

## Avifaunal Diversity in Unprotected Rural Wetland : Records from Kurukshetra, Haryana, India

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### ABSTRACT

The man-made, perennial and primarily rain-fed village ponds, an integral component of rural landscape in India, harbor a diverse range of resident and migratory birds. We surveyed unprotected rural pond of Thana village in Kurukshetra District, Haryana, India to assess the composition, abundance and diversity of avifauna from April 2019 to March 2021, using point count and direct observation methods. A total of 140 bird species belonging to 97 genera, distributed among 45 families and 17 orders were recorded. Anatidae was the most diverse family with 18 species, constituting 12.8% of the bird community in the study area. Among the recorded bird species, 88 (62.86%) species were residents, 48 (34.28%) species were winter migrants, and only 4 (2.86%) species were summer migrants. The insectivore guild was the most abundant with 40 species. The study records

the presence of eight bird species of conservation importance (six Near Threatened species and two vulnerable species) according to the IUCN Red list. In addition to this, the studied wetland also supported 40 (28.6%) bird species, whose global population trend is decreasing. These findings emphasize the role of unprotected rural wetlands in providing potential habitat for birds throughout the year. Further studies should be designed to understand the major factors influencing the presence or absence of birds in unprotected rural ponds so that these wetlands may be properly managed by implementing specific strategies to secure the potential habitat of birds.

**Keywords** Avifauna, Diversity, Conservation, Rural ponds, Kurukshetra.

### INTRODUCTION

Wetlands are considered to be among the most productive and dynamic ecosystems on the planet, serving as an ecotone between terrestrial and aquatic habitats (Zedler and Kercher 2005). They have distinct ecological properties, roles and values. Globally, wetlands cover about 6% of the earth's surface and are cradles of life for a wide array of species including invertebrates, fish, amphibians, reptiles, birds, mammals and plants. As a result, wetlands are considered as biodiversity repositories within an area or landscape.

Birds are an inseparable component of wetland ecosystems as they play an important role in nutrient

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recycling and occupy different trophic levels in the food web (Custer and Osborn 1977, Rajashekara and Venkatesha 2010). Birds also act as useful bio-indicators reflecting the ecological health of the wetland ecosystems (Custer and Osborn 1977). Wetlands are important for resident as well as migratory birds as they provide them with foraging, breeding, roosting and nesting habitats and sometimes also serve as stopover sites (Kumar *et al.* 2016). India has around 4.7% of the total geographical area of the country under wetlands (Bassi *et al.* 2014). About 25% of the total bird species recorded in India are found to be dependent on wetlands (Kumar *et al.* 2005).

The man-made, perennial and primarily rain-fed village ponds are an integral component of rural landscape in India. These are generally used to harvest rainwater and bathe domestic cattle. They have historically been employed as a cost-effective method of retaining water for irrigation. Furthermore, these rural ponds serve as a balanced habitat for local flora and fauna (Kaur *et al.* 2018). These village ponds are unprotected wetlands as they have no official protection or conservation status and are also open for public use (Blanckenberg *et al.* 2020). These wetlands are usually ignored, but such wetlands too provide the required habitat to the birds. These wetlands are essential wintering grounds for large congregations of migratory birds. However, the status of bird assemblages in these rural wetlands is largely unknown. Very less information is available on the status and diversity of avifauna in rural ponds in India, especially in Haryana (Ali *et al.* 2013, Kaur *et al.* 2018). Sustainable management of these ecological ponds is essential for biodiversity conservation point of view. The significance of local landscapes for conservation of avifauna can only be recognized by understanding the structure and composition of bird community in the particular landscape. Information on the species composition and seasonal assemblages of birds in a specific wetland environment is immensely useful in assessing the habitat conditions and designing appropriate conservation and management strategies for long-term biodiversity protection. In this context, the present study was designed to document the species richness, abundance and community composition of birds in the rural pond of village Thana in Kurukshetra District of Haryana, India.

## MATERIALS AND METHODS

### Study area

The present study was conducted in village Thana of Kurukshetra District (29° 52' N to 30° 12' N and 76° 26' E to 77° 04' E). Situated in the North-Eastern part of the Haryana State, Kurukshetra District has an area of 1530 km<sup>2</sup>, accounting for 3.8% of the total area of the state. Saraswati, Markanda and Ghaggar are the main rivers of the region. From agriculture point of view, it is one of the most fertile districts of the state. The selected rural pond is man-made, perennial and primarily rainfed and water levels varied seasonally depending on the amount of rainfall received, but can also be filled with drainage passing near the village. This pond is surrounded by human habitations on one side and agricultural fields on the other, with local people using the pond for their domestic and livelihood needs. The surrounding agriculture fields with wheat and paddy as main crops provide extra foraging ground for certain bird species, islands with their trees provide suitable roosting and nesting sites. The study area, experiencing sub-tropical climate, has three seasons : Rainy (July to September), cool and dry (October-February) and the hot dry (March-June); temperature ranges 3°- 45° C and annual rainfall averages 582 mm.

