



Avifaunal Diversity in Different Habitats of Semi-Arid Region of Karnataka, India

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Abstract: This study investigates avifaunal diversity in four sites of in and around Raichur city using the Short-Strip Transect Count (SSCT) method and point count method. The total of 52 bird species, belonging to 35 families and 16 orders, were recorded. Among these, 67.03% were resident species, while 32.69% comprised local, partially migratory, and highly migratory species. The family *Ardeidae* had the highest number of species occurrences, while the order *Passeriformes* was the most represented, with 17 species. Insectivorous birds dominated the foraging guilds, followed by carnivorous species. According to the IUCN Red List, 50 species were classified as least concern, while the spot-billed pelican and the black-headed ibis were listed as near threatened. Species abundance was highest at Manchalapur Lake and Maliyabad Lake, moderate in the Krishna River, and lowest at Raichur University, where only a few rare species were observed.

Keywords: Birds, Biodiversity, Raichur city, Migratory birds, Insectivores, foraging pattern

Biodiversity plays a crucial role in maintaining ecological balance, and biodiversity conservation is an important factor in protecting the ecological environment (Mi et al., 2021). India is one of the mega-diverse countries of the world and home to many of the world's most biodiverse ecosystems, including deserts, terrestrial, marine, and freshwater ecosystems; tropical and temperate forests, swamplands, plains; grasslands; riverine habitats; and islands (Rajagopal et al., 2022). Wetlands are habitats that are in the intermediate position between terrestrial and aquatic bodies, where flora, fauna, and birds are one of the essential biotic factors of wetlands and play the highest role in the food chain (Krishna et al., 2018). Avian diversity and abundance are heralds of healthy functioning of ecosystems, vegetation, and food that determine the diversity of species in a habitat (Walker and Shochat 2010; Tanalgo et al., 2015). Due to the destruction of natural habitat and anthropogenic activity, avifaunal populations have been reduced. Avifaunal populations have been declining due to the disruption of natural habitat and human activity. They have important functions as consumers, pollinators, predators, and indicators, among other things. Wetland migratory birds are significant components of global diversity. Birds are test animals for studying environmental issues. Of the recorded 310 wetland species found in India, half of the species visit India from China, Russia, and Central Asia (Manohara et al., 2016).

The amount of natural and semi-natural vegetation cover in a landscape influences how bird communities respond to agricultural intensification. The difference in bird species composition between small- and large-scale farms increases as vegetation cover increases, which further promotes the

heterogeneity of bird communities at the landscape level (Marcacci et al., 2020, 2022; Gremion et al., 2022). Recently, with the increased consciousness for biodiversity survey and monitoring, many new species were discovered or re-described. The present investigation is focused on diversity and occurrence status.

MATERIAL AND METHODS

Study area: Raichur district is located in northeastern part of Karnataka state and lies between the two major rivers, Krishna and Tungabhadra. The Krishna River flows on the Northern part and Tungabhadra river flows on the southern part of the district which lies on the geographical Coordinates (16.2160°N and 77.3566°E) on Deccan plateau. It has an average elevation of 407m (1,335ft). The temperature around Raichur varies from 29°C to 43°C. Rainfall for the whole district is 728.2 mm, annually. Overall, the region is warm and humid most of the year. The abundance of bird species was studied in 4 different areas of Raichur, namely the habitats/sites Raichur University, Maliyabad Lake, the Krishna River, and Manchalapur Lake (Table 1, Fig. 1).

Data collection: The observations were recorded from July to December 2023 twice a week through visual encounter method two time in a day, morning from 6:00 to 9:30 AM and in the evening from 4 to 7 PM. The detailed survey of birds was conducted by the direct count method and the short-strip transects count method (SSCT) (Colin et al., 1993) and Point count method (Verner et al., 1985). The birds were sighted with the help of binoculars (Celestron Up-Close 10×40). Spot identification was done by using guide (Ali and Ripley 1968-74). Data collected through using digital cameras [Canon EOS 5D] and [Nikon D5600] through photography.

