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# Avian species diversity in the southern Gulf of Lake Tana, Ethiopia

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**ABSTRACT**

Avian study in the southern Gulf of Lake Tana, Ethiopia, was conducted from June 2018 to April 2019 during the wet and dry seasons to explore species composition, relative abundance, and habitat association of birds. The study area was classified based on its vegetation cover and composition and thus three habitat types namely, swampy, open wetlands, and forest habitats were identified for data collection. The point count method was used to gather information about the diversity and abundance of birds. A total of 131 avian species belonging to 15 orders and 53 families were identified. The avian species recorded in the study area showed 122 and 108 species during the wet and dry seasons, respectively. Black-winged love birds (*Agaporinis taranta*) and the Abyssinian oriole (*Oriolus monachal)* were endemic avian species to both Ethiopia and Eritrea recorded in the area. Moreover, two resident species; the African sacred ibis (*Threskiornis aethiopicus)* and the black kite **(***Milves migrans),* and two Palearctic migrants; common house martin *(Delichon urbicum)* and yellow wagtail (*Motacilla flava)* were also identified in the area. The highest avian diversity was recorded in the open wetland habitat (H'=3.96), while the lowest was in the swampy habitat which is located all the way adjacent to the southern Gulf of Lake Tana (H'=3.22). The abundance score showed that 54.8% of the avian species were uncommon and there is a significant difference in the abundance of birds between the wet and dry seasons ($p<0.05$). Anthropogenic activities and urbanization are the main threats to birds in the area. Therefore, appropriate management actions should be designed and implemented to ensure the conservation of birds in the southern Gulf of Lake Tana and its surrounding habitats.

**Keywords**: Southern Gulf of Lake Tana, Species diversity, Point count, Bahir Dar, Ethiopia.

## 1. INTRODUCTION

Ethiopia is known for its diverse avifauna attributed mainly to the country's diverse habitat types. Over 860 species of birds are identified from Ethiopia representing approximately 9.5% of birds in the world and 39% in Africa. It is known that 19 avian species are endemic to Ethiopia, while 14 species are shared with Eritrea and 31 species are globally threatened (Lepage, 2021). According to Ethiopian Wildlife and Natural History Society (EWNHS) (1996) forests, wetlands, and riverine ecosystems are sites for wintering or migrant birds in Ethiopia. As a result, there are 214 Pale-arctic migrant avian species, and many of these birds have breeding populations in the country (Pol, 2006).



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In Ethiopia, most avian species are found in Important Bird Areas (IBAs), but these areas cover only 5% of the country's total area and wetlands comprise 41% of the IBAs (Ayenalem and Bekele, 2008). Habitat variables of wetlands differ in water depth, water level fluctuation, salinity, topography, and vegetation (Colwell and Taft, 2000). Wetland birds are categorized into wetland specialists and wetland generalists (Airinatwe, 1999). Wetland specialists are completely dependent on aquatic habitats, while wetland generalists are frequently found in wetlands, and they also use other habitats (Wondafrash, 2003).

The sizes of wetland habitats influence species richness and relative abundance of water birds (Froneman et al., 2001). Larger wetlands, which have high habitat heterogeneity can support a greater diversity of water birds than smaller ones (Colwell and Taft, 2000). Water birds foraging close to the shores persist in both large and small ponds and are considered area-independent species, while those species foraging in open and deep-water habitats are considered area-dependent species and are restricted to relatively large ponds (Paracuellos, 2006). The kinds and amounts of resources available for breeding and foraging activities can also affect avian communities (Lee and Rotenberry, 2005). Thus, larger wetlands are of greater conservation value than smaller ones in supporting diverse water bird species (Paracuellos, 2006).

Different environmental factors including food availability, temperature, and the presence or absence of competitors and predators have been found to influence bird species diversity and their relative abundance. According to Robert and Kathleen (1992), habitat modification, fragmentation, urbanization, and the surrounding landscape composition can influence avian species diversity and abundance. Habitat loss and fragmentation are widely regarded as major factors contributing to the decline of avian populations (Raman, 2006). One in eight of the world's avian species face extinction in the next millennium because of habitat destruction (Delannoy, 2010). Avian study in the Zegie peninsula and nearby islands showed a total of 101 species of birds belonging to 44 families of these 91 are residents and 10 are Palearctic migrants (Aynalem and Bekele, 2009). Tassie and Bekele (2008) identified 193 species of birds belonging to 64 families in Dembia Plain wetland of Lake Tana. The study by Alemu et al. (2020) on birds of Bahir Dar city also showed that 186 bird species belonging to 21 orders and 59 families. The same study was also conducted by Molla et al. (2021) in Zegie Peninsula Forest patches and associated wetlands of Lake Tana and showed the occurrence of 96 species of birds. However, there is no recent study on birds in the southern Gulf of Lake Tana. Therefore, the main objective

of this study is to explore species composition, relative abundance, and habitat association of birds and design appropriate management actions to conserve the avifauna of the lake and its surrounding habitats.

## 2. MATERIALS AND METHODS

### 2.1. Description of the Study Area

A study on avian diversity and abundance was conducted in the southern Gulf of Lake Tana, Bahir Dar city, Ethiopia. Lake Tana has a total drainage area of approximately 15,000km$^2$ and the catchment of the lake is one of the global top 250 lake regions most important for biological diversity conservation (Barker, 2004). Lake Tana is the largest lake in Ethiopia with a total area of 3600 km$^2$ and is the source of the Blue Nile River (Fig 1).

