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A black Northern Palm Squirrel (Funambulus pennantii) is shown in profile, sitting on a light-colored, textured rock surface. It is holding a small, light-colored piece of food in its paws and appears to be eating it. The squirrel's fur is entirely black, and its eyes are dark. The background is a blurred green, suggesting a natural outdoor setting. The title 'Record of melanistic Five-striped Squirrel from Vadodara, Gujarat' is overlaid on the left side of the image in a bold, orange font.

Record of melanistic Five-striped Squirrel from Vadodara, Gujarat

(© Bhavesh Trivedi)

Northern Palm Squirrel or Five-striped squirrel, *Funambulus pennantii* Wroughton 1905 is a non-volant non-endemic to South Asia and listed as Least Concern in IUCN Red List (Molur et al. 2005). Northern palm squirrel *F. pennantii* shares several niche occupied by Three-striped Palm Squirrel *Funambulus palmarum* (Linnaeus, 1766). Photographs and literatures indicate *F. pennantii* as slender-bodied, brownish-grey dorsum with five pale colored stripes from head to tail. The tail is long, does not have a mid-ventral line, and resembles a grey bottlebrush (Menon 2014). The Northern palm squirrel is diurnal, adapted to living close to human settlements (Menon 2014). It is located all over northern India, South to Dharwad (Karnataka), and east to Meghalaya (Prater 1971, Menon 2014, Pradhan and Talmale 2012). Commonly found in urban, rural and forested areas.

Recently, a black Northern Palm Squirrel *Funambulus pennantii* was spotted foraging

on the edge of an agricultural field near Bhayli Village of Vadodara District, Gujarat. Visual observations and photographic documentation were made from 24 May 2020 till 29 May 2020 in the same locality (22.28666°N & 73.12528°E). During afternoon, the squirrel was spotted resting on the canopy of the Sevan Tree *Gmelina arborea*. A similar observation was made on 30 August 2009 from Ganpatpura Village of Padra, Vadodara District (22.26805°N & 73.07583°E). The squirrel was identified as a melanistic NPS based on visible characters such as body was completely black with black coloured eyes. Hence, it appears to be a case of melanism (Tutt 1891).

Melanism is an ubiquitous phenomenon in the animal kingdom (Tutt, 1891). Melanism is a development of the dark coloured pigment called melanin in the skin and is the opposite of leucism. Of the 17 cases of colour aberrations reported under Sciuridae in a review on colour aberrant mammals



(Mahabal et al. 2019), Jayashankar (2019) reported one case of melanistic Three-striped Palm Squirrel from Bengaluru's rural district, Karnataka while nine cases of leucism in NPS have been reported from Kutch, Gujarat (Newnham 1886), Kolkata, West Bengal (Agrawal & Chakraborty 1979), Chandigarh (Chaturvedi & Ghose 1984), Udaipur City, Rajasthan (Sharma 2004), Sindhudurg District, Maharashtra (Mahabal et al. 2005), Northern Udaipur, Rajasthan (Mehra et al. 2007, 2010), Satara District, Maharashtra (Sayyed & Mahabal 2016), Ghazipur District, Uttar Pradesh (Yadav 2019), and recently from Dehradun (Kamalakkannan et al. 2019).

Leucism is often referred as patchy albinism and is commonly observed in mammals, birds, reptiles and amphibians. Albinism is a genetic muddle leading to absolute or fractional absence of pigment in skin, hair and eyes (Lyons et al. 2005). So far, there is no record of melanism reported in NPS from the Gujarat State. Thus, the present instance of melanistic NPS from Bhayli and Padra villages could be the first report for the Gujarat State.

Colour abnormalities are very rare in wild mammals. Besides, it has to be noted that the survival rate of such color aberrant animal is comparatively lesser than the normal ones because of their distinctive features which can be easily noticed by predators.

