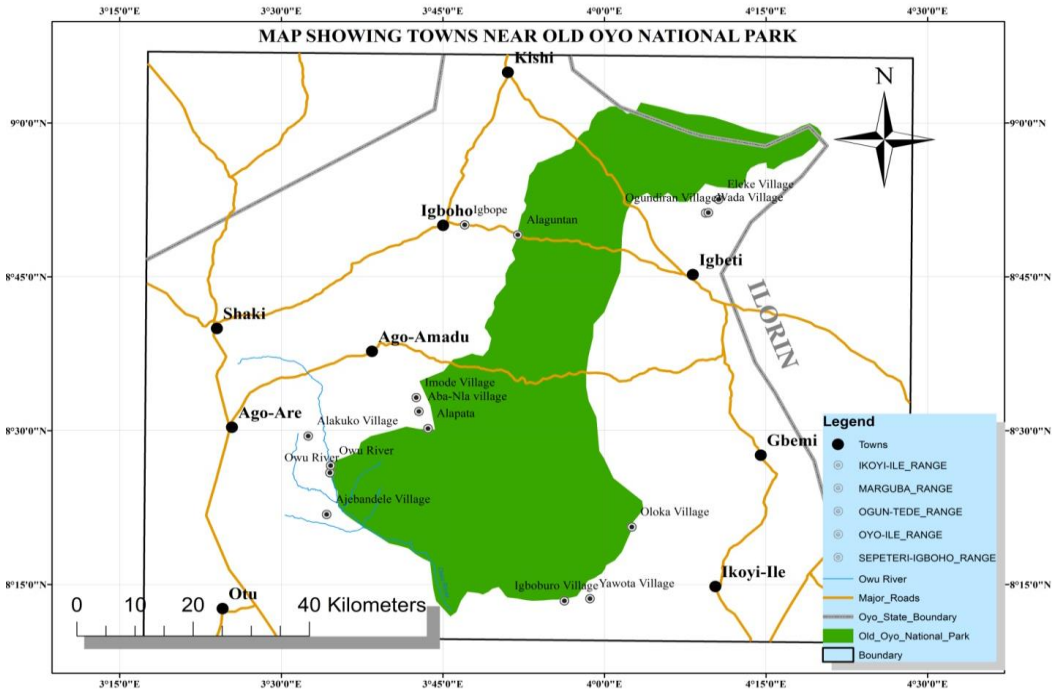


**Figure 1:** Map of Old Oyo National Park showing the buffer zone villages
**Source:** Adedoyin *et al*., 2018

### Experimental Design

A total of ten (10) point counts were laid in the five ranges in the buffer zone. Each point count was more than 5 km apart to prevent double counting. Each point count was visited twice in a month between the hours of 7:00 am-12 noon and 4:00 pm and 7:00 pm (local time). The observer stayed quietly for between 10-15 minutes in each count point to allow for human presence. Binocular (10 x 40) was used to observe bird species. Birds within and outside a fixed radius of 100 m were counted. Birds sighted were identified as described and classified by Serle *et al*, (1997). The following assumptions were made: birds do not approach observer or flee; birds behave independently of the others; birds are not counted twice; birds are identified correctly and distance estimates are correct. Relative abundance of wild birds' population is calculated using:

$$RB = log_e\left(\frac{n_1}{n_2}\right) \times \frac{n(\pi r^2)}{m} \quad \ldots\ldots\ldots [1]$$

Where: RB = Relative Abundance
$n_1$ - number of species of birds counted within the radius (100 m); $n_2$ - number of birds

counted beyond the fixed radius (100 m); n - total number of birds; m- total number of birds counted within each range and r- radius.

**Data Collection**

Ecological data collected (such as number of species of birds counted within and beyond fixed radii, number of species encountered and fraction of the entire population made up of species) on avifauna resources were subjected to diversity indices analysis using PAST (PAleontological STatistics) Software Package for Education and Data Analysis (version 3.04) as recommended by (Hammer *et al*, 2001).

