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**Avian Diversity of Wetland Habitats of District Fatehabad,  
Haryana (India)**

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**Abstract**

The present study was conducted in three wetland habitats of district Fatehabad, Haryana (India) from December, 2012 to November, 2014 to record the avian diversity, its abundance and status. A total of 73 species of birds belonging to 55 genera classified into 16 orders and 32 families were recorded during the two years of study period. Of the 16 orders identified during the study, order Passeriformes was reported as most diverse with 22 species which constituted 30.14 per cent of the total documented species. On the basis of percentage encounter rate, the recorded bird species were categorized into four categories, i.e., Abundant (A), Common (C), Uncommon (UC) and Rare (Ra). Analysis of data revealed that out of total 73 recorded species, 9 species (12.33%) were abundant (A), 29 avian species (39.73%) were common (C), 22 species (30.14%) were uncommon (UC) and 13 species (17.80%) were rare (R). In order to assess the seasonal variation in avian species richness, the recorded bird species were categorized as Resident (R), Winter Migratory (WM), Summer Migratory (SM) and Local Migratory (LM). Analysis of data on seasonal migration revealed that of the total 73 avian species encountered 53 (72.60%) were resident species, 16 (21.92%) were winter migrant and 2 (2.74%) species each of summer migrant and local migrant. According to Red Data Book of IUCN, Alexandrine Parakeet (*Psittacula eupatria*) has been categorized as “near threatened” species.

**Key words:** Wetland, Fatehabad, Avian

**Introduction**

Birds, the most beautiful creatures of nature, are a group of vertebrates which have feathers, wings and hollow bones as aerial lifestyle adaptation. They are the most liked animals owing to their rich colouration, song, easy identification and liveliness. Out of nearly 10,000 different kinds of birds in the world, about 13 per cent are found in Indian sub-continent. In India, high avian diversity consisting of nearly 1300 avian species has been reported and the main reason for the rich bird life in India is the presence of varied habitats, from the hot arid deserts of Rajasthan to the thick tropical rain forests of the Western Ghats and northeast India (Grimmett and Inskipp, 2003). Birds are considered as important health indicators of the ecological conditions and productivity of an ecosystem (Desai and Shanbhag, 2007). They also play important role in wetland ecosystem and use wetlands for breeding, nesting, as a source of drinking water, for feeding and resting (Balapure *et al.*, 2012). Any change in the physical, chemical and biological factors of wetlands affects the density, diversity and richness of avian fauna.

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A lot of work has been done on various aspects of avian diversity in different region of Haryana. However no information was available on the avian diversity of wetlands of district Fatehabad. Therefore, the present study was planned to study the avian diversity in and around three lentic water bodies, namely, Daulatpuria Pond (DP), Chilli Lake (CL) and Bhodia Khera Temple Pond (BP) from December, 2012 to November, 2014 to identify the avian diversity in the study area and to assess the status and abundance of different avian species.

**Material and Methods**

Periodic weekly visits were conducted in the selected study sites. During each periodic visit, birds were observed early in the morning till mid morning and in the evening till sunset from December, 2012 to November, 2014 using line transect method (Sales and Berkmueller, 1988), and point count method (Altman, 1974). Time adjustments were done as required in different seasons. Avian fauna were sighted using binoculars and photographed. Identification and classification of birds were done in the light of available literature (Ali and Ripley, 1983; Manakandan and Pittie, 2001; Grimmett *et al.*, 2003). To observe the status of different avian species, the latter were categorized as ‘Resident’(R), ‘Local migrants’ (LM)

and 'Winter migrants' (WM). Similarly, on the basis of the frequency of sighting, various bird species were categorized as 'Abundant' or 'A' (encounter rate 95% to 100%), 'Common' or 'C' (encounter rate 60% to 95%), Uncommon or UC (encounter rate 20% to 60%) and 'Rare' or 'Ra' (encounter rate less than 20%) following the terminology used by Srinivasulu and Nagulu (2002).

### Results and Discussion

Birds act as crucial ecological indicators of any aquatic ecosystem because of their amazing ability to fly away from unhealthy and filthy lay of land. In the present study, avi-faunal diversity of three wetlands, namely, Chilli Lake (CL), Bhodia Khera temple pond (BP) and Daulatpuria Pond (DP) was explored from December, 2012 to November, 2014. Birds' inventory of recorded wetland species from all the three study sites has been presented in Table 1. Periodic weekly visits conducted at the three selected wetlands revealed the presence of 73 species of water birds and water associated birds which belonged to 55 genera classified into 16 orders and 32 families (Table 1). Presence or absence of different number of avian fauna recorded order-wise and family-wise in different wetlands are also shown in Table 2. Of the 16 orders identified during the study, order Passeriformes was reported as the most diverse avian order with 22 species (Fig. 1) which constituted 30.14 per cent of the total documented species (Fig. 2). Order Passeriformes was followed by 10 species (13.70%) of the order Ciconiiformes, 8 species (10.96%) of the order Charadriiformes, 6 species (8.22%) of the order Anseriformes, 5 species (6.85%) of the order Coraciiformes, 4 species (5.48%) each of the orders Columbiformes and Gruiformes, 3 species (4.11%) of the order Cuculiformes, 2 species (2.74%) each of the orders Pelecaniformes, Psittaciformes and Accipitriformes and only 1 species (1.37%) each of the orders Podicipediformes, Piciformes, Galliformes, Bucerotiformes and Upupiformes (Table 1 and Fig. 2). Number of species of each represented family of different order has been presented in Fig. 3. On the basis of percentage encounter rate, the recorded bird species were categorized into four categories, *i.e.*, Abundant (A), Common (C), Uncommon (UC) and Rare (Ra). Abundance status of identified avian species at three selected wetlands has been presented in Table 4.1. Analysis of data revealed that out of total 73 recorded species, 9 species (12.33%) were abundant (A), 29 avian species (39.73%) were Common (C) and 22 species (30.14%) were Uncommon (UC) (Fig. 2). The remaining 13 (17.81%) avian species, namely, White Wagtail, *Motacilla alba*; Citrine Wagtail, *Motacilla citreola*; White-tailed Lapwing, *Vanellus*