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Interesting feeding record of Grey Plover at Gulf of Mannar

Grey Plover *Pluvialis squatarola* is a medium-sized wader migrating from the Arctic breeding ground to the wintering sites. Conservation status is Least Concerned. They are 27–30 cm long with a wingspan of 71–83 cm and a weight of 190–280 g (up to 345g in preparation for migration). In spring and summer (late April or May to August), the adults are



spotted black and white on the back and wings. The face and neck are black with a white border; they have a black breast & belly and a white rump. The tail is white with black barring. The bill and legs are black. They moult to winter plumage in mid-August to early September and retain this until April; this being a fairly plain grey above, with a grey-speckled breast and white belly. The juvenile and



first-winter plumages, held by young birds from fledging until about one year old, are similar to the adult winter plumage but with the back feathers blacker with creamy white edging. In all plumages, the inner flanks and axillary feathers at the base of the underwing are black, a feature that readily distinguishes it from the other





three *Pluvialis* species in flight. On the ground, the Grey Plover can also be told from the other *Pluvialis* species by their larger (24–34 mm), heavier bill (Hayman et al. 1986; Snow & Perrins 1988).

During our September survey of 2020, we found some 50 individuals in Dhanushkodi lagoon of Rameswaram Island on the eastern coast of India and more than a hundred numbers in November 2020. In our November survey, the tides were high

due to heavy wind on the Palk Bay due to the onset of the north-east monsoon. The entire lagoon from Konthandaramar Koil to Aricahalmunai was flooded by the early morning. After a few hours, around 11 in the morning water had receded and seaweeds and other bycatches from the sea were washed ashore. This helped the waders to feed on the mollusks and polychaete worms. They forage for food on beaches and tidal flats, usually by sight. The food consists of small mollusks,



polychaete worms, crustaceans, and insects. They are less gregarious than the other *Pluvialis* species, not forming dense feeding flocks, instead feeding widely dispersed over beaches, with birds well spaced apart. They will, however, form dense flocks on high tide roosts.

Grey Plover forage visually in a run-stop-search manner. Each foraging move ends in a search, pause, or prey-capture





attempt. One of the Grey Plovers ate a mollusk. Then it found a Neries, a polychaete worm which was more than a feet long intertwining its left leg while attempting to eat. It held on to the leg for a few minutes as it was difficult for the bird to drag from the feet and eat. A few steps of the walk couldn't help the bird to drag the feed to the mouth. The bird flew a short distance into the seawater and the stretch freed the worm from its leg; it then dragged the worm with the beak and swallowed it. In north temperate zones, the Grey Plover diet is dominated by polychaetes and other small prey (Baker 1974; dir Durell et al. 1990; Kersten & Piersma 1998). Grey Plover diet are observed recorded to eat bivalves and crabs. Grey Plover diet reflects the regional availability of prey types, with the birds consuming more large prey in tropical and southern temperate regions than in northern temperate regions (Turpie & Hockey 2008).

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A checklist of birds from Kondakarla Ava, a freshwater lake in Visakhapatnam, Andhra Pradesh, India

Birds have been the focus of interest as they are indicators of water quality and as parameters of restoration success and regional biodiversity. There are several factors that affect wetland bird communities. Hilden (1965) listed five factors as proximate ones which were involved in habitat selection: landscape, terrain, nest, song, and other sites (other animals and food). A few studies on diversity and abundance of aquatic birds also support the fact that there is a decreasing trend in avian population in our country's various water bodies (Azous & Horner 2001; Kumar & Gupta 2009).

The objective of this study was to prepare an updated list of birds of the Kondakarla Ava freshwater lake situated in Visakhapatnam District of Andhra Pradesh; this paper focuses purely on avian diversity since they form one of the base for conservation studies and management projects.

The Kondakarla Ava, a freshwater lake (17.60083N & 82.99805E), is one of its kind and is the second largest freshwater lake in Andhra Pradesh next to the Kolleru Lake. This lake has formed a unique ecosystem providing livelihood options to thousands of households. It is named after the village Kondakarla abutting the lake.

Kondakarla Ava is part of the Sarada riverine system and is classified as a perennial eutrophic shallow fresh water lentic body. It receives water from the Sarada River and Anakapalli Ava through Krishnam-Raju Channel. With a rectilinear polygon shape originally, the water spread of this lake is 753.93ha and the water storage capacity is up to 0.18 TMC (at full tank level). For about seven months in a year, the lake receives rainfall from both Southwest monsoon and Northeast monsoon (Avg. 1069mm). Annually around 0.86 TMC of water flows from the lake. Through a human made outlet that is connected to irrigation channels, water is supplied to eight villages. Agriculture is the dominant land use seen in this area whereas fishing is limited only to the surrounding villages of the water body. Being a freshwater lake, this place is famous for the number of migratory birds that arrive here each year.

