Journal homepage:https://www.environcj.in/

Environment Conservation Journal

ISSN 0972-3099 (Print) 2278-5124 (Online)

Avifaunal diversity of Moharli Lake, near Tadoba Andhari Tiger Reserve, Chandrapur (Maharashtra)

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ARTICLE INFO

Received : 12 December 2023
Revised : 15 February2024
Accepted : 24 March 2024

Available online: 20 April 2024

Key Words:
Avifauna
Biodiversity
Feeding habits
Migratory
Tadoba Andhari

ABSTRACT

Lakes and their basins are major repositories of biodiversity. Monitoring the basin and their respective water bodies requires an assessment of avifaunal diversity, as birds are a health indicator of the ecosystem. The present investigation focused on the avifauna diversity of Moharli Lake and its environs. Moharli Lake is located a short distance from the Tadoba Andhari Tiger Reserve (TATR) in the Chandrapur district of Maharashtra. Serving as one of the primary entrances to TATR, the Moharli gate overlooks this perennial freshwater lake. Abundant in nutrients, the lake supports a diverse avian population, including migratory bird species. The lake and its environs were surveyed nightly throughout the study duration, spanning from June 2014 to April 2015. The birds were classified into five distinct groups based on their habitat. A total of 81 species, representing 67 genera across 31 families within 13 orders, were documented and classified according to their status and occurrence, including migratory species. The presence of birds was meticulously documented alongside their dietary inclinations and feeding behaviors. The diverse bird community within the study area indicates a conducive habitat for both breeding and sustenance. A comprehensive analysis of avifaunal diversity in this region will aid in formulating conservation strategies for the future.

Introduction

Birds are considered useful biological indicators because they are ecologically versatile and live in all kinds of habitats, such as herbivores or carnivores. (Jarvinen and Vaisanen,1979). Birds are excellent model organisms for understanding key issues in ecology, animal behavior, evolutionary biology and conservation. (Urfi, 2011). The abundance of avifauna indicates the health status of lakes because the availability of water, safe habitat and food sources for both adults and nestling and essential nesting sites in and around the lakes are important for the occurrence and abundance of aquatic bird populations. (Joshi, 2012) Avifaunal diversity is one of the most important ecological indicators for evaluating habitat status. Many researchers have carried out numerous studies on avifaunal diversity in freshwater bodies in India. The species composition of a specific area or a community is interlinked to the available resources of that area, which include the physical environment, availability of food and biotic interactions. The Tadoba Andhari Tiger Reserve (TATR) in the Chandrapur district in eastern Maharashtra represents a unique habitat for wildlife in central India and one of the oldest national parks in the state. Tadoba was named after the local Gond chieftain “Taru”. Moharli is a small village in the Chandrapur district that is located 28 km away from Chandrapur. Moharli Lake is situated just before the entrance for TATR through Moharli village, i.e., near the Moharli gate. The MTDC residences for the tourists visiting the TATR are available in this area. Moharli Lake, selected to study avian biodiversity in and around it, is a perennial freshwater body receiving water from the Irai dam. It is situated approximately 218 meters above the mean sea level, at 79°33’ E longitude and 20°19’N latitude. The lake is surrounded by agro-pastoral and shrub habitats on all sides. The lake and

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Doi:https://doi.org/10.36953/ECJ.26852786