*leucurus*; Wood Sandpiper, *Tringa glareola*; Common Greenshank, *Tringa nebularia*; Common Redshank, *Tringa tetanus*; Black Stork, *Ciconia nigra*; Blue-cheeked Bee-eater, *Merops persicus*; Common Coot, *Fulica atra*; Alexandrine Parakeet, *Psittacula eupatria*; Common Hoopoe, *Upupa epops*; Black Kite, *Milvus migrans* and Indian Grey Hornbill, *Ocyrceros birostris* were categorized as rare (Ra) species based on encounter rate (Table 1 and Fig. 2).

In order to assess the seasonal variation in avian species richness, the recorded bird species were categorized as Resident (R), Winter Migratory (WM), Summer Migratory (SM) and Local Migratory (LM). Analysis of data on seasonal migration revealed that of the total 73 avian species encountered, 51 (69.86%) were resident species, 17 (23.29%) were winter migrants, 3 (4.11%) were summer migrants and only 2 species (2.74%) were found to be local migrants (Fig. 3).

In the present study, a total number of 73 species of water-birds and water-associated birds have been recorded collectively from all the three wetland habitats. Earlier, Gupta *et al.* (2010) reported 63 species of wetland birds belonging to 10 orders and 16 families from various village ponds in Kaithal district. Gupta and Kaushik (2010) studied the spectrum of endangered avian diversity in the village ponds of Northern Haryana and recorded 80 species of wetland birds belonging to 10 orders and 20 families. Tak *et al.* (2010) observed 31 species of wetland birds from the Hathinikund Barrage in Yamunanagar (Haryana). It is pertinent to mention that Gupta and Kaushik (2011) reported 47 species of wetland birds from Hathinikund Barrage. Also, Chopra *et al.* (2012) reported 87 species of water-bird and water-associated birds categorized into 58 genera, 24 families and 10 orders. In the present study, order Passeriformes has represented the maximum number of bird species followed by Ciconiiformes and Charadriiformes. These findings are supported by the earlier study on Damdamma Jheel, Haryana (Gupta and Kaushik, 2012). Dominance of Passerines was also reported earlier by many ornithologists (Yadav and Maleywar, 1978; Gupta and Bajaj, 2002, Chopra and Sharma, 2012; Chopra *et al.*, 2013). 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. During the present study, only single bird species *i.e.* Black Drongo (Table 1) was reported from Dicruridae of order Passeriformes. Earlier, Toor *et al.* (1982); Gupta and Bajaj (2002); Chopra and Sharma (2012) and Chopra *et al.* (2012) also reported

the similar findings. Family Sturnidae of the order Passeriformes was represented by four species, namely, Asian Pied Starling, Bank Myna, Common Myna and Brahminy Starling (Table 1). Chopra and Sharma (2012) also reported the presence of 4 species in Shivalik region of Haryana. In the present study, family Pycnonotidae was represented by two species viz. Red-vented Bulbul and Yellow-vented bulbul. Earlier, Gupta *et al.* (2012) reported only single species viz. Red-vented Bulbul from family Pycnonotidae. Other ornithologists such as Chopra and Sharma (2012) and Chopra *et al.* (2013) also reported the presence of Red-vented Bulbul in Shivalik region of Haryana and Sultanpur National Park, Gurgaon respectively. Order Charadriiformes was represented by 8 species which belonged to 4 families. Other ornithologists reported higher number of species from various regions of India (Tak *et al.*, 2010; Gupta and Kaushik, 2011; Gupta *et al.*, 2012, Chopra *et al.*, 2012). However, Chopra and Sharma (2014) observed lesser number of species *i.e.* only 5 species of the order Charadriiformes. In the present study, White-tailed Lapwing was observed which was absent in some of the earlier studies in Haryana (Kumar and Gupta, 2009; Gupta *et al.*, 2012; Chopra and Sharma, 2012; Aggarwal, 2014). Of the order Coraciiformes, 5 species belonging to 3 families were documented from all the study sites in the present venture. However, Gupta *et al.* (2012) sighted 10 species of the same order from Jhajjar, Haryana and Chopra *et al.* (2012) reported 12 species which belonged to 6 families. Order Psittaciformes was represented only 2 species, namely, Rose-ringed Parakeet and Alexandrine Parakeet. Similar findings were reported earlier by Chopra *et al.* (2012) from Sultanpur National Park, Gurgaon.