### Data collection

Bird surveys were conducted at two-week intervals from April 2019 to March 2021, using point-count method (Bibby *et al.* 2000). Twelve vantage points, at least 250 m apart, were selected at the perimeter of the pond. Each point location was surveyed 24 times during the entire study period. On arrival at a survey point, an initial five-minute settling-down period was used prior to counting the birds and fifteen minutes were spent at each vantage point for recording the birds. The substantial care was taken when counting birds to avoid double counts. Birds were recorded directly with the help of field binoculars (Nikon 7 × 35), during hours of peak activity 06:00 to 10:00 h and 16:00 to 18:00 h. Opportunistic records of birds at other times were also included to document a comprehensive checklist. Birds were identified using field guides (Ali and Ripley 1987, Grimmett *et al.* 2011).

**Table 1.** Checklist of avifauna recorded from Thana village of Kurukshetra District, Haryana, India. R- Resident, S- Summer migrant, W- Winter migrant, CO- Common, FC- Fairly common, UC- Uncommon, RA- Rare, I- Insectivorous, O- Omnivorous, C- Carnivorous, H- Herbivorous, N- Nectarivorous, G- Grainivorous, F-Frugivorous, LC- Least concern, NT- Near threatened, VU- Vulnerable, →- Stable, ↑- Increasing, ↓- Decreasing, ?- Unknown, IUCN- International Union for Conservation of Nature, IWPA- Indian Wildlife (Protection Act), 1972, CITES- The Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Sl. No.	Order/Family/ Common english name	Scientific name	Residential status	Local status	Feeding guild	Conservation status			Global status	Time of migration	
						IUCN	IWPA	CITES		Arrival	Departure
Order: Anseriformes Family: Anatidae											
1	Lesser Whistling Duck	<i>Dendrocygna javanica</i>	S	UC	O	LC	IV		↓	May	October
2	Bar-headed Goose	<i>Anser indicus</i>	W	UC	H	LC	IV		↓	November	March
3	Greylag Goose	<i>Anser anser</i>	W	RA	H	LC	IV		↑	December	March
4	Ruddy Shelduck	<i>Tadorna ferruginea</i>	W	UC	O	LC	IV		?	November	March
5	Common Shelduck	<i>Tadorna tadorna</i>	W	RA	O	LC	IV		↑	December	January
6	Red-crested Pochard	<i>Netta rufina</i>	W	RA	O	LC	IV		?	December	February
7	Common Pochard	<i>Aythya ferina</i>	W	RA	O	VU	IV		↓	December	February
8	Ferruginous Duck	<i>Aythya nyroca</i>	W	RA	O	NT	IV		↓	December	January
9	Tufted Duck	<i>Aythya fuligula</i>	W	UC	O	LC	IV		→	November	March
10	Garganey	<i>Spatula querquedula</i>	W	RA	O	LC	IV		↓	January	February
11	Northern Shoveler	<i>Spatula clypeata</i>	W	UC	O	LC	IV		↓	November	March
12	Gadwall	<i>Mareca strepera</i>	W	UC	H	LC	IV		↑	November	March
13	Eurasian Wigeon	<i>Mareca penelope</i>	W	UC	H	LC	IV		↓	December	March
14	Indian Spot-billed Duck	<i>Anas poecilorhyncha</i>	R	CO	H	LC	IV		↓	-	-
15	Mallard	<i>Anas platyrhynchos</i>	W	RA	O	LC	IV		↑	December	February
16	Northern Pintail	<i>Anas acuta</i>	W	UC	H	LC	IV		↓	November	March
17	Common Teal	<i>Anas crecca</i>	W	UC	H	LC	IV		?	November	March
18	Knob-billed Duck	<i>Sarkidiornis melanotos</i>	R	FC	O	LC	IV	II	↓	-	-
Order : Galliformes Family : Phasianidae											
19	Indian Peafowl	<i>Pavo cristatus</i>	R	CO	O	LC	I		→	-	-
Order: Phoenicopteriformes Family : Podicipedidae											
20	Little Grebe	<i>Tachybaptus ruficollis</i>	R	FC	C	LC	IV		?	-	-
Order: Columbiformes Family: Columbidae											
21	Rock Pigeon	<i>Columba livia</i>	R	CO	G	LC	IV		↓	-	-
22	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	R	CO	G	LC	IV		↑	-	-
23	Spotted Dove	<i>Streptopelia chinensis</i>	R	UC	G	LC	IV		↑	-	-
24	Laughing Dove	<i>Streptopelia senegalensis</i>	R	UC	G	LC	IV		→	-	-
25	Turtle Dove	<i>Streptopelia orientalis</i>	W	RA	G	LC	IV		→	December	January
26	Red-collared Dove	<i>Streptopelia tranquebarica</i>	R	RA	G	LC	IV		↓	-	-

