



A study of residential status of aquatic avian diversity of Harsi reservoir, Gwalior district, Madhya Pradesh, India

Kirar Jitendra Singh and Sharma Dushyant Kumar*

Department of Zoology,
SMS Govt. Model Science College, Gwalior, Madhya Pradesh (INDIA)

E-mail: jeetsinghkirar99@gmail.com

*dushyant3268@gmail.com

Abstract

A study was conducted in Harsi Reservoir, Gwalior District, Madhya Pradesh, India from October 2022 to September 2023 to study the impact of seasonal variations on aquatic avian diversity. A total of 91 aquatic bird species, belonging to 11 orders and 28 families were recorded and identified. The maximum aquatic bird species were recorded in the winter season while minimum in the rainy season. The status of the aquatic birds was categorized as residential (R), Local movements (LM), summer migrant (SM) and winter migrants (WM). Out of 91 species, 24 species were resident, 11 species were local movements, 51 species winter migratory and 05 species summer migratory. Charadriiformes was the most dominant order, represented by 27 species. This study will help to prepare a seasonal checklist of aquatic avian species of the reservoir.

Keywords: Avian diversity, Harsi Reservoir, Gwalior, Summer migrant, Winter migrant.

Introduction

Aquatic avian community is most important component of a dynamic ecosystem. Avifaunal are homeothermic or warm-blooded egg-laying vertebrates characterized by the presence of feathers and modification of forelimbs as wings for flight (Verma and Prakash, 2020). Aves might live on this planet even if there were no human beings, but human beings cannot live without the aves. Avifauna are an integral part of the whole system of life on this planet (Ali and Futehally,

2008). Recently, aquatic avians have become of interest as indicators of wetland quality and as parameters of restoration success and regional biodiversity (Kumar and Gupta, 2009). There are about 1314 species from the Indian subcontinent out of which 450 species are determined from central India (Raju and Ramachandran, 2016). Bird diversity plays a major role in maintaining the ecological balance of the ecosystem. Avifauna are most important part of the food chain and food web. Many avians migrate due to change in season. Avifauna are perhaps great indicator of

changes in weather. Therefore, the present study was conducted in Harsi reservoir, Gwalior district to focus not only on preparing the checklist of Avians, but also to find out their occurrence, status as well as to create human being awareness for their conservation.

Materials and Methods

The study area, Harsi reservoir has been constructed on Parwati river, situated near Harsi village in Dabra Tehsil, Gwalior District, Madhya Pradesh (fig.1). Reservoir is situated about 100 km from Gwalior district. It was built over the Parwati River during 1928 to 1935. Harsi reservoir is covered by hills and small hillock by its three sides. It is a composite earthen dam,

located at latitude 25°57'59" North and longitude 77°58'00" East. The reservoir attracts migratory avifauna.

The sampling was done from 6:00 am to 11.30 am in the morning and from 4: 00 pm to 6: 00 pm in the evening which varied according to the season. The study was carried out by using (1) Point Count Method (Javed and Kaul, 2002) and (2)The Line Transect Method. Photographs were taken using digital camera (Nikon D-5300) for identification and documentation while Olympus binocular was used for visual count. All seen aquatic avian species were noted down and identified with the help of field guide books (Grimmett et al., 1999 and Ali, 2006).

