



Avian diversity and their status in and around Bhindawas bird sanctuary, Haryana (India)

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Abstract: One year survey conducted in and around Bhindawas bird sanctuary in district Jhajjar, Haryana (India) from January, 2015 to December, 2015; revealed a total of 104 bird species belonging to 15 orders and 39 families. Of these, 67 bird species were resident, 32 species were winter migrants and only 5 species were summer migrants. Based on their frequency of sighting, 33 bird species were categorized as Abundant, 27 species as Common, 32 species as Uncommon and 12 species as Rare. Maximum number of species belonged to order Passeriformes and least number of species belonged to order Podicipediformes and Strigiformes. Among the recorded birds, 4 species namely, Darter, *Anhinga melanogaster*, Black-necked Stork, *Ephippiorhynchus asiaticus*; Oriental White Ibis, *Threskiornis melanocephalus*; and Alexandrine Parakeet, *Psittacula eupatria* were near threatened and 2 species namely, Common, Pochard, *Aythya ferina* and Sarus Crane, *Grus antigone* were vulnerable. In early 1990s, a study was conducted on Bhindawas bird sanctuary and thereafter, a great deal of infrastructure, development and urbanization has occurred. However, scanty information is available on the avian diversity periodic monitoring of Bhindawas bird sanctuary, Haryana. Therefore, present study was planned to monitor and document the avian species.

Keywords: Abundant, Bhindawas bird sanctuary, Diversity, Migrants, Resident

INTRODUCTION

Birds are the most beautiful creatures on the planet; they exhibit a great variety of specific features enabling them to occupy numerous habitats, i.e. shrubby, mixed forest and aquatic habitat. Besides, birds play roles as pollinators, scavengers, predators, bio-indicator of ecosystem and they also function as early warning system (Dhadse *et al.*, 2009). From time to time, various ornithologists have conducted studies on birds in different regions as well as in various protected areas of India (Barua and Sharma, 1999; Mahabal, 2000; Aravind *et al.*, 2001; Urfi, 2003; Kumar, 2007; Harisha and Hosetti, 2009; Barsal and Inskipp, 2009; Maity *et al.*, 2010; Saikia and Saikia, 2011; Lameed, 2012; Bibi and Ali, 2013; Wijesundara and Wijesundara, 2014; Abbas *et al.*, 2014; Indika and Mahaulpatha, 2015).

In Haryana, Bhindawas Bird Sanctuary is the largest wetland having *Eucalyptus*, *Acacia*, *Azadirachta* and *Zizyphus* which are the main trees planted around the lake. Cormorants, egrets, storks etc. use them for roosting and nesting. In the last few years, huge anthropogenic pressure is being witnessed in this region. Keeping in view the conservational values of sanctuary, the present study was conducted to prepare the checklist of birds and also to list various factors which may be responsible for the affecting avian diversity in the Bhindawas bird sanctuary.

MATERIALS AND METHODS

Study area: Bhindawas bird sanctuary is located 25 kms south-east of Jhajjar (28°37'N and 76°40'E) and about 80 kms north-west of Delhi. This Sanctuary spreads over an area of 1016.94 acres. It was notified as wildlife Sanctuary on 7th May, 1986. The area also has a lake with a periphery of about 12 kms. The Sanctuary premises are surrounded by seven villages, namely, Kanwah, Bilochpura, Nawada, Redhuwas, Shanjanpur, Kunjah and Chadwana. The climate of the Sanctuary is dry with an intensely hot summer and a cold winter (Fig. 1, 2).