Table 1. Continued.

Sl. No.	Order/Family/ Common english name	Scientific name	Residential status	Local status	Feeding guild	Conservation status			Global status	Time of migration	
						IUCN	IWPA	CITES		Arrival	Departure
27	Yellow Footed Green Pigeon	<i>Treron phoenicopterus</i>	R	UC	F	LC	IV		↑	-	-
	Order: Caprimulgiformes Family : Apodidae										
28	House Swift	<i>Apus affinis</i>	R	UC	I	LC	IV		↑	-	-
	Order : Cuculiformes Family : Cuculidae										
29	Greater Coucal	<i>Centropus sinensis</i>	R	FC	O	LC	IV		→	-	-
30	Asian Koel	<i>Eudynamys scolopaceus</i>	R	UC	O	LC	IV		→	-	-
31	Pied Cuckoo	<i>Clamator jacobinus</i>	S	RA	I	LC	IV		→	June	August
	Order : Gruiformes Family: Rallidae										
32	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	R	CO	O	LC	IV		?	-	-
33	Purple Swamphen	<i>Porphyrio porphyrio</i>	R	CO	O	LC	IV		?	-	-
34	Common Moorhen	<i>Gallinula chloropus</i>	R	CO	O	LC	IV		→	-	-
35	Eurasian Coot	<i>Fulica atra</i>	R	FC	O	LC	IV		↓	-	-
	Order : Suliformes Family: Phalacrocoracidae										
36	Little Cormorant	<i>Microcarbo niger</i>	R	FC	C	LC	IV		?	-	-
37	Great Cormorant	<i>Phalacrocorax carbo</i>	W	UC	C	LC	IV		↑	November	March
38	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	W	UC	C	LC	IV		?	November	February
	Order : Pelecaniformes Family : Ciconiidae										
39	Painted Stork	<i>Mycteria leucocephala</i>	W	UC	C	NT	IV	I	↓	December	February
40	Asian Openbill	<i>Anastomus oscitans</i>	W	RA	C	LC	IV		?	December	February
41	Woolly-necked Stork	<i>Ciconia episcopus</i>	R	RA	C	NT	IV		↓	-	-
	Family : Ardeidae										
42	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	R	RA	C	LC	IV		↓	-	-
43	Indian Pond Heron	<i>Ardeola grayii</i>	R	CO	C	LC	IV		?	-	-
44	Cattle Egret	<i>Bubulcus ibis</i>	R	CO	C	LC	IV		↑	-	-
45	Grey Heron	<i>Ardea cinerea</i>	R	FC	C	LC	IV		?	-	-
46	Purple Heron	<i>Ardea purpurea</i>	R	FC	C	LC	IV		↓	-	-
47	Great Egret	<i>Ardea alba</i>	R	FC	C	LC	IV		?	-	-
48	Intermediate Egret	<i>Ardea intermedia</i>	R	FC	C	LC	IV		↓	-	-
49	Little Egret	<i>Egretta garzetta</i>	R	UC	C	LC	IV		↑	-	-
	Family : Threskiornithidae										
50	Glossy Ibis	<i>Plegadis falcinellus</i>	W	RA	C	LC	IV		↓	January	February
51	Black-headed Ibis	<i>Threskiornis melanoleucus</i>	W	UC	C	NT	IV		↓	November	March
52	Eurasian Spoonbill	<i>Platalea leucorodia</i>	W	UC	C	LC	I		?	November	March
53	Black Ibis	<i>Pseudibis papillosa</i>	W	UC	C	LC	IV		↓	October	March
	Order : Charadriiformes Family : Burhinidae										
54	Indian Thick Knee	<i>Burhinus indicus</i>	R	FC	O	LC	IV		↓	-	-
	Family : Recurvirostridae										

Table 1. Continued.

