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Assessment of status, diversity and threats of wetland birds of Bathi Lake, Doddabathi Village, Davanagere District, Karnataka, India

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Abstract

The study revealed a total of 47 wetland bird species belonging to 16 families and 8 orders. Among them the family Ardeidae found to be dominated by the representation of 9 species, followed by the Scolopacidae with 6 species; least by Podicipedidae, Anhingidae, Rostratulidae, Recurvirostridae and Laridae with one species each. The study also revealed that the lake is a vulnerable wetland harboring plenty of resident as well as few migratory birds. Four species like Black-headed Ibis (*Threskiornis melanocephalus*), Darter (*Anhinga melanogaster*), Black-tailed Godwit (*Limosa limosa*) and River Tern (*Sterna aurantia*) were near threatened and have a protected status under the schedule IV of Indian Wildlife Protection Act, 1972. The present study location is also facing tremendous conservation challenges by the impact of anthropogenic alteration of the habitats in and around the lake.

Keywords: Wetland birds, Migratory birds, Diversity, Bathi Lake, Threats of wetlands, Threatened species

1. Introduction

The birds which inhabit and dependent on wetland directly or indirectly for feeding, breeding, nesting or roosting are commonly called as water birds or wetland birds [1]. Selection of wetland by waterfowl is influenced by complex characteristics including water chemistry, aquatic vegetation, invertebrate fauna and physical features [2].

The wetlands of South Asia are facing tremendous anthropogenic pressure, which can greatly influence the structure of the bird community [3]. Wetlands have profound ecological and economic importance. Mostly they are highly productive but ecologically fragile, liable to degradation and degeneration under the prevailing anthropogenic pressure [4]. The loss of water bird habitats through direct and indirect human interferences has led to a decline in several water bird populations. Therefore, it is vital to understand the underlying causes for the decline in populations and to control these trends in order to prevent the loss of key components of the biodiversity of wetland habitats [5].

Monitoring of wetland birds provides valuable information on the ecological health and status of wetlands and can be a vital tool for developing awareness regarding the conservation value of the wetlands. The importance of local landscapes for conservation of avifauna can only be understood by knowing the structure of the bird community of that region [6]. The present study was conducted to analyze the diversity and richness of wetland birds and to identify the consequences of direct and indirect human interferences.

2. Materials and methods

2.1 Study Area

Bathi Lake is a small irrigation tank located between 14°28'27" N latitude and 75°52'13" E longitude. It lies at an elevation of 598 mt above mean sea level (MSL) in Davanagere Taluk of Davanagere District in Karnataka, India (Fig. 1). This lake is situated adjacent to Harihar-Davanagere state highway road. This wetland provides water for fishing activities or aquacultural practice as well as irrigation to surrounding agricultural lands of Doddabathi village. The lake is approximately 7 km distance from Davanagere city and 7 km from Harihar Taluk.

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Fig 1: Map of the study area

2.2. Methodology

The checklist is prepared based primarily on the field work conducted during November 2014 to October 2015 across Bathi Lake by foot i.e., along road side count. In the heronry, total counts were carried out by direct and point counting methods for the birds [7, 8]. A total of 12 visits (1 visit per month) were spent in the field observing status and diversity

of birds. Birds were observed from 6 A.M to 11 A.M and identified using Olympus binoculars (10x50) and field guides [9], also given standardized common and scientific names [10]. The status of birds was determined and categorized into three groups such as; LM- Local migratory, WM- winter migratory and R- Resident on the basis of their movement and seasonality of occurrence (Table 1).

Table 1: Systematic list of wetland birds with their conservation status in Bathi Lake, Davanagere district, Karnataka.

