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Research Article

Seasonal Population Trends Of Aquatic Avifauna In Tekanpur Lake, Gwalior(M.P.).

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Abstract

Birds are highly conspicuous species of the environmental ecosystem. Birds can control the pest and uphold the diversity of other organisms also they are the effective bioindicators of physiochemical properties of water. Present study was carried out from July- 2023 to June-2024. To assess bird diversity, the point-count and line transect methods was used but opportunistic spotting was also included. A total of 47 avian species belongs to 37 genera, 12 families and 8 orders were recorded. Anseriformes order was most dominant with 15 species followed by other order. Family Anatidae was the most dominant, representing 15 species of the total species recorded. Among the reported species 12 were residential while 23 were migrant and 12 species are residential migrants. The rich avifaunal diversity of the Tekanpur Lake confirms it as a suitable habitat for both residential and migrant bird species. Hence, the present study helps to assess the diversity and present status of aquatic avifauna in Tekanpur lake for conservation and management of the lake.

Keywords: Aquatic Avifauna, Diversity, Distribution, Abundance, Tekanpur Lake

INTRODUCTION

Birds are essential animal group of an ecosystem and maintain the trophic level. They play a functional role in the ecosystem as potential pollinators and scavengers, and are rightly called as bioindicators (Prui and Virani, 2016).Birds have a swift metabolism and also, they are important for the turnover of substance and energy in communities. Aquatic birds may impact the eutrophication of reservoirs positively or negatively. If they feed inside the water but excrete on land, they postponed the process of eutrophication. On the other hand, if they feed on land and excrete into the water, they accelerate the eutrophication. The effect of common waterbirds like cormorants, egrets, herons and some species of duck manage the intake and excrete of nitrogen and phosphorous in water body. Water birds also known as aquatic avifauna, encompasses a wide range of species adapted to life in and around the water bodies (Rajasekhara and Venkatesha, 2011).

The abundance of avifauna indicates the healthy status of lakes owing the availability of water, safe habitat and food sources for both adults and nestlings, and essential nesting/ roosting sites in and around the lakes are important for the occurrence and abundance of aquatic bird populations (Joshi, 2012). Through research focused on water birds in the Gwalior Tekanpur region, researcher have the chance to explorethe various aspects of ecology of birds andtheir conservation. By understanding the ecological requirements and conservation challenges faced by these birds, researchers can contribute to the sustainable management water habitats, ensuring the continualexistence of these birds for future generations to appreciate and cherish the beauty of nature.