Sl. No.	Order/Family/ Common English name	Scientific name	Residential status	Local status	Feeding guild	Conservation status				Time of migration		
						IUCN	IWPA	CITES	Global status	Arrival	Departure	
55	Pied Avocet	<i>Recurviro straavosetta</i>	W	RA	C	LC	IV			?	December	February
56	Black-winged Stilt	<i>Himantopus himantopus</i>	R	CO	C	LC	IV			→	-	-
	Family : Charadriidae											
57	Little Ringed Plover	<i>Charadrius dubius</i>	W	UC	C	LC	IV			→	November	March
58	Red-wattled Lapwing	<i>Vanellus indicus</i>	R	CO	C	LC	IV			?	-	-
59	White-tailed Lapwing	<i>Vanellus leucurus</i>	W	UC	C	LC	IV			↑	October	March
	Family : Jacanidae											
60	Bronze-winged Jacana	<i>Metopidius indicus</i>	R	RA	O	LC	IV			?	-	-
	Family : Scolopacidae											
61	Black-tailed Godwit	<i>Limosa limosa</i>	W	RA	O	NT	IV			↓	December	February
62	Common Snipe	<i>Gallinago gallinago</i>	W	RA	C	LC	IV			↓	November	February
63	Ruff	<i>Calidris pugnax</i>	W	UC	O	LC	IV			↓	November	March
64	Common Sandpiper	<i>Actitis hypoleucos</i>	W	FC	I	LC	IV			↓	August	March
65	Green Sandpiper	<i>Tringa chropus</i>	W	UC	I	LC	IV			↑	September	March
66	Spotted Redshank	<i>Tringa erythropus</i>	W	RA	C	LC	IV			→	November	February
67	Common Redshank	<i>Tringa totanus</i>	W	UC	C	LC	IV			?	November	March
68	Marsh Sandpiper	<i>Tringa stagnatilis</i>	W	UC	C	LC	IV			↓	November	March
69	Wood Sandpiper	<i>Tringaglareola</i>	W	UC	I	LC	IV			→	October	March
	Family : Laridae											
70	River Tern	<i>Sterna aurantia</i>	R	UC	C	VU	IV			↓	-	-
	Order : Accipitriformes											
	Family : Accipitridae											
71	Black-winged Kite	<i>Elanus caeruleus</i>	R	RA	C	LC	I	II		→	-	-
72	Shikra	<i>Accipiter badius</i>	R	FC	C	LC	I	II		→	-	-
73	Brahminy Kite	<i>Haliastur indus</i>	R	RA	C	LC	I	II		↓	-	-
74	Black Kite	<i>Milvus migrans</i>	R	UC	C	LC	I	II		?	-	-
	Order : Strigiformes											
	Family : Strigidae											
75	Spotted owl	<i>Athene brama</i>	R	FC	C	LC	IV	II		→	-	-
	Order : Bucerotiformes											
	Family : Bucerotidae											
76	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	R	UC	O	LC	IV			→	-	-
	Family : Upupidae											
77	Common Hoopoe	<i>Upupa epops</i>	R	CO	O	LC	IV			↓	-	-
	Order : Piciformes											
	Family : Picidae											
78	Black-rumped Flameback	<i>Dinopium benghalense</i>	R	RA	I	LC	IV			→	-	-
	Family : Ramphastidae											
79	Brown-headed Barbet	<i>Psilopogon zeylanicus</i>	R	RA	F	LC	IV			→	-	-
80	Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	R	RA	F	LC	IV			↑	-	-
	Order : Coraciiformes											
	Family : Meropidae											
81	Green Bee Eater	<i>Merops orientalis</i>	S	FC	I	LC	IV			↑	March	September
82	Blue Tailed Bee Eater	<i>Merops philippinus</i>	S	RA	I	LC	IV			→	May	September

Table 1. Continued.