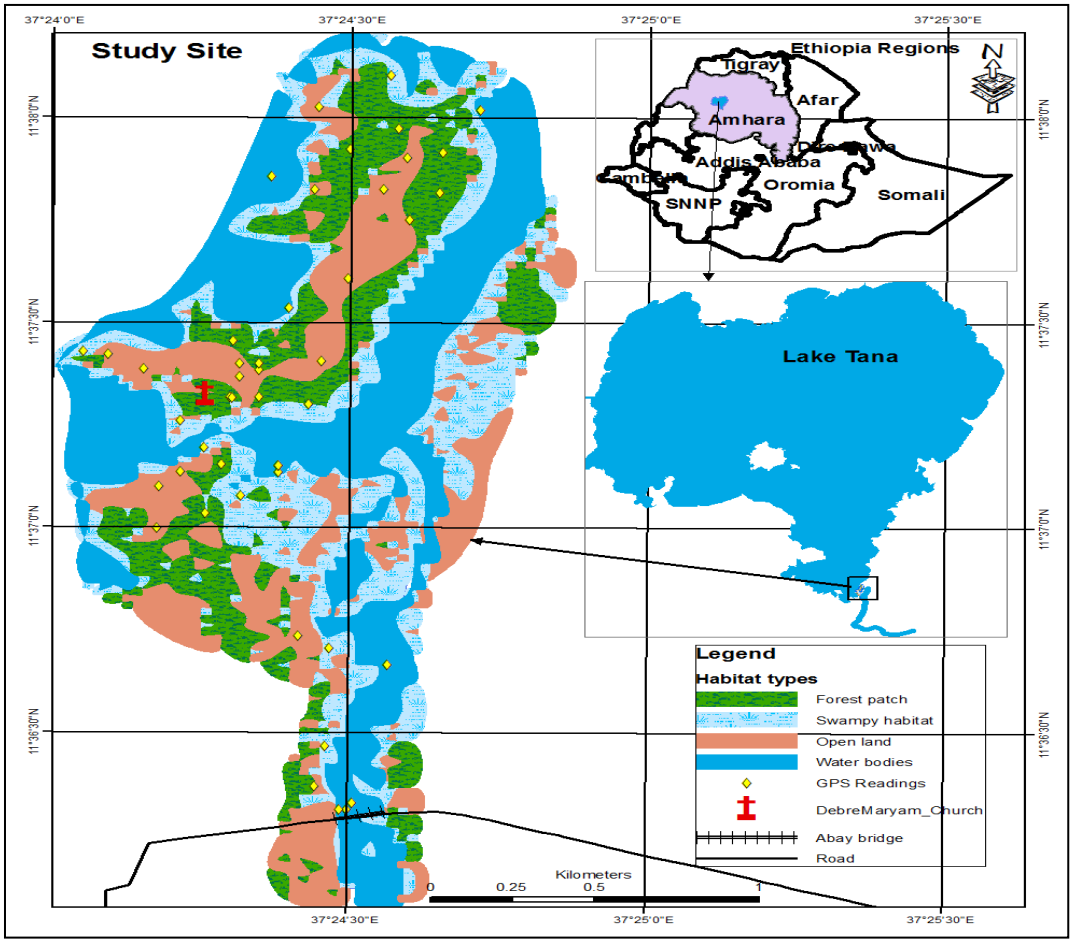


Figure 1. Location map of the southern Gulf of Lake Tana, Bahir Dar, Ethiopia.

Lake Tana is located at 12º00'N latitude and 37º15'E longitude with an average altitude of 1800m a.s.l. and it is 565km far from the capital Addis Ababa. It is approximately 84km long and 66 km wide, with a mean depth of about 9m (Dejen, 2003) and has more than 30 islands (EWNHS, 1996). It has more than 40 tributary rivers, but the major rivers feeding the Lake are Gilgel Abay from the South, Ribb and Gumara from the East, and Megetch from the North.

Blue Nile River is the largest river in terms of volume of discharge and the second largest in terms of area in Ethiopia, which comprises 176,000km$^2$ (17%) of the area of Ethiopia (Conway, 2000). Most of the Lake Tana's catchment area is characterized by croplands, but only a few limited areas of highlands are forest patches. The mean monthly maximum and minimum temperature recorded at Bahir Dar are 30.3ºC and 7.82ºC, respectively. The 10-year (2008 to 2018) rainfall data of the area shows the uni-modal distribution, and heavy rainfall is recorded from June to August.

Lake Tana harbors different indigenous trees including but not limited to *Albizia gummifera*, *Millettia ferryginea*, and *Cordia africana*. The area is a gene center for indigenous crops including *Guizotia abyssinica*, and *Eragrostis tef*. Wild coffee (*Coffee arabica*) occurs naturally in the area, especially in the Zegie Peninsula (Ejigu and Tassie, 2020).

**2.2. Methods**

Field equipment used during the data collection period includes binoculars, a digital photo camera, and a Global Positioning System (GPS). Bird guidebooks (Stevenson and Fanashawe, 2002; Redman et al., 2009; Ayanlem, 2013) were used for bird identification to the species level. A preliminary survey was conducted in May 2018 to gather relevant information about the study area. In this survey, an overall view of the study area was assessed. Global Positioning System readings were used to locate the positions and to identify the altitudinal ranges of the study area.