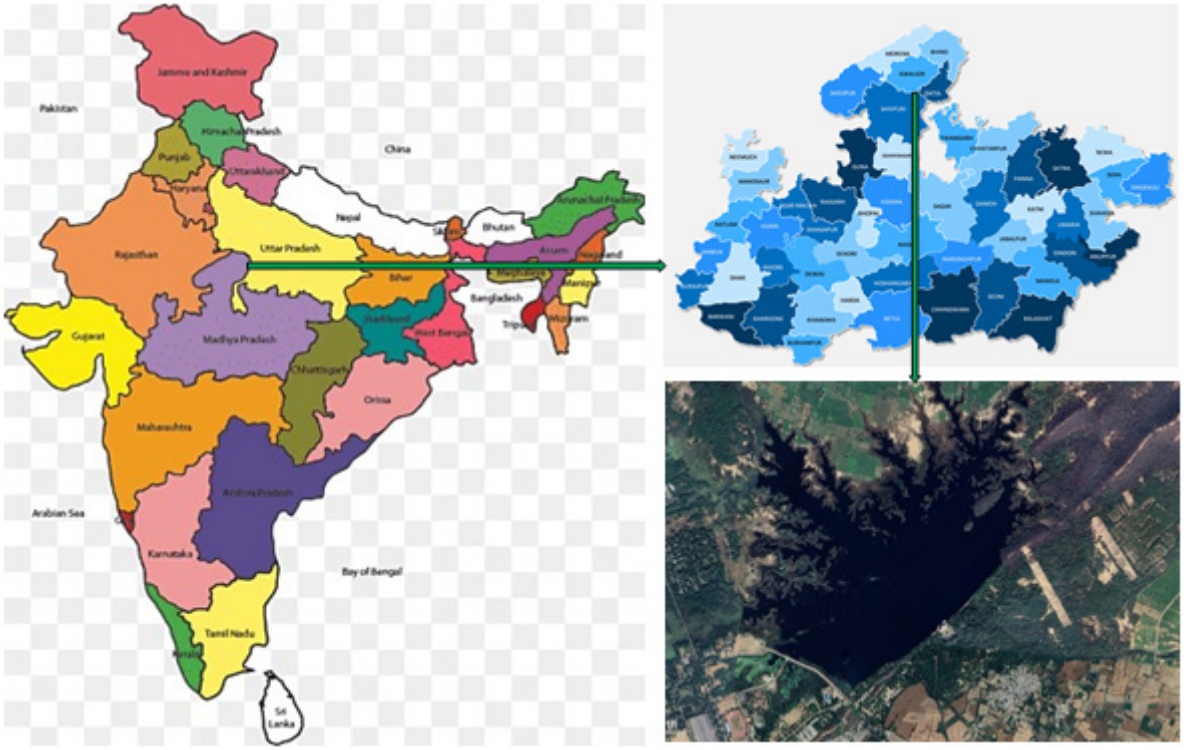
Study Area

Tekanpur, nestled in the district of Gwalior in Madhya Pradesh, India, represents the perfect blend of historical charm and natural splendour. Tekanpur is renowned for its crown jewel, Tekanpur lake, a peaceful oasis that aids as a paradise for aquatic avifauna. Tekanpur lake is a witness of the basic connection between humanity and the natural world. The study area is located to the southern site 26 km away from Gwalior city between26° 0'4.49"N latitude and 78°17'21.37"E longitude (**Fig. 1**). The lake area experiences a hot semi-arid climate, with temperatures ranging from 14°C

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to 34°C throughout the year. Occasionally, temperatures can drop to 3°C or soar to as high as 47°C. Receiving an annual rainfall of 600-700 mm, the lake experiences a decline in water levels post-monsoon, with most water either percolating into the groundwater table or evaporating.Among these, water birds play a crucial role, both ecologically and culturally, making them a fascinating subject for research and exploration.

Figure 1. Study area of research work



METHODOLOGY

The survey was carried out during dusk and dawn times, from 6:30 am to 10:00 am in the morning and 4:00 pm to 6:30 pm in the evening. Point count and line transect methods were followed for quantitate data collection and bird species observation. Binocular (Nikon – 10X40) and Nikon DSLR (D-7200) camera were used for observation and identification of bird species and Photographic evidences of avifauna respectively. Direct count methods were adopted from Bibbey et al., (2000) and Javad and Kaul (2002) for recording and analysis. Birds were identified by field guide book (Grimmett et al., 2011) and experienced resource person.