Sl. No.	Order/Family/ Common English name	Scientific name	Residential status	Local status	Feeding guild	Conservation status			Global status	Time of migration	
						IUCN	IWPA	CITES		Arrival	Departure
	Family : Coraciidae										
83	Indian Roller	<i>Coracias benghalensis</i>	R	RA	I	LC	IV		↑	-	-
	Family : Alcedinidae										
84	Common Kingfisher	<i>Alcedo atthis</i>	R	RA	C	LC	IV		?	-	-
85	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	R	CO	C	LC	IV		↑	-	-
86	Pied Kingfisher	<i>Ceryle rudis</i>	R	RA	C	LC	IV		?	-	-
	Order : Psittaciformes										
	Family : Psittaculidae										
87	Alexandrine Parakeet	<i>Psittacula eupatria</i>	R	UC	F	NT	IV	II	↓	-	-
88	Rose-ringed Parakeet	<i>Psittacula krameri</i>	R	CO	F	LC	IV		↑	-	-
89	Slaty-headed Parakeet	<i>Psittacula himalayana</i>	R	RA	F	LC	IV	II	→	-	-
90	Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	R	RA	F	LC	IV	II	↓	-	-
	Order : Passeriformes										
	Family : Dicruridae										
91	Black Drongo	<i>Dicrurus macrocercus</i>	R	FC	I	LC	IV		?	-	-
92	Ashy Drongo	<i>Dicrurus leucophaeus</i>	R	RA	I	LC	IV		?	-	-
	Family : Laniidae										
93	Long-Tailed Shrike	<i>Lanius schach</i>	R	FC	I	LC	IV		?	-	-
	Family : Corvidae										
94	Rufous Treepie	<i>Dendrocitta vagabunda</i>	R	FC	I	LC	IV		↓	-	-
95	House Crow	<i>Corvus splendens</i>	R	CO	O	LC	V		→	-	-
	Family : Stenostiridae										
96	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	W	RA	I	LC	IV		→	December	February
	Family : Nectariniidae										
97	Purple Sunbird	<i>Cinnyris asiaticus</i>	R	CO	N	LC	IV		→	-	-
	Family : Ploceidae										
98	Baya Weaver	<i>Ploceus philippinus</i>	R	UC	G	LC	IV		→	-	-
	Family : Estrildidae										
99	Indian Silverbill	<i>Euodice malabarica</i>	R	CO	G	LC	IV		→	-	-
100	Scaly-breasted Munia	<i>Lonchura punctulata</i>	R	UC	G	LC	IV		→	-	-
	Family: Passeridae										
101	House Sparrow	<i>Passer domesticus</i>	R	FC	O	LC	IV		↓	-	-
102	Sind Sparrow	<i>Passer pyrrhonotus</i>	R	RA	O	LC	IV		→	-	-
103	Chestnut Shouldered Petronia	<i>Gymnoris xanthocollis</i>	R	UC	O	LC	IV		→	-	-
	Family : Motacillidae										
104	Rosy Pipit	<i>Anthus roseatus</i>	W	UC	I	LC	IV		→	November	February
105	Long-billed Pipit	<i>Anthus similis</i>	R	UC	I	LC	IV		→	-	-
106	Paddyfield Pipit	<i>Anthus rufulus</i>	R	FC	I	LC	IV		→	-	-
107	Yellow Wagtail	<i>Motacilla flava</i>	W	FC	I	LC	IV		↓	September	March
108	Grey Wagtail	<i>Motacilla cinerea</i>	W	UC	I	LC	IV		→	October	February
109	Citrine Wagtail	<i>Motacilla citreola</i>	W	FC	I	LC	IV		↑	September	March

Table 1. Continued.