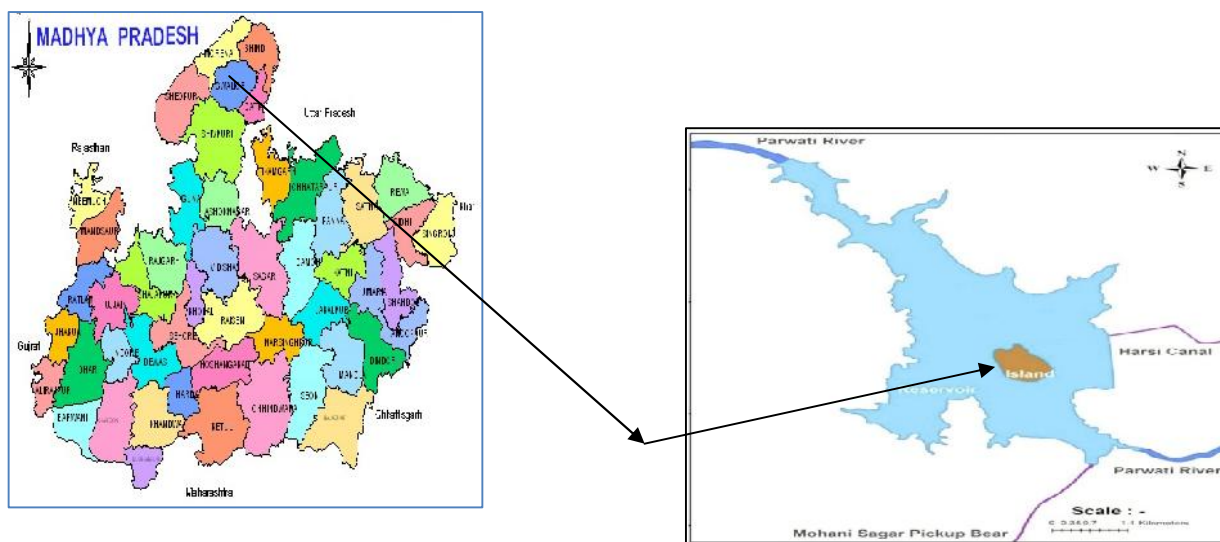


Fig.1:- Map showing of study area Harsi Reservoir

Results and Discussion

A total of 91 aquatic bird species, belonging to 11 orders and 28 families were observed and identified from study sites. The observed aquatic avian species have been enlisted in tables (1) and (2). Seasonal abundance and percentage of aquatic avian species during different seasons of Harsi Reservoir, Gwalior District (M.P.) have been shown in figures 1 and 2 respectively. The results showed that the distribution of aquatic avian was highly influenced by disturbance variables. The maximum aquatic avian species

were noted in the winter season while minimum in the rainy season. Seasonal abundance of avifaunal species was reported in three different seasons (winter, summer and rainy). A maximum of 87 species were recorded in winter season, followed by 86 in summer season and 56 species during rainy season respectively. Earlier, more or less similar findings were found by Deka and Nath (2013) from Chandubi tectonic lake, Assam. The residential status of the aquatic avifauna was categorized as residential (R), winter migrants

(WM), local movement (LM) and summer migrant (SM). Out of 91 species, 24 species were resident, 51 species were winter migratory, 11 local movement and 05 species were summer migratory. Charadriiformes was the most dominant order, represented by 27 species, followed by Passeriformes (17 species), Pelecaniformes (14 species), Anseriformes (12 species), Coraciiformes (06 species), Gruiformes (05 species), Suliformes (04 species), Ciconiiformes (03 species). There were three orders, described by single species viz. Podicipediformes, Cuculiformes and Phoenicopteridae.

Chopra et al., (2017) recorded 67 species as resident, 32 as winter migrant species and 5 species as summer migrants in Bhindawas bird sanctuary. Muralikrishna et al., (2017) in Kondagai Village, Sivaganga District, South India recorded 17 bird species as resident, 11 species as local migrant and 3 species as migrant. A total of 51 species of aquatic birds, belonging to 37 genera and 18 families were recorded at Aji-1 fresh water reservoir, Rajkot, Gujarat by Dolatsang and Trivedi (2018). Pant et al. (2020) found a total of 171 bird species in the river Narmada Basin in Jabalpur District of Madhya Pradesh. Out of 171 avian species, 02 were summer migrants (SM) and 41 were winter migratory 09 (WM). Sharma and Sharma (2021) reported 73 species, 47 species were winter migrant and 26 species were resident at Sakhya Sagar and Madhav lakes and its surrounding areas of Madhav National Park, Shivpuri, M.P., India. Siva and Neelananarayanan (2021) identified 102 bird species, 84 species were resident (R) and 18 were winter migrant (WM) at Thinnanur Lake in Tiruchirappalli District, Tamil Nadu. Shakya et al., (2021)

identified a total of 48 avian species in the winter season, while 43 avian species in the summer season and 35 avian species during the rainy season in Ramakrishna Ashram, Gwalior, M. P., India. Malay et al., (2022) made a comparative study of avian diversity at three selected sites of Porbandar, Gujarat and documented 199 species of avians belonging to 22 orders and 55 families. Out of the total 199 species, 109 species were winter migrants, two species were monsoon migrants, 01 avian species each were passage migrant and summer migrants respectively and 86 species were residents. Patel and Bagada (2022) documented avian species richness report of Juagadh, Gujarat, India and reported that 302 avian species belonging to 21 orders and 72 families. Among these 302 species, 97 were Widespread Resident (WR), 56 were Resident (R), 134 were Winter Migrant (WM), 11 were Monsoon Migrant (MM) and 05 were Passage Migrant (PM). Umrigar and Dholakia (2022) documented aquatic avifaunal diversity of Gavier Lake, District Surat Gujarat, India and found 57 bird species belonging to 08 orders and 15 families. Among these 57 species, 26 species were residential, 10 were residential migrant, 21 species were migrant. Adhurya et al., (2023) studied avian diversity in Durgapur Government College Campus, West Bengal, India and documented 106 avian species belonging to 47 families. Among these 106 species, 23 were winter migrants (WM), 04 were summer migrants (SM), 01 was passage migrant (PM), 01 was vagrant and 77 were residents (R). Winter season supported the highest avian species richness while maximum avian density was reported in the month of March.