Analysis of data revealed that out of total 73 recorded species, 9 species were abundant (A), 29 avian species were Common (C), 22 species were Uncommon (UC) and 13 species were Rare (Ra). Similar studies have been carried out in different part of the country to know the abundance status of various avian species (Kumar and Gupta, 2009; Das and Saikia, 2011; Balapure *et al.*, 2012; Bhadja and Vaghela, 2013; Chopra *et al.*, 2012; Chopra and Sharma, 2014; Mistry and Mukherjee, 2015). Kumar and Gupta (2009) recorded Northern Shoveller (*Anas clypeata*), Northern Pintail (*Anas acuta*), White-Breasted Kingfisher (*Halcyon smyrnensis*), White-Breasted Water Hen (*Amaurornis phoenicurus*), Common Moorhen (*Gallinula chloropus*), Black-Winged Stilt (*Himantopus himantopus*), Red-Wattled Lapwing (*Vanellus indicus*), Cattle Egret (*Bubulcus ibis*) and Indian Pond-Heron (*Ardeola grayii*) as the common

species, while, Purple Heron (*Ardea purpurea*) and Lesser Pied Kingfisher (*Ceryle rudis*) as rare species inhabiting the water bodies of Kurukshetra.

Population of Red-wattled Lapwing, Black-winged Stilt, Common Moorhen, Great Cormorant and Little Cormorant was found to be high in winter season from December to February, as compared to rest of the year. Kumar and Gupta (2013) also observed the similar findings and reported that Black-winged Stilt and Little Cormorant were found in higher number, but their presence in Summer and Monsoon confirmed the status as "Resident". Common Sandpiper, Common Coot, White Wagtail, Citrine Wagtail, Little Grebe, Black Stork, Black Kite, Common Redshank, Common Pochard, Spot-billed Duck, Common Teal, Northern Pintail, Northern Shoveler, Common Greenshank and Gadwall were recorded in small numbers only in the winter season. Kaushik and Gupta (2014) also reported Common Pochard, Common Teal, Northern Pintail, Northern Shoveler, Spot-billed Duck, Common Greenshank and Gadwall and Common Sandpiper as winter visitors. They also reported these birds in small numbers from Asan Barrage near Paonta sahib, Northern India. In the present study, Cattle Egrets have been reported in very large numbers on the trees around the water body in the month of March, April, May and June as compared to rest of the year. Such a large population may be due to onset of breeding season.

#### Factors affecting the biodiversity at the study sites

A humans produce habitat fragmentation which is a significant cause of biodiversity destruction (Simberloff, 1992) and reduces species richness and taxon diversity (Kruess and Tscharntke, 1994) by urbanization, pollution, deforestation and agricultural land conversion. In the present study, a number of factors and drivers have been observed at the study sites which may affect the biodiversity. These included (i) noise due to plying vehicles on nearby roads at CL and BP sites (ii) deforestation around the study sites (iii) dumping of domestic garbage in and around the water bodies (iv) high tension electric wires crossing through nearby agricultural area at all the study sites (v) washing of cloths at the bank of water body at BP and CL site (vi) encroachment for making buildings (vii) dumping of sewage water deteriorating the water quality at CL site (viii) high anthropogenic activities during religious ceremony at BP site. Many of such kinds of drivers have been reported in earlier studies to cause the loss of biodiversity (Chopra *et al.*, 2014). On the basis of present investigation, following recommendations has been contemplated:

- Use of soaps and detergents should be completely prohibited.
- Plantations should be done on the bank of water bodies and there should be check on deforestation.
- Awareness programs should be initiated to make the people aware about the importance of wildlife.
- Water quality should be monitored at regular intervals.
- Intrusion of water body for settlements and its misuse for religious activities like idol immersion should be restricted.
- There should be ban on dumping of garbage, harmful chemicals like pesticides and sewage water in the water bodies to maintain the water quality which will indirectly help to conserve the bird diversity.
- Government authorities should take adequate steps for management of domestic and sewage discharge as well as embankment of water bodies so that proper nesting sites can be provided to the birds.

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**Table 1: Birds' Inventory of selected wetland habitats of study area during the two year study period (December, 2012 to November, 2014)**

Sr. No.	Common Name	Zoological Name	IUCN Status	Residential Status	Abundance Status
<b>1. Order: Passeriformes</b>					
<b>Family: Laniidae</b>					
1	Long-tailed Shrike	<i>Lanius schach</i>	LC	R	C
<b>Family: Motacillidae</b>					
2	White Wagtail	<i>Motacilla alba</i>	LC	WM	Ra
3	White-browed Wagtail	<i>Motacilla madaraspatisensis</i>	LC	R	C
4	Citrine Wagtail	<i>Motacilla citreola</i>	LC	WM	Ra
<b>Family: Cettidae</b>					
5	Bush Warbler	<i>Cettia sp.</i>	LC	R	C
<b>Family: Sturnidae</b>					
6	Asian Pied Starling	<i>Gracupica contra</i>	LC	R	C