RESULT AND DISCUSSION

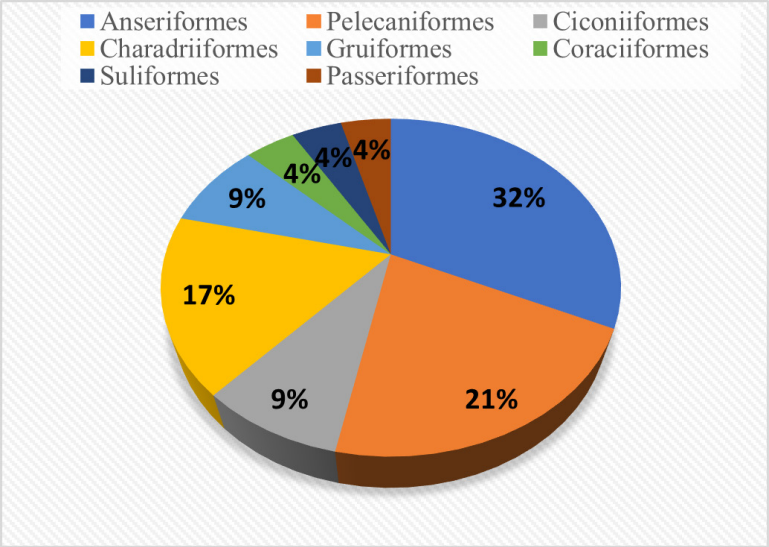
The Tekanpur lake observations expose a rich diversity of avian species inhabiting the lake. Compilation of identified birds, featuring their family, common name, scientific name, IUCN status and common status (**Table 1**). A total of 47 aquatic bird species belonging to 8 orders and 12 families were observed during the study period. Chilke (2012) observed total of 58 species of birds belonging to 9 orders and 29 families from Bamanwada Lake of Rajura and its surrounded area, district Chandrapur, Maharashtra. Vyas et al., (2010) while working on Upper Lake, Bhopal, recorded 43 species, belonging to 14 families and 8 orders with family Anatidae as the most dominant family represented by ten species, followed by family Ardeidae represented by 8 species.

Table 1. Checklist of recorded species with taxonomic position in Jiwaji University.

S. No.	Order	Family	Scientific Name	Common Name	IUCN Status	Residential Status
1	Anseriformes	Anatidae	Mareca strepera	Gadwal	LC	M
2			Netta rufina	Red Crested Pochard	LC	M
3			Nettapuscoromandelianus	Cotton Pygmy Goose	LC	M
4			Aythya farina	Common Pochard	VU	M
5			Aythya fuligula	Tufted Duck	LC	M
6			Anas acuta	Northern Pintail	LC	M
7			Anas poecilorhyncha	Indian Spot-billed Duck	LC	M
8			Sarkidiornis melanotos	knob-billed duck	LC	M
9			Anas crecca	Common teal	LC	M
10			Anseranser	Greylag Goose	LC	M
11			Dendrocygna javanica	Lesser Whistling-duck	LC	M
12			Tadornaferruginea	Ruddy Shelduck	LC	M
13			Anser indicus	Bar-headed Goose	LC	M
14			Tadornatadorna	Common Shelduck	LC	M
15			Anas platyrhynchos	Mallard	LC	M
16	Pelecaniformes	Threskiornithidae	Pseudibispapillosa	Red naped ibis	LC	M
17			Platalealeucorodia	Eurasian spoonbill	LC	M
18			Ardea intermedia	Intermediate Egret	LC	RM
19			Egretta garzetta	Little Egret	LC	RM
20			Bubulcus ibis	Cattle Egret	LC	R
21			Ardea purpurea	Purple Heron	LC	RM
22			Ardeolagrayii	Indian Pond-Heron	LC	R
23			Nycticoraxnycticorax	Black crowned night Heron	LC	M
24		Ardeidae	Ardea cinerea	Grey Heron	LC	RM
25			Ardea alba	Great White Egret	LC	RM
26	Ciconiidae	Ciconiiformes	Ephippiorhynchus asiaticus	Black Necked Stork	NT	M
27			Mycteria leucocephala	Painted Stork	NT	M
28			Anastomusoscitans	Asian Openbill	LC	M
29			Ciconia episcopus	Woolly-necked stork	VC	M
30	Charadriiformes	Scolopacidae	Tringaochropus	Green Sandpiper	LC	RM
31			Tringza tetanus	Common Redshank	LC	RM
32			Actitis hypoleucos	Common Sandpiper	LC	RM
33			Calidris minuta	Little Stint	LC	RM
34		Jacanidae	Hydrophasianuschirurgus	Pheasant-tailed Jacana	LC	RM
35			Metopidius indicus	Bronzewinged Jacana	LC	RM
36		Charadriidae	Vanellus indicus	Red-wattled Lapwing	LC	R
37		Recurvirostridae	Himantopus Himantopus	Black-winged Stilt	LC	RM
38	Gruiformes	Rallidae	Fulicaatra	Common coot	LC	RM
39			Amaurornisphoenicurus	White-breasted Waterhen	LC	R
40			Porphyrioporphyrio	Purple swamphen	LC	RM
41			Gallinula chloropus	Common Moorhen	LC	RM
42	Coraciiformes	Alcedinidae	Halcyon smyrnensis	White-breasted Kingfisher	LC	R
43			Alcedo atthis	Common Kingfisher	LC	R
44	Suliformes	Phalacrocoracidae	Microcarboniger	Little cormorant	LC	RM
45			Phalacrocorax carbo	Great Cormorant	LC	RM
46	Passeriformes	Motacillidae	Motacillaalba	White Wagtail	LC	R
47			Motacilla cinerea	Grey wagtail	LC	R