RESULTS AND DISCUSSION

Diversity based on abundance: Total of 52 species of birds belonging to 16 orders of 35 families (Table 2). The majority of birds were resident (67.3%) and others migratory (32.69%). Both the Krishna River and the Raichur University campus have 47 species. whereas, in Manchlapur Lake and Malyabad, 49 species were observed (Table 3). The documentation includes 15 aquatic and 37 terrestrial birds. The study conducted indicated significant variation in diversity and abundance in different seasons that might be due to migration patterns, habitat changes, and climatic conditions (Aynalem and Bakele 2008). The 90% of species show similarity of species in each site and might be due to interspersed similar plants, and many contain similar species of birds that share the same habitat (Tsegaye and Godisa 2016, Daselgnetal 2021, Dasalegnm and Fasika 2022). Common birds were maximum in Manchlapur Lake, followed by Krishna river, Raichur University campus, and Maliyabad, (Table 3). Similarly abundant species were high in Manchlapur and Maliyabad followed by Raichur University and Krishna river. Rare birds were high in Raichur University, followed by Krishna river, Malyabad lake and Machalapur lake. The higher bird abundance observed may be attributed to intact and moderate levels of taxonomic diversity, species richness, and overall bird abundance (Gashe et al., 2018). Mosisa et al. (2023) reported that seasonal and habitat

variations influenced the presence of bird species, with 48.32% categorized as abundant, 17% as uncommon, and 1% as rare particularly among forest-adapted species. Similar findings were reported by Simamora et al. (2021). Mukhopadhyay and Mazumdar (2017) observed that bird diversity is closely regulated by the quality and quantity of available food resources. Factors such as abundance, habitat types, seasonal fluctuations in food supply, and breeding behaviors also play a crucial role in shaping bird communities (Aynalem and Bakele 2008, Girma et al., 2017). The high presence of common bird species was along the Krishna River, likely due to the diverse flora and fauna in the river basin, which provides suitable habitats for a wide range of bird species (Tamenut and Fasik 2022). Furthermore, the presence of trees along riverbanks has been found to significantly influence bird abundance and species richness, as supported by Mistry et al. (2015) and Bideberi et al. (2013).

Diversity based on IUCN status: Based on the IUCN status,

Table 1. Site coordinates

Sites	Coordinates Latitude (N)	Longitude (E)
Krishna river	16.382712° N	77.356433° E
Manchlapur lake	16.200829° N	77.362289° E
Raichur University	16.0984° N	77.4129° E
Maliyabad Lake	16.0296° N	76.6846° E