Based on the habitat characteristics, the study area was classified into three different habitats. Swampy habitat, which is located adjacent to the southern Gulf of Lake Tan, open wetlands, and forest patches were identified. Sampling units representing each habitat type were selected based on the stratified random sampling method. The technique involved dividing the study area into blocks by choosing the location of each habitat with random numbers as adapted from Sutherland (1996).

The point count method was used to record the presence and abundance of avian species (Bibby et al., 2000). Data were taken on 30 sampling points of which 13 sampling points were on

swampy habitats, 9 on forest patch habitats, and 8 on open wetlands. In each point count station, a minimum distance of 150-200m was maintained to avoid double counting (Vielliard, 2000). The point count method was undertaken from a fixed location within the sample unit of a radius of 25m at a time interval consisting of 5-10 minutes depending upon the difficulties of the area and the type of avian species to be identified (Vielliard, 2000; Buckland, 2006). To minimize disturbance during counts, a waiting period of 3–5 minutes before counting was applied (Hostler and Martine, 2001). All birds seen were recorded, except birds flying over the canopy and not stopping within the 25m radius.

Data were recorded in the morning from 06:30–10:00 a.m. and in the afternoon from 3:00–6.00 p.m. for five consecutive days per month for six months during the wet and dry seasons. Wet season data were collected during June, July, and August 2018, while data for the dry season were collected during February, March, and April 2019. The identification of avian species was carried out using the plumage pattern, size, shape, and color of birds (Aynalem and Bekele, 2009). Photographs were taken to confirm identification of some of the avian species which were not easily identified in the field during data collection. The taxonomic groups of birds were categorized based on field guides (Stevenson and Fanashawe, 2002, Redman et al., 2009; Ayanlem, 2013).

**2.3. Data Analysis**

Avian diversity was analyzed using the Shannon-Wiener Diversity Index (H').

$$\mathbf{H = - \sum pi\ lnpi}$$

Where, p is the proportion (n/N) of individuals of one species found (n) divided by the total number of individuals found (N), and *ln* is the natural log.

Simpson′s Index of Diversity (D) was used to evaluate the relative abundance of avian species in each habitat type. Species evenness was assessed using Shannon's equitability index (E). Avian community similarity between the different habitats was assessed using Sorensen's coefficient of Index (CC) as adopted from Jeffery et al. (2004).

$$\mathbf{D = \frac{1}{\sum pi2}} \qquad\qquad \mathbf{E= \frac{H}{Hmax}}$$

Where, H is the Shanon-Wiener diversity index; H*max* is the highest possible diversity value for the community.

$$\mathbf{CC = \frac{2C}{S1 + S2}}$$

Where, C is the numbers of species the two communities have in common,
S1 is the total number of avian species found in community 1, and
S2 is the total number of avian species found in community 2.

Data for the abundance of birds and the effect of habitat types and season on birds were analyzed using ANOVA and SAS (Version 9.2) software program was used to run the analysis and Tukey's HSD test at $\alpha$=0.05 was used to test significant differences.

## 3. RESULTS

### 3.1. Species Diversity

A total of 131 avian species belonging to 15 orders and 53 families were identified of which 122 and 108 species were recorded during the wet and dry seasons, respectively. Among the total avian species, 99 species were recorded during the wet and dry seasons, 23 species were recorded only during the wet season, and 9 species only during the dry season. The study area harbored black-winged love birds (*Agaporinis taranta*) and the Abyssinian oriole (*Oriolus monachal)* which are endemic to both Ethiopia and Eritrea. Moreover, two resident species; the African sacred ibis (*Threskiornis aethiopicus)* and the black kite **(***Milves migrans)*, and two Palearctic migrants; the common house martin *(Delichon urbicum)* and yellow wagtail (*Motacilla flava)* were also recorded in the area (Appendix 1). Though, the area is known for different avian species, the order Passeriformes contains the highest number (n=56) of species that constitute 42.8% of the total bird species in the area (Fig 2).

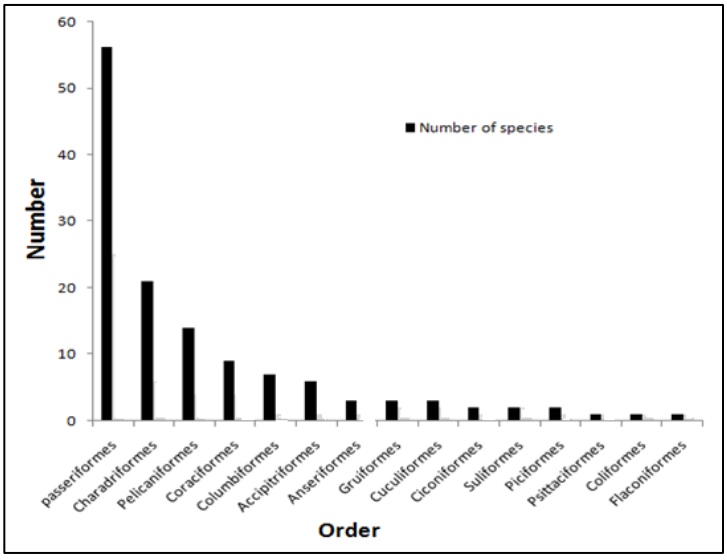


Figure 2. Avian species composition in the study area.

### 3.2. Species Richness

The highest number (n=103) of avian species was recorded in the open wetland habitat and the lowest (n=59) was in the forest patch habitat during the wet season. During the dry season, the highest number of avian species was recorded in the forest patch habitat and the lowest was in the swampy habitat (Table 1).