Table 1:- Aquatic avian diversity observed during different seasons at Harsi Reservoir, Gwalior district, Madhya Pradesh from October 2022 to September 2023.

S.No.	Common name	Scientific name	Winter	Summer	Rainy
1.	Black-headed ibis	<i>Threskiornis melanocephalus</i>	P	P	P
2.	Eurasian spoonbill	<i>Platalea leucorodia</i>	P	P	P
3.	Red-naped ibis	<i>Pseudibis papillosa</i>	P	P	A
4.	Glossy ibis	<i>Plegadis falcinellus</i>	P	P	P
5.	Cattle egret	<i>Bubulcus ibis</i>	P	P	P
6.	Eastern great egret	<i>Ardea alba modesta</i>	P	P	P
7.	Intermediate egret	<i>Ardea intermedia</i>	P	P	P
8.	Little egret	<i>Egretta garzetta</i>	P	P	P
9.	Indian pond heron	<i>Ardeola grayii</i>	P	P	P
10.	Black-crowned night heron	<i>Nycticorax nycticorax</i>	A	P	P
11.	Purple heron	<i>Ardea purpurea</i>	P	P	A
12.	Great egret	<i>Ardea alba</i>	P	P	P
13.	Grey heron	<i>Ardea cinerea</i>	P	P	A
14.	Striated heron	<i>Butorides striata</i>	P	P	A
15.	Little grebe	<i>Tachybaptus ruficollis</i>	P	P	P
16.	Little cormorant	<i>Microcarbo niger</i>	P	P	P
17.	Indian cormorant	<i>Phalacrocorax fuscicollis</i>	P	P	P
18.	Great cormorant	<i>Phalacrocorax carbo</i>	P	P	A
19.	Oriental darter	<i>Anhinga melanogaster</i>	P	P	P
20.	White-breasted waterhen	<i>Amaurornis phoenicurus</i>	P	P	P
21.	Purple swamphen	<i>Porphyrio porphyrio</i>	P	P	P
22.	Common moorhen	<i>Gallinula chloropus</i>	P	P	P
23.	Eurasian coot	<i>Fulica atra</i>	P	P	A
24.	Sarus crane	<i>Grus antigone</i>	P	P	P
25.	White-breasted kingfisher	<i>Halcyon smyrnensis</i>	P	P	P

26.	Pied kingfisher	<i>Ceryle rudis</i>	P	P	P
27.	Common kingfisher	<i>Alcedo atthis</i>	P	A	P
28.	Indian roller	<i>Coracias benghalensis</i>	P	P	P
29.	Asian green bee-eater	<i>Merops orientalis</i>	P	P	P
30.	Blue-tailed bee-eater	<i>Merops philippinus</i>	A	P	P
31.	Asian openbill	<i>Anastomus oscitans</i>	P	P	P
32.	Painted stork	<i>Mycteria leucocephala</i>	P	P	A
33.	Woolly-necked stork	<i>Ciconia episcopus</i>	P	P	A
34.	Bronze-winged jacana	<i>Metopidius indicus</i>	P	P	P
35.	Pheasant-tailed jacana	<i>Hydrophasianus chirurgus</i>	A	P	P
36.	Marsh sandpiper	<i>Tringa stagnatilis</i>	P	P	P
37.	Common sandpiper	<i>Actitis hypoleucos</i>	P	P	P
38.	Green sandpiper	<i>Tringa ochropus</i>	P	P	P
39.	Wood sandpiper	<i>Tringa glareola</i>	P	P	A
40.	Temminck's stint	<i>Calidris temminckii</i>	P	P	A
41.	Ruff (bird)	<i>Calidris pugnax</i>	P	A	A
42.	Common redshank	<i>Tringa tetanus</i>	P	P	A
43.	Red-necked stint	<i>Calidris ruficollis</i>	P	P	A
44.	Common greenshank	<i>Tringa nebularia</i>	P	P	P
45.	Spotted redshank	<i>Tringa erythropus</i>	P	P	A
46.	Little stint	<i>Calidris minuta</i>	P	P	A
47.	Sanderling	<i>Calidris alba</i>	P	P	A
48.	Dunlin	<i>Calidris alpina</i>	P	P	A
49.	Little ringed plover	<i>Charadrius dubius</i>	P	P	P
50.	Yellow-wattled lapwing	<i>Vanellus malabaricus</i>	P	P	P