Methodology: To record the avian diversity, periodic fortnightly visits were conducted from January 2015 to December 2015. During each visit, data was recorded in the morning by using line transect method (Gaston, 1975; Sale and Berkmuller, 1988). Birds were observed using the binoculars (Nikon Monarch 8x42) and photographs were taken by digital camera (Canon 1200D). The Photographs were subsequently identified using field guide by Grimmett *et al.* (1999). Classification of the observed bird species was done following Manakandan and Pittie (2001). Abundance status of the bird, on the basis of the frequency of sighting, i.e., Abundant (90-100%), Common (60-90%), Uncommon (20-60%), Rare (less than 20%) was observed following the terminology of Srinivasulu and Nagulu (2001). Residential / migratory status of the birds was assessed

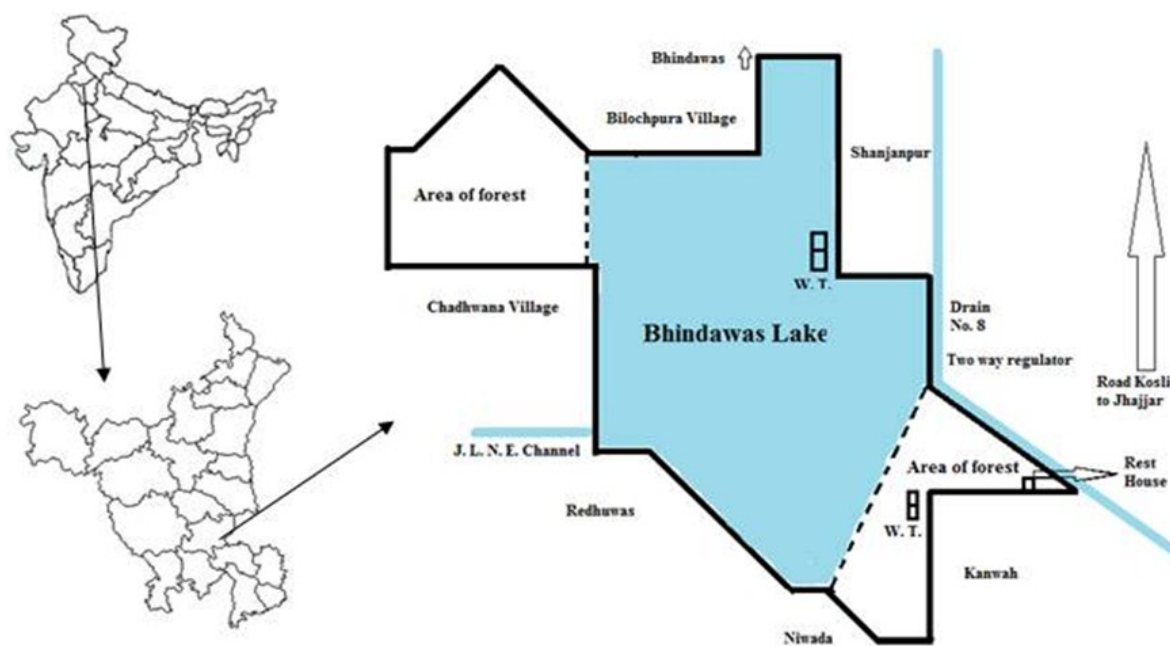


Fig. 1. Location and Diagrammatic presentation of Bhindawas bird sanctuary in district Jhajjar, Haryana.

strictly with reference to the study area on the basis of presence or absence method following Ali and Ripley, (1987). Later bird species were categorized as ‘Resident’ (R) and ‘Migratory’- ‘Local migrants’ (LM), ‘Summer migrants’ (SM) and ‘Winter migrants’ (WM).

RESULTS AND DISCUSSION

In the present study, a total 104 species of birds were identified in and around Bhindawas bird sanctuary during January 2015 to December 2015 (Table 1). Recorded bird species belonged to 15 orders, namely, Podicipediformes, Pelecaniformes, Ciconiiformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Charadriiformes, Columbiformes, Psittaciformes, Cuculiformes, Strigiformes, Coraciiformes, Piciformes and Passeriformes. The study revealed that maximum number of species belonged to order Passeriformes (31.73%) followed by Anseriformes (12.5%), Charadriiformes (11.54%), Ciconiiformes (10.58%), Coraciiformes (6.73%), Gruiformes and Columbiformes (4.81% each), Pelecaniformes, Falconiformes (3.85% each), Galliformes, Psittaciformes, Cuculiformes and Piciformes (1.92% each) and Podicipediformes and Strigiformes with least number of species with 0.96% each (Fig. 3). Earlier studies of Pawar (2011), in mangroves of Uran (Raigad), Navi Mumbai, Maharashtra, West coast of India and Chilke (2012), in and around Bamanwada lake of Rajura, district- Chandrapur (Maharashtra) have also reported that Passeriformes was the most dominant order representing maximum number of species. In their studies, most of