Habitat and birds found in Kondakarla
Ava Lake, Visakhapatnam, Andhra Pradesh.

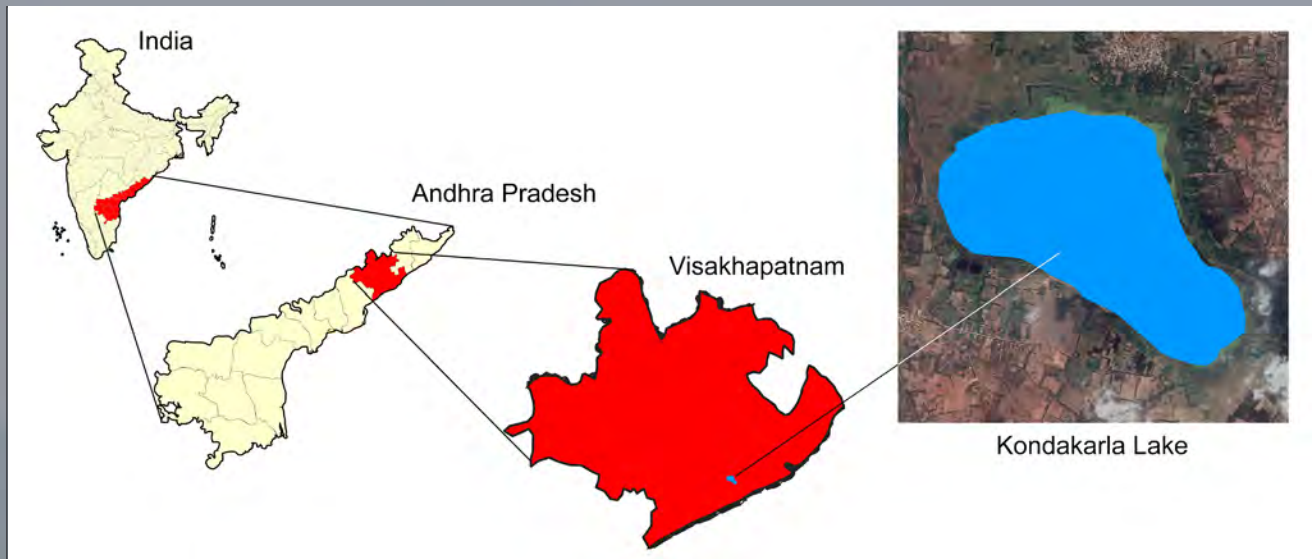


Figure 1. Location of Kondakarla Ava freshwater lake in Visakhapatnam District, Andhra Pradesh (Courtesy: Google Earth; The above map is indicative and is not to scale).

Bird count was done over a period of three years from January 2017 to February 2020. Observations were made during early morning between 06.00 to 10.30 h. and in the evening from 1530 to 18.30 h. However, timings were adjusted sometimes depending upon bird activity. Opportunistic counts done during other times of the day were also taken into consideration. Regular surveys were done by walking on fixed routes around the lake and also using the palmyrah boats inside the water body.

Birds were recorded following imaginary grid method and line transect method as outlined by Ali & Ripley (1983) and Ali (1996). Sightings and calls were both recorded. Observations were made using binoculars and photography was done using Nikon D5000 and D3300 wherever possible for future reference purposes. Scientific names and taxonomic classification of birds is after Praveen et al. (2016).

A total of 123 species of birds belonging to 45 families of 17 orders represent the avian diversity at the Kondakarla Ava Lake (see Table 1).