Sl. No.	Order/Family/ Common English name	Scientific name	Residential status	Local status	Feeding guild	Conservation status			Global status	Time of migration	
						IUCN	IWPA	CITES		Arrival	Departure
110	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	R	CO	I	LC	IV	→	-	-	
111	White Wagtail	<i>Motacilla alba</i>	W	FC	I	LC	IV	→	September	March	
112	Crested Lark	<i>Galerida cristata</i>	R	UC	O	LC	IV	↓	-	-	
113	Zitting Cisticola	<i>Cisticola juncidis</i>	R	UC	I	LC	IV	↑	-	-	
114	Ashy Prinia	<i>Prinia socialis</i>	R	UC	I	LC	IV	→	-	-	
115	Plain Prinia	<i>Prinia inornata</i>	R	FC	I	LC	IV	→	-	-	
116	Common Tailorbird	<i>Orthotomus atrogularis</i>	R	FC	I	LC	IV	→	-	-	
117	Streak Throated Swallow	<i>Petrochelidon fluvicola</i>	R	UC	I	LC	IV	↑	-	-	
118	Wire-tailed Swallow	<i>Hirundo smithii</i>	R	FC	I	LC	IV	↑	-	-	
119	Barn Swallow	<i>Hirundo rustica</i>	W	UC	I	LC	IV	↓	September	February	
120	Plain Martin	<i>Riparia paludicola</i>	R	UC	I	LC	IV	↓	-	-	
121	Pale Martin	<i>Riparia diluta</i>	R	UC	I	LC	IV	?	-	-	
122	Red Vented Bulbul	<i>Pycnonotus cafer</i>	R	FC	O	LC	IV	↑	-	-	
123	Common Chiffchaff	<i>Phylloscopus collybita</i>	W	UC	I	LC	IV	↑	November	March	
124	Grey-hooded Warbler	<i>Phylloscopus xanthoschistos</i>	R	RA	I	LC	IV	→	-	-	
125	Oriental White-eye	<i>Zosterops palpebrosus</i>	R	RA	N	LC	IV	↓	-	-	
126	Large Grey Babbler	<i>Argya malcolmi</i>	R	FC	O	LC	IV	→	-	-	
127	Common Babbler	<i>Argya caudata</i>	R	FC	O	LC	IV	→	-	-	
128	Striated Babbler	<i>Argya earlei</i>	R	UC	O	LC	IV	↓	-	-	
129	Asian Pied Starling	<i>Gracupica contra</i>	R	FC	O	LC	IV	↑	-	-	
130	Brahminy Startling	<i>Sturnia pagodarum</i>	R	UC	O	LC	IV	?	-	-	
131	Common Myna	<i>Acridotheres tristis</i>	R	CO	O	LC	IV	↑	-	-	
132	Bank Myna	<i>Acridotheres ginginianus</i>	R	FC	O	LC	IV	↑	-	-	
133	Indian Robin	<i>Saxicoloides fulicatus</i>	R	UC	I	LC	IV	→	-	-	
134	Oriental Magpie Robin	<i>Copsychus saularis</i>	R	FC	I	LC	IV	→	-	-	
135	Bluethroat	<i>Luscinia svecica</i>	W	UC	I	LC	IV	→	November	February	
136	Red-breasted Flycatcher	<i>Ficedula parva</i>	W	RA	I	LC	IV	↑	December	February	
137	Black Redstart	<i>Phoenicurus ochruros</i>	W	RA	O	LC	IV	↑	November	February	
138	Siberian Stonechat	<i>Saxicola maurus</i>	W	UC	I	LC	IV	→	October	March	
139	Pied Bushchat	<i>Saxicola caprata</i>	R	FC	I	LC	IV	→	-	-	
140	Brown Rock Chat	<i>Oenanthe fusca</i>	R	CO	I	LC	IV	→	-	-	

Taxonomic position (Order and family), common and scientific names of recorded species were accorded following Praveen *et al.* (2020). Residential status was assigned to the recorded species based on the field observations as resident, summer visitor and winter visitor (Grimmett *et al.* 2011). To know the local abundance of the bird species, sighting frequency for each species was recorded and were categorized following Mackinnon and Phillipps (1993) as common (CO) - sighted on 80–100% of field visits, fairly common (FC) - sighted on 60–79.9% of field visits, uncommon (UC) - sighted on 20–59.9% of field visits, rare (RA) - sighted on less than 19.9% of field visits. Species richness was calculated as total number of bird species observed in the study area. The relative diversity (RDi) of bird families was calculated using the following formula (Torre-Cuadros *et al.* 2007).

$$\text{RDi} = \frac{\text{Number of bird species in a family}}{\text{Total number of species}} \times 100$$

Based on the field observations and description given by Ali and Ripley (1987), the recorded bird species were categorized in seven feeding guilds (insectivorous, omnivorous, carnivorous, granivorous, herbivorous, frugivorous and nectarivorous). The conservation status of recorded species was assessed according to the Indian Wildlife (Protection) Act, (1972), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 2012) and International Union for Conservation of Nature (IUCN 2021). The global population trend (decreasing, increasing, stable, unknown) of the recorded species compiled from the Red List of IUCN (2021) was compared with their local status in the study area.

## RESULTS

A total of 140 species of birds belonging to 97 genera distributed among 45 families and 17 orders were recorded during the study period (Table 1). Passeriformes was the most dominant order with 50 species followed by Anseriformes (18), Charadriiformes (17) and the remaining 14 orders. In terms of families, Anatidae was the most diverse family with 18 species and the highest RDi value (12.8) followed by Scol-

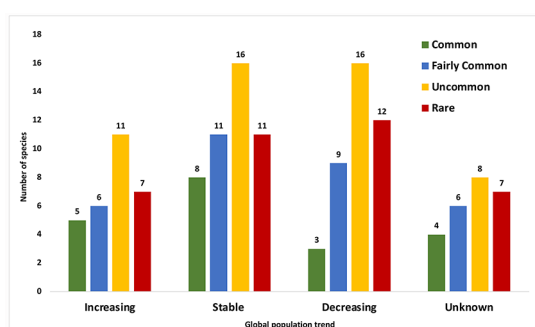
**Table 2.** Relative diversity index (RDi) of avian families recorded in selected rural pond of Kurukshetra District of Haryana, India.