surrounding area contain rich flora and fauna. The dominant flora included *Typha, Cyperus, Ipomoea, Hydrilla, Chara, Vallisneria, Nymphea, etc.,* and the surrounding marginal flora included bushes and trees. Tadoba National Park and the Andhari Tiger Reserve are located just a few kilometers from the designated study area. This area encompasses a typical dry deciduous forest rich in diverse flora, notably teak trees and various other plants with medicinal properties. The vicinity around Moharli Lake and its adjacent forest serve as favorable breeding and nesting sites for numerous bird species. This area attracts a diverse array of birds, encompassing both resident and migratory species. The water body and the surrounding natural vegetation offer a rich variety of food sources, contributing to the abundance of avian life in the region. The recent surge in awareness regarding biodiversity and surveillance efforts has led to the discovery of numerous new bird species. This development has spurred the investigation of avian populations in Moharli Lake. The current study aimed to examine the diversity, status, distribution, and feeding behaviors of the bird species inhabiting this area. Many earlier researchers have studied the avifauna in India. Osmanton (1922) studied 135 species of birds from Pachmari. Ali (1939) published a list of 278 species from central India. Balkhande *et al*. (2013) recorded 50 species of birds near the Parna River. Dist. Parbhani. Pentewar M.S. (2018) identified a total of 56 birds near the Sikara Dam, Nanded. Gajanan (2019) studied the wetlands and water birds of the Amaravati district.

Material and Methods

The aim of this study was to document the biodiversity of avifauna and their present status in and around Moharli Lake. Moharli Lake and its surrounding area were visited and surveyed on a fortnightly basis during the study period from June 2014 to April 2015. Four different sites were selected for observing the birds. Observations were carried out by using a field binocular (7 x 50 Olympus), and species were identified with the help of field guides by Salim Ali (1996), Grimmet *et al.* (1991) and Pakshikosh (Maruti Chitampali,2002). The survey was conducted early in the morning between 7:00 am and 10:00 am.

The feeding habits of the birds were studied through direct field observations with continuous watches, through photography, using binoculars and field guides. The feeding activity of different bird species was investigated during their active times, such as early morning and afternoon. The invaluable guidance and expertise of the esteemed local bird watcher Mr. Kamade greatly enriched this study. Despite certain constraints regarding timing and proximity, efforts were made to meticulously observe and document the feeding habits of various bird species with the assistance of local resources.

Results and Discussion

Avifauna in and around any aquatic ecosystem are susceptible to changes in the environment. These are conspicuous and therefore can be easily observed for monitoring the changes taking place. (Morrison, 1986). Birds have always been fascinated for their ability to fly in air and for their beautiful color combinations. Birds play a very important role in the ecosystem as potential pollinators and scavengers as well as predators. A total of 81 different species of birds, including aquatic and nonaquatic species, were found during the present investigation in and around Moharli Lake near the TATR (Table 1 and Figure 1). The identified bird species can be categorized into five different groups according to their habitat: arboreal, terrestrial, swimming or diving birds, shore birds and birds of prey. This study revealed that 81 species of birds belong to 67 genera and 31 families of 13 different orders. Passeriformes was the dominant order represented by 37 species, followed by Ciconiformes (11) and Coraciformes (8). The bird species that were found were categorized by their status. Some of them were common residents of that area, some were migratory, some were breeding migrants, and some were local migrants. The birds, such as yellow wagtail, Rosy starling, and Ruddy shel duck, were found to be migratory at the beginning of winter. Among these, Ruddy shel duck (*Tadorna ferruginea*) was occasionally found. Only one species, the Weaver bird, was a migrant species for breeding purposes. (BM) Species such as the paddy field pipit, openbill stork, painted stork, black winged stilt and large cormorant; thus, a total of 05 species were found to be local migrants (LM). The rest of the birds were residents of the area.

Table 1: Recorded species of birds in and around Moharli Lake (TATR) along with their order, Family, occurrence, status and feeding habits during the study period

