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STUDIES ON THE RESIDENTIAL STATUS OF BIRDS IN AND AROUND KOTWAL RESERVOIR, MORENA DISTRICT, INDIA

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Abstract: Birds are the biological indicators in an environment since the birds belong to the top level of the food chain in an ecosystem. Ecological changes cause changes in a number of breeding and wintering of bird populations. Bird habitat and many bird species are inseparable and helpful to mankind in various ways and their presence is very essential to restore local biodiversity. The present study on avifauna was carried out around Kotwal reservoir, Morena district of Madhya Pradesh, India. A total of 104 species were found belonging to 17 Orders and 40 families. Out of these, 57 (55%) bird species were winter migrants (WM), 5 (5%) summer migrants, and 42 (40%) species were residents. This study will help to evaluate bird density and diversity, species composition, abundance and distribution of birds of Kotwal reservoir.

Keywords: Bird diversity, Ecosystem, Kotwal reservoir, Residential status.

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INTRODUCTION

Birds, fascinating creatures with feathers, are bipedal vertebrates and warm-blooded animals (Verma and Prakash, 2020a). They hold a special place in our environment, being both visually striking and ecologically significant. People find great joy in observing the activities of birds, often taking a keen interest in their behaviour. Engaging in bird watching allows individuals to experience aesthetic and recreational satisfaction as they observe these magnificent creatures in their natural habitats, undisturbed by human interference. Some birds act like eternal symbol of marital fidelity (Verma and Prakash, 2017). The captivating sights and sounds of birds bring a sense of wonder and appreciation for the beauty of the natural world.

India is home to a wide array of vibrant and visually appealing bird species. Birds hold significant ecological importance as they serve as integral components and essential links within the food chain of aquatic ecosystems. Their presence is indicative of rich and diverse biodiversity within an ecosystem; however, anthropogenic activities and e-wastes badly influence the environment and sustainable development (Ashok, 2017a; Verma and Prakash, 2020b; Prakash and Verma, 2022). Everyone should follow the environmental ethics (Ashok, 2017b). Birds often occupy the role of keystone species, playing a crucial role in maintaining the natural balance of habitats and serving as fundamental components of food chains and intricate food webs. Monitoring bird populations

provides valuable insights into the ecological well-being of the environment.

Avifauna can be found in diverse habitats worldwide, including groundwater, reservoirs, ponds, wetlands, grasslands, forests, deserts, jungles, city gardens, and even in close proximity to human dwellings. They are ubiquitous and their presence signifies the dynamic interplay between nature and human habitats (Wahied and Saba, 2020). In recent times, there has been a noticeable decrease in bird populations, and several factors contribute to this decline. Specifically, aquatic bird species are affected due to a decline in the quality of their habitats, both on land and in water. Ground and surface water sources have been negatively impacted, leading to the drying up of streams and other bodies of water that are essential for their survival.

Additionally, pollution caused by pesticides and other chemicals further exacerbates the situation, posing a significant threat to aquatic bird populations. These combined factors have played a role in the decline of bird numbers, emphasizing the urgent need for conservation efforts to safeguard their habitats and address the issues of habitat degradation and pollution. In this respect, the present survey was carried out to study residential status of birds in and around Kotwal reservoir, located in Morena district of Madhya Pradesh, India.

MATERIALS AND METHODS

Kotwal reservoir (fig. 1-3) is located in the eastern part, about 12.4 km from Morena city, Madhya Pradesh. Geographically, the Kotwal reservoir lies between 26.29'15" N latitude and 78.7'30" E longitude near the Kotwal village in Morena district. The Kotwal reservoir has been named after the name of the nearest village, Kotwal. Kotwal reservoir is located across the Asan River, which is a tributary of Kunwari River that empties into Chambal River. An earthen type of dam was constructed there in 1914 with a maximum height as 171.39 m and 1158 m as maximum length. The maximum water area of the Kotwal reservoir is 1768 hectare and the minimum water area is 809 hectare. Therefore, the average water area lies between 1327 and 1400 hectare with a catchment area of 84.289 million m^3. The water of the reservoir is mainly used for irrigation in nearby agriculture lands and also for drinking and fisheries purpose.