7	Bank Myna	<i>Acridotheres ginginianus</i>	LC	R	C
8	Common Myna	<i>Acridotheres tristis</i>	LC	R	A
9	Brahminy Starling	<i>Sturnia pagodarum</i>	LC	R	C
<b>Family: Nectariniidae</b>					
10	Purple Sun Bird	<i>Nectarinia asiatica</i>	LC	R	C
<b>Family: Pycnonotidae</b>					
11	Red-vented Bulbul	<i>Pycnonotus cafer</i>	LC	R	UC
12	Yellow-throated Bulbul	<i>Pycnonotus xantholaemus</i>	LC	R	UC
<b>Family: Dicuridae</b>					
13	Black Drongo	<i>Dicurus macrocercus</i>	LC	R	C
<b>Family: Muscipidae</b>					
14	Indian Robin	<i>Saxicoloides fulicata</i>	LC	R	C
15	Pied Bushchat	<i>Saxicola caprata</i>	LC	R	C
16	Common Babbler	<i>Turdoides striata</i>	LC	R	C
17	Jungle Babbler	<i>Turdoides caudate</i>	LC	R	C
18	Large Grey Babbler	<i>Turdoides malcolmi</i>	LC	R	C
<b>Family: Cisticolidae</b>					
19	Plain Prinia	<i>Prinia inornata</i>	LC	R	C
<b>Family: Corvidae</b>					
20	Black-Billed Magpie	<i>Pica pica</i>	LC	R	UC
21	Large-billed Crow	<i>Corvus macrorhynchos</i>	LC	R	UC
<b>Family: Passeridae</b>					
22	House Sparrow	<i>Passer domesticus</i>	LC	R	UC
<b>2. Order: Podicipediformes</b>					
<b>Family: Podicipedidae</b>					
23	Little Grebe	<i>Tachybaptus rufficollis</i>	LC	R	UC
<b>3. Charadriiformes</b>					
<b>Family: Charadriidae</b>					
24	Red-wattled Lapwing	<i>Vanellus indicus</i>	LC	R	A
25	White-tailed Lapwing	<i>Vanellus leucurus</i>	LC	WM	Ra
<b>Family: Recurvirostridae</b>					
26	Black-winged Stilt	<i>Himantopus himantopus</i>	LC	R	A
<b>Family: Scolopacidae</b>					
27	Common Sandpiper	<i>Actitis hypoleucos</i>	LC	WM	UC

28	Wood Sandpiper	<i>Tringa glareola</i>	LC	WM	Ra
29	Common Green Shank	<i>Tringa nebularia</i>	LC	WM	Ra
30	Common Red Shank	<i>Tringa Totanus</i>	LC	WM	Ra
<b>Family: Burhinidae</b>					
31	Eurasian Thick-knee	<i>Burhinus oedicnemus</i>	LC	R	C
<b>4. Order: Ciconiiformes</b>					
<b>Family: Ardeidae</b>					
32	Great Egret	<i>Ardea alba</i>	LC	R	A
33	Median Egret	<i>Mesophoyx intermedia</i>	LC	R	C
34	Little Egret	<i>Egretta garzetta</i>	LC	R	C
35	Cattle Egret	<i>Bubulcus ibis</i>	LC	R	A
36	Grey Heron	<i>Ardea cinerea</i>	LC	R	UC
37	Indian Pond Heron	<i>Ardeola grayii</i>	LC	R	C
38	Purple Heron	<i>Ardea purpurea</i>	LC	R	UC
39	Yellow Bittern	<i>Ixobrychus sinensis</i>	LC	SM	UC
<b>Family: Ciconiidae</b>					
40	White Stork	<i>Orthotomous sutoris</i>	LC	LM	UC
41	Black Stork	<i>Ciconia nigra</i>	LC	WM	Ra
<b>5. Order: Pelecaniformes</b>					
<b>Family: Phalacrocoracidae</b>					
42	Little Cormorant	<i>Microcarbo niger</i>	LC	R	UC
43	Great Cormorant	<i>Phalacrocorax carbo</i>	LC	R	C
<b>6. Order: Columbiformes</b>					
<b>Family: Columbidae</b>					
44	Laughing Dove	<i>Spilopelia senegalensis</i>	LC	R	A
45	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	LC	R	A
46	Yellow Footed green Pigeon	<i>Treron phoenicoptera</i>	LC	R	UC
47	Rock Pigeon	<i>Columba livia</i>	LC	R	C
<b>7. Order: Coraciiformes</b>					
<b>Family: Alcedinidae</b>					
48	White-breasted Kingfisher	<i>Halcyon smyrnensis</i>	LC	R	C
49	Common Kingfisher	<i>Alcedo atthis</i>	LC	LM	UC
<b>Family: Meropidae</b>					
50	Green Bee-eater	<i>Merops orientalis</i>	LC	R	C