Table 1. Species diversity of birds among the three study sites during the wet season.

| ***Habitat type*** | ***Season*** | ***Richness*** | ***Abundance*** | ***D*** | ***H'*** | ***Hmax*** | ***H'/Hmax*** |
|---|---|---|---|---|---|---|---|
| Open wetlands | Wet | 103 | 1420 | 0.97 | 3.96 | 4.6 | 0.86 |
| | Dry | 68 | 540 | 0.97 | 3.57 | 4.21 | 0.85 |
| Swampy | Wet | 66 | 343 | 0.95 | 3.68 | 4.18 | 0.88 |
| | Dry | 45 | 166 | 0.96 | 3.46 | 4.18 | 0.88 |
| Forest patch | Wet | 59 | 487 | 0.92 | 3.56 | 4.08 | 0.89 |
| | Dry | 71 | 735 | 0.91 | 3.42 | 4.26 | 0.8 |

The overall, the highest number of avian species recorded during the study period were in the open wetland habitat and the lowest was in the swampy habitat (Table 2).

Table 2. Over all species diversity of birds in different habitats during the study period.

| ***Habitat type*** | ***Richness*** | ***Abundance*** | ***D*** | ***H'*** | ***Hmax*** | ***H'/Hmax*** |
|---|---|---|---|---|---|---|
| Open wetlands | 58 | 1682 | 0.9 | 3.48 | 4.06 | 0.86 |
| Swampy | 35 | 392 | 0.95 | 3.22 | 3.56 | 0.9 |
| Forest patch | 49 | 1094 | 0.96 | 3.41 | 3.89 | 0.87 |

### 3.3. Relative Abundance

The relative abundance of avifauna in the study area indicated that 54.8% (n=227) of the species were uncommon, 35.9% (n=149) were frequent, 8.2% (n=34) were common, and 0.96 % (n=4) were abundant. This indicated that more than half of the avian species in the study area were uncommon birds (Table 3).

Table 3. Relative abundance of bird species during the wet and the dry seasons.

| ***Habitat type*** | ***Season*** | ***Uncommon*** | ***Frequent*** | ***Common*** | ***Abundant*** |
|---|---|---|---|---|---|
| Open wetlands | Wet | 53 | 31 | 19 | 1 |
| | Dry | 34 | 27 | 6 | - |
| Swampy | Wet | 52 | 13 | 1 | _ |
| | Dry | 27 | 19 | - | - |
| Forest patch | Wet | 29 | 27 | 3 | 1 |
| | Dry | 31 | 32 | 5 | 2 |

There was a significant difference in the relative abundance of birds among the different species ($F_{128}$, 1836 =5.04, P<0.05). The most abundant avian species was the village weaver (*Ploceus cucullatus*) with a mean relative abundance of 44.1 followed by red checked cordon-bleu (*Uraeginthus bengalus*) with a mean relative abundance value of 22.4, and the least abundant was African hoopoe (*Upupa africana*) with a mean relative abundance of 0.07.

During the wet season, the open wetlands had a relatively high average number of birds (3.65) followed by the forest patch (3.57), and the lowest was recorded in the swampy habitat (2.35). During the dry season, the forest patch had relatively the highest number of birds (5.44) followed by the open wetlands (1. 4), and the lowest was obtained in the swampy habitat (1.33). During the wet and dry seasons, the forest patch habitat had the highest mean abundance of birds (8.15) followed by the open wetlands (4.97), and the lowest was in the swampy habitat (3.6) (Table 4).

Table 4. The average number of birds estimated in different habitat types and seasons.

| ***Habitat type*** | ***Seasons*** | | |
|---|---|---|---|
| | ***Wet*** | ***Dry*** | ***Both seasons*** |
| Open wetlands | 3.65bc | 1.4c | 4.97ab |
| Swampy | 2.35bc | 1.33c | 3.6 bc |
| Forest patch | 3.57bc | 5.4ab | 8.15 a |

### 3.4. Species Similarity

During the wet season, the highest species similarity was recorded between the open wetlands and the forest patches (CC=0.63), while the lowest was between the swampy habitat and the forest patch (CC=0.54). During the dry season, relatively the highest species similarity was recorded between the swampy habitat and the forest patch (CC=0.74), and the lowest was obtained between the swampy habitat open wetlands (CC= 0.53) (Table 5).

Table 5. Species similarity between different habitats during the wet and dry seasons.

| ***Habitat type*** | ***Swampy*** | ***Open wetlands*** | | ***Forest patch*** | |
|---|---|---|---|---|---|
| | | ***wet*** | ***dry*** | ***wet*** | ***dry*** |
| Swampy | _ | 0.59 | 0.53 | 0.54 | 0.74 |
| Open wetlands | _ | _ | _ | 0.63 | 0.64 |

## 4. DISCUSSION

A total of 131 species of birds were recorded from the southern Gulf of Lake Tana, which indicates that the area is relatively rich in its avian species diversity. The majority of the avian species belong to the order Passeriformes. This result agrees with the findings of Esayas (2011) and Genet and Ejigu (2017) as they confirmed that the order Passeriformes is also the most diversified species in other parts of the country. The distribution of birds varied in the three different habitat types within the study area. The highest number of avian species was recorded in the open wetlands during the wet season. This might be due to the availability of high ground cover of the wetland habitats as the wetland habitat holds different plant species including papyrus (*Cyperus papyrus*) and Typha plants, which are important for feeding and nesting sites for wetland birds. Thus, the open wetland contributes to the highest avian species diversity. The lowest number of avian species recorded in the swampy habitats, which is located adjacent to the southern Gulf of Lake Tana, might be due to food scarcity. Telleria and Santos (1994) described that habitat structure affects the distribution of individual species. Moreover, habitat size, modes of foraging, and floristic compositions of the area have significant influence on the abundance and distribution of species in an area (Wiens and Rotenberry, 1981; Marone, 1991).