Fig. 1. Four different sites of study area

Table 2. Birds from the study area

Birds name	Scientific name	Order name	IUCN (Status)	Status	Food
Laughing dove	<i>Spilopelia senegalensis</i>	Columbiformes	LC	R	G, H
Eurasian collared dove	<i>Streptopelia decaocto</i>	Columbiformes	LC	R	G, F
Indian roller	<i>Coracias benghalensis</i>	Coraciiformes	LC	R	O
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Coraciiformes	LC	R	C,O
Asian green bee-eater	<i>Merops orientalis</i>	Coraciiformes	LC	R	I, C
Black-winged stilt	<i>Himantopus himantopus</i>	Coraciiformes	LC	M	C,I
Pied Kingfisher	<i>Ceryle rudis</i>	Coraciiformes	LC	R	C,P
Large grey babbler	<i>Argya malcolmi</i>	Passeriformes	LC	R	G
Brahminy starling	<i>Sturnia pagodarum</i>	Passeriformes	LC	R	F,I,O
House crow	<i>Corvus splendens</i>	Passeriformes	LC	R	O,I,F
Baya weaver	<i>Ploceus philippinus</i>	Passeriformes	LC	R	O,G
Barn Swallow	<i>Hirundo rustica</i>	Passeriformes	LC	M	I
Indian Silverbill	<i>Euodice malabarica</i>	Passeriformes	LC	M	G, H
Ashy prinia	<i>Prinia socialis</i>	Passeriformes	LC	R	I
Purple-rumped sunbird	<i>Leptocoma zeylonica</i>	Passeriformes	LC	R	I, H
Common tailor bird	<i>Orthotomus sutorius</i>	Passeriformes	LC	R	C,I
Scaly-breasted munia	<i>Lonchura punctulata</i>	Passeriformes	LC	R	G,F,I
White-browed wagtail	<i>Motacilla maderaspatensis</i>	Passeriformes	LC	R	I
Pied bushchat	<i>Saxicola caprata</i>	Passeriformes	LC	R	I
Indian robin	<i>Copsychus fulicatus</i>	Passeriformes	LC	R	O
Indian bushlark	<i>Mirafra erythroptera</i>	Passeriformes	LC	WM	C
Long-tailed shrike	<i>Lanius schach</i>	Passeriformes	LC	R, PM	I, C
Jungle babbler	<i>Argya striata</i>	Passeriformes	LC	R	I, G
Red-vented bulbul	<i>Pycnonotus cafer</i>	Passeriformes	LC	R	O
Eastern great egret	<i>Ardea modesta</i>	Pelecaniformes	LC	PM	C,P
Cattle egret	<i>Bubulcus</i>	Pelecaniformes	LC	PM	I
Eurasian Spoonbill	<i>Platalea leucorodia</i>	Pelecaniformes	LC	PM	C,I
Glossy ibis	<i>Plegadis falcinellus</i>	Pelecaniformes	LC	M	C,P,I
Black-headed ibis	<i>Threskiornis melanocephalus</i>	Pelecaniformes	NT	M	C,P
Spot billed pelican	<i>Pelecanus philippensis</i>	Pelecaniformes	NT	WM	O
Little egret	<i>Egretta garzetta</i>	Pelecaniformes	LC	HM	C
Malayan night heron	<i>Gorsachius melanolophus</i>	Pelecaniformes	LC	M	C,P
Indian pond heron	<i>Ardeola grayii</i>	Pelecaniformes	LC	R	C
Red-naped ibis	<i>Pseudibis papillosa</i>	Pelecaniformes	LC	R	O
Grey heron	<i>Ardea cinerea</i>	Pelecaniformes	LC	R	C
Black-winged kite	<i>Elanus axillaris</i>	Accipitriformes	LC	R	C
Shikra	<i>Accipiter badius</i>	Accipitriformes	LC	R	C
Plumbeous kite	<i>Ictinia plumbea</i>	Accipitriformes	LC	M	I
Greater coucal	<i>Centropus sinensis</i>	Cuculiformes	LC	R	I
Asian Koel	<i>Eudynamis scolopaceus</i>	Cuculiformes	LC	PM,R	F,I,O
Red-wattled lapwing	<i>Vanellus indicus</i>	Charadriiformes	LC	R	I
Common sandpiper	<i>Actitis hypoleucos</i>	Charadriiformes	LC	M	C
Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	Charadriiformes	LC	R	C
Indian cormorant	<i>Phalacrocorax fuscicollis</i>	Suliformes	LC	R	C
Indian spot-billed duck	<i>Anas poecilorhyncha</i>	Anseriformes	LC	R	O
Peacock	<i>Pavo cristatus</i>	Galliformes	LC	R	O
Swamp hen	<i>Porphyrio porphyrio</i>	Gruiformes	LC	M	O
Black-rumped flameback	<i>Dinopium javanense</i>	Piciformes	LC	R	F,O
Painted stork	<i>Mycteria leucocephala</i>	Ciconiiformes	LC	R	C,P
Indian grey hornbill	<i>Ocyrceros birostris</i>	Bucerotiformes	LC	R	O,F,I
Spotted owlet	<i>Athene brama</i>	Strigiformes	LC	R	I, C
Rose-ringed parakeet	<i>Psittacula krameri</i>	Psittaciformes	LC	R	G,F,H

Status: R-Resident, M-Migratory, PM-Partially Migratory, HM-Highly Migratory, WM-Winter Migratory

Food: H-Herbivorous, C-Carnivorous, I-Insectivorous, G-Granivorous, P-Piscivorous, O-Omnivorous, F-Frugivorous