$D = 1 - \sum P_i^2$ …… [2]

$H = - \sum (P_i * \ln P_i)$ ..…… [3]

Where: D = the Simpson's diversity index; H = the Shannon diversity index; $P_i$ = fraction of the entire population made up of species *i*; s = numbers of species encountered; *i*=1; $\sum$ = sum from species 1 to species s

**RESULTS**

During wet season in Ogun-Tede range buffer zone, *Tockus nasatus* (6.70±1.65)/km$^2$ had the highest relative abundance while *Streptopelia semitorquata* (0.30±0.07)/km$^2$ had the least.

In dry season, *Ploceus cucullatus* (4.22±1.02)/km$^2$ had the highest relative abundance while *Milvus migrans* (0.27±0.06)/km$^2$ had the least.

**Table 1: Wet Season Wild Birds Species Abundance in Ogun-Tede Buffer zone**

| **Family** | **Species** | **$n_1$** | **$n_2$** | **n** | **Relative Abundance/km$^2$** |
|---|---|---|---|---|---|
| Acciptridae | *Kaupifalco monogrammicus* | 9 | 13 | 22 | 1.19±0.28 |
| | *Milvus migrans* | 7 | 13 | 20 | 1.82±0.44 |
| Alcedinidae | *Halcyon malimbica* | 1 | 4 | 5 | 1.02±0.25 |
| Apodidae | *Cypsiurus parvus* | 8 | 13 | 21 | 1.50±0.36 |
| Bucerotidae | *Tockus nasatus* | 5 | 24 | 29 | 6.70±1.65 |
| Columbidae | *Columba guinea* | 12 | 25 | 37 | 4.00±0.97 |
| | *Streptopelia semitorquata* | 2 | 3 | 5 | 0.30±0.07 |
| Coraciidae | *Coracias abyssinica* | 3 | 5 | 8 | 0.60±0.14 |
| Cuculidae | *Centropus senegalensis* | 3 | 6 | 9 | 0.92±0.22 |
| Phasianidae | *Francolinus bicalcaratus* | 2 | 7 | 9 | 1.66±0.41 |
| Ploceidae (Passerine) | *Petronia dentata* | 2 | 5 | 7 | 0.94±0.23 |
| Ploceidae (Ploceinae) | *Ploceus cucullatus* | 19 | 27 | 46 | 2.38±0.55 |
| Ploceidae (Viduinae) | *Vidua macroura* | 2 | 7 | 9 | 1.66±0.41 |
| Psittacidae | *Poicephalus senegalus* | 8 | 15 | 23 | 2.13±0.51 |
| **Mean** | | | | **18.0** | **1.92±0.46** |
| **Total** | | | | **250.0** | **26.82±6.49** |

**Table 2: Dry Season Wild Birds Species Abundance in Ogun-Tede Buffer zone**

| Family | Species | $n_1$ | $n_2$ | n | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Acciptridae | *Kaupifalco monogrammicus* | 3 | 7 | 10 | 1.14±0.28 |
| | *Milvus migrans* | 2 | 3 | 5 | 0.27±0.06 |
| Alcedinidae | *Halcyon malimbica* | 1 | 3 | 4 | 0.59±0.14 |
| Apodidae | *Cypsiurus parvus* | 5 | 11 | 16 | 1.70±0.41 |
| Columbidae | *Columba guinea* | 6 | 14 | 20 | 2.28±0.55 |
| | *Streptopelia semitorquata* | 7 | 16 | 23 | 2.56±0.62 |
| Coraciidae | *Coracias abyssinica* | 2 | 12 | 14 | 3.38±0.83 |
| Ploceidae (Passerine) | *Petronia dentata* | 3 | 11 | 14 | 2.45±0.60 |
| Ploceidae (Ploceinae) | *Ploceus cucullatus* | 19 | 27 | 46 | 4.22±1.02 |
| Ploceidae (Viduinae) | *Vidua macroura* | 14 | 29 | 43 | 2.96±0.73 |
| **Mean** | | | | **16.0** | **2.16±0.52** |
| **Total** | | | | **159.0** | **21.55±5.24** |

In Marguba range during wet season, *Motacilla flava* (4.14±1.02)/km$^2$ had the highest relative abundance while *Ploceus cucullatus* (0.52±0.10)/km$^2$ had the least relative abundance. In dry season, *Tockus nasatus* (4.42±1.09)/km$^2$ had the highest relative abundance while *Ardeola ibis* (1.28±0.30)/km$^2$ had the least.