The avian study data was collected for one complete year from October 2021 to September 2022. The observation of bird's diversity studies was conducted by Point Count method (Javed and Kaul, 2002) and Line transect method (Buckland *et al.*, 2001; Gregory *et al.*, 2004).

Fig.1 : District map of Morena.

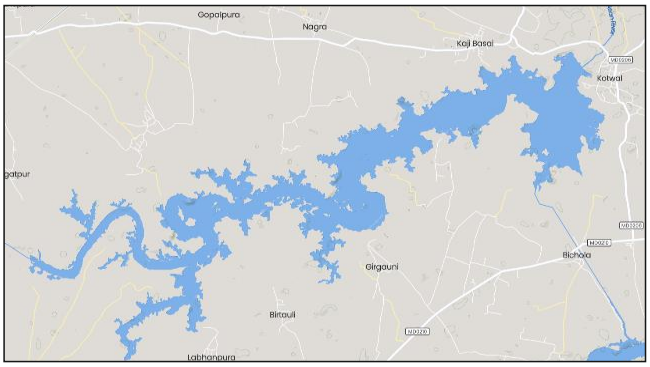


Fig.2: Map view of Kotwal Reservoir.

Fig.3 (a): A view of Kotwal Reservoir.

Fig.3 (b): A view of Kotwal Reservoir Dam.

Avifauna was observed during winter, rainy and summer seasons in the morning (6.00 am to 12 noon) and last afternoon (4.00 pm to 6.00 pm). Nikon D-5600 (with 70-300 mm zoom lens and 18-55 mm normal lens) digital camera was used for taking pictures and Olympus binocular was used for close observation of birds and their diversity. Photographs were identified by using standard field guides such as Grimmett *et al*. (1999) and Ali (1941). Local people also assisted in the identification and gave perceptions about the existence of the birds in the study area.

RESULTS AND DISCUSSION

A total of 104 species of the birds were recorded in and around the ecosystems of Kotwal reservoir. These birds belong to 40 different families and 17 orders. The birds were classified on the basis of their residential status as R- Residential, WM- Winter migrant and SM- Summer migrant. The birds observed are enlisted in table number 1. Their residential status and IUCN status are represented in figures 4 and 5 respectively.

Table 1: List of Bird species observed and identified at Kotwal reservoir, Morena district, M.P., India with their residential status.

S.No.	Order	Families	Scientific Name	Common Name	IUCN Status	Residential Status
1.	Pelecaniformes	Threskiornithidae	*Threskiornis melanocephalu*	Black-headed ibis	NT	WM
2.			*Platalea leucorodia*	Eurasian spoonbill	LC	WM
3.			*Pseudibis papillosa*	Red-naped ibis	LC	WM
4.		Ardeidae	*Bubulcus ibis*	Cattle egret	LC	R
5.			*Ardea alba modesta*	Eastern great egret	LC	WM
6.			*Ardea intermedia*	Intermediate egret	LC	WM
7.			*Egretta garzetta*	Little egret	LC	R
8.			*Ardeola grayii*	Indian pond heron	LC	R
9.			*Nycticorax nycticorax*	Black-crowned night heron	LC	SM
10.			*Ardea purpurea*	Purple heron	LC	WM
11.			*Ardea alba*	Great egret	LC	WM
12.			*Ardea cinerea*	Grey heron	LC	WM
13.			*Butorides striata*	Striated heron	LC	WM
14.	Podicipediformes	Podicipedidae	*Tachybaptus ruficollis*	Little grebe	LC	WM
15.	Suliformes	Phalacrocoracidae	*Microcarbo niger*	Little cormorant	LC	WM
16.			*Phalacrocorax fuscicollis*	Indian cormorant	LC	WM
17.			*Phalacrocorax carbo*	Great cormorant	LC	WM
18.		Anhingidae	*Anhinga melanogaster*	Oriental darter	LC	R
19.	Gruiformes	Rallidae	*Amaurornis phoenicurus*	White-breasted waterhen	LC	WM
20.			*Porphyrio porphyrio*	Purple swamphen	LC	WM
21.			*Gallinula chloropus*	Common moorhen	LC	WM
22.			*Fulicaatra*	Eurasian coot	LC	WM
23.	Coraciiformes	Alcedinidae	*Halcyon smyrnensis*	White-throated kingfisher	LC	R