Avian family	Number of species recorded	RDi value
Anatidae	18	12.8
Scolopacidae	9	6.4
Ardeidae, Motacillidae,		
Muscicapidae	8	5.7
Columbidae	7	5
Hirudinidae	5	3.6
Rallidae, Threskiornithidae,		
Accipitridae, Psittaculidae,		
Cisticolidae, Sturnidae	4	2.8
Cuculidae, Ciconiidae, Charadriidae,		
Phalacrocoracidae, Alcedinidae,		
Passeridae, Leiothrichidae	3	2.1
Recurvirostridae, Ramphastidae,		
Meropidae, Dicuridae, Phylloscopidae,		
Corvidae, Estrildidae	2	1.4
Phasianidae, Podicipedidae, Apodidae,		
Burhinidae, Laridae, Strigidae,		
Bucerotidae, Upupidae, Picidae,		
Coraciidae, Stenostiridae, Nectariniidae,		
Ploceidae, Pycnonotidae,		
Zosteropidae,		
Alaudidae, Jacanidae, Laniidae	1	0.7

opacidae (9 species, RDi = 6.4). However, 18 families such as Phasianidae, Podicipedidae, Apodidae, Burhinidae, Laridae, Strigidae, Bucerotidae, Upupidae, Picidae, Coraciidae, Stenostiridae, Nectariniidae, Ploceidae, Pycnonotidae, Zosteropidae, Alaudidae, Jacanidae and Laniidae were least represented just by a single species each during this study (RDi = 0.7, Table 2).

Among the recorded species, 88 species (62.86%) were found to be residents, 48 (34.28%) species were winter migrants and only 4 (2.86%) species were summer migrants. Data on local abundance status of recorded species revealed that 20 species were common, 32 species were fairly common, 51 species were uncommon and 37 species were rare in the study area (Fig. 1). As far as the foraging habit of the bird community in the selected wetland was concerned, seven major feeding guilds were identified (Fig. 2). The insectivore guild was the most abundant one with 40 species followed by omnivore (38), car-





**Fig. 1.** Comparison of local status of avifaunal species recorded in selected rural pond of Kurukshetra District of Haryana with their IUCN global population trend.

nivore (37), granivore (9), herbivore (7), frugivore (7) and nectarivore (2).

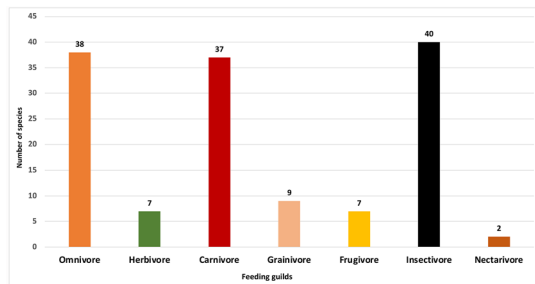
Among the recorded avifauna, six species namely Ferruginous Duck (*Aythya nyroca*), Painted Stork (*Mycteria leucocephala*), Woolly-necked Stork (*Ciconia episcopus*), Black-headed Ibis (*Threskiornis melanocephalus*), Black-tailed Godwit (*Limosalimosa*), and Alexandrine Parakeet (*Psittacula eupatria*) are listed as Near Threatened species, and two species namely Common Pochard (*Aythya ferina*) and River Tern (*Sterna aurantia*) as Vulnerable species in IUCN Red List (2021). In addition to this, Painted Stork (*M. leucocephala*) is listed in Appendix I and Knob-billed Duck (*Sarkidiornis melanotos*), Shikra (*Accipiter badius*), Brahminy Kite (*Haliastur indus*), Black-Winged Kite (*Elanus caeruleus*), Black Kite (*Milvus migrans*), Spotted Owllet (*Athene brama*), Alexandrine Parakeet (*P. eupatria*), Slaty-headed Parakeet (*P. himalayana*) and Plum-headed Parakeet (*P. cyanacephala*) are listed in Appendix II of CITES (2012). According to Indian Wildlife (Protection) Act, 1972, six species - Indian Peafowl (*Pavo cristatus*), Eurasian Spoonbill (*Platalea leucorodia*), Shikra (*A. badius*), Brahminy Kite (*H. indus*), Black-Winged Kite (*E. caeruleus*) and Black Kite (*M. migrans*) are included in the Schedule I, whereas one species-House Crow (*Corvus splendens*) in the schedule V and rest were included in the schedule IV (Table 1). With regard to the global population trend, the studied rural wetland supported 46 (32.8%) globally stable bird species, 40 (28.6%) globally decreasing species, 29 (20.8%) globally increasing species and

25 (17.8%) species whose global population trend was unknown (Table 1, Fig. 1). When local status of recorded species was compared with their global population trend, we found that three species, namely, Spot-billed Duck, Rock Pigeon and Common Hoopoe, having a globally declining population trend were still common in the study area.