IUCN Status: LC- Least concern, NT- Near Threatened

Table 3. Abundance of bird species in different habitat

Birds name	Scientific name	Krishna river	Manchlapur lake	Raichur University	Maliyabad
Laughing dove	<i>Spilopelia senegalensis</i>	+++	+++	+++	+++
Eurassian collared dove	<i>Streptopelia decaocto</i>	+++	+++	+++	+++
Indian roller	<i>Coracias benghalensis</i>	++	++	+++	++
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	+++	+++	++	+++
Asian green bee-eater	<i>Merops orientalis</i>	+++	+++	+++	+++
Black-winged stilt	<i>Himantopus himantopus</i>	+++	+++	+	++
Pied Kingfisher	<i>Ceryle rudis</i>	++	++	-	+
Large grey babbler	<i>Argya malcolmi</i>	+++	+++	+++	+++
Brahminy starling	<i>Sturnia pagodarum</i>	++	++	+++	++
House crow	<i>Corvus splendens</i>	++	++	+++	+++
Baya weaver	<i>Ploceus philippinus</i>	+++	+++	+	++
Barn Swallow	<i>Hirundo rustica</i>	+++	+++	+	++
Indian Silverbill	<i>Euodice malabarica</i>	+++	+++	+++	+++
Ashy prinia	<i>Prinia socialis</i>	++	+++	+++	+++
Purple-rumped sunbird	<i>Leptocoma zeylonica</i>	++	++	+++	+++
Common tailor bird	<i>Orthotomus sutorius</i>	+	++	++	++
Scaly-breasted munia	<i>Lonchura punctulata</i>	+++	+++	++	+++
White-browed wagtail	<i>Motacilla maderaspatensis</i>	+++	+++	+++	+++
Pied bushchat	<i>Saxicola caprata</i>	++	++	+++	++
Indian robin	<i>Copsychus fulicatus</i>	++	+++	+++	+++
Indian bushlark	<i>Mirafra erythroptera</i>	-	+	++	++
Long-tailed shrike	<i>Lanius schach</i>	+	++	+++	+++
Jungle babbler	<i>Argya striata</i>	-	++	++	+++
Red-vented bulbul	<i>Pycnonotus cafer</i>	++	+++	+++	+++
Eastern great egret	<i>Ardea modesta</i>	++	+++	++	++
Cattle egret	<i>Bubulcus</i>	+++	+++	+++	+++
Eurassian Spoonbill	<i>Platalea leucorodia</i>	++	+++	-	+
Glossy ibis	<i>Plegadis falcinellus</i>	++	+++	+	++
Black-headed ibis	<i>Threskiornis melanocephalus</i>	+++	+++	+	++
Spot billed pelican	<i>Pelecanus philippensis</i>	-	+++	-	-
Little egret	<i>Egretta garzetta</i>	+++	+++	++	+++
Malayan night heron	<i>Gorsachius melanolophus</i>	-	+	-	-
Indian pondheron	<i>Ardeola grayii</i>	+++	+++	+++	+++
Red-naped ibis	<i>Pseudibis papillosa</i>	++	+++	++	+++
Grey heron	<i>Ardea cinerea</i>	+++	+++	++	+++
Black-winged kite	<i>Elanus axillaris</i>	++	++	++	++
Shikra	<i>Accipiter badius</i>	++	++	+++	+++
Plumbeous kite	<i>Ictinia plumbea</i>	+	-	-	-
Greater coucal	<i>Centropus sinensis</i>	++	++	+++	+++
Asian Koel	<i>Eudynamis scolopaceus</i>	++	++	+++	++
Red-wattled lapwing	<i>Vanellus indicus</i>	+++	+++	+++	+++
Common sandpiper	<i>Actitis hypoleucos</i>	+++	+++	+	++
Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	++	++	+++	+++
Indian cormorant	<i>Phalacrocorax fuscicollis</i>	+++	+++	++	+++
Indian spot-billed duck	<i>Anas poecilorhyncha</i>	+++	+++	+	++
Peacock	<i>Pavo cristatus</i>	++	++	+++	+++
Swamp hen	<i>Porphyrio porphyrio</i>	++	+++	+	++
Black-rumped flameback	<i>Dinopium javanense</i>	+	-	++	++
Painted stork	<i>Mycteria leucocephala</i>	+++	+++	++	+++
Indian grey hornbill	<i>Ocyrceros birostris</i>	-	-	++	+
Spotted owlet	<i>Athene brama</i>	+	++	++	+++
Rose-ringed parakeet	<i>Psittacula krameri</i>	++	++	+++	+++
Total- 52	-----	47	49	47	49