24.			*Ceryle rudis*	Pied kingfisher	LC	R
25.			*Alcedo atthis*	Common kingfisher	LC	WM
26.		Coraciidae	*Coracias benghalensis*	Indian roller	LC	R
27.		Meropidae	*Merops orientalis*	Asian green bee-eater	LC	R
28.			*Merops philippinus*	Blue-tailed bee-eater	LC	SM
29.	Ciconiiformes	Ciconiidae	*Anastomus oscitans*	Asian openbill	LC	WM
30.			*Mycteria leucocephala*	Painted stork	NT	WM
31.			*Ciconia episcopus*	Woolly-necked stork	NT	WM
32.	Charadriiformes	Jacanidae	*Metopidius indicus*	Bronze-winged jacana	LC	R
33.			*Hydrophasianus chirurgus*	Pheasant-tailed jacana	LC	WM
34.		Scolopacidae	*Tringa stagnatil*is	Marsh sandpiper	LC	WM
35.			*Actitis hypoleuco*s	Common sandpiper	LC	WM
36.			*Tringa ochropus*	Green sandpiper	LC	WM
37.			*Tringa glareola*	Wood sandpiper	LC	WM
38.			*Calidris temminckii*	Temminck's stint	LC	WM
39.			*Calidris pugnax*	Ruff (bird)	LC	WM
40.			*Tringa tetanus*	Common redshank	LC	WM
41.			*Tringa nebularia*	Common greenshank	LC	WM
42.		Charadriidae	*Charadrius dubius*	Little ringed plover	LC	WM
43.			*Charadrius placidus*	Long-billed plover	LC	WM
44.			*Vanellus malabaricus*	Yellow-wattled lapwing	LC	WM
45.			*Vanellus indicus*	Red-wattled lapwing	LC	R
46.			*Vanellus duvaucelii*	River lapwing	NT	WM
47.		Recurvirostridae	*Himantopus himantopus*	Black-winged stilt	LC	WM
48.		Rostratulidae	*Rostratula benghalensis*	Greater painted-snipe	LC	WM
49.		Laridae	*Sterna aurantia*	River tern	VU	R
50.			*Chroicocephalus ridibundus*	Black-headed gull	LC	WM
51.		Burhinidae	*Esacus recurvirostris*	Great stone-curlew	NT	WM
52.	Passeriformes	Motacillidae	*Motacilla maderaspatensis*	White-browed wagtail	LC	R
53.			*Motacilla alba*	White wagtail	LC	WM
54.			*Motacilla flava*	Western yellow wagtail	LC	WM
55.			*Motacilla citreola*	Citrine wagtail	LC	WM
56.		Corvidae	*Corvus splendens*	House crow	LC	R
57.			*Corvus culminatus*	Indian jungle crow	LC	R
58.		Passeridae	*Passer domesticus*	House sparrow	LC	R
59.		Estrildidae	*Lonchura malacca*	Tricoloured munia	LC	R