Sr no.	Common name	*Zoological name*	Family	Status	Occurrence	Feeding habit
Group A : Arboreal Order : Passeriformes						
1	Red munia	*Amanda awandava*	Ploceidae	R	Common	G
2	White throated Munia	*Lonchura malaborica*	Ploceidae	R	Common	G
3	Spotted Munia	*Lonchura punctulata*	Ploceidae	R	Common	G
4	Weaver bird/Baya	*Places Philippines*	Ploceidae	BM	Common	G
5	Yellow throated sparrow	*Petronia xanthocolis*	Ploceidae	R	Common	G
6	House sparrow	*Passer domesticus*	Ploceidae	R	Common	G
7	Loten's sunbird	*Nectarinia lotenia*	Nectariniidae	R	Common	N
8	Pied white wagtail	*Motacilla alba*	Motaeillidae	M	Common	I
9	Large pied wagtail	*Motacilla maderaspatensis*	Motaeillidae	R	Common	I
10	Yellow wagtail	*Motacilla flava*	Motaeillidae	M	Common	I
11	Paddy field pipit	*Anthus novaeseelandae rufulus*	Motaeillidae	LM	Common	I
12	Purple rumped sunbird	*Nectarinia zeylonica*	Nectariniidae	R	Common	N
13	Indian robbin	*Saxicoloides fulicata*	Muscicapidae	R	Common	I
14	Pied Bushchat	*Saxiola captata*	Muscicapidae	R	Common	I
15	Indian Magpie - Robbin	*Copsychus salaries*	Muscicapidae	R	Common	I
16	Ashy prinia - Ashy wren warbler	*Prinia socialis*	Muscicapidae	R	Common	I
17	Common tailer bird	*Orthotomus sutorius*	Muscicapidae	R	Common	I
18	Asian paradise fly catcher	*Terpsiphone paradisi*	Muscicapidae	R	Common	I
19	Large gray babbler	*Turdoides Malcolm*	Muscicapidae	R	Common	O

Sr no.	Common name	*Zoological name*	Family	Status	Occurrence	Feeding habit
20	Yellow eyed babbler	*Chrysomma sinense*	Muscicapidae	R	Common	O
21	Redvented Bulbul	*Pycnonotus cafer*	Pycnonotidae	R	Common	O
22	Common Iowa	*Aegithinia tipi*	Aegithinidae	R	Common	I
23	Common wood shrike	*Tephrodormis pondicerianus*	Campephagidae	R	Common	C
24	Large cuckoo shrike	*Coracina noveahollandiae*	Campephagidae	R	Common	C
25	Jungle crow	*Corvus macrorhynchos*	Corvidae	R	Common	O
26	House crow	*Corvus splendens*	Corvidae	R	Common	O
27	Indian tree pie	*Dendrocitta vagabunda*	Corvidae	R	Common	O
28	Rosy starling	*Sternus roseus*	Starnidae	M	Common	O
29	Brahmni starling	*Sternus pagodarum*	Starnidae	R	Common	O
30	Common myna	*Acridotheres trysts*	Starnidae	R	Common	O
31	Asian pied starling	*Sternus contra*	Starnidae	R	Common	O
32	Black Drogo	*Dicrurus adsimilis*	Dicruridae	R	Common	I
33	Rufousbacked shrike	*Lanius schach*	Lanidae	R	Common	C
34	Golden oriole	*Oriolus oriolus*	Oriolidae	R	Common	O
35	Blackheaded Oriole	*Oriolus xanthornus*	Oriolidae	R	Common	O
36	Wiretailed swallow	*Hirudo smithii*	Hirundinidae	R	Common	I
	Ord : Piciformes					
37	Blackshoulder woodpecker	*Chrysocolaptes festivals*	Picidae	R	Common	I
	Ord : Psittaciformes					
38	Blossomhead Parakeet	*Psittacula cyanocephala*	Pscittacidae	R	Common	F
39	Alexandrine Parakeet	*Psittacula eupatria*	Pscittacidae	R	Common	F
	Group B: Terrestrial Ord: Galliformes					