**Table 3: Wet Season Wild Birds Species Abundance in Marguba Buffer zone**

| Family | Species | $n_1$ | $n_2$ | n | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Alcedinidae | *Halcyon senegalensis* | 1 | 8 | 9 | 2.44±0.60 |
| Ardeidae | *Ardeola ibis* | 10 | 18 | 28 | 2.14±0.51 |
| Bucerotidae | *Tockus nasatus* | 1 | 6 | 7 | 1.63±0.40 |
| Columbidae | *Stigmatopelia senegalensis* | 2 | 8 | 10 | 1.81±0.44 |
| Cuculidae | *Centropus senegalensis* | 2 | 8 | 10 | 1.81±0.44 |
| Meropidae | *Merops pusillus* | 2 | 9 | 11 | 2.16±0.53 |
| Motacillae | *Motacilla flava* | 3 | 16 | 19 | 4.14±1.02 |
| Ploceidae (Ploceinae) | *Ploceus cucullatus* | 17 | 19 | 36 | 0.52±0.10 |
| Pycnonotidae | *Pycnonotus barbatus* | 2 | 12 | 14 | 3.27±0.80 |
| Surnidae (Sturniae) | *Lamprotornis chloropterus* | 1 | 11 | 12 | 3.75±0.93 |
| Turdidae | *Turdus pelios* | 6 | 15 | 21 | 2.51±0.61 |
| **Mean** | | | | **16.0** | **2.38±0.58** |
| **Total** | | | | **177.0** | **26.18±6.38** |

**Table 4: Dry Season Wild Birds Species Abundance in Marguba Buffer zone**

| Family | Species | $n_1$ | $n_2$ | n | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Ardeidae | *Ardeola ibis* | 5 | 10 | 15 | 1.28±0.30 |
| Bucerotidae | *Tockus nasatus* | 1 | 13 | 14 | 4.42±1.09 |
| Columbidae | *Stigmatopelia senegalensis* | 7 | 15 | 22 | 2.06±0.49 |
| Ploceidae (Ploceinae) | *Ploceus cucullatus* | 10 | 17 | 27 | 1.76±0.41 |
| Turdidae | *Turdus pelios* | 3 | 12 | 15 | 2.56±0.62 |
| **Mean** | | | | **19.0** | **2.42±0.58** |
| **Total** | | | | **93.0** | **12.08±2.91** |

*Bradornis pallidus* (5.00±1.23)/km$^2$ had the highest relative abundance while *Halcyon senegalensis* (1.19±0.29)/km$^2$ had the least during wet season in Sepeteri range. *Numida meleagris* (3.48±0.85)/km$^2$ had the highest relative abundance while *Nectarinia senegalensis* (1.29±0.32)/km$^2$ had the least in dry season.

**Table 5: Wet Season Wild Birds Species Abundance in Sepeteri Buffer zone**

| Family | Species | $n_1$ | $n_2$ | n | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Alcedinidae | *Halcyon senegalensis* | 2 | 7 | 9 | 1.19±0.29 |
| Bucerotidae | *Tockus nasatus* | 2 | 8 | 10 | 1.47±0.36 |
| Caprimulgidae | *Caprimulgus nigriscapularis* | 2 | 9 | 11 | 1.75±0.43 |
| Columbidae | *Streptopelia semitorquata* | 4 | 10 | 14 | 1.36±0.33 |
| Muscicapidae (Muscicapinae) | *Bradornis pallidus* | 2 | 19 | 21 | 5.00±1.23 |
| Nectarinidae | *Nectarinia olivacea* | 2 | 15 | 17 | 3.62±0.89 |
| | *Nectarinia senegalensis* | 1 | 9 | 10 | 2.32±0.57 |
| Numididae | *Numida meleagris* | 12 | 18 | 30 | 1.29±0.30 |
| Picidae | *Mesopicos geortae* | 1 | 16 | 17 | 4.98±1.23 |
| **Mean** | | | | **15.0** | **2.55±0.63** |
| **Total** | | | | **139.0** | **22.98±5.63** |