60.			*Lonchura punctulate*	Scaly-breasted munia	LC	R
61.		Hirundinidae	*Hirundo smithii*	Wire-tailed swallow	LC	WM
62.			*Hirundo rustica*	Barn swallow	LC	WM
63.		Ploceidae	*Ploceus benghalensis*	Black-breasted weaver	LC	WM
64.		Leiothrichidae	*Argya striata*	Jungle babbler	LC	R
65.			*Argya malcolmi*	Large grey babbler	LC	R
66.			*Argya caudata*	Common babbler	LC	R
67.		Sturnidae	*Gracupica contra*	Indian pied myna	LC	R
68.			*Acridotheres ginginianus*	Bank myna	LC	R
69.			*Acridotheres tristis*	Common myna	LC	R
70.			*Pastor roseus*	Rosy starling	LC	WM
71.			*Sturnia pagodarum*	Brahminy starling	LC	WM
72.		Cisticolidae	*Prinia socialis*	Ashy prinia	LC	R
73.		Dicruridae	*Dicrurus macrocercus*	Black drongo	LC	R
74.		Laniidae	*Lanius schach*	Long-tailed shrike	LC	WM
75.		Muscicapidae	*Oenanthe fusca*	Brown rock chat	LC	R
76.			*Copsychus fulicatus*	Indian robin	LC	R
77.			*Copsychus saularis*	Oriental magpie-robin	LC	R
78.		Pycnonotidae	*Pycnonotus cafer*	Red-vented bulbul	LC	R
79.	Galliformes	Phasianidae	*Pavo cristatus*	Peafowl	LC	R
80.	Cuculiformes	Cuculidae	*Centropus sinensis*	Greater coucal	LC	R
81.			*Eudynamys scolopaceus*	Asian koel	LC	SM
82.			*Clamator jacobinus*	Jacobin cuckoo	LC	SM
83.		Accipitridae	*Milvus migrans*	Black kite	LC	WM
84.			*Accipiter badius*	Shikra	LC	WM
85.			*Neophron percnopterus*	Egyptian vulture	EN	WM
86.			*Pernis ptilorhynchus*	Crested honey buzzard	LC	WM
87.	Anseriformes	Anatidae	*Sarkidiornis melanotos*	Knob-billed duck	LC	SM
88.			*Dendrocygna javanica*	Lesser whistling duck	LC	WM
89.			*Anas platyrhynchos*	Mallard	LC	WM
90.			*Anas platyrhynchos domesticus*	Rouen duck	LC	R
91.			*Anser anser domesticus*	Domestic goose	LC	R
92.			*Tadorna ferruginea*	Ruddy shelduck	LC	WM
93.			*Spatula clypeata*	Northern shoveler	LC	WM
94.			*Anas poecilorhyncha*	Indian spot-billed duck	LC	WM
95.	Columbiformes	Columbidae	*Treron phoenicopterus*	Yellow-footed green pigeon	LC	R
96.			*Streptopelia decaocto*	Eurasian collared dove	LC	R
97.			*Columba livia domestica*	Feral pigeon	LC	R
98.	Psittaciformes	Psittaculidae	*Psittacula cyanocephala*	Plum-headed parakeet	LC	R

99.			*Psittacula krameri*	Rose-ringed parakeet	LC	R
100.	Bucerotiformes	Bucerotidae	*Ocyceros birostris*	Indian grey hornbill	LC	R
101.		Upupidae	*Upupa epops*	Eurasian hoopoe	LC	R
102.	Strigiformes	Strigidae	*Athene cunicularia*	Burrowing owl	LC	WM
103.			*Athene brama*	Spotted owlet	LC	R
104.	Piciformes	Picidae	*Dinopium benghalense*	Black-rumped flameback	LC	R

IUCN status (IUCN, 2022): LC- Least Concern, NT- Near Threatened, EN- Endangered, VU- Vulnerable
Residential status: R- Residential, WM- Winter migrant, SM- Summer migrant