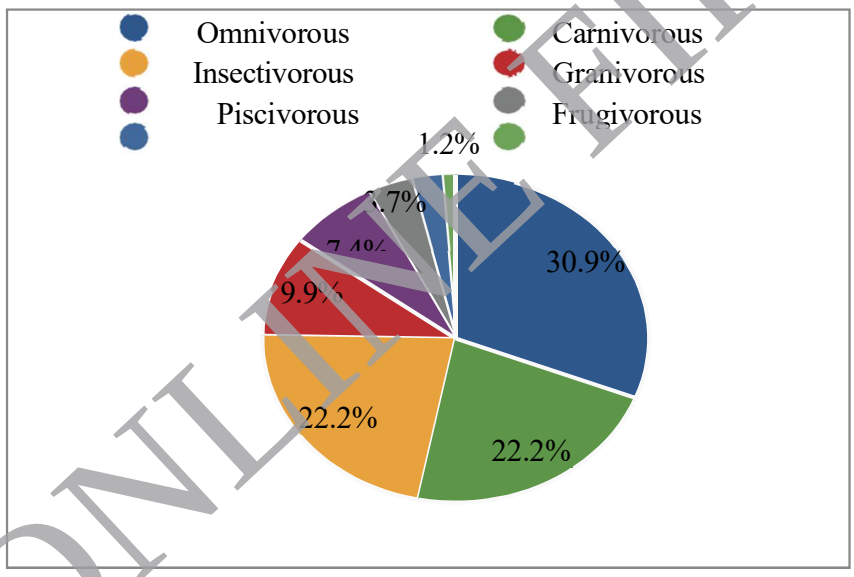
Sr no.	Common name	*Zoological name*	Family	Status	Occurrence	Feeding habit
40	Red jungle fowl	*Gallus gallus*	Phasianidae	R	Uncommon	O
41	Gray jungle fowl	*Gallus sonneratti*	Phasianidae	R	Common	O
	Ord: Cueuliformes					
42	Asian koel	*Eudynamys scolopacea*	Cuculidae	R	Common	O
43	Lesser Coucal	*Centropus sinensis*	Cuculidae	R	Common	O
	Ord: Columbiformes					
44	Spotted Dove	*Streptopelia chinensis*	Columbidae	R	Common	G
45	Little brown Dove	*Streptopelia senegalensis*	Columbidae	R	Common	G
46	Yellowfooted green pigeon	*Trenon phoenicoptera*	Columbidae	R	Common	F
	Group C: Swimming **Ord: Anseriformes**					
47	Spotbill duck	*Anas poecilorhyncha*	Anatidae	R	Common	H
48	Lesser whistling duck	*Dendrocygna javanica*	Anatidae	R	Common	O
49	Comb duck (Nakta)	*Sarkidiornis melanotos*	Anatidae	R	Common	O
50	Ruddy shel duck	*Tadorna ferruginea*	Anatidae	M	Occasional	O
	Order: Coraciformes					
51	Indian gray hornbill	*Ocyceros birostris*	Bucerotidae	R	Common	O
52	Small green bee eater	*Merops orientalis*	Meropidae	R	Common	I
53	Indian roller	*Coracias benghalensis*	Coraciidae	R	Common	I
54	Whitebreasted kingfisher	*Halcyon smyrnesis*	Alcedinidae	R	Common	P
55	Storkbilled kingfisher	*Pelargopsis capensis*	Alcedinidae	R	Occasional	P
56	Indian pied Kingfisher	*Ceryle rudis*	Alcedinidae	R	Common	P
57	Common kingfisher	*Alcedo atthis*	Alcedinidae	R	Common	P
58	Common hoopoe	*Upupa epopee*	Upupidae	R	Common	I