**Table 6: Dry Season Wild Birds Species Abundance in Sepeteri Buffer zone**

| Family | Species | $n_1$ | $n_2$ | n | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Apodidae | *Cypsiurus parvus* | 6 | 13 | 19 | 1.68±0.41 |
| Bucerotidae | *Tockus nasatus* | 1 | 7 | 8 | 1.78±0.44 |
| Columbidae | *Streptopelia semitorquata* | 2 | 9 | 11 | 1.90±0.47 |
| Muscicapidae (Muscicapinae) | *Bradornis pallidus* | 2 | 12 | 14 | 2.87±0.71 |
| Nectarinidae | *Nectarinia olivacea* | 2 | 11 | 13 | 3.30±0.82 |
| | *Nectarinia senegalensis* | 2 | 7 | 9 | 1.29±0.32 |
| Numididae | *Numida meleagris* | 4 | 17 | 21 | 3.48±0.85 |
| Ploceidae (Ploceinae) | *Ploceus cucullatus* | 11 | 25 | 36 | 3.39±0.82 |
| **Mean** | | | | **16.0** | **2.46±0.61** |
| **Total** | | | | **131.0** | **19.69±4.84** |

During wet season in Oyo-Ile range buffer zone, *Motacilla flava* (5.66±1.40)/km$^2$ had the highest relative abundance while *Ploceus cucullatus* (1.06±0.25)/km$^2$ had the least. In dry season, *Milvus migrans* (3.83±0.95)/km$^2$ had the highest relative abundance while *Cypsiurus parvus* (1.08±0.26)/km$^2$ had the least. *Coracias abyssinica* (3.90±0.96)/km$^2$ had the highest relative abundance while *Cypsiurus parvus* (1.22±0.28)/km$^2$ had the least relative abundance during wet season in Yemoso range.

**Table 7: Wet Season Wild Birds Species Abundance in Oyo-Ile Buffer zone**

| Family | Species | $n_1$ | $n_2$ | n | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Acciptridae | *Butastur rufipennis* | 1 | 8 | 9 | 1.96±0.48 |
| Alcedinidae | *Halcyon senegalensis* | 1 | 13 | 14 | 3.76±0.93 |
| Bucerotidae | *Tockus nasatus* | 1 | 9 | 10 | 2.30±0.57 |
| Columbidae | *Columba guinea* | 6 | 11 | 17 | 1.08±0.26 |
| | *Stigmatopelia senegalensis* | 5 | 15 | 20 | 2.30±0.56 |
| Motacillae | *Motacilla alba* | 3 | 11 | 14 | 1.90±0.47 |
| | *Motacilla flava* | 2 | 21 | 23 | 5.66±1.40 |
| Ploceidae (Ploceinae) | *Ploceus cucullatus* | 13 | 18 | 31 | 1.06±0.25 |
| **Mean** | | | | **17.0** | **2.50±0.62** |
| **Total** | | | | **138.0** | **20.02±4.92** |

**Table 8: Dry Season Wild Birds Species Abundance in Oyo-Ile Buffer zone**

| Family | Species | $n_1$ | $n_2$ | n | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Acciptridae | *Butastur rufipennis* | 2 | 11 | 13 | 2.37±0.58 |
| | *Milvus migrans* | 1 | 13 | 14 | 3.83±0.95 |
| | *Kaupifalco monogrammicus* | 1 | 12 | 13 | 3.45±0.85 |
| Apodidae | *Cypsiurus parvus* | 9 | 14 | 23 | 1.08±0.26 |
| Columbidae | *Stigmatopelia senegalensis* | 4 | 13 | 17 | 2.14±0.52 |
| Motacillae | *Motacilla flava* | 1 | 12 | 13 | 3.45±0.85 |
| Ploceidae (Ploceinae) | *Ploceus cucullatus* | 10 | 17 | 27 | 1.53±0.37 |
| **Mean** | | | | **17.0** | **2.55±0.63** |
| **Total** | | | | **120.0** | **17.85±4.38** |