Season is one important factor that determines avian species composition and abundance in the area. During the dry season, relatively greater number of avian species is found in the forest patch habitat. This might be because many birds from the open wetland locally migrate to this site as the wetland is dried out during the dry season. The open wetlands consist of more open lands compared to the forest patch habitat, and during the dry season, more than half of these areas are changed to dry land and used as cattle grazing grounds. The distinct seasonality of rainfall and seasonal variation in the abundance of food resources result in seasonal changes in the species abundance of birds (Gaston et al., 2000; Molla et al., 2021). The distribution and abundance of many avian species are determined by vegetation composition that forms a major element of their habitats. As vegetation changes along complex environmental gradients, a particular bird species may increase or decrease in number and disappear as the habitat changes (Lee and Rotenberry, 2005).

Wide areas of wetlands are being converted into farmlands and urban expansion affects many bird species (Meyer and Turner, 1992). In addition to this, habitat fragmentation could affect the distribution and abundance of birds by influencing habitat use, reproduction, and

survival. The removal of emergent vegetation could also affect birds that use the vegetation as a food source (Rodewald and Yahner, 2001). People residing at the adjacent areas of Lake Tana and near the wetland of Bahir Dar city use the matured papyrus for local boat construction, and papyrus is also used by the local people to spread at home during the day-to-day coffee ceremonies, which contribute for the destruction of birds' habitats and could affect their diversity and abundance.

The distribution and abundance of birds could also be affected in similar ways by the degree of specialization in their ecological requirements (Cofre et al., 2007). In the present study, egrets (*B. ibis),* Egyptian geese (*A. aegyptiaca*), hammer kops (*S. umbretta*), sacred ibis (*T. aethiopicus*), African jacanas (*A. africanus*), herons (*Ardeidae*), and darter *(A. rufa)* prefer wetlands and water bodies. Common bulbul (*P. barbatus*), eastern grey plantain eater (*C. zonurus*), and greater blue-eared starling (*L. chalybaeus*) mainly prefer forest habitats, while wagtails (*Motacillidae)* and fiscals (*L. collaris*) prefer open land habitats. All habitats have certain particulars to attract birds of great ecological importance (Manhals and Ribeiro, 2005).

Herons, egrets, ibis, and jacana feed in shallow waters to catch diverse aquatic animals including aquatic invertebrates, fish, and amphibians. They prefer open and shallow areas as these habitats are rich in resources. They avoid the dense vegetation habitats that interfere with their movement and foraging efficiency (Lantz et al., 2011). When the water level increases, they move to other areas as shallow water prey is easier to catch compared to deep water habitats (Liordos, 2010). During the wet season, most birds were not found in the swampy habitats at adjacent areas of Lake Tana because the water level was very high.

In the open wetlands, there are many resident birds. In the backyard of the local people residing within and near the open wetland habitats, there are many fruits such as mango, banana, lemon, coffee, and different types of vegetables that can attract many avian species. Habitats that are dominated by patches of shrubs and fruiting trees can attract many bird species (Knight et al., 2001). The relative abundance of avian species from the three different habitats showed that more than half (58%) of the avian species identified are uncommon birds. Ryan and Owino (2006) suggested that the presence of more uncommon species in a certain area could be related to the breeding nature, large home range, and niche of the species.

Some of the most common species from the open wetlands and in the forest, habitat is African jacana, laughing dove, red-billed fire finch, red-checked cordon bleu, speckled pigeon,

village weaver, and yellow-billed egret. This might be due to the availability of different ecological requirements in the open wetlands and forest habitats. The Sorensen's coefficient in the swampy habitat and forest patch habitat near the Head of the Blue Nile River showed that the overall community similarity of the two study sites is very high during the dry season. Moreover, the overall community similarity in the open wetlands, swampy habitat, and the forest patch habitat is relatively higher. This indicates that the avian community composition of the three study habitats is similar. Tubelis and Cavalcanti (2001) showed that the similarity of avian species composition between habitats indicates a tendency for similar habitats to have similar species composition (Genet and Ejigu, 2017; Tesfahun and Ejigu, 2022). In contrast, the lowest avian species similarity was between swampy habitats and open wetlands during the dry season. This might be due to the differences in feeding adaptations of avian communities in each habitat type. Aich and Mukhopadhyay (2008) described that ground cover supports more habitat specialist species, while areas under anthropogenic influence harbored more opportunistic species.

The highest avian species diversity occurred in the open wetlands during the wet season compared to the other two habitat types. This might be due to the presence of better food availability in the open wetlands during this season. Lower mean species evenness is recorded in the forest patch habitat during the dry season, which indicates that there is an unbalanced distribution of the number of individuals among the different species. This uneven distribution in avian species richness can partly be attributed to differences in habitat type and quality (Marie et al., 2008).