51.	Red-wattled lapwing	<i>Vanellus indicus</i>	P	P	P
52.	River lapwing	<i>Vanellus duvaucelii</i>	P	P	P
53.	Black-winged stilt	<i>Himantopus himantopus</i>	P	P	P
54.	Greater painted-snipe	<i>Rostratula benghalensis</i>	P	P	P
55.	River tern	<i>Sterna aurantia</i>	P	P	P
56.	Common tern	<i>Sterna hirundo</i>	P	P	P
57.	Black-headed gull	<i>Chroicocephalus ridibundus</i>	P	P	A
68.	Indian skimmer	<i>Rynchops albicollis</i>	P	P	P
59.	Great stone-curlew	<i>Esacus recurvirostris</i>	P	P	A
60.	Indian stone-curlew	<i>Burhinus indicus</i>	P	A	A
61.	White-browed wagtail	<i>Motacilla maderaspatensis</i>	P	P	P
62.	White wagtail	<i>Motacilla alba</i>	P	P	A
63.	Western yellow wagtail	<i>Motacilla flava</i>	P	A	A
64.	Citrine wagtail	<i>Motacilla citreola</i>	P	A	A
65.	Wire-tailed swallow	<i>Hirundo smithii</i>	P	P	P
66.	Barn swallow	<i>Hirundo rustica</i>	P	P	A
67.	Streak-throated swallow	<i>Petrochelidon luvicola</i>	A	P	P
68.	Brown-throated martin	<i>Riparia paludicola</i>	P	P	P
69.	Black-breasted weaver	<i>Ploceus benghalensis</i>	P	P	P
70.	Indian pied myna	<i>Gracupica contra</i>	P	P	P
71.	Bank myna	<i>Acridotheres ginginianus</i>	P	P	P
72.	Common myna	<i>Acridotheres tristis</i>	P	P	P
73.	Rosy starling	<i>Pastor roseus</i>	P	P	A
74.	Ashy prinia	<i>Prinia socialis</i>	P	P	P
75.	Plain prinia	<i>Prinia inornate</i>	P	P	P

76.	Purple sunbird	<i>Cinnyris asiaticus</i>	P	P	P
77.	Oriental magpie-robin	<i>Copsychus saularis</i>	P	P	P
78.	Greater coucal	<i>Centropus sinensis</i>	P	P	P
79.	Knob-billed duck	<i>Sarkidiornis melanotos</i>	P	P	P
80.	Lesser whistling duck	<i>Dendrocygna javanica</i>	P	P	P
81.	Domestic goose	<i>Anser anser domesticus</i>	P	P	P
82.	Ruddy shelduck	<i>Tadorna ferruginea</i>	P	P	A
83.	Northern shoveler	<i>Spatula clypeata</i>	P	P	A
84.	Bar-headed goose	<i>Anser indicus</i>	P	P	A
85.	Common shelduck	<i>Tadorna tadorna</i>	P	P	A
86.	Indian spot-billed duck	<i>Anas poecilorhyncha</i>	P	P	A
87.	Eurasian wigeon	<i>Mareca Penelope</i>	P	P	A
88.	Gadwall	<i>Mareca strepera</i>	P	P	A
89.	Eurasian teal	<i>Anas crecca</i>	P	P	A
90.	Garganey	<i>Spatula querquedula</i>	P	P	A
91.	Greater flamingo	<i>Phoenicopterus roseus</i>	P	P	A
Total			87	86	56

*<https://www.iucnredlist.org/>

Table 2: Seasonal abundance and percentage of aquatic avian species at Harsi Reservoir, Gwalior district, Madhya Pradesh during October 2022 to September 2023.

S.No.	Study Area	Different seasons	No. of Species	Percentage
1.	Harsi Reservoir	Winter	87	38%
2.		Summer	86	38%
3.		Rainy	56	24%