Among the 123 species recorded here, the Common Pochard is listed as Vulnerable and Painted Stork, Oriental Darter, and Alexandrine Parakeet are Near Threatened (BirdLife International 2017). According to the Wildlife Protection Act of 1972 and IUCN's Red List, a species is listed in Schedule I & IV and included in the Red List

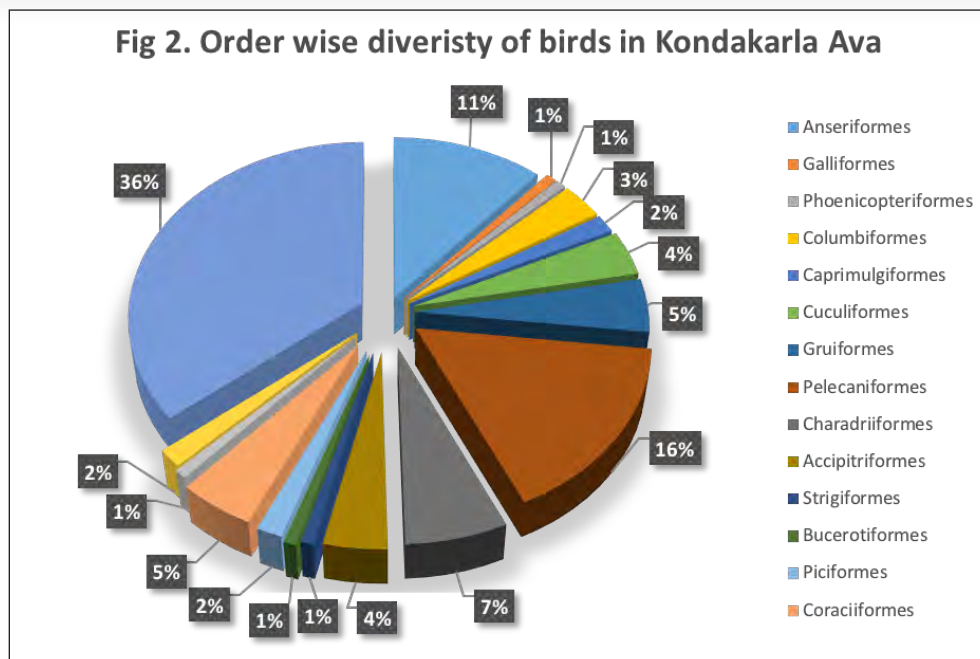


Figure 2. Order wise diversity of birds in Kondakarla Ava.

categories, respectively, depending upon its population status, rate of decline, and range sizes. The supporting vegetation along the lake fringes supports Passeriformes which forms the highest order of birds found here with 43 species forming 36% of the total species diversity (Figure 2).

The mysterious and rather uncommon Pink-headed Duck was recorded from this lake by Abdulali (1945), which gives a sorrowful picture of how rich the resources and diversity was a century or so back, and the lack of management over the years. Successful breeding of huge number of Pheasant-tailed Jacanas have been observed here by the authors. There have also been records of Tufted Duck, Comb Duck, Black-headed Ibis in this lake from various previous records (Lakshmi 2001; ENVIS 2016), but they do not frequent the lake every year anymore.

The family wise richness of birds in Kondakarla Ava lake shows Anatidae (ducks, goose) having the highest species count here with 14 species (Figure 3).

The lake is home to several winter migrants such as Common Pochard, Red-crested Pochard, Common Teal, Fulvous Whistling Duck, Eurasian Wigeon and Eurasian Marsh Harrier. Local migrants including Sandpipers, Ibises, Pipits, and Starlings are also spotted here. Winter migrants have three main criteria for habitat selection- 1. Availability of food, 2. Availability of space and 3. Protection from predators.

Kondakarla Ava lake is a hotspot favouring all three requirements thus hosting thousands of birds every year. Once known as a paradise for migratory birds, recent observations by the authors reveal lesser count of birds in the lake. The decreased avian count in this

Table 1. Checklist of birds found in Kondakarla Ava freshwater lake, Visakhapatnam, Andhra Pradesh