Rare + Common ++ Abundance

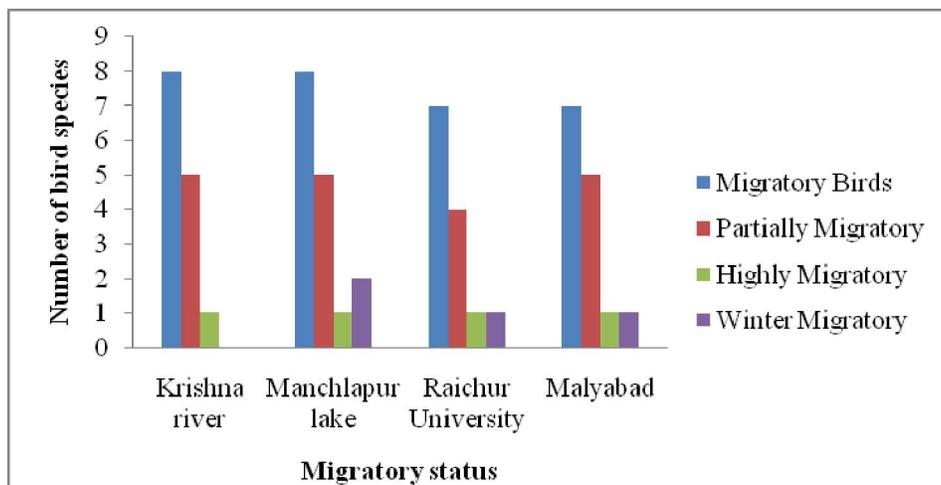


Fig. 2. Conservation/ (IUCN) status of bird species

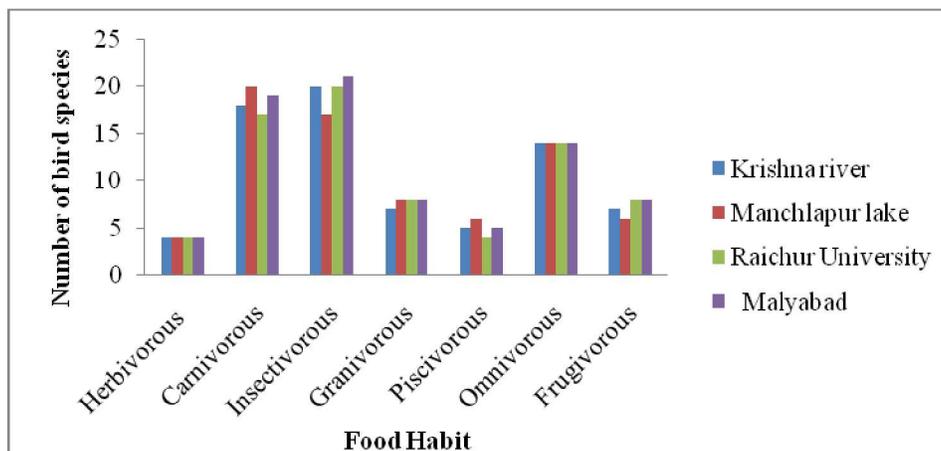


Fig. 4. Different feeding habits of birds

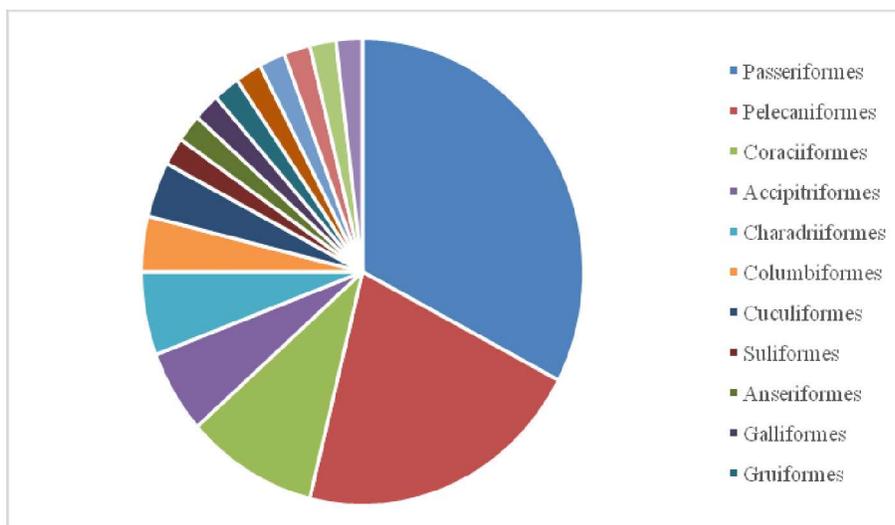


Fig. 5. Percent occurrence of birds species of different orders

the observed birds were categorized as the least concerned species highest observed in Malyabad, Manchalapur, Raichur University and lowest Krishna river, where maximum (37) resident birds were in Malayabad followed by Raichur University, Manchalapur and Krishna river (Fig. 3). Ther near threatened were highest in Manchalapur followed by Krishna river, Malyabad and Raichur University. Black-headed ibis and spot-billed pelican are near-threatened species as per IUCN status, which are almost rare species but found abundantly in Krishna River and Manchlapur Lake sites which might be due to preferred habitat and foraging area (Barik et al 2021). Highest percentage was of Passeriformes (32.69%) and followed by Pelicaniformes, Coraciiformes, Accipitriformes, Columbiformes .

Diversity based on migratory status: Migratory birds accounted for 32% of the total avifauna, while resident species comprised 67.3%. The highest number of migratory birds was at the Krishna River and Manchalapur Lake, followed by Raichur and Malyabad. (Fig. 4) Similar trend was observed for partially migratory species, except at Raichur University. The highly migratory species displayed a consistent distribution pattern across all sites. In contrast, winter migrants were most abundant at Manchalapur Lake, followed by the other two locations, with the exception of the Krishna River. Biswas et al. (2025) recorded 78.57% resident birds and 21.43% migratory birds, suggesting that study area offers favorable environmental conditions and potential to attract more migratory species.