the avian species were resident (R) and rest were migrant species. Beresford *et al.* (2005) explained the reason of high diversity of Passerine birds to their ability to use various kinds of habitats and to have large variety of food items *viz.* grains, seeds, floral buds, fruits, nectar and invertebrates. Order and family wise distribution of avian species has also been presented in Table 2.

Study revealed heterogeneous distribution of birds in different types of habitats, *viz.*, along roadside and the periphery of the lakes, inside the wetland, in and around agricultural fields, and in fallow lands. A total of 56 species were recorded on vegetation along roadside, electrical wires and the periphery of the lake, 51 species from wetland, 26 species from agricultural fields and 19 species from fallow lands (Fig. 4); of the total recorded avian fauna, 28 species were recorded from more than one type of habitats, 7 species were sighted from three type of habitats; of these, 3 species were sighted on roadside plantation, agricultural fields and fallow land; 3 species were noticed in wetland, agricultural fields and fallow land; one species was sighted on wetland, roadside plantation and fallow land, and 2 species namely, Cattle Egret and Indian Pond Heron were observed from all type of habitat. Earlier also Chopra and Sharma (2014) recorded 73 (46.79%) species from roadside plantation, 36 (23.08%) species from wetland, 24 (15.38%) species from agricultural field and 23 (14.74%) species from orchards in lower Shivalik foothills.

Out of total, 67 species were resident, 32 species were winter migrants and 5 species were summer migrants



Fig. 2. (A) Vegetation of Bhindawas bird sanctuary and (B) Fallow land in the Bhindawas bird sanctuary.

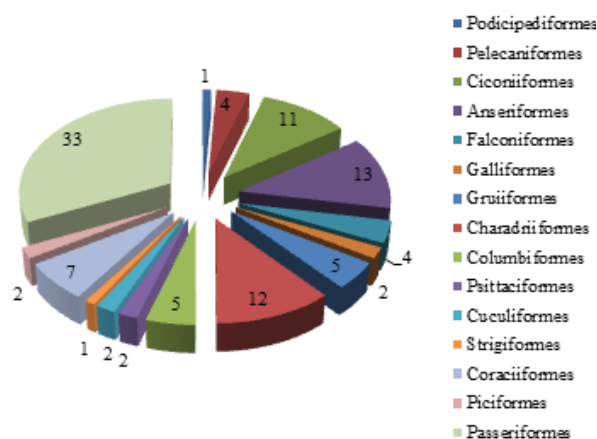


Fig. 3. Pie chart representing number of avian species in different order in Bhindawas bird sanctuary.

(Fig. 4). In previous studies, maximum number of species were recorded in winter season due to more food availability and favorable climatic conditions for nesting and roosting at Jaikwadi reservoir, Paithan (Ghorade et al., 2014); minimum number of species were recorded during monsoon season and maximum during the winter season in Chandubi tectonic lake, Assam (Deka and Nath, 2013). Based on the frequency of their sighting, 33 species were abundant, 27 species were common, 32 species were uncommon and 12 species were rare (Fig. 4). Glossy Ibis, *Plegadis falcinellus*; Brahminy Shelduck, *Tadorna ferruginea*;