**Table 9: Wet Season Wild Birds Species Abundance in Yemoso Buffer zone**

| Family | Species | $n_1$ | $n_2$ | n | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Acciptridae | *Butastur rufipennis* | 1 | 10 | 11 | 3.06±0.76 |
| | *Milvus migrans* | 2 | 11 | 13 | 2.68±0.66 |
| Apodidae | *Cypsiurus parvus* | 11 | 16 | 27 | 1.22±0.28 |
| Bucerotidae | *Tockus nasatus* | 3 | 13 | 16 | 2.83±0.69 |
| Columbidae | *Streptopelia semitorquata* | 6 | 14 | 20 | 2.05±0.49 |
| Coraciidae | *Coracias abyssinica* | 1 | 12 | 13 | 3.90±0.96 |
| Phasianidae | *Francolinus bicalcaratus* | 5 | 17 | 22 | 3.25±0.79 |
| Psittacidae | *Poicephalus senegalus* | 3 | 11 | 14 | 2.20±0.54 |
| **Mean** | | | | **17.0** | **2.65±0.65** |
| **Total** | | | | **136.0** | **21.19±5.17** |

*Milvus migrans* and *Kaupifalco monogrammicus* (4.59±1.14)/km$^2$ had the highest relative abundance while *Ardeola ibis* (0.57±0.12)/km$^2$ had the least relative abundance in dry season. In wet season, Simpson's Index (0.8946) and Shannon-Wiener's Index (2.413) were highest in Ogun-Tede range, but both indices were lowest in Oyo-Ile range. In dry season, Simpson's Index (0.855) and Shannon-Wiener's Index (2.102) were also highest in Ogun-Tede range, but these two indices (Simpson and Shannon) were lowest in Marguba range.

**Table 10: Dry Season Wild Birds Species Abundance in Yemoso Buffer zone**

| Family | Species | $n_1$ | $n_2$ | N | Relative Abundance/km$^2$ |
|---|---|---|---|---|---|
| Acciptridae | *Milvus migrans* | 1 | 12 | 13 | 4.59±1.14 |
| | *Kaupifalco monogrammicus* | 1 | 12 | 13 | 4.59±1.14 |
| Apodidae | *Cypsiurus parvus* | 11 | 16 | 27 | 2.05±0.49 |
| Ardeidae | *Ardeola ibis* | 10 | 12 | 22 | 0.57±0.12 |
| Columbidae | *Columba guinea* | 2 | 13 | 15 | 3.99±0.98 |
| | *Streptopelia semitorquata* | 4 | 14 | 18 | 3.20±0.79 |
| Coraciidae | *Coracias abyssinica* | 1 | 12 | 13 | 3.90±0.96 |
| Phasianidae | *Francolinus bicalcaratus* | 7 | 13 | 20 | 1.76±0.42 |
| **Mean** | | | | **18.0** | **2.96±0.73** |
| **Total** | | | | **128.0** | **20.75±5.08** |

**Table 11: Wet Season Wild Birds Species Diversity in each range of Old Oyo National Park Buffer zone**

| Diversity Indices | Ranges | | | | |
|---|---|---|---|---|---|
| | Ogun-Tede | Marguba | Sepeteri-Igboho | Oyo-Ile | Yemoso |
| Taxa | 14 | 11 | 9 | 8 | 8 |
| Individuals | 250 | 177 | 139 | 138 | 136 |
| Dominance | 0.1054 | 0.1172 | 0.1303 | 0.1445 | 0.1365 |
| Simpson | 0.8946 | 0.8828 | 0.8697 | 0.8555 | 0.8635 |
| Shannon | 2.413 | 2.268 | 2.118 | 2.004 | 2.036 |
| Evenness | 0.798 | 0.878 | 0.9241 | 0.9278 | 0.9571 |
| Brillouin | 2.302 | 2.148 | 1.997 | 1.895 | 1.924 |
| Menhinick | 0.8854 | 0.8268 | 0.7634 | 0.681 | 0.686 |
| Margalef | 2.354 | 1.932 | 1.621 | 1.421 | 1.425 |
| Equitability | 0.9145 | 0.9457 | 0.9641 | 0.9639 | 0.9789 |
| Fisher_ alpha | 3.204 | 2.596 | 2.151 | 1.849 | 1.857 |
| Berger-Parker | 0.184 | 0.2034 | 0.2158 | 0.2246 | 0.1985 |
| Chao-1 | 14 | 11 | 9 | 8 | 8 |