Diversity based on feeding habit: Based on the food/feeding, the avifauna is dominated by carnivorous followed by insectivorous, omnivorous, and frugivorous birds (Fig. 5). Herbivorous shown similar trend in all sites. However, the insectivorous bird community was dominant in Maliyabad. This might be due to semi-arid open grasslands and man-made water bodies Biswas et al., (2025) observed that 41% of bird species were omnivores, 32% carnivores, and 16% insectivores. Similarly, More and Patil (2024) reported that 40% of the total bird species were insectivores, likely due to their high adaptability to human-modified agricultural landscapes. 52 species of birds belonging to 16 orders of 35 families (Fig. 6) Passeriformes were the highest followed by Pelicaniformes, coracciformes.

CONCLUSION

The total of 52 bird species were recorded, with Passeriformes and Pelecaniformes being the most numerous. Manchalapur Lake exhibited the highest species diversity, while Maliyabad Lake showed the greatest bird abundance. Most of the recorded species were resident and classified as of least concern. However, near threatened

species were observed at each site, with Manchalapur having the highest number. The migratory bird presence was most prominent at the Krishna and Manchalapur sites. In terms of feeding behavior, carnivorous and insectivorous species were the most dominant. Despite being a semiarid region, the area supports significant avian diversity that must be preserved and safeguarded.