Most avian species are limited by the availability of food. Seasonal fluctuations in the abundance of individual species are more extreme. During the dry season, some avian species left the area, decreasing both in number of species and their abundance. This is similar to the finding of Wiley et al. (1996), which confirms that different habitat features affect the habitat selection of birds. It is shown that the avian community structures in the swampy habitat are influenced by several environmental factors including water depth, vegetation composition, food resources, and foraging behavior of birds. Generally, the findings of the present study showed that food availability and various anthropogenic influences on the southern Gulf of Lake Tana have a profound negative impact on avian species composition and abundance. Hence, appropriate management strategies are demanding to ensure conservation of birds in the area.

## 5. CONCLUSION

If properly conserved, the southern Gulf of Lake Tana is a suitable habitat to support different avian species. The present study confirmed that the area supports more avian species belonging to different orders and families. However, the local people managed the wetlands of this area primarily for different human land uses including for livestock grazing and farming rather than for biodiversity conservation. Thus, habitat disturbances due to various anthropogenic activities have a significant negative impact on the conservation of avifauna. As a result, proper management strategies should be designed and implemented to maintain the southern Gulf of the Lake Tana's ecosystem and ensure the conservation of avifauna in this area in particular and the entire lake ecosystem in general.

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## 7. CONFLICT OF INTEREST

No conflict of interest.

## 8. REFERENCE

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Appendix 1. List of avian species recorded during the study period in the southern Gulf of Lake Tana.

| ***Order*** | ***Family*** | ***Common name*** | ***Scientific name*** | ***Seasons*** | | |
|---|---|---|---|---|---|---|
| | | | | ***Wet*** | ***Dry*** | ***Both*** |
| Anseriformes | Anatidae | Egyptian goose | *Alopochen aegyptiaca* | | | ✓ |
| Anseriformes | Anatidae | Spur-winged goose | *Plectropterus gambensis* | | | ✓ |
| Anseriformes | Anatidae | African pygmy goose | *Nettapus auratus* | ✓ | | |
| Ciconiiformers | Ciconiidae | African open-bill | *Anastomus lamelligerus* | | | ✓ |
| Ciconiiformers | Ciconiidae | Yellow-billed stork | *Mycteria ibis* | | | ✓ |
| Suliformes | phalacrocoracidae | Long-tailed cormorant | *Phalacrocorax africanus* | | | ✓ |
| Suliformes | Anhingidae | African darter | *Anhinga rufa* | | | ✓ |
| Pelecaniformes | Pelecanidae | Great white pelican | *Pelecanus onocrotalus* | ✓ | | |
| Pelecaniformes | Scopidae | Hamerkop | *Scopes umbrette* | | | ✓ |
| Pelecaniformes | Ardeidae | Gray heron | *Ardae cinerea* | | | ✓ |
| Pelecaniformes | Ardeidae | Black-headed heron | *Ardae melanocephala* | | | ✓ |
| Pelecaniformes | Ardeidae | Goliath heron | *Ardae goliath* | ✓ | | |
| Pelecaniformes | Ardeidae | Purple heron | *Ardae purpurea* | ✓ | | |
| Pelecaniformes | Ardeidae | Great white egret | *Ardea alba* | | | ✓ |
| Pelecaniformes | Ardeidae | Cattle egret | *Bulbulcus ibis* | | | ✓ |
| Pelecaniformes | Ardeidae | Squacco heron | *Ardeola ralloides* | | | ✓ |
| Pelecaniformes | Ardeidae | Yellow-billed egret | *Ardea intermedia* | | | ✓ |
| Pelecaniformes | Threskiornithidae | Glossy ibis | *Plegadis falcinellus* | | ✓ | |
| Pelecaniformes | Threskiornithidae | Sacred ibis | *Threskiornis aethiopicus* | | | ✓ |
| Pelecaniformes | Threskiornithidae | Hadada ibis | *Bostrychia hagedash* | | | ✓ |
| Pelecaniformes | Egreta | Little egret | *Egretta garzetta* | | | ✓ |
| Accipitriformes | Accipitridae | Black kite | *Milvus migrans* | ✓ | | |
| Accipitriformes | Accipitridae | African-fish eagle | *Haliaeetus vocifer* | | | ✓ |
| Accipitriformes | Accipitridae | Eurasian marsh harrier | *Circus aeruginosus* | | ✓ | |
| Accipitriformes | Accipitridae | Augur buzzard | *Buteo augur* | | | ✓ |
| Accipitriformes | Accipitridae | Yellow-billed kite | *Milves aegyptias* | | | ✓ |
| Accipitriformes | Accipitridae | Western banded snake eagle | *Circaetus cinerascens* | ✓ | | |
| Accipitriformes | Accipitridae | Little sparrow hawk | *Accipiter minullus* | ✓ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Gruiformes | Rallidae | Black crake | *Zapornia flavirostra* | | | ✓ |
| Gruiformes | Gruidae | Black-crowned crane | *Balearica pavonina* | | | ✓ |
| Gruiformes | Gruidae | Common crane | *Grus grus* | | | ✓ |
| Charadriiformes | Burhinidae | Senegal thick knee | *Burhinus Capinsis* | ✓ | | |
| Charadriiformes | Charadriidae | Three banded plover | *Charadrius tricollaries* | ✓ | | |
| Charadriiformes | Charadriidae | Kittlitz's plover | *Charadrius pecuarius* | ✓ | | |
| Charadriiformes | Charadriidae | Spur-winged plover | *Vanellus spinosus* | | | ✓ |
| Charadriiformes | Charadriidae | Common-ringed plover | *Charadrius hiaticula* | | | ✓ |
| Charadriiformes | Recurvirostridae | Black-winged stilt | *Himantopus himantopus* | | | ✓ |
| Charadriiformes | Jacanidae | African jacana | *Actophilornis africanus* | | | ✓ |
| Charadriiformes | Jacanidae | Lesser jacana | *Microparra capensis* | | | ✓ |
| Charadriiformes | Scolopacidae | Common sandpiper | *Actitis hypoleucos* | | | ✓ |
| Charadriiformes | Scolopacidae | Spotted red shank | *Tringa erytropus* | | | ✓ |
| Charadriiformes | Scolopacidae | Common green shank | *Tringa neubularia* | | | ✓ |
| Charadriiformes | Scolopacidae | Marsh-sand piper | *Tringa stagnatillis* | | | ✓ |
| Charadriiformes | Scolopacidae | Wood-sand piper | *Tringa glareola* | | | ✓ |
| Charadriiformes | Scolopacidae | Curlew-sand piper | *Calidris ferruginea* | | | ✓ |
| Charadriiformes | Scolopacidae | Common snipe | *Gallinago gallinago* | | | ✓ |
| Charadriiformes | Scolopacidae | Africa snipe | *Gallinago nigripennis* | | ✓ | |
| Charadriformes | Ladridae | Black-headed gull | *Chroicocephalus ridibundus* | ✓ | | |
| Charadriformes | Ladridae | Gull-billed tern | *Gelochelidon nilotica* | | | ✓ |
| Charadriformes | Ladridae | White-winged tern | *Chilidenias leucopterus* | | | ✓ |
| Charadriformes | Ladridae | Lesser-black headed gull | *Larus foscus* | | | ✓ |
| Charadriformes | Ladridae | Great-black headed gull | *Larus marinus* | | ✓ | |
| Columbiformes | Columbidae | Red-eyed dove | *Streptopelia semitorquat* | | | ✓ |
| Columbiformes | Columbidae | Vinaceous dove | *Streptopelia vinacea* | | | ✓ |
| Columbiformes | Columbidae | Laughing dove | *Streptopelia senegalensis* | | | ✓ |
| Columbiformes | Columbidae | Namaqua dove | *Oena capensis* | ✓ | | |
| Columbiformes | Columbidae | Bruce's-green pigeon | *Treron waalia* | ✓ | | |
| Columbiformes | Columbidae | African mourning dove | *Streptopelia decipiens* | | | ✓ |
| Columbiformes | Columbidae | Speckled pigeon | *Columba guinea* | | | ✓ |
| Psittaciformes | Psittacidae | Black-winged lovebird | *Agaporinis taranta* | | | ✓ |