	Common name	Scientific name	IUCN status	Schedule (WPA, 1972)
I. Anseriformes				
a	Anatidae			
1	Common Pochard	<i>Aythya ferina</i> (Linnaeus, 1758)	VU	IV
2	Common Teal*	<i>Anas crecca</i> Linnaeus, 1758	LC	IV
3	Cotton Teal	<i>Nettapus coromandelianus</i> (J.F. Gmelin, 1789)	LC	IV
4	Eurasian Wigeon	<i>Mareca penelope</i> (Linnaeus, 1758)	LC	IV
5	Fulvous Whistling-Duck	<i>Dendrocygna bicolor</i> (Vieillot, 1816)	LC	I
6	Gadwall	<i>Mareca strepera</i> (Linnaeus, 1758)	LC	IV
7	Indian Spot-billed Duck	<i>Anas poecilorhyncha</i> J.R. Forster, 1781	LC	IV
8	Comb Duck*	<i>Sarkidiornis melonotos</i> (Pennant, 1769)	LC	IV
9	Lesser Whistling-Duck	<i>Dendrocygna javanica</i> (Horsfield, 1821)	LC	IV
10	Northern Pintail	<i>Anas acuta</i> Linnaeus, 1758	LC	IV
11	Northern Shoveler	<i>Spatula clypeata</i> (Linnaeus, 1758)	LC	IV
12	Red-crested Pochard	<i>Netta rufina</i> (Pallas, 1733)	LC	IV
13	Ruddy Shelduck	<i>Tadorna ferruginea</i> (Pallas, 1764)	LC	IV
14	Tufted Duck*	<i>Aythya fuligula</i> (Linnaeus, 1758)	LC	IV
II. Galliformes				
a	Phasianidae			
15	Grey Francolin	<i>Francolinus pondicerianus</i> (J.F. Gmelin, 1789)	LC	IV
III. Phoenicopteriformes				
a	Podicipedidae			
16	Little Grebe	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	LC	IV
IV. Columbiformes				
a	Columbidae			
17	Eurasian Collared-Dove	<i>Streptopelia decaocto</i> (Frisvaldszky, 1838)	LC	IV
18	Laughing Dove	<i>Streptopelia senegalensis</i> (Linnaeus, 1766)	LC	IV
19	Rock Pigeon	<i>Columba livia</i> J.F. Gmelin, 1789	LC	IV
20	Spotted Dove	<i>Streptopelia chinensis</i> (Scopoli, 1786)	LC	IV
V. Caprimulgiformes				
a	Apodidae			
21	Asian Palm-Swift	<i>Cypsiurus balasensis</i> (J.E. Gray, 1829)	LC	IV
22	Indian House Swift	<i>Apus affinis</i> (J.E. Gray, 1830)	LC	IV
VI. Cuculiformes				
a	Cuculidae			
23	Asian Koel	<i>Eudynamis scolopacea</i> (Linnaeus, 1758)	LC	IV
24	Common Hawk-Cuckoo	<i>Hierococcyx varius</i> (Vahl, 1797)	LC	IV
25	Grey bellied Cuckoo	<i>Cacomantis passerinus</i> (Vahl, 1797)	LC	IV
26	Greater Coucal	<i>Centropus sinensis</i> (Stephens, 1815)	LC	IV
27	Pied Cuckoo	<i>Clamator jacobinus</i> (Boddaert, 1783)	LC	IV
VII. Gruiformes				
a	Rallidae			
28	Baillon's Crake	<i>Zapornia pusilla</i> (Pallas, 1776)	LC	IV
29	Common Moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)	LC	IV
30	Common Coot	<i>Fulica atra</i> Linnaeus, 1758	LC	IV
31	Purple Swamphen	<i>Porphyrio porphyrio</i> (Linnaeus, 1758)	LC	IV
32	Ruddy-breasted Crake	<i>Zapornia fusca</i> (Linnaeus, 1766)	LC	IV