REFERENCES

- Aynalem S and Bekele A 2008. Species composition, relative abundance and distribution of bird fauna of riverine and wetland habitats of Infranz and Yiganda at southern tip of Lake Tana, Ethiopia. *Tropical Ecology* **49**(2): 199.
- Barik S, Saha GK and Mazumdar S 2021. How the habitat features influence Black-headed Ibis (*Threkiornis melanocephalus*) in a suburban area? A study from mid-West Bengal, India. *Proceedings of the Zoological Society of London* **75**(1): 39-47.
- Bideberi G 2013. *Diversity, distribution and abundance of avifauna in respect to habitat types: A case study of Kilakala and Bigwa, Morogoro, Tanzania* (Doctoral dissertation, Sokoine University of Agriculture).
- Biswas A, Pradeep Debnath Arjan Basu Roy, Lina Chatterjee, Bulganin Mitra, Saptarshi Mitra, Punarbasu Chaudhuri 2025. Investigating avian fauna diversity and exploring their possible threats in and around wet-landscape of Rudrasagar lake: An Indian Ramsar site. *Wetland Ecology Management* **33**(22): 1-19.
- Desalegn T, Aynalem S and Tassie 2021. Diversity, abundance and habitat association of avifauna in Menageshaambamariam and Gamedhanialem forest, Oromia region, Ethiopia. *International Journal of Avian & Wildlife Biology* **6**(1): 1-10.
- Desalegn T and Negussie F 2022. Diversity, species composition, and relative abundance of avifauna at Debre libanos monastery, Ethiopia. *International Journal of Zoology* **(1)**: 8697842.
- Gashe S, Bekele A, Mengesha G and Asefa A 2018. Consequences of deforestation on bird diversity in the Hamuma forest, southwestern Ethiopia. *SINET. Ethiopian Journal of Science* **41**(1): 15-33.
- Girma Z, Mamo Y, Mengesha G, Verma A and Asfaw T 2017. Seasonal abundance and habitat use of bird species in and around Wondo Genet Forest, south-central Ethiopia. *Ecology and Evolution* **7**(10): 3397-3405.
- Gremion J, Marcacci G, Mazenauer J, Sori T, Kebede F and Ewnetu M 2022. Habitat preferences of the Ortolan Bunting (*Emberiza hortulana*) in its prime wintering grounds, the cereal-dominated Ethiopian Highlands. *Ibis* **164**: 74-87.
- Krishna MP 2018. Diversity studies of birds in and around Harangi reservoir, Kodagu district central western ghats. *International Journal of Creative Research Thoughts (IJCRT)* **6**(2): 1402-1410.
- Manohara G, Harisha MN and Hosetti BB 2016. Status, diversity and conservation threats of migratory wetland birds in Magadi Bird Sanctuary, Gadag district, Karnataka, India. *Journal of Entomology and Zoology Studies* **4**(4): 265-269.
- More S and Patil S 2024. Study of bird diversity from Shukryacharya hills and its surrounding areas Dist. Sangli MS. *International Journal of Multidisciplinary Research* **6**(2): 1-7.
- Marcacci G, Gremion J, Mazenauer J, Sori T, Kebede F and Ewnetu M 2020. Large-scale versus small-scale agriculture: disentangling the relative effects of the farming system and semi-natural habitats on birds' habitat preferences in the Ethiopian Highlands. *Agriculture, Ecosystems and Environment* **289**: article 106737. <https://doi.org/10.1016/j.agee.2019.106737>.
- Mi X, Feng G, Hu Y, Zhang J, Chen L, Corlett R T, and Ma K. 2021. The global significance of biodiversity science in China: An overview. *National Science Review* **8**(7): 1-25.

- Mistry J 2015. Avifaunal diversity in and around Berhampur, Murshidabad district, West Bengal, India. *International Journal of Fauna and Biological Studies* **4**: 6-10
- Mukhopadhyay S and Mazumdar S 2017. Composition, diversity and foraging guilds of avifauna in a suburban area of southern West Bengal, India. *The Ring* **39**(1):103-120.
- Mosisa GB, Tassie N and Dejene SW 2023. Diversity and abundance of avifauna in the Suba Forest area, central Ethiopia. *Ostrich* **94**(3): 204-216.
- Rajagopal T, Sonaimuthu K, Selvarani S, Ponmanickam P and Sekar M 2022. A survey on avifauna diversity in some selected localities in and around Madurai city. *Ecology Environment & Conservation* **28**: 207-216.
- Simamora TI, Purbowo SD and Laumonier Y 2021. Looking for indicator bird species in the context of forest fragmentation and isolation in West Kalimantan, Indonesia. *Global Ecology and Conservation* **27**: e01610.
- Tanalgo KC, Pineda JAF, Agravante ME and Amerol ZM 2015 Bird diversity and structure in different land-use types in lowland south-central Mindanao, Philippines. *Tropical Life Sciences Research* **26**: 85-103.
- Tsegaye M and Gadisa T 2016. Avian diversity in dhatiwalel national park of western Ethiopia. *International Journal of Molecular Evolution and Biodiversity* **6**(1): 1-12.
- Verner J 1985. Assessment of counting techniques. *Current Ornithology* **2**: 247-302.
- Walker JS and Shochat E 2010. Scalar effects of vegetation on bird communities in an urbanizing desert ecosystem. *Urban Ecosystems* **13**: 155-167.

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