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|---|---|---|---|---|---|---|
| Musophagiformes | Musophagidae | Eastern plantain eater | *Crinifer zonurus* | | | ✓ |
| Cuculiformes | Cuculidae | Blue-headed coucal | *Centropus monachus* | | | ✓ |
| Cuculiformes | Cuculidae | White-browed coucal | *Centropus superciliosus* | | ✓ | |
| Coliiformes | Cillidae | Speckled mouth bird | *Colius striatus* | | | ✓ |
| Coraciiformes | Alcedinidae | Malachite kingfisher | *Corythornis cristatus* | | | ✓ |
| Coraciiformes | Alcedinidae | African pygmy kingfisher | *Ispidina picta* | | | ✓ |
| Coraciiformes | Alcedinidae | Woodland kingfisher | *Halcyon senegalensis* | | | ✓ |
| Coraciiformes | Alcedinidae | Giant kingfisher | *Megaceryle maxima* | | | ✓ |
| Coraciiformes | Alcedinidae | Pied kingfisher | *Ceryle rudis* | | | ✓ |
| Coraciiformes | Meropidae | Little bee-eater | *Merops pusillus* | | | ✓ |
| Coraciiformes | Meropidae | Blue-breasted bee-eater | *Meros variegates* | ✓ | | |
| Coraciiformes | Upupidae | Eurasian hoopoe | *Upupa epops* | | | ✓ |
| Coraciiformes | Bucerotidae | Silvery-checked hornbill | *Bycanistes brevis* | | | ✓ |
| Piciformes | Lybiidae | Black-billed barbet | *Lybius guifsabalito* | | | ✓ |
| Piciformes | Lybiidae | Double-toothed barbet | *Lybius bidentatus* | | | ✓ |
| Passeriformes | Platysteiridae | Brown-throated wattle eye | *Platysteria cyanea* | | | ✓ |
| Passeriformes | Platysteiridae | Eastern black-headed batis | *Batis minor* | | | ✓ |
| Passeriformes | Malaconotidae | Back-crowned tchagra | *Tchagra senegalus* | | | ✓ |
| Passeriformes | Malaconotidae | Tropical boubou | *Laniarius aethiopicus* | | | ✓ |
| Passeriformes | Laniidae | Red-backed shrike | *Lanus collurio* | | | ✓ |
| Passeriformes | Laniidae | Southern fiscal | *Lanus collaris* | | | ✓ |
| Passeriformes | Laniidae | Long-tailed fiscal | *Lanius cabanisi* | ✓ | | |
| Passeriformes | Monarchidae | African paradise flycatcher | *Terpsiphone viridise* | | | ✓ |
| Passeriformes | Coravidae | Pied crow | *Corves albus* | | | ✓ |
| Passeriformes | Hirundinidae | Barn swallow | *Hirundo rustica* | | ✓ | |
| Passeriformes | Hirundinidae | Wire tailed swallow | *Hirundo smithii* | | | ✓ |
| Passeriformes | Hirundinidae | Common house martin | *Delicoh urbicum* | | | ✓ |
| Passeriformes | Pycnonotidae | Common bulbul | *Pycnonootus barbatus* | | | ✓ |
| Passeriformes | Cisticolidae | Grey-backed camaroptera | *Camaroptera brevicaudata* | | | ✓ |
| Passeriformes | Cisticolidae | Tawny-flanked prinia | *Prinia subflava* | | | ✓ |
| Passeriformes | Muscicapidae | Northern black flycatcher | *Melaenornis edolioedes* | | | ✓ |
| Passeriformes | Muscicapidae | Ruppel’s robin-chat | *Cossypha semirufa* | | | ✓ |