**Table 12: Dry Season Wild Birds Species Diversity in each range of Old Oyo National Park Buffer zone**

| Diversity Indices | Ranges | | | | |
|---|---|---|---|---|---|
| | Ogun-Tede | Marguba | Sepeteri-Igboho | Oyo-Ile | Yemoso |
| Taxa | 10 | 5 | 8 | 7 | 7 |
| Individuals | 159 | 93 | 131 | 120 | 128 |
| Dominance | 0.145 | 0.2149 | 0.159 | 0.1563 | 0.1526 |
| Simpson | 0.855 | 0.7851 | 0.841 | 0.8438 | 0.8474 |
| Shannon | 2.102 | 1.574 | 1.959 | 1.902 | 1.913 |
| Evenness | 0.8186 | 0.9649 | 0.8869 | 0.9571 | 0.9673 |
| Brillouin | 1.986 | 1.481 | 1.847 | 1.794 | 1.81 |
| Menhinick | 0.7931 | 0.5185 | 0.699 | 0.639 | 0.6187 |
| Margalef | 1.776 | 0.8825 | 1.436 | 1.253 | 1.237 |
| Equitability | 0.9131 | 0.9778 | 0.9423 | 0.9775 | 0.9829 |
| Fisher_ alpha | 2.369 | 1.131 | 1.878 | 1.621 | 1.591 |
| Berger-Parker | 0.2704 | 0.2903 | 0.2748 | 0.225 | 0.2109 |
| Chao-1 | 10 | 5 | 8 | 7 | 7 |

Thirty (30) wild birds' species and eight hundred and forty (840) individuals were recorded in the wet season, while twenty-one (21) species and six hundred and thirty-one (631) individuals were recorded during dry season. Also, Simpson's diversity index in the wet season (0.95) was greater than the one in the dry season (0.91) while Shannon diversity index in the wet season (3.2) was also greater than the one in the dry season (2.7).

**Table 13: Wild Birds Richness, Evenness and Diversity in Old Oyo National Park Buffer zone (Wet and Dry Seasons)**

| Species | Wet | Dry |
|---|---|---|
| *Kaupifalco monogrammicus* | 22 | 36 |
| *Milvus migrans* | 33 | 32 |
| *Halcyon malimbica* | 5 | 4 |
| *Cypsiurus parvus* | 48 | 85 |
| *Tockus nasatus* | 72 | 22 |
| *Columba guinea* | 54 | 35 |
| *Streptopelia semitorquata* | 39 | 52 |
| *Coracias abyssinica* | 21 | 14 |
| *Centropus senegalensis* | 19 | 0 |
| *Francolinus bicalcaratus* | 31 | 20 |
| *Petronia dentata* | 7 | 14 |
| *Ploceus cucullatus* | 113 | 133 |
| *Vidua macroura* | 9 | 10 |
| *Poicephalus senegalus* | 37 | 0 |
| *Halcyon senegalensis* | 32 | 0 |
| *Ardeola ibis* | 28 | 37 |
| *Stigmatopelia senegalensis* | 30 | 39 |
| *Merops pusillus* | 11 | 0 |
| *Pycnonotus barbatus* | 14 | 0 |
| *Lamprotornis chloropterus* | 12 | 0 |
| *Turdus pelios* | 21 | 15 |
| *Caprimulgus nigriscapularis* | 11 | 0 |
| *Bradornis pallidus* | 21 | 14 |
| *Nectarinia senegalensis* | 10 | 9 |
| *Nectarinia olivacea* | 17 | 13 |
| *Numida meleagris* | 30 | 21 |
| *Mesopicos geortae* | 17 | 0 |
| *Butastur rufipennis* | 20 | 13 |
| *Motacilla alba* | 14 | 0 |
| *Motacilla flava* | 42 | 13 |
| **Number of species** | **30** | **21** |
| **Number of individuals** | **840** | **631** |
| **Simpson's Diversity Index** | **0.95** | **0.91** |
| **Shannon Diversity Index** | **3.2** | **2.7** |