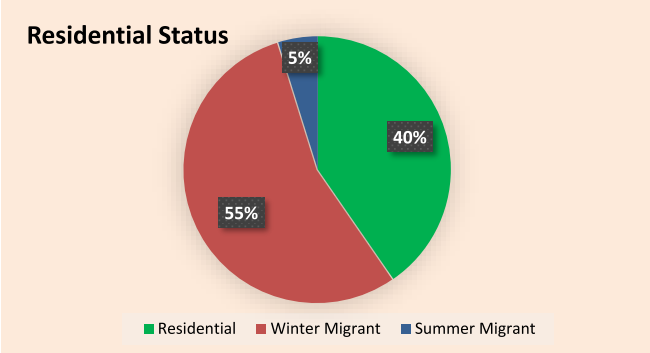


Fig.4: Residential status of birds observed.

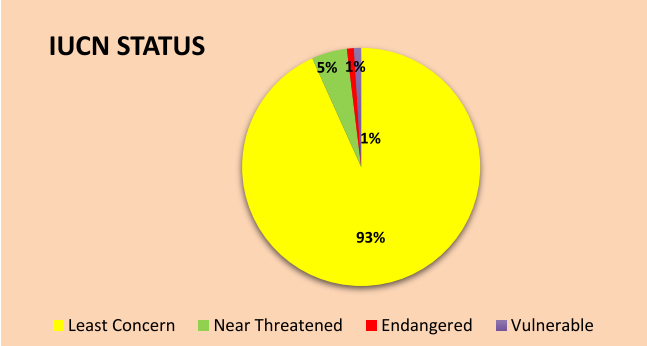


Fig. 5: IUCN status of birds observed

Egyptian vulture
Neophron percnopterus

Burrowing owl
Athene cunicularia

Shikra
Accipiter badius

Ruff Jacobin
Calidris pugnax

Cuckoo
Clamator jacobinus

Ruddy shelduck
Tadorna ferruginea

Knob-billed duck
Sarkidiornis melanotos

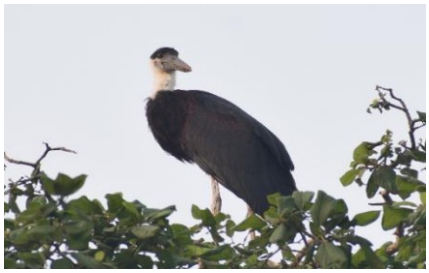
Black-headed ibis
Threskiornis melanocephalus

Yellow-wattled lapwing
Vanellus malabaricus

Long-tailed shrike
Lanius schach

Black-rumped flameback
Dinopium benghalense

Crested honey buzzard
Pernis ptilorhynchus



Woolly-necked stork
Ciconia episcopus

Rosy starling
Pastor roseus

Painted stork
Mycteria leucocephala

Pied kingfisher
Ceryle rudis

Western yellow wagtail
Motacilla flava

Black-crowned night heron
Nycticorax nycticorax

Purple swamphen
Porphyrio porphyrio

Spotted owlet
Athene brama

Yellow-footed green pigeon
Treron phoenicopterus

Fig.6: Photographs showing some of the beautiful birds found in Kotwal reservoir.

Thus, in the present study, a sum of 104 species of the birds belonging to 17 orders and 40 different families were recorded in the study area. The order Passeriformes has highest number of bird species (27 species), followed by Charadriiformes (20 species), Pelecaniformes (13 species), Anseriformes (8 species), Coraciiformes (6 species), Suliformes, Gruiformes and Accipitriformes (4 species each), Ciconiiformes, Cuculiformes, Columbiformes (3 species each) and Psittaciformes, Bucerotiformes, Strigiformes (2 species each). Only 1 bird species was identified each in Podicipediformes, Galliformes and Piciformes orders. Passeriformes was the most dominant order, represented by 27 species.