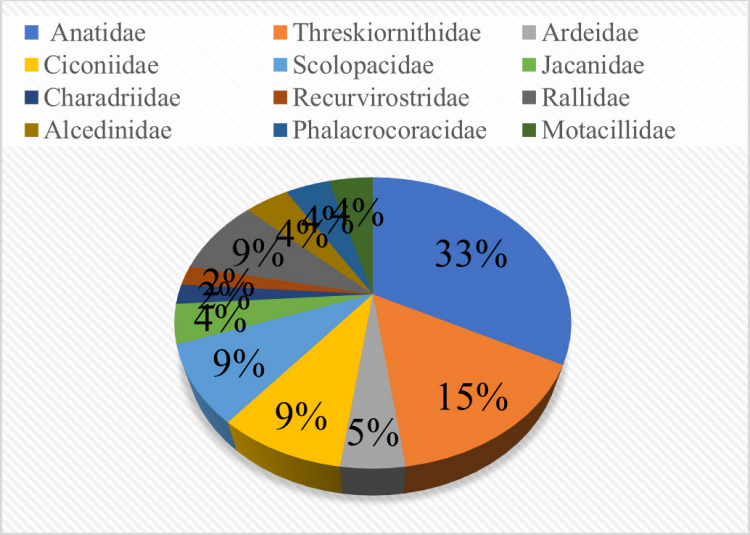
Orders Anserifomres 15 (31.91), Pelecaniformes 10 (21.28), Ciconiifromes 4 (8.51), Charadriiformes 8 (17.02), Gruiformes 4 (8.51), Coraciiformes 2 (4.26), Suliformes 2 (4.26) and Passeriformes 2 (4.26) (**Fig. 2**). Apsara and Kavya (2024) observed order passeriformes (37 species) dominated the avifauna followed by Pelecaniformes (12 species), Accipitriformes, Coraciformes, Columbiformes, Gruiformes (4 species each), Cuculiformes, Piciformes, Suliformes (3 species each), Anseriformes, Charadriformes, Ciconiformes (2 species each), Bucerotiformes, Galliformes, Podicipediformes, Psittacciformes, Strigiformes (1 species each) in KukkarahalliLake.Patilet al.,(2018)reported 134 species of birds belonging to 16 ordersfromAjanti Dam area of Hinganghat (Wardha), Central India.

Figure 2. Order wise species composition.