## DISCUSSION

The high richness of recorded bird species could be due to variety of habitats, abundance of food resources, suitable shelter and availability of nesting or roosting sites in the study area (Rajpar and Zakaria 2013, Kumar *et al.* 2016). The results showed that man-made and unprotected rural wetlands play crucial role in conservation of local avifauna and contribute in maintaining regional biodiversity. This richness of avifauna is comparable with earlier studies conducted in wetlands of Haryana State. For instance, Kumar and Sharma (2018) recorded 126 species of birds from similarly sized man-made sacred ponds of Kurukshetra District of Haryana, Rai *et al.* (2019) reported 171 avian species belonging to 51 families and 17 orders from Basai wetlands in Gurugram District of Haryana and Rai and Vanita (2021) documented 114 species comprising 47 families and 18 orders from Otu Reservoir of Sirsa District. However, Alfred *et al.* (2001) documented 216 wetland bird species from various wetland habitats in the much more expansive Sub-Himalayan Terai and Indo-Gangetic Plains of Northern India.

In present survey, Passeriformes was the most represented order which in agreement with previous records that order Passeriformes constitutes the most predominant avian taxa in India (Praveen *et al.* 2016). Muscicapidae is known to be the largest family of birds in India (Manakadan and Pittie 2001). In our study area, however, the Anatidae showed the highest diversity of species, followed by Scolopacidae. Nevertheless, several studies have also found Anatidae to be the most diverse avian family, particularly in various wetland habitats of India (Kumar *et al.* 2016, Rai *et al.* 2019, Singh and Braich 2022). Most species that have been recorded during present study are residents followed by winter and summer migrants. These results are in agreement with previous records



**Fig. 2.** Guilds-based classification of avian species recorded in selected rural pond of Kurukshetra District of Haryana, India.

that the majority of the birds recorded from wetlands of Haryana were resident in nature, followed by winter visitors and summer visitors (Kumar and Gupta 2013, Kumar *et al.* 2016, Rai *et al.* 2019). Haryana, being a part of the Central Asian Flyway, serves as a wintering site for the migratory birds travelling from northern part of Asia and parts of Europe. Resident species were present throughout the year and showed no seasonal variation. However, the migratory species (winter visitors and summer visitors) showed a definite species-specific pattern of arrival and departure from the study area. Most of winter migrants were recorded from November to March. The migratory birds usually prefer areas having congenial environment, enormous food availability and safe and secure sites as wintering grounds (Kumar *et al.* 2016). The wetlands along with the irrigated agricultural fields in Kurukshetra District prove to be a good habitat for the migratory birds (Kumar and Sharma 2018). This is one of the reasons for encountering significant numbers of winter migrants in the study area. The winter migratory species start appearing at studied pond from October, reached a peak in the month of January, then start declining and leave the rural ponds by March, flying back to their breeding grounds. Seven foraging guilds are found in the study area, Insectivore being the most dominant.

The mosaic of habitats at unprotected rural wetland of Thana such as mudflats, marshy area, islands, large number of trees at banks and irrigated crop fields provided multiple and variety of the alternative food resources, and opportunities for micro-habitat segregation for the birds (Kumar *et al.* 2016, Murillo-Pacheco *et al.* 2018). Moreover, there is low

anthropogenic pressure at pond because the pond is considered sacred by local people. Absence of netting or wires over the pond and poaching resulted in high richness at this wetland.

Overall, eight species of global conservation importance (six near threatened and two vulnerable) were documented from unprotected rural wetland of Kurukshetra District of Haryana. Moreover, 10 species are listed under Appendix I and Appendix II of CITES. The population status of 40 recorded species (28.6%) is declining globally. This implies that rural wetlands along with adjoining agricultural landscapes have the potential to serve as critical habitats for winter migrants and globally threatened bird species. Awareness among local populations with combined efforts of researchers, conservators, and government agencies can support sustainability of existing avifaunal diversity in rural ponds of Haryana.

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