Sl. No	Common Name ¹	Scientific Name ²	S ³	CS ⁴	
				IUCN 2014.3	WPA, 1972
Order: Podicipediformes Family: Podicipedidae					
1	Little Grebe	<i>Tachybaptus ruficollis</i>	LM	LC	IV
Order: Pelecaniformes Family: Phalacrocoracidae					
2	Little Cormorant	<i>Phalacrocorax niger</i>	RM	LC	IV
3	Indian Shag	<i>Phalacrocorax fuscicollis</i>	RM	LC	IV
Family: Anhingidae					
4	Darter	<i>Anhinga melanogaster</i>	LM	NT	IV
Order: Ciconiiformes Family: Ardeidae					
5	Little Egret	<i>Egretta garzetta</i>	R	LC	IV
6	Cattle Egret	<i>Bubulcus ibis</i>	R	LC	IV
7	Large Egret	<i>Casmerodius albus</i>	R	LC	IV
8	Median Egret	<i>Mesophoyx intermedia</i>	R	LC	IV
9	Grey Heron	<i>Ardea cinerea</i>	WM	LC	IV
10	Purple Heron	<i>Ardea purpurea</i>	LM	LC	IV
11	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	LM	LC	IV
12	Chestnut Bittern	<i>Ixobrychus cinnamomeus</i>	LM	LC	IV
13	Indian Pond Heron	<i>Ardeola grayii</i>	R	LC	IV
Family: Ciconiidae					
14	White-necked Stork	<i>Ciconia episcopus</i>	LM	LC	IV
15	Asian Openbill Stork	<i>Anastomus oscitanus</i>	LM	LC	IV
Family: Threskiornithidae					
16	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	R	NT	IV
17	Black Ibis	<i>Pseudibis papillosa</i>	R	LC	IV
Order: Anseriformes Family: Anatidae					
18	Lesser-whistling Duck	<i>Dendrocygna javanica</i>	LM	LC	IV
19	Spot Billed Duck	<i>Anas poecilorhyncha</i>	R	LC	IV
20	Cotton Teal	<i>Nettapus coromandelianus</i>	R	LC	IV
21	Common Teal	<i>Anas crecca</i>	WM	LC	IV
22	Garganey **	<i>Anas querquedula</i>	WM	LC	IV
Order: Gruiformes Family: Rallidae					
23	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	R	LC	IV
24	Brown Crake	<i>Amaurornis akool</i>	R	LC	IV
25	Common Moorhen	<i>Gallinule chloropus</i>	WM	LC	IV
26	Purple Moorhen	<i>Porphyrio porphyrio</i>	R	LC	IV
27	Common Coot**	<i>Fulica atra</i>	WM	LC	IV
Order: Charadriiformes Family: Jacanidae					
28	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	R	LC	IV
29	Bronze-winged Jacana	<i>Metopidius indicus</i>	R	LC	IV

	Family: Rostratulidae				
30	Greater Painted Snipe	<i>Rostratula benghalensis</i>	R	LC	IV
	Family: Charadriidae				
31	Little Ringed Plover**	<i>Charadrius dubius</i>	WM	LC	IV
32	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	LM	LC	IV
33	Red-wattled Lapwing	<i>Vanellus indicus</i>	R	LC	IV
	Family: Scolopacidae				
34	Black-tailed Godwit	<i>Limosa limosa</i>	WM	NT	IV
35	Marsh Sandpiper**	<i>Tringa stagnatilis</i>	WM	LC	IV
36	Common Greenshank**	<i>Tringa nebularia</i>	WM	LC	IV
37	Green Sandpiper **	<i>Tringa ochropus</i>	WM	LC	IV
38	Common Sandpiper**	<i>Tringa hypoleucos</i>	WM	LC	IV
39	Little Stint**	<i>Calidris minuta</i>	WM	LC	IV
	Family: Recurvirostridae				
40	Black-winged Stilt	<i>Himantopus himantopus</i>	LM	LC	IV
	Family: Laridae				
41	River Tern	<i>Sterna aurantia</i>	LM	NT	IV
	Order: Coraciiformes Family: Alcedinidae				
42	Small Blue Kingfisher	<i>Alcedo atthis</i>	R	LC	IV
43	Lesser Pied Kingfisher	<i>Ceryle rudis</i>	R	LC	IV
44	White-breasted Kingfisher	<i>Halcyon smyrnensis</i>	R	LC	IV
	Order: Passeriformes Family: Motacillidae				
45	Yellow Wagtail**	<i>Motacilla flava</i>	WM	LC	IV
46	Grey Wagtail	<i>Motacilla cinerea</i>	RM	LC	IV
47	Large Pied Wagtail	<i>Motacilla maderaspatensis</i>	R	LC	IV

¹Common names after Manakadan *et al.*, 1998.

²Scientific names after Inskipp *et al.*, 1996.

³S³-Status of the birds observed as Resident (R), Winter Migratory (WM), Local Migratory (LM), and Resident Migratory (RM)

CS⁴- Conservation status: GT-Globally threatened; LC-least concerned; NT- Near threatened; WPA, 1972- Wildlife Protection Act 1972; Schedule IV

** Birds with migratory population

3. Results and Discussion

The present study revealed a total of 47 wetland bird species belonging to 16 families and 8 orders recorded from the study area. Details such as common, scientific names, frequency and conservation status of the wetland birds are presented in Table 1. The order Charadriiformes dominated the list (by 6 families with 13 species) followed by Ciconiiformes (by 3 families with 13 species), Pelecaniformes (by 2 families with 3 species), Anseriformes and Gruiformes (by 1 family with 5 species each), Passeriformes and Coraciiformes (by 1 family with 3 species each), and least by Podicipediformes, (1 family with 1 species) (Table 1).