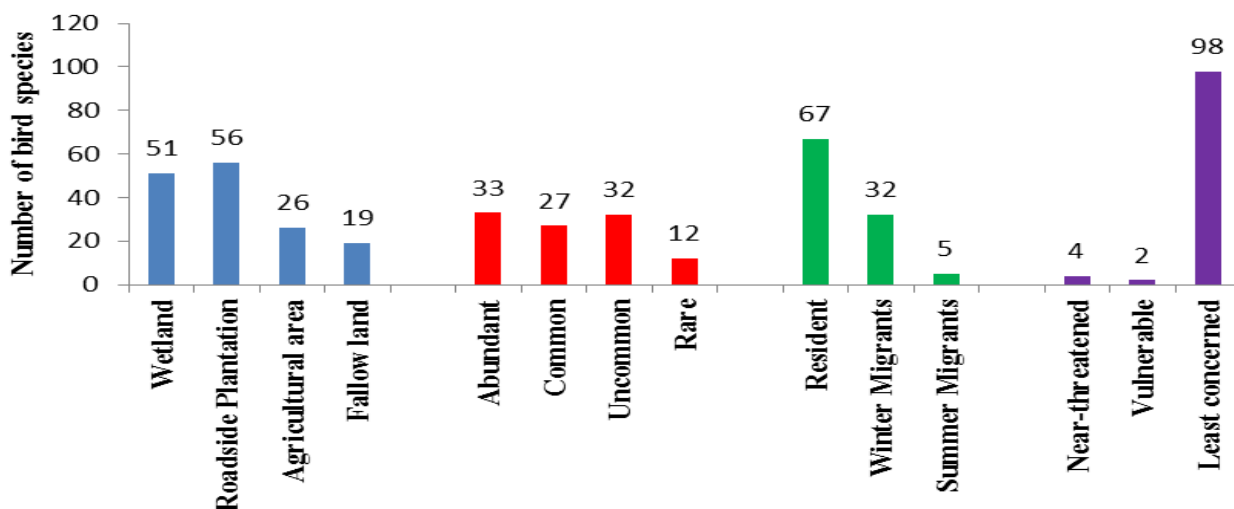


Fig. 4. Bar diagram representing the status of bird species from January 2015 to December 2015 in Bhindawas bird sanctuary.

Mallard, *Anas platyrhynchos*; Black-shouldered Kite, *Elanus caeruleus*; Pied Harrier, *Circus macrourus*; Sarus Crane, *Grus antigone*; White-tailed Lapwing, *Vanellus leucurus*; Temminck’s Stint, *Calidris temminckii*; Red Collared Dove, *Streptopelia tranquebarica*; Indian Grey Hornbill, *Ocyrceros birostris*; Streak-throated Swallow, *Hirundo fluvicola*; Bluethroat, *Luscinia svecica* were ‘rarely sighted’ bird species in the study area.

Recently, IUCN Red list of endangered birds reveals in which 1375 bird species were recognized as globally threatened and India is ranked at the eighth position with 84 threatened bird species (Bird Life International, 2016). In the present study, 4 species were near threatened, namely, Darter *Anhinga melanogaster*, Black-necked Stork *Ephippiorhynchus asiaticus*, Oriental White Ibis *Threskiornis melanocephalus* and Alexandrine Parakeet *Psittacula eupatria*) and 2 species were vulnerable (Common Pochard *Aythya ferina* and Sarus Crane *Grus antigone*) and 98 species were least concerned (Fig. 4).

During the study period, lake was found now infested with Water Hyacinth *Eichhornia crassipes* and blue green algae, indicating the enriched nutrient loading in the lake. The possible reason may be nutrient loading from nearby agricultural field. Also, great deal of infrastructure development, increased urbanization, regular cutting of grass from the region by villagers and increasing pace of tourists being close to Delhi, the capital of India, are some of the factors which might affect avian diversity, in particular, in the region in near future.

Conclusion

Bhindawas bird sanctuary has rich avian fauna, beside this, it also supports some other mammalian species like Neelgai, Jungle Cat, Monkey and Rabbit. A total 104 species of birds were recorded, among the observed avian species some endangered species were

Table 1. List of birds recorded from Bhindawas bird sanctuary during January 2015 to December 2015.