51	Blue-cheeked Bee-eater	<i>Merops persicus</i>	LC	SM	Ra
<b>Family: Coraciidae</b>					
52	Indian Roller	<i>Coracias benghalensis</i>	LC	R	C
<b>8. Order: Gruiformes</b>					
<b>Family: Rallidae</b>					
53	Common Moorehen	<i>Gallinula chloropus</i>	LC	R	A
54	Common Coot	<i>Fulica atra</i>	LC	WM	Ra
55	Purple Swamphen	<i>Porphyrio porphyrio</i>	LC	R	UC
56	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	LC	R	A
<b>9. Order: Piciformes</b>					
<b>Family: Picidae</b>					
57	Golden Wood-pecker	<i>Dinopium benghelense</i>	LC	R	C
<b>10. Order: Cuculiformes</b>					
<b>Family: Cuculidae</b>					
58	Greater Cauca	<i>Centropus sinensis</i>	LC	R	C
59	Pied Cuckoo	<i>Clamator jacobinus</i>	LC	R	C
60	Asian Koel	<i>Eudynamys scolopaceus</i>	LC	R	C
<b>11. Order: Psittaciformes</b>					
<b>Family: Psittacidae</b>					
61	Rose-ringed Parakeet	<i>Psittacula krameri</i>	LC	R	C
62	Alexandrine Parakeet	<i>Psittacula eupatria</i>	NT	R	Ra
<b>12. Order: Galliformes</b>					
<b>Family: Phasianidae</b>					
63	Grey Francolin	<i>Francolinus pondicerianus</i>	LC	R	C
<b>13. Order: Upupiformes</b>					
<b>Family: Upupidae</b>					
64	Common Hoopoe	<i>Upupa epops</i>	LC	R	Ra
<b>14. Order: Accipitriformes</b>					
<b>Family: Accipitridae</b>					
65	Black Kite	<i>Milvus migrans</i>	LC	WM	Ra
66	Shikra	<i>Accipiter badius</i>	LC	R	UC
<b>15. Order: Anseriformes</b>					
<b>Family: Anatidae</b>					
67	Spot-billed Duck	<i>Anas poecilorhyncha</i>	LC	WM	UC



68	Northern Pintail	<i>Anas acuta</i>	LC	WM	UC
69	Northern Shoveller	<i>Anas clypeata</i>	LC	WM	UC
70	Common Pochard	<i>Aythya ferina</i>	LC	WM	UC
71	Common Teal	<i>Anas crecca</i>	LC	WM	UC
72	Gadwall	<i>Anas strepera</i>	LC	WM	UC
<b>16. Order: Bucerotiformes</b>					
<b>Family: Bucerotidae</b>					
73	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	LC	R	Ra

R= Resident, WM= Winter Migrant, SM= Summer Migrant, LM= Local Migrant, A= Abundant,

C=Common, UC= Uncommon, Ra= Rare, LC= Least Concerned, NT= Near Threatened.

**Table 2: Order wise and family wise distribution of number of bird species in different wetlands of study area**

Taxon	Order/Family wise distribution of sighted avian species	Number of bird species sighted in each wetland		
		DL	CL	BP
<b>Order: Passeriformes</b>	<b>22</b>	<b>22</b>	<b>6</b>	<b>17</b>
Family: Laniidae	1	1	1	1
Family: Motacillidae	3	3	2	3
Family: Cettiidae	1	1	-	1
Family: Sturnidae	4	4	3	4
Family: Nectariniidae	1	1	-	1
Family: Pycnonotidae	2	2	-	-
Family: Dicuridae	1	1	-	1
Family: Muscicapidae	5	5	-	4
Family: Cisticolidae	1	1	-	-
Family: Corvidae	2	2	-	1
Family: Passeridae	1	1	-	1
<b>Order: Podicipediformes</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>-</b>
Family: Podicipedidae	1	1	-	-
<b>Order: Charadriiformes</b>	<b>8</b>	<b>6</b>	<b>6</b>	<b>6</b>
Family: Charadriidae	2	1	2	1
Family: Recurvirostridae	1	1	1	1
Family: Scolopacidae	4	3	2	3
Family: Burhinidae	1	1	1	1
<b>Order: Ciconiiformes</b>	<b>10</b>	<b>10</b>	<b>6</b>	<b>7</b>
Family: Ardeidae	8	8	6	7

Family: Ciconiidae	2	2	-	-
<b>Order: Pelecaniformes</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
Family: Phalacrocoracidae	2	2	2	2
<b>Order: Columbiformes</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>4</b>
Family: Columbidae	4	4	2	4
<b>Order: Coraciiformes</b>	<b>5</b>	<b>5</b>	<b>2</b>	<b>5</b>
Family: Alcedinidae	2	2	2	2
Family: Meropidae	2	2	-	2
Family: Coraciidae	1	1	-	1
<b>Order: Gruiformes</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>
Family: Rallidae	4	4	4	4
<b>Order: Piciformes</b>	<b>1</b>	<b>1</b>	-	<b>1</b>
Family: Picidae	1	1	-	1
<b>Order: Cuculiformes</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
Family: Cuculidae	3	3	2	3
<b>Order: Psittaciformes</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>
Family:Psittacidae	2	2	1	1
<b>Order: Galliformes</b>	<b>1</b>	<b>1</b>	-	<b>1</b>
Family: Phasianidae	1	1	-	1
<b>Order: Upupiformes</b>	<b>1</b>	<b>1</b>	-	<b>1</b>
Family: Upupidae	1	1	-	1
<b>Order: Accipitriformes</b>	<b>2</b>	<b>2</b>	-	-
Family: Accipitridae	2	2	-	-
<b>Order: Anseriformes</b>	<b>6</b>	<b>6</b>	<b>1</b>	<b>6</b>
Family: Anatidae	6	6	1	6
<b>Order: Bucerotiformes</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Family: Bucerotidae	1	1	1	1