	Common name	Scientific name	IUCN status	Schedule (WPA, 1972)
33	White-breasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	LC	IV
VIII. Pelecaniformes				
a	Ciconiidae			
34	Asian Openbill	<i>Anastomus oscitans</i> (Boddaert, 1783)	LC	IV
35	Painted Stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	NT	IV
b	Ardeidae			
36	Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus, 1758)	LC	IV
37	Yellow Bittern	<i>Ixobrychus sinensis</i> (J.F. Gmelin, 1789)	LC	IV
38	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i> (J.F. Gmelin, 1789)	LC	IV
39	Black Bittern	<i>Ixobrychus flavicollis</i> (Latham, 1790)	LC	IV
40	Black-crowned Night Heron	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	LC	IV
41	Grey Heron	<i>Ardea cinerea</i> Linnaeus, 1758	LC	IV
42	Great Egret	<i>Ardea alba</i> Linnaeus, 1758	LC	IV
43	Indian Pond-Heron	<i>Ardeola grayii</i> (Sykes, 1832)	LC	IV
44	Intermediate Egret	<i>Ardea intermedia</i> Wagler, 1829	LC	IV
45	Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	LC	IV
46	Purple Heron	<i>Ardea purpurea</i> Linnaeus, 1766	LC	IV
47	Striated Heron	<i>Butorides striata</i> (Linnaeus, 1758)	LC	IV
c	Threskiornithidae			
48	Glossy Ibis	<i>Plegadis falcinellus</i> (Linnaeus, 1766)	LC	IV
49	Red-naped Ibis	<i>Pseudibis papillosa</i> (Temminck, 1824)	LC	IV
d	Phalacrocoracidae			
50	Great Cormorant	<i>Phalacrocorax carbo</i> (Linnaeus, 1758)	LC	IV
51	Indian Cormorant	<i>Phalacrocorax fuscicollis</i> Stephens, 1826	LC	IV
52	Little Cormorant	<i>Microcarbo niger</i> (Vieillot, 1817)	LC	IV
e	Anhingidae			
53	Oriental Darter	<i>Anhinga melanogaster</i> Pennant, 1769	NT	IV
IX. Charadriiformes				
a	Recurvirostridae			
54	Black-winged Stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)	LC	IV
b	Charadriidae			
55	Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	LC	IV
56	Yellow wattled Lapwing	<i>Vanellus malabaricus</i> (Boddaert, 1783)	LC	IV
c	Jacanidae			
57	Bronze-winged Jacana	<i>Metopidius indicus</i> (Latham, 1790)	LC	IV
58	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i> (Scopoli, 1786)	LC	IV
d	Scolopacidae			
59	Common Sandpiper	<i>Actitis hypoleucos</i> (Linnaeus, 1758)	LC	IV
60	Common Snipe	<i>Gallinago gallinago</i> (Linnaeus, 1758)	LC	IV
61	Wood Sandpiper	<i>Tringa glareola</i> Linnaeus, 1758	LC	IV
X. Accipitriformes				
a	Accipitridae			
62	Black kite	<i>Milvus migrans</i> (Boddaert, 1783)	LC	I
63	Black winged Kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	LC	I
64	Brahminy Kite	<i>Haliastur indus</i> (Boddaert, 1783)	LC	I
65	Eurasian Marsh-Harrier	<i>Circus aeruginosus</i> (Linnaeus, 1758)	LC	I
66	Shikra	<i>Accipiter badius</i> (J. F. Gmelin, 1788)	LC	I

	Common name	Scientific name	IUCN status	Schedule (WPA, 1972)
XI. Strigiformes				
a	Strigidae			
67	Spotted Owlet	<i>Athene brama</i> (Temminick, 1821)	LC	I
XII. Buceriformes				
a	Upupidae			
68	Common Hoopoe	<i>Upupa epops</i> Linnaeus, 1758	LC	IV
XIII. Piciformes				
a	Picidae			
69	Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i> (Linnaeus, 1758)	LC	IV
b	Ramphastidae			
70	Coppersmith Barbet	<i>Psilopogon haemacephalus</i> (Statius Muller, 1776)	LC	IV
XIV. Coraciiformes				
a	Meropidae			
71	Blue-tailed Bee-eater	<i>Merops philippinus</i> Linnaeus, 1767	LC	IV
72	Green Bee-eater	<i>Merops orientalis</i> Latham, 1801	LC	IV
b	Coraciidae			
73	Indian Roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	LC	IV
c	Alcedinidae			
74	Common Kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)	LC	IV
75	Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)	LC	IV
76	White-throated Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	LC	IV
XV. Falconiformes				
a	Falconidae			
77	Peregrine Falcon	<i>Falco peregrinus</i> Tunstall, 1771	LC	I
XVI. Psittaciformes				
a	Psittaculidae			
78	Alexandrine Parakeet	<i>Psittacula eupatria</i> (Linnaeus, 1766)	NT	IV
79	Rose-ringed Parakeet	<i>Psittacula krameri</i> (Scopoli, 1769)	LC	IV
XVII. Passeriformes				
a	Oriolidae			
80	Indian Golden Oriole	<i>Oriolus kundoo</i> Sykes, 1832	LC	IV
81	Black hooded Oriole	<i>