Family/S. species	No. of	Common name	Scientific name	Abundance status	Residential status	IUCN Status
Podicipedidae						
1		Little Grebe	<i>Tachybaptus ruficollis</i>	UC	R	LC
Phalacrocoracidae						
2		Little Cormorant	<i>Phalacrocorax niger</i>	A	R	LC
3		Indian Shag	<i>Phalacrocorax fuscicollis</i>	UC	R	LC
4		Great Cormorant	<i>Phalacrocorax carbo</i>	UC	R	LC
Anhingidae						
5		Darter	<i>Anhinga melanogaster</i>	UC	R	NT
Ardeidae						
6		Little Egret	<i>Egretta garzetta</i>	C	R	LC
7		Grey Heron	<i>Ardea cinerea</i>	A	R	LC
8		Purple Heron	<i>Ardea purpurea</i>	C	R	LC
9		Large Egret	<i>Casmerodius albus</i>	UC	R	LC
10		Median Egret	<i>Mesophoyx intermedia</i>	UC	R	LC
11		Cattle Egret	<i>Bubulcus ibis</i>	A	R	LC
12		Indian Pond Heron	<i>Ardeola grayii</i>	C	R	LC
Ciconiidae						
13		Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	C	WM	NT
Threskiornithidae						
14		Glossy Ibis	<i>Plegadis falcinellus</i>	RA	WM	LC
15		Oriental White Ibis	<i>Threskiornis melanocephalus</i>	C	WM	NT
16		Black Ibis	<i>Pseudibis papillosa</i>	UC	R	LC
Anatidae						
17		Greylag Goose	<i>Anser anser</i>	A	WM	LC
18		Bar-headed Goose	<i>Anser indicus</i>	A	WM	LC
19		Brahminy Shelduck	<i>Tadorna ferruginea</i>	RA	WM	LC
20		Comb Duck	<i>Sarkidiornis melanotos</i>	UC	WM	LC
21		Cotton Teal	<i>Nettapus coromandelianus</i>	UC	SM	LC
22		Gadwall	<i>Anas strepera</i>	A	WM	LC
23		Eurasian Wigeon	<i>Anas Penelope</i>	A	WM	LC
24		Mallard	<i>Anas platyrhynchos</i>	RA	WM	LC
25		Spot-billed Duck	<i>Anas poecilorhyncha</i>	A	R	LC
26		Northern Shoveller	<i>Anas clypeata</i>	A	WM	LC
27		Northern Pintail	<i>Anas acuta</i>	A	WM	LC
28		Garganey	<i>Anas querquedula</i>	A	WM	LC
29		Common Pochard	<i>Aythya ferina</i>	A	WM	V
Accipitridae						
30		Black-shouldered Kite	<i>Elanus caeruleus</i>	RA	R	LC
31		Black Kite	<i>Milvus migrans</i>	C	R	LC
32		Crested Serpent-Eagle	<i>Spilornis cheela</i>	UC	R	LC
33		Pied Harrier	<i>Circus macrourus</i>	RA	WM	LC
Phasianidae						
34		Grey Francolin	<i>Francolinus pondicerianus</i>	C	R	LC
35		Indian Peafowl	<i>Pavo cristatus</i>	A	R	LC
Gruidae						
36		Sarus Crane	<i>Grus antigone</i>	RA	R	V
Rallidae						
37		White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	C	R	LC
38		Purple Moorhen	<i>Porphyrio porphyrio</i>	C	R	LC
39		Common Moorhen	<i>Gallinula chloropus</i>	A	WM	LC
40		Common Coot	<i>Fulica atra</i>	A	WM	LC
Jacaniidae						
41		Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	UC	SM	LC
42		Bronze-winged Jacana	<i>Metopidius indicus</i>	C	SM	LC
Charadriidae						
43		Little Ringed Plover	<i>Charadrius dubius</i>	UC	WM	LC
44		Red-wattled Lapwing	<i>Vanellus indicus</i>	A	R	LC
45		White-tailed Lapwing	<i>Vanellus leucurus</i>	RA	WM	LC