**DP:** Daulatpuria Pond; **CL:** Chilli Lake; **BP:** Bhodia Khera Temple Pond

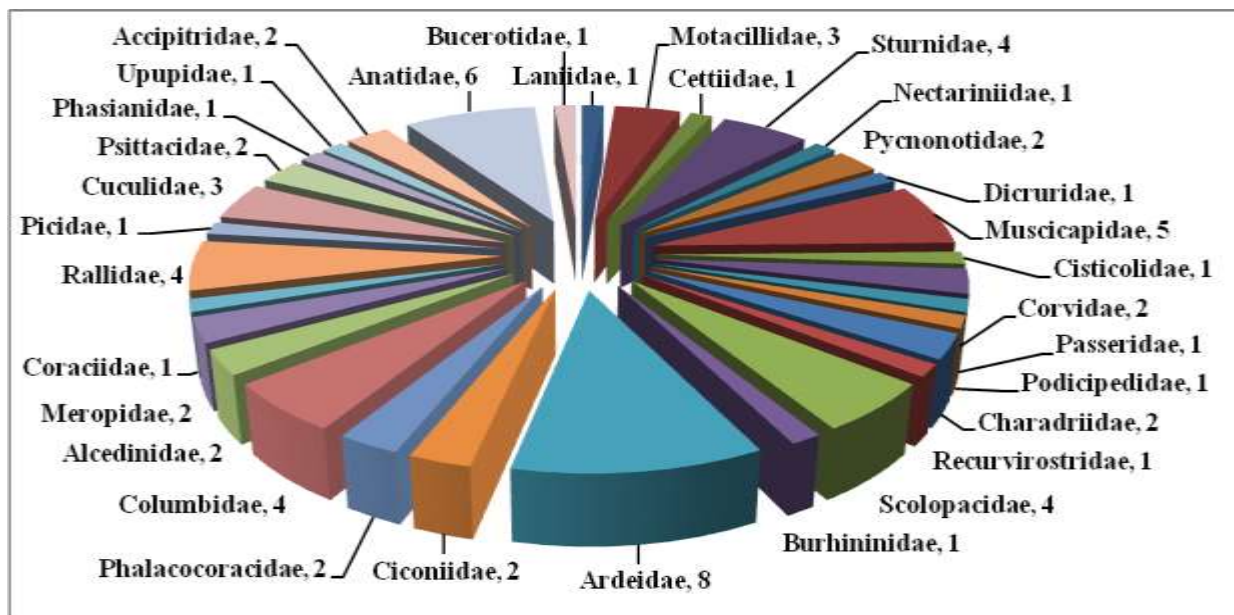


Fig. 1: Number of avian species belonging to different families in the study area

Table 3: Per cent Composition and number of bird species in each represented avian order and family

S. No.	Order	Number (%) of Species	Family	Number (%) of Species
1	Passeriformes	22 (30.14%)	Laniidae	1 (4.55%)
			Motacillidae	3 (13.64%)
			Cettiidae	1 (4.55%)
			Sturnidae	4 (18.18%)
			Nectariniidae	1 (4.55%)
			Pycnonotidae	2 (9.09%)
			Dicruridae	1 (4.55%)
			Muscicapidae	5 (22.72%)
			Cisticolidae	1 (4.55%)
			Corvidae	2 (9.09%)
			Passeridae	1 (4.55%)
2	Podicipediformes	1 (1.37%)	Podicipedidae	1 (100%)
3	Charadriiformes	8 (10.96%)	Charadriidae	2 (25%)
			Recurvirostridae	1 (12.5%)
			Scolopacidae	4 (50%)
4	Ciconiiformes	10 (13.70%)	Ardeidae	8 (80%)

			Ciconiidae	2 (20%)
5	Pelecaniformes	2 (2.74%)	Phalacrocoracidae	2 (100%)
6	Columbiformes	4 (5.48%)	Columbidae	4 (100%)
7	Coraciiformes	5 (6.85%)	Alcedinidae	2 (40%)
			Meropidae	2 (40%)
			Coraciidae	1 (20%)
8	Gruiformes	4 (5.48%)	Rallidae	4 (100%)
9	Piciformes	1 (1.37%)	Picidae	1 (100%)
10	Cuculiformes	3 (4.11%)	Cuculidae	3 (100%)
11	Psittaciformes	2 (2.74%)	Psittacidae	2 (100%)
12	Galliformes	1 (1.37%)	Phasianidae	1 (100%)
13	Upupiformes	1 (1.37%)	Upupidae	1 (100%)
14	Accipitriformes	2 (2.74%)	Accipitridae	2 (100%)
15	Anseriformes	6 (8.22%)	Anatidae	6 (100%)
16	Bucerotiformes	1 (1.37%)	Bucerotidae	1 (100%)