The family Ardeidae dominated the list by the representation of 9 species, which contributed 19%, followed by the Scolopacidae with 6 species, contributed 13%; Rallidae and Anatidae with 5 species each, contributed 11% each; Motacillidae, Alcedinidae and Charadriidae, with 3 species each, contributed 6% each; Ciconiidae, Threskiornithidae, Phalacrocoracidae and Jacanidae with 2 species each, contributed 4% each and least by Podicipedidae, Anhingidae, Rostratulidae, Recurvirostridae and Laridae with one species each, contributed 2% each of total family wise frequency of occurrence of water birds of the study area (Fig. 2).

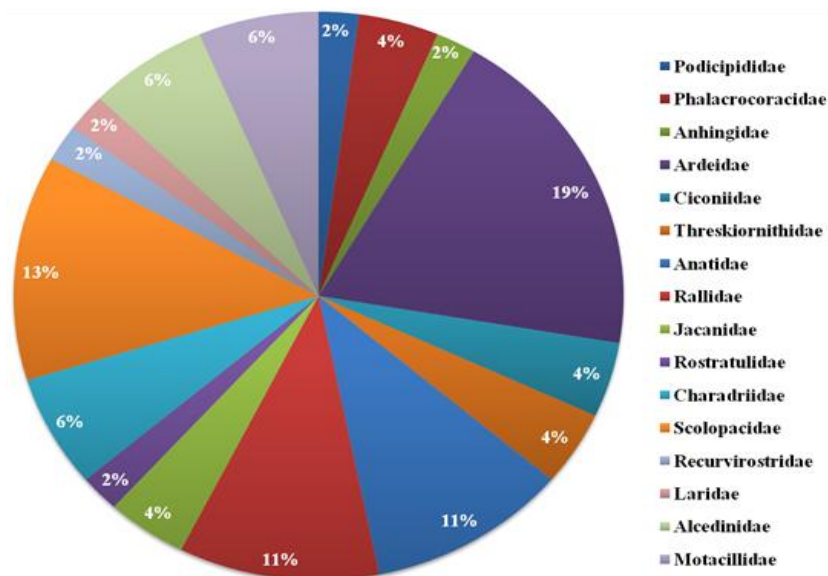


Fig 2: Family wise species distribution and diversity of wetland birds in Bathi Lake, Davanagere District.

Based on the residential status of wetland birds, resident birds (R) were emerged as the most of predominant with 20 species, which contribute 43%, followed by the winter migratory (WM) with 13 species, contribute 28%, local

migratory (LM) with 11 species, contribute 23% and as least by resident migratory (RM) with 3 species, contribute 6% of the total wetland birds specie recorded from the study area (Fig. 3).

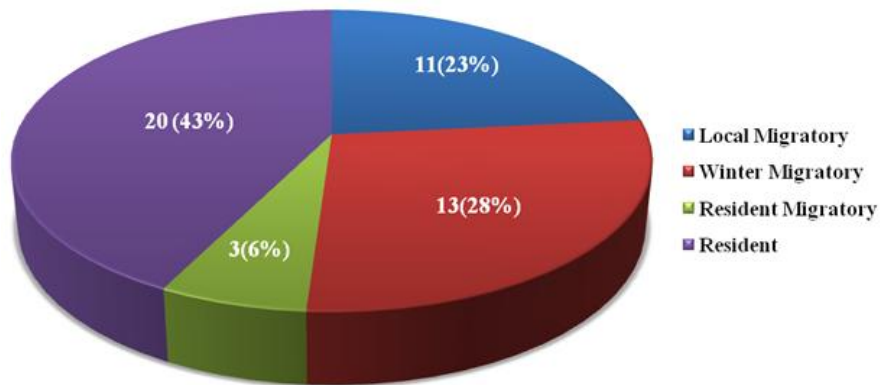


Fig 3: Residential status of wetland birds of Bathi Lake, Davanagere District.