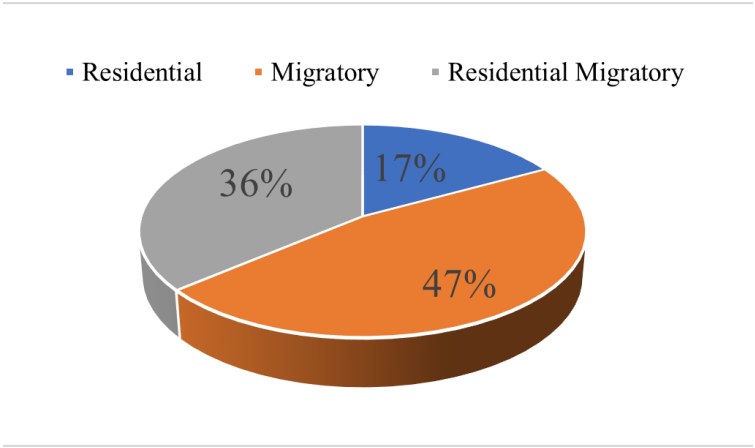
Family Anatidae 15 (31.91), Threskiornithidae 8 (17.02), Ardeidae 2 (4.26), Ciconiidae 4 (8.51), Scolopacidae 4 (8.51), Jacanidae 2 (4.26), Charadriidae 1 (2.13), Recurvirostridae 1 (2.13), Rallidae 4 (8.51), Alcedinidae 2 (4.26), Phalacrocoracidae 2 (4.26), Motacillidae 2 (4.26) (**Fig. 3**). Vala et al., (2020) reported Scolopacidae family represents the higher number of species (13) followed by Ardeidae (08) and Anatidae (07). Family Laridae had the highest individuals (5535) recorded in the study area during the study period in Jamnagar Gujarat. Lahariya and Mahor (2024) worked on anthropogenic impact on aquatic avifaunal study in Bhoj Wetland, Bhopal and recorded families Anatidae were the most dominated with 12 species followed by Ardeidae 8 species, Scolopacidae 6 species, Rallidae and Ciconiidae each 4 species, Threskiornithidae and Alcedinidae each 3 species, Laridae, Charadriidae, Jacanidae, Gruidae, Phalacrocoracidae, Motacillidae each 2 species, Rostratulidae, Recurvirostridae, Burhinidae, Glareolidae 1 species.

Figure 3. Family wise species composition.



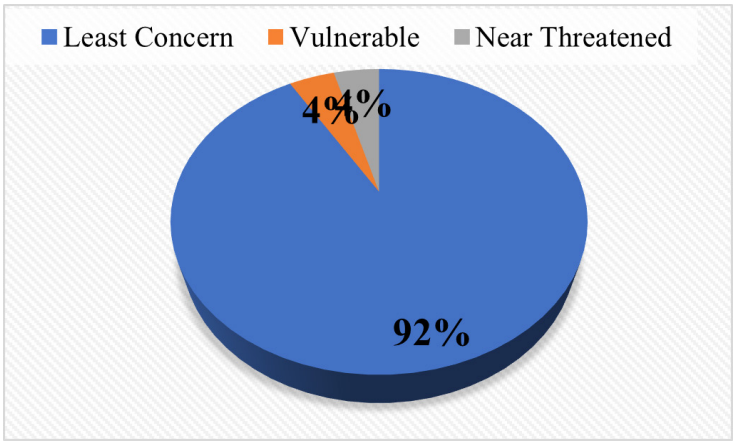
Their IUCN status was observed as per IUCN threatened species among them out of total recorded species 43 least concern, 2 species near threatened and 2 species vulnerable were recorded (**Fig. 4**). Gajraj and Kohli (2024) studyon avian fauna in Barkheda lake Jaipur revelled IUCN status of recorded species among them 1 species was found as near threatened while rest 20 species were found least concerned. The IUCN status "Least concern" indicates that these species are currently not considered to be at significant risk of extinction.

Figure 4. IUCN status of recorded species.



Local status of bird was also analysed through the seasonal study out of total 47 species, 17 species were residential migratory with 36%, 8 species were residential with 17% and 22 species were migratory with 47% (**Fig. 5**). Mukherji and Mukherji (2016) documented 38 resident species and 33 migratory species in Khodiyar wetland of Gujarat state. Out of eighty-six species, 56 species were residents (65%), 23 species were winter visitors (27%), 02 species were summer visitors (2%) and 05 species were passage visitors (6%) recorded during the study of avifaunal diversity from Khairbandha Lake in Gondia District, Maharashtra State, India (Puri and Virani, 2016).