**Table 4: A composite list of birds sighted at study sites (DP, CL and BP) during the study period (December, 2012 to November, 2014)**

S.No.	Common Name	Scientific Name	DP	CL	BP
1	Long-tailed Shrike	<i>Lanius schach</i>	+	+	+
2	White Wagtail	<i>Motacilla alba</i>	+	+	+
3	White-browed Wagtail	<i>Motacilla madaraspatisensis</i>	+	+	+
4	Citrine Wagtail	<i>Motacilla citreola</i>	+	-	+
5	Bush Warbler	<i>Cettia sps</i>	+	-	+
6	Asian Pied Starling	<i>Gracupica contra</i>	+	+	+
7	Bank Myna	<i>Acridotheres ginginianus</i>	+	+	+
8	Common Myna	<i>Acridotheres tristis</i>	+	+	+
9	Brahminy Starling	<i>Sturnia pagodarum</i>	+	-	+
10	Purple Sun Bird	<i>Nectarinia asiatica</i>	+	-	+
11	Red-vented Bulbul	<i>Pycnonotus cafer</i>	+	-	-
12	Yellow-throated Bulbul	<i>Pycnonotus xantholaemus</i>	+	-	-
13	Black Drongo	<i>Dicrurus macrocercus</i>	+	-	+
14	Indian Robin	<i>Saxicoloides fulicata</i>	+	-	-
15	Pied Bushchat	<i>Saxicola caprata</i>	+	-	+
16	Common Babbler	<i>Turdoides striata</i>	+	-	+

17	Jungle Babbler	<i>Turdoides caudata</i>	+	-	+
18	Large Grey Babbler	<i>Turdoides malcolmi</i>	+	-	+
19	Plain Prinia	<i>Prinia inornata</i>	+	-	-
20	Black-Billed Magpie	<i>Pica pica</i>	+	-	-
21	Large-billed Crow	<i>Corvus macrorhynchos</i>	+	-	+
22	House Sparrow	<i>Passer domesticus</i>	+	-	+
23	Little Grebe	<i>Tachybaptus rufficollis</i>	+	-	-
24	Red-wattled Lapwing	<i>Vanellus indicus</i>	+	+	+
25	White-tailed Lapwing	<i>Vanellus leucurus</i>	-	+	-
26	Black-winged Stilt	<i>Himantopus himantopus</i>	+	+	+
27	Common Sandpiper	<i>Actitis hypoleucos</i>	+	+	+
28	Wood Sandpiper	<i>Tringa glareola</i>	-	+	-
29	Common Green Shank	<i>Tringa nebularia</i>	+	-	+
30	Common Red Shank	<i>Tringa Totanus</i>	+	-	+
31	Eurasian Thick-knee	<i>Burhinus oedicephalus</i>	+	+	+
32	Great Egret	<i>Ardea alba</i>	+	+	+
33	Median Egret	<i>Mesophoyx intermedia</i>	+	-	-
34	Little Egret	<i>Egretta garzetta</i>	+	+	+
35	Cattle Egret	<i>Bubulcus ibis</i>	+	+	+
36	Grey Heron	<i>Ardea cinerea</i>	+	+	+
37	Indian Pond Heron	<i>Ardeola grayii</i>	+	+	+
38	Purple Heron	<i>Ardea purpurea</i>	+	-	+
39	Yellow Bittern	<i>Ixobrychus sinensis</i>	+	+	+
40	White Stork	<i>Orthotomus sutoris</i>	+	-	-
41	Black Stork	<i>Ciconia nigra</i>	+	-	-
42	Little Cormorant	<i>Microcarbo niger</i>	+	+	+
43	Great Cormorant	<i>Phalacrocorax carbo</i>	+	+	+
44	Laughing Dove	<i>Spilopelia senegalensis</i>	+	+	+
45	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	+	+	+
46	Yellow Footed green Pigeon	<i>Treron phoenicoptera</i>	+	-	+
47	Blue Rock Pigeon	<i>Columba livia</i>	+	-	+
48	White-breasted Kingfisher	<i>Halcyon smyrnensis</i>	+	+	+
49	Common Kingfisher	<i>Alcedo atthis</i>	+	+	+
50	Green Bee-eater	<i>Merops orientalis</i>	+	-	+



51	Blue-cheeked Bee-eater	<i>Merops persicus</i>	+	-	+
52	Indian Roller	<i>Coracias benghalensis</i>	+	-	+
53	Common Moorehen	<i>Gallinula chloropus</i>	+	+	+
54	Common Coot	<i>Fulica atra</i>	+	+	+
55	Purple Swampphen	<i>Porphyrio porphyrio</i>	+	+	+
56	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	+	+	+
57	Golden Wood-pecker	<i>Dinopium benghelense</i>	+	-	+
58	Greater Cauca	<i>Centropus sinensis</i>	+	+	+
59	Pied Cuckoo	<i>Clamator jacobinus</i>	+	-	+
60	Asian Koel	<i>Eudynamis scolopaceus</i>	+	+	+
61	Rose-ringed Parakeet	<i>Psittacula krameri</i>	+	+	+
62	Alexandrine Parakeet	<i>Psittacula eupatri</i>	+	-	-
63	Grey Francolin	<i>Francolinus pondicerianus</i>	+	-	+
64	Common Hoopoe	<i>Upupa epops</i>	+	-	+
65	Black Kite	<i>Milvus migrans</i>	+	-	-
66	Shikra	<i>Accipiter badius</i>	+	-	-
67	Spot-billed Duck	<i>Anas poecilorhyncha</i>	+	+	+
68	Northern Pintail	<i>Anas acuta</i>	+	-	+
69	Northern Shoveller	<i>Anas clypeata</i>	+	-	+
70	Common Pochard	<i>Aythya ferina</i>	+	-	+
71	Common Teal	<i>Anas crecca</i>	+	-	+
72	Gadwall	<i>Anas strepera</i>	+	-	+
73	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	+	+	+