## DISCUSSION

Generally, relative abundance and distributions of wild birds' species in Old Oyo National Park buffer zone revealed that more species were recorded in wet season than in dry season. This may be due to abundance and availability of food. Wet season is usually the period that different crops (mainly grains such as maize, millet, sorghum, soya-beans and groundnuts) are planted. Hence, the large number of wild birds' species. This agrees with the

submission of Newton (1998) and Benton *et al*, (2003) that food abundance influences the distribution and size of wild populations. Many of the wild birds' species recorded were granivores. This is in consonance with the submission of Cirne and Lopez-Iborra (2005) and Hagy *et al*, (2008) that most species of avian granivores are beneficial and found in agro-ecosystems, especially because most species eat considerable quantities of grains as well as invertebrates during breeding season. However, the reduction in wild birds' species during dry season may be due to the fact that some of these birds' species migrated to another ecological zone for breeding. Also, fluctuations were noticed across ranges in the wild birds' species recorded in wet and dry seasons. This may not be unconnected with the variation in the vegetation and habitat quality. Anthropogenic activities, land-use systems, environmental factors and food scarcity might have induced the decrease in wild birds' relative abundance and distribution in dry season. This submission agrees with the earlier views of Beerens *et al*, (2011) and Sekercioglu *et al*, (2008).

Wild birds' species in Ogun-Tede range were dominated by fewer species (mainly *Ploceus cucullatus* and *Columba guinea*) in the wet season because they were not well distributed across the range. This may not be unconnected with the land-use system in the area which suited granivores (since grains were the most planted crops) more than other wild birds' species, hence reducing the number of other wild birds' species in the buffer zone. This is further revealed in the species evenness in Ogun-Tede range being the lowest. Wild birds' species were well distributed in Yemoso range and this made the species evenness to be the highest. This may not be unconnected to the evenly distributed resources (mainly food and water) in the buffer zone. In dry season, *Ploceus cucullatus* dominated other wild birds' species in Ogun-Tede range because they (the wild birds' species) were not well distributed across the range. This may not be unconnected with the generalist nature of this species. They are mainly found around human habitation and feed on variety of food components such as grains, insects and worms. Also, wild birds' species were well distributed in Yemoso range in the dry season and this made the species evenness to be the highest. This may not be unconnected to the evenly distributed resources (mainly food and water) in the buffer zone. Simpson's index and the Shannon-Wiener diversity index were higher in wet season. Wild birds' species evenness was also higher in wet season when compared to the species evenness in the dry season. This indicates that there was greater evenness in the wet season sample obtained (due to food availability) compared to sample obtained during dry season. Migration of wild birds' species during dry (early and late) season may be responsible for the reduced values of the diversity indices.

## CONCLUSION

The study had been able to establish that there were avifauna resources richness and diversity in all the ranges' buffer-zone of Old Oyo National Park. These findings should therefore enhance the mild protection of the buffer-zone (due to its wild birds' species richness and diversity) as well as the conservation and effective management of these wild birds' species for ecological processes.

## RECOMMENDATIONS

Based on the findings from the study, the following recommendations were made:

i. range headquarters should be situated at least 1-1.5km from the buffer zone, for effective anti-poaching, monitoring and policing;
ii. buffer zone should be made 4-5km round the park boundaries to give a blanket protection to wild birds and other renewable resources of the Park;

iii. however, strict punitive measures should be taken on anyone who transgresses this demarcation
iv. the Park management should create conservation education and awareness groups in the support zone households as well as starting conservation clubs in primary and secondary schools surrounding all the five ranges.

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