Figure 5. Residential status of recorded species.



The seasonal abundance data provided insight into the dynamic fluctuation in birds population throughout the year. The residential birds are observed in almost all the months of study period but the migratory birds were observed mostly in the winter season. Winter season witnessed the highest (661) total count of water birds in winter season followed by summer season 227 and rainy season 195 (**Table 2**). Conversely, the summer season recorded comparatively lower numbers of water birds, indicative of potential migration to cooler regions or alterations in local habitat conditions(Narayanan and Latha, 2024). Interestingly some species such as egrets displayed higher counts during the summer months suggesting specific breeding or foraging during this period (Ali et al., 2024). These observations suggest a healthy ecosystem supporting both local and seasonal bird populations.

Table 2. Seasonal abundance of aquatic avifauna.

S. No.	Common Name	Rainy season	Winter season	Summer season
1	Gadwall	0	16	0
2	Red Crested Pochard	0	59	0
3	Cotton Pygmy Goose	0	4	0
4	Common Pochard	0	33	0
5	Tufted Duck	0	7	0
6	Northern Pintail	0	42	0
7	Indian Spot-billed Duck	6	18	0
8	knob-billed duck	6	8	0
9	Common teal	0	14	0
10	Greylag Goose	0	12	0
11	Lesser Whistling-duck	24	67	26
12	Ruddy Shelduck	2	4	0
13	Bar-headed Goose	0	8	0
14	Common Shelduck	0	6	0
15	Mallard	0	11	0
16	Red naped ibis	2	6	0
17	Eurasian spoonbill	0	12	0
18	Intermediate Egret	9	19	14
19	Little Egret	13	27	18
20	Cattle Egret	23	39	28
21	Purple Heron	1	2	2
22	Indian Pond-Heron	9	6	4
23	Black crowned night Heron	0	1	1
24	Grey Heron	7	3	2
25	Great White Egret	0	5	0
26	Black Necked Stork	0	2	0
27	Painted Stork	2	12	5
28	Asian Openbill	5	7	13
29	Woolly-necked stork	3	13	4
30	Green Sandpiper	2	8	5
31	Common Redshank	0	2	0
32	Common Sandpiper	4	6	3
33	Little Stint	0	3	0
34	Pheasant-tailed Jacana	3	5	4
35	Bronze-winged Jacana	2	11	5
36	Red-wattled Lapwing	9	13	17
37	Black-winged Stilt	21	27	12
38	Common coot	0	49	14
39	White-breasted Waterhen	6	4	3
40	Purple swamphen	3	5	9
41	Common Moorhen	4	8	6
42	White-breasted Kingfisher	3	2	1
43	Common Kingfisher	1	0	0
44	Little cormorant	18	31	24
45	Great Cormorant	0	11	0
46	White Wagtail	3	6	2
47	Grey wagtail	4	7	5
Total		195	661	227

The rainy season presented a wide-ranging distribution of bird species, with fluctuations observed in different taxa (Deomurari, et al., 2023). While some species maintained consistent numbers across seasons, others exhibited notable increases or decreases, highlighting the complex interaction between environmental factors and avian population dynamics (Shah, et al., 2023). Population of migratory birds dominated at the lake in winter, because the weather of northern hemisphere is not appropriate to these birds during winter, especially in getting food, shelter and better breeding ground (Dolatsanget al., 2020). Monitoring efforts could provide valuable insights into population trends, habitat preferences, and conservation priorities for maintaining the lake's ecological integrity and avian diversity (Lloyd, 2023).

CONCLUSION

The water birds of Tekanpur Lake, in India represent a diverse and ecologically important community, contributing to the local biodiversity and ecosystem health. Through research, it's an evident that the lake serves as a crucial habitat for various avian species highlighting the importance of its conservation and management. Further studies could research into specific aspects such as migration patterns, population dynamics and the impact of environmental factors on bird populations to enhance our understanding and inform conservation efforts.

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