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Scolopacidae					
46	Marsh Sandpiper	<i>Tringa stagnatilis</i>	A	WM	LC
47	Spotted Redshank	<i>Tringa erythropus</i>	C	WM	LC
48	Common Redshank	<i>Tringa tetanus</i>	C	WM	LC
49	Little Stint	<i>Calidris minuta</i>	UC	WM	LC
50	Temminck's Stint	<i>Calidris temminckii</i>	RA	WM	LC
Recurvirostridae					
51	Black-winged stilt	<i>Himantopus himantopus</i>	A	R	LC
52	Pied Avocet	<i>Recurvirostra avosetta</i>	UC	WM	LC
Columbidae					
53	Blue Rock Pigeon	<i>Columba livia</i>	A	R	LC
54	Spotted Dove	<i>Streptopelia chinensis</i>	UC	R	LC
55	Eurassian Collared Dove	<i>Streptopelia decaocto</i>	C	R	LC
56	Red Collared Dove	<i>Streptopelia tranquebarica</i>	RA	R	LC
57	Laughing Dove	<i>Stigmatopelia senegalensis</i>	A	R	LC
Psittacidae					
58	Rose Ringed Parakeet	<i>Psittacula krameri</i>	A	R	LC
59	Alexandrine Parakeet	<i>Psittacula eupatria</i>	C	R	NT
Cuculidae					
60	Asian Koel	<i>Eudynamys scolopacea</i>	C	SM	LC
61	Greater Coucal	<i>Centropus sinensis</i>	A	R	LC
Strigidae					
62	Spotted Owlet	<i>Athene brama</i>	C	R	LC
Alcedinidae					
63	White breasted Kingfisher	<i>Halcyon smyrnensis</i>	A	R	LC
64	Lesser Pied Kingfisher	<i>Ceryle rudis</i>	UC	WM	LC
Meropidae					
65	Small Bee-eater	<i>Merops orientalis</i>	UC	R	LC
66	Blue-tailed Bee-eater	<i>Merops philippinus</i>	UC	SM	LC
Coraciidae					
67	Indian Roller	<i>Coracias benghalensis</i>	UC	R	LC
Upupidae					
68	Common Hoopoe	<i>Upupa epops</i>	C	R	LC
Bucerotidae					
69	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	RA	R	LC
Capitonidae					
70	Coppersmith Barbet	<i>Megalaima haemacephala</i>	UC	R	LC
Picidae					
71	Yellow-fronted Pied Wood-pecker	<i>Dendrocopos mahrattensis</i>	UC	R	LC
Alaudidae					
72	Red-winged Bush-Lark	<i>Mirafra erythroptera</i>	UC	R	LC
Hirundinidae					
73	Streak-throated Swallow	<i>Hirundo fluvicola</i>	RA	R	LC
Motacillidae					
74	White Wagtail	<i>Motacilla alba</i>	A	WM	LC
75	Large Pied Wagtail	<i>Motacilla maderaspatensis</i>	C	R	LC
76	Citrine Wagtail	<i>Motacilla citreola</i>	C	WM	LC
77	Grey Wagtail	<i>Motacilla cinerea</i>	C	WM	LC
78	Paddyfield Pipit	<i>Anthus rufulus</i>	UC	R	LC
Pycnonotidae					
79	Red-vented Bulbul	<i>Pycnonotus cafer</i>	A	R	LC
80	White-eared Bulbul	<i>Pycnonotus leucotis</i>	UC	WM	LC
Laniidae					
81	Bay-backed Shrike	<i>Lanius vittatus</i>	UC	R	LC
Muscicapidae					
82	Bluethroat	<i>Luscinia svecica</i>	RA	WM	LC
83	Oriental Magpie-Robin	<i>Copsychus saularis</i>	C	R	LC
84	Indian Robin	<i>Saxicoloides fulicata</i>	UC	R	LC
85	Pied Bushchat	<i>Saxicola caprata</i>	UC	R	LC
86	Indian Chat	<i>Cercomela fusca</i>	A	R	LC
87	Common Babbler	<i>Turdoides caudatus</i>	UC	R	LC