This similar pattern of study was reported on wetland birds in Anekere wetland of Karkala, Udupi District ^[11]; Pallikaranai Wetlands of Chennai ^[12]; Kundavada Lake of Davanagere District ^[13]; Chhilchhila Wildlife Sanctuary of Haryana ^[1] and wetlands of Jalpaiguri, West Bengal ^[5]. These studies also recorded the seasonal change in density and diversity of migratory avifauna of which some are globally threatened and near threatened species.

The study also revealed the of the total wetland birds recorded, 91% (n=43) were least concerned (LC) and 9% (n=4) were near threatened (NT) species (Fig. 4), which includes, Black-headed Ibis (*Threskiornis melanocephalus*), Darter (*Anhinga melanogaster*), Black-tailed Godwit (*Limosa limosa*) and River Tern (*Sterna aurantia*) have a protected status under the schedule IV of Indian Wildlife Protection Act, 1972 ^[14].

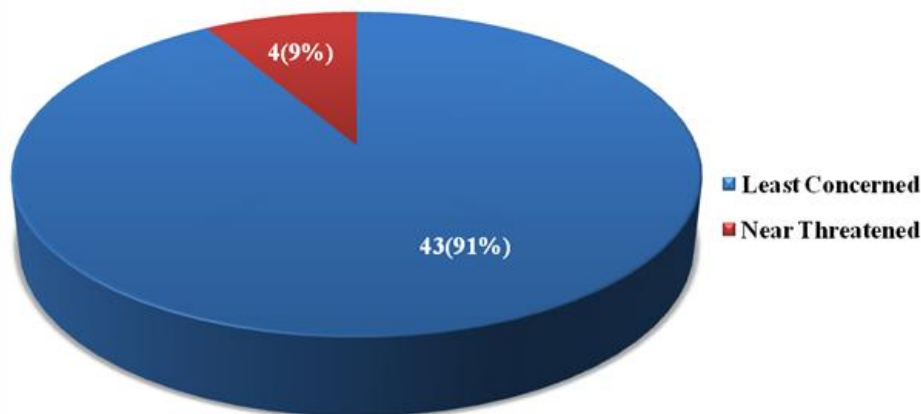


Fig 4: Conservation status of wetland birds of Bathi Lake, Davanagere District.

From the study it has been found that the lake is a vulnerable wetland harboring plenty of resident and few migratory birds such as Grey Heron, Common Moorhen, Common Coot, Garganey, Common Teal, Little Ringed Plover, Black-tailed Godwit, Marsh Sandpiper, Common Greenshank, Green Sandpiper, Common Sandpiper, Little Stint and Yellow Wagtail. Most of the migratory species recorded were winter visitors and the resident birds were observed throughout the year. These winter migratory avifauna exhibit a distinct species specific pattern for arrival at and departure from the wetland. Every year the peak population of winter migratory birds was seen during the month of January and February and almost all of them leave the wetland by end of March. The basic requirements of the migratory water birds at their wintering sites are adequate food supply and safety ^[15]. The wetland birds are in general being heterogeneous in their feeding habits ^[16]. In the present study, the habitat by supporting different aquatic fauna like fishes, crustaceans, invertebrates, water plants and planktons as the primary feed

and also irrigated agricultural fields surrounding the lake probably provided foraging grounds for the resident as well as few migratory wetland birds, which further adds to their diversity ^[17, 18].

From the present study it has been found that the diversity of wetland birds was gradually decreasing due to disturbances caused by the heavy vehicular movement as the study site is located adjacent to state highway road (Davanagere-Harihar), fishing and modern agricultural practices. Other factors includes, habitat degradation due to encroachment, siltation, agricultural runoff and expansion of agricultural land for paddy and sugarcane cultivation are amongst threats from the locals, anthropogenic pressure and less availability of abundant food, draining of water, release of sewage, throwing of domestic garbage, weed infestation, developmental activities like construction of roads are some major threats often disturbed the avifauna. Hence, being generally at or near the top of most wetland food chains they are highly susceptible to habitat disturbances and are

therefore good indicators of the general condition of wetland habitats [19, 20, 21].

Furthermore, the lake is heavily infested by the growth of the hydrophytes like water hyacinth (*Eichhornia crassipes*), *Salvinia molesta*, *Cattail typha* and lesser Duckweed (*Lemna*), water Hyacinth (*Eichhornia crassipes*) has rapidly covered the water surface of lake and thereby reducing the feeding areas for water birds [17]. All these activities affected the aquatic bird's habitat and resulting in loss of avifaunal diversity of the lake ecosystem [13, 15, 17, 22].

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