Sr no.	Common name	*Zoological name*	Family	Status	Occurrence	Feeding habit
	Ord: Pelecaniformes					
59	Little cormorant	*Phalacrocorax niger*	Phalacrocidae	R	Common	P
60	Large cormorant	*Phalacrocorax carbo*	Phalacrocidae	LM	Common	P
	Group D: Shorebirds Ord: Ciconiformes					
61	Openbill stork	*Aanastomus oscitans*	Ciconidae	LM	Common	C
62	Painted stork	*Mycteria leucocephala*	Ciconidae	LM	Occasional	C
63	Whitenecked stork	*Ciconia episcopus*	Ciconidae	R	Common	C
64	Chestnut Bittern	*Ixobrychus cinnamomeus*	Ardeidae	R	Occasional	C
65	Little Egret	*Egretta garzetta*	Ardeidae	R	Common	C
66	Pond Heron	*Ardeola grayii*	Ardeidae	R	Common	C
67	Purple heron	*Ardea purpurea*	Aredeidae	R	Common	C
68	Median Egret	*Egretta intermedia*	Aredeidae	R	Common	C
69	Cattle Egret	*Bubulcus ibis*	Aredeidae	R	Common	C
70	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	Jacanidae	R	Common	O
71	Bronzewinged Jacana	*Metopidius indicus*	Jacanidae	R	Common	O
	Group D: Shorebirds Ord: Charedriformes					
72	Redwattled lapwing	*Vanellus indicus*	Charadriidae	R	Common	C
73	Blackwinged stilt	*Himantopus Himantopus*	Recurcirostride	LM	Common	C
74	Little ringed plover	*Charadrius dubius*	Charadriidae	R	Common	I
	Ord : Gruiformes					
75	Whitebreasted waterhen	*Amaurornis phoenicurus*	Rallidae	R	Common	O
76	Indian moordhen	*Gallinula chloropus*	Rallidae	R	Occasional	O

77	Parple moorhen	*Porphyrio porphyrio*	Rallidae	R	Common	C
	Group E: Birds of prey Ord: Falconiformis					
78	Blackwinged kite	*Elanus caeruleus*	Accipitridae	R	Common	C
79	Pariah Kite	*Milvus migrans*	Accipitridae	R	Common	C
80	Indian shikra	*Accipiter badius*	Accipitridae	R	Common	C
81	Crested Serpent Eagle	*Spiloris chela*	Accipitridae	R	Common	C

Abbreviations: R-Residents, M-Winter migrants, LM-Local migrant, C-Carnivorous, G - Granivorous, F-Frugivorous, P- Piscivorous, I - Insectivorous, H - Herbivorous, O – Omnivorous

Figure 1: Categorization of Birds according to feeding Habits



According to their occurrence and abundance, these species were further categorized as common. uncommon, occasional and rarely found. Most of the species were found to be common. Seventy-three species out of 81 were common in this area. Red jungle fowl was the only uncommon species, whereas Alexandrine Parakeet, Ruddy shel duck, Painted stork, Chestnut Bittern, Large cormorant, Indian moorhen, Stork billed kingfisher, and a total of 7 species were occasionally found. To determine the presence of food items in and around the lakes, close observations of the feeding habits of the birds were carried out, and the birds were categorized as carnivorous, omnivorous, piscivorous, insectivorous herbivorous, frugivorous, granivorous or nectar feeders. Previous knowledge and experience with companion birdwatchers were also taken into consideration regarding feeding habits. Among the total 81 species detected, a maximum of 25 (30.99%) species were omnivorous, carnivorous or insectivorous, with 18 (22.2%) each. Granivorous (8 species; 9.9%), piscivorous 06 (7.4%), frugivorous 03 (3.7%), nectar feeder 02 (2.5%) and herbivorous only 01 (1.2%). (Refer to the pie graph). The most bird species were recorded during the early monsoon season and late winter as well as during spring.