Several workers have studied the avian diversity and also the residential status of birds from time

to time. Dey *et al.* (2013) carried out a preliminary study on avifaunal species diversity of Maharaja Bir Bikram College Campus, Tripura and recorded total 76 species of bird in which 12 bird species were winter migrants, 19 were resident migrants, 44 were residents and one was a local migrant. Harney and Bhute (2014) studied the diversity of avifauna in and around Chalbardi (Rai) lake near Bhadrawati, Chandrapur (M.S.) and recorded 65 species of birds belonging to 15 different orders and 40 families. Out of these a total of 65 species, 54 were residential, 10 were residential migratory and 1 is residential migratory common. Puri (2015) recorded a total of 27 species in Malguzari Lake at Zaliya near Amgaon in Gondia district (M.S.) in which 13 were residents, 10 were resident migrants and 04 were migrants.

Lodhi *et al.* (2017) studied the residential status of the birds in Tighra reservoir in Gwalior, M.P. and reported 30 migrant, 16 residential migrant and 10 fully residents. Rai *et al.* (2017) recorded a total of 128 species in the Basai wetlands, Haryana, out of which 79 species were resident (R), 45 bird species were winter migrant (WM) and 4 species were summer migrant (SM). Sargar *et al.* (2019) determined 45 resident, 08 resident migrant and 02 resident migrant common in Dudhana River Basin, Parbhani district (M.S.), India. Mahato *et al.* (2021) determined 36 winter migrants, 78 residents, and only 01 summer migrant in Purpulia Town, West Bengal, India. Sharma and Sharma (2021) identified the avifaunal diversity of Sakhya Sagar and Madhav lakes and its surrounding areas of Madhav National Park and recorded 73 species of birds belonging to 10 orders and 25 families. Out of these 73 species, 47 species were winter migrant and 26 species were resident.

As the residential status is concerned, both resident and migratory birds were observed in the Kotwal reservoir. Every year, during winter season, a huge number of migratory water bird species aggregate in this reservoir from different parts of the world. There are many reasons for the arrival of these migratory birds such as favourable climate or availability of food. Authors found that in the present study, out of the 104 bird species, 57 (55%) bird species were winter migrant (WM), 5 (5%) summer migrant (SM) and 42 (40%) species were resident (R).

Mokal and Bhoye (2022) have worked on Nandur Madhyameshwar bird Sanctuary, Nashik (M.S.) and have recorded 24 species of birds belonging to 16 families. Out of these 24 species, 14 species were resident migratory, 2 species were migratory and 8 were resident. Similarly, Harney (2022) studied the bird diversity of fly ash pond of Chandrapur (M.S.) and recorded 108 species of birds. Out of total 108 species, 62 were resident, 34 were resident migrant, 11 were migratory and 01 was resident migratory. Patel and Bagada (2022) made an avian species richness report of Juagadh, Gujarat, India and recorded 302 species of birds. Out of these 302 species, 97 were widespread resident (WR), 56 were resident (R), 134 were winter migrant (WM), 11 were monsoon migrant (MM) and 5 were passage migrant (PM). Sharma and Sharma (2022) observed a total of 123 bird species, belonging to 19 orders and 49 families in Madhav National Park, Shivpuri. Out of 123 species, 74 species were resident, 45 species winter migratory and 4 species summer migratory.

Recently, Aloysius *et al.* (2023) studied the avian diversity and abundance in the Sarasalai Mangrove Reserve, Jaffna, Sri Lanka and recorded 107 species belonging to 45 families. Out of these 107 species, 36 were migrants and were 15 migrant species.

CONCLUSION

In summary, the Kotwal reservoir and its surrounding areas including forests, agricultural lands, and terrestrial habitats, exhibit significant avian diversity that serve as attractive destinations for migratory birds. The reservoir harbours numerous migratory water bird species that move from various parts of the world. Preserving and conserving the reservoir is crucial not only for maintaining the avian diversity but also for the preservation of other organisms that directly or indirectly rely on the bird populations. By focusing on the conservation of the reservoir, humans can contribute to the preservation of its rich avian biodiversity and the intricate ecological balance that depends on it.

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