**DP:** Daulatpuria Pond; **CL:** Chilli Lake; **BP:** Bhodia Khera Temple Pond;

(+): Present; (-): Absent

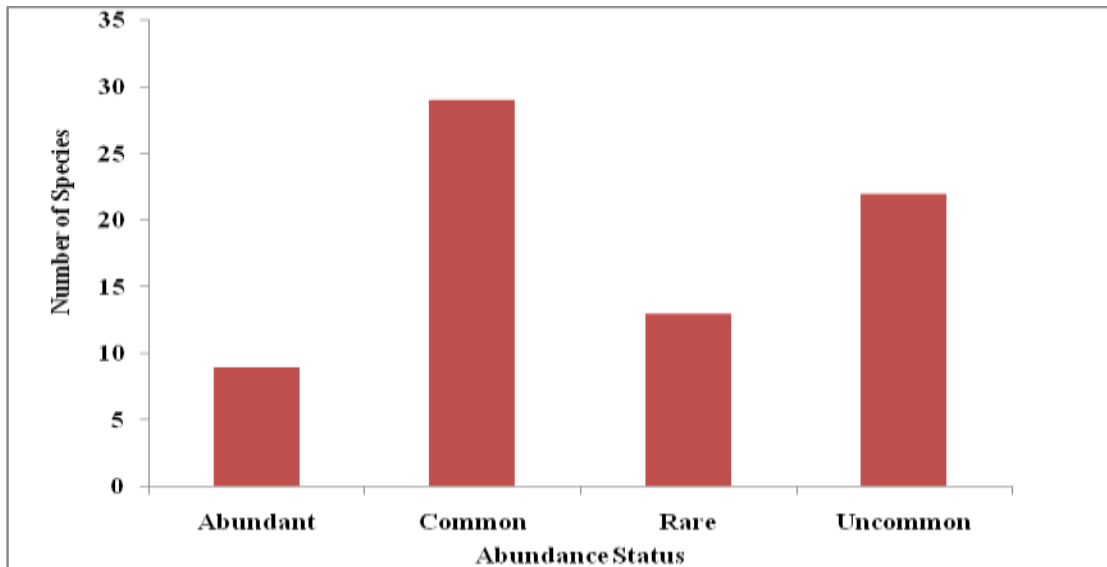


Fig. 2: Abundance status of avian fauna reported in the study area

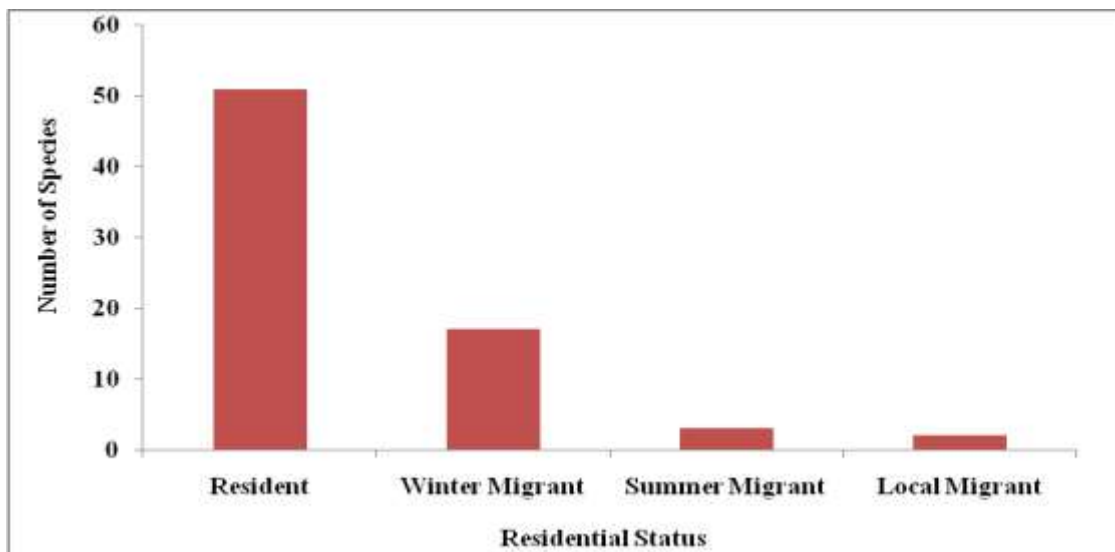


Fig. 3: Residential status of avian fauna in the study area

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