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88	Large Grey Babbler	<i>Turdoides malcolmi</i>	C	R	LC
89	Jungle Babbler	<i>Turdoides striatus</i>	A	R	LC
90	Ashy Prinia	<i>Prinia socialis</i>	C	R	LC
91	Plain Prinia	<i>Prinia inornata</i>	C	R	LC
92	Common Tailorbird	<i>Orthotomus sutorius</i>	C	R	LC
93	Common Chiffchaff	<i>Phylloscopus collybita</i>	A	WM	LC
Nectariniidae					
94	Purple Sunbird	<i>Nectarinia asiatica</i>	C	R	LC
Zosteropidae					
95	Oriental White-eye	<i>Zosterops palpebrosus</i>	UC	R	LC
Emberizidae					
96	Spotted Munia	<i>Lonchura punctulata</i>	UC	R	LC
Passeridae					
97	House Sparrow	<i>Passer domesticus</i>	A	R	LC
98	Baya Weaver	<i>Ploceus philippinus</i>	UC	R	LC
Sturnidae					
99	Common Myna	<i>Acridotheres tristis</i>	A	R	LC
100	Bank Myna	<i>Acridotheres ginginianus</i>	A	R	LC
Dicruridae					
101	Black Drongo	<i>Dicrurus macrocercus</i>	A	R	LC
Corvidae					
102	Indian Treepie	<i>Dendrocitta vagabunda</i>	C	R	LC
103	House Crow	<i>Corvus splendens</i>	A	R	LC
104	Jungle Crow	<i>Corvus macrorhynchos</i>	UC	R	LC

A- Abundant, C- Common, UC- Uncommon, RA- Rare, R- Resident, WM- Winter migrant, SM- Summer migrant, LC- Least concerned, NT- Near threatened, V- Vulnerable

Table 2. Showing Per cent composition and number of bird species in each represented avian order and family in Bhindawas bird sanctuary.

S.N.	Order	Number (%) of species	Family	Number (%) of species
1	Podicipediformes	1(0.96%)	Podicipedidae	1(0.96%)
2	Pelecaniformes	4(3.85%)	Phalacrocoracidae	3(2.89%)
3	Ciconiiformes	11(10.58%)	Anhingidae	1(0.96%)
			Ardeidae	7(6.73%)
			Ciconiidae	1(0.96%)
4	Anseriformes	13(12.5%)	Threskiornithidae	3(2.89%)
			Anatidae	13(12.5%)
			Accipitridae	4(3.85%)
5	Falconiformes	4(3.85%)	Phasianidae	2(1.92%)
6	Galliformes	2(1.92%)	Gruidae	2(1.92%)
7	Gruiformes	5(4.81%)	Rallidae	4(3.85%)
			Jacaniidae	2(1.92%)
			Charadriidae	3(2.89%)
			Scolopacidae	5(4.81%)
			Recurvirostridae	2(1.92%)
			Columbidae	5(4.81%)
			Psittacidae	2(1.92%)
11	Cuculiformes	2(1.92%)	Cuculidae	2(1.92%)
12	Strigiformes	1(0.96%)	Strigidae	1(0.96%)
13	Coraciiformes	7(6.73%)	Alcedinidae	2(1.92%)
			Meropidae	2(1.92%)
			Coraciidae	1(0.96%)
			Upupidae	1(0.96%)
			Bucerotidae	1(0.96%)
			Capitonidae	1(0.96%)
			Picidae	1(0.96%)
14	Piciiformes	2(1.92%)	Alaudidae	1(0.96%)
			Hirundinidae	1(0.96%)
			Motacillidae	5(4.81%)
			Pycnonotidae	2(1.92%)
			Laniidae	1(0.96%)
			Muscicapidae	12(11.54%)
			Nectariniidae	1(0.96%)
			Zosteropidae	1(0.96%)
			Emberizidae	1(0.96%)
			Passeridae	2(1.92%)
			Sturnidae	2(1.92%)
			Dicruridae	1(0.96%)
			Corvidae	3(2.88%)

also reported such as Darter, Black-necked Stork, Oriental White Ibis, Alexandrine Parakeet, Common Pochard and Sarus Crane. It is also recommended that the research related to diversity, abundance, residential status and migration patterns of birds should be regularly carried out, so that the reduction in diversity, population size and their ecological reasons can be determined.

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