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|---|---|---|---|---|---|---|
| Passeriformes | Muscicapidae | Common redstart | *Phoenicurus phoenicurus* | | | ✓ |
| Passeriformes | Muscicapidae | African stone chat | *Saxicola torquatus* | | | ✓ |
| Passeriformes | Muscicapidae | Northern wheatear | *Oenanthe oenanthe* | | | ✓ |
| Passeriformes | Muscicapidae | White-browed robin chat | *Cossypha heuglini* | | | ✓ |
| Passeriformes | Turdidae | African thrush | *Turdus pelios* | | | ✓ |
| Passeriformes | Turdidae | Abyssinian thrush | *Turdus abyssinicus* | | | ✓ |
| Passeriformes | Buphagidae | Red-billed oxpecker | *Buphagus erythrorhynchus* | ✓ | | |
| Passeriformes | Nectariniidae | Tacazze sunbird | *Nectarinia tacazze* | | | ✓ |
| Passeriformes | Nectariniidae | Variable sunbird | *Cinnyris venustus* | | | ✓ |
| Passeriformes | Nectariniidae | Scarlet-chested sunbird | *Chalcomitra senegalensis* | | | ✓ |
| Passeriformes | Motacillidae | Long-billed pipit | *Anthus similis* | ✓ | | |
| Passeriformes | Motacillidae | Grey wagtail | *Motacilla cinerea* | | | ✓ |
| Passeriformes | Motacillidae | African pied wagtail | *Motacilla aguimp* | | | ✓ |
| Passeriformes | Motacillidae | Plain-backed pipit | *Anthus leucophyrus* | | | ✓ |
| Passeriformes | Motacillidae | Yellow wagtail | *Motacilla flava* | | | ✓ |
| Passeriformes | Motacillidae | White wagtail | *Motacilla alba* | | ✓ | |
| Passeriformes | Passeridae | Swainson’s sparrow | *Passer swainsonii* | | | ✓ |
| Passeriformes | Passeridae | Yellow-spotted petronia | *Petronia pyrgita* | ✓ | | |
| Passeriformes | Passeridae | Grey-headed sparrow | *Passer griseus* | ✓ | | |
| Passeriformes | Ploceidae | Baglafecht weaver | *Ploceus baglaftch* | | | ✓ |
| Passeriformes | Ploceidae | Spectacled weaver | *Ploceus ocularis* | | | ✓ |
| Passeriformes | Ploceidae | Speck’s weaver | *Ploceus spekei* | | ✓ | |
| Passeriformes | Ploceidae | Village weaver | *Ploceus cucullatus* | | | ✓ |
| Passeriformes | Ploceidae | Black-headed weaver | *Ploceus melanocephalus* | | | ✓ |
| Passeriformes | Ploceidae | Fantailed window bird | *Euplectes axillaries* | | | ✓ |
| Passeriformes | Estrildida | Red-checked cordon-bleu | *Uraeginthus bengalus* | | | ✓ |
| Passeriformes | Estrildida | Red-billed firefinch | *Lagonostitca senegala* | | | ✓ |
| Passeriformes | Estrildida | Bronze mannikin | *Spermestes cucullatus* | | | ✓ |
| Passeriformes | Estrildida | African fire finch | *Lagonostica rubricate* | | | ✓ |
| Passeriformes | Viduidae | Village indigo bird | *Vidua chalybeate* | | | ✓ |
| Passeriformes | Sturnidae | Greater blue eared starling | *Lamprotornis chalybaeus* | | | ✓ |
| Passeriformes | Zosteropidae | Heuglin’s white-eye | *Zosterops poliogastrus* | ✓ | | |

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|---|---|---|---|---|---|---|
| Passeriformes | Zosteropidae | Abyssinian white eye | *Zosterops abyssinicus* | | | ✓ |
| Passeriformes | Acrocephalidae | Eurasian reed warbler | *Acrocephalus scirpaceus* | | | ✓ |
| Passeriformes | Acrocephalidae | Eastern olivaceous warbler | *Hippolais pallid* | | | ✓ |
| Passeriformes | Picidae | Nubian woodpecker | *Campethera nubica* | | ✓ | |
| Passeriformes | Fringillidae | White-billed canary | *Crithagra dorsostriatus* | ✓ | | |
| Passeriformes | Oriolidae | Abyssinian oriole | *Oriolus monachal* | ✓ | | |
| Passeriformes | Upupidae | African hoopoe | *Upupa Africana* | ✓ | | |