Upadhyay *et al.* (2019) noted the feeding activity of 56 bird species on the Sophia Girls College Campus, Ajmer. Choudhari *et al.* (2020) recorded 191 bird species from southern Nagaur, Rajasthan, 77 of which were insectivores, 45 were carnivores, 24 were granivores, 23 were omnivores, 11 were herbivores, 10 were frugivores and one was a nectivore. In the present investigation, birds such as Large gray babbler, Red vented Bulbul, Indian tree pie, Jungle and House crow, Myna, Asian koel, and Jungle fowl were recorded as nonaquatic omnivorous birds because they feed on fruits, grains, shoots and small invertebrates. Purple Moorhen, White-breasted moorhen, Indian Moorhen, Jacana, Ruddy shel duck, Comb duck, and Lesser Whistling duck are aquatic omnivorous birds that feed upon grass, weeds, the shoots of aquatic plants, insects, mollusks and worms. The insectivorous birds found in the present investigation were yellow wagtail, white wagtail, paddy field pipit, robbin, pied bushchat, commonora, Ashy wren warbler, Asian flycatcher, black Drongo, wire tailed swallow, and woodpecker. Their diet included aquatic insects such as water beetles, locusts, flies, crickets, water skaters, water bugs, grasshoppers, etc. The aquatic carnivorous birds recorded were mostly from the order Ciconiformes, such as the Openbill Stork, Painted Stork, Little Egret, Median Egret, Pond Heron and Purple Herron, which feed upon aquatic insects and their larvae, mollusks, crustaceans, tadpoles, small froglets, etc. Birds such as Cattle Egret, Red Wattled Lapwing, Shikra, Kite, Shrike, and Serpent Eagle were found to feed on insects, crabs, frogs, snakes, rodents, etc. These birds were categorized as nonaquatic carnivo rous birds. The lake is dominated by fishes such as *Channa* species and carps such as *Labeo rohita, Cirrhina mrigala, Catla catla* and other species. Their fries, fingerlings and small fishes were found to be consumed by kingfisher species, little cormorant and large cormorant, which are therefore considered piscivorous. Some birds, such as Red Munia, Spotted Munia, Weaver bird, Sparrow, Spotted dove, and Little Brown Dove, were recorded to feed upon grass seeds and grains. These were classified as granivorous, blossom-headed parakeet, Alexandrine parakeet and green pigeon and were recorded as frugivorous, i.e., feeding on a variety of fruits available in nearby forests. The nectar feeder species recorded were Loten's sunbird and purple rumped Sunbird. Spotbill duck was the only herbivorous species. Yahya (1988), Patel *et al*. (1992), Salim Javed (1996), and Sivaperuman Jayson (2002) reported similar observations regarding the feeding behaviors of birds. Kedar and Patil (2005) identified 60 bird species in Rishi Lake, Karanjalad, and Maharashtra. Additionally, Kulkarni *et al*. (2006) documented 93 bird species at the Shikhachi Wadi Reservoir in Nanded District, Maharashtra. Furthermore, Kukade *et al*. (2011) reported 68 bird species at Chhatri Lake in Amravati District, Maharashtra. It is advisable to incorporate more recent references, as the current ones are dated. Chilke (2012) studied avian diversity in and around Bamanwada Lake of Rajura in the Chandrapur district. Shende and Patil (2017) reported 190 species of birds from the Gorewada International Biopark Nagpur. Deshmukh and Rudey (2019) studied the avifauna of Dev talav near Nagbhid in the Chandrapur District and recorded 105 bird species.

Conclusion

The avifaunal diversity of Moharli Lake signifies favorable environmental conditions both within and around the lake, which support a variety of resident and migratory bird species. The presence of diverse aquatic and terrestrial birds that exhibit adaptability in their feeding habitats was noted. This study area demonstrates significant avifaunal diversity, which is essential for establishing foundational bird data within the Moharli region of the Tadoba Andhari Tiger Reserve (TATR). It is imperative to conserve this site effectively to facilitate future studies and maintain the ecological richness of the TATR area.

Acknowledgment

The author is very thankful to Shri. Prakash Kamde, well-known bird watcher and President, SARD NGO for his kind support and guidance as well as postgraduate students in the Zoology Department for helping with the field work. We are also thankful to the Principal, Sardar Patel College, Chandrapur.

Conflict of interest

The authors declare that they have no conflicts of interest.

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