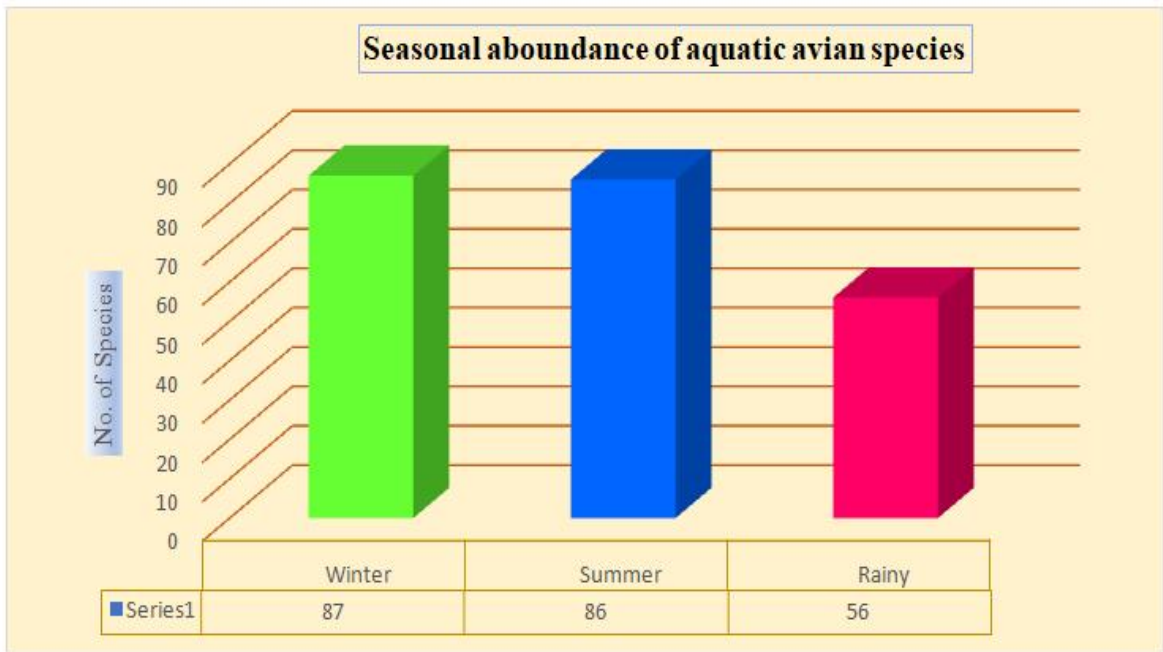


Fig. 1-: Abundance of aquatic avian species observed in different seasons in the study area.

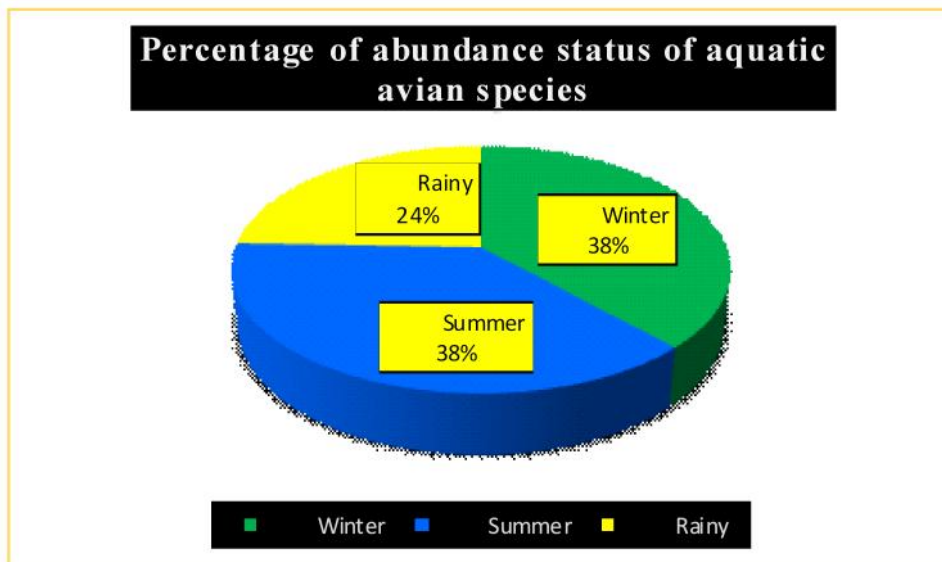


Fig. 2-: Relative Percentage of abundance status of aquatic avian species in study area during 2022 to 2023.

Conclusion


The present study indicates that Harsi reservoir, Gwalior district represents a good diversity of avifauna which is influenced by climatic conditions and also shows seasonal variations. Seasonal variations were found in the aquatic avian species; the highest avian species diversity

was found during the winter season, followed by summer season, while it was lowest during the rainy season. Reservoir is also an important area for migratory as well as globally red listed avian species such as Woollynecked Stork, Sarus crane, River lapwing, Great Thick-knee, Red-necked stint, River Tern, Indian skimmer Oriental Darter, Painted Stork, and Black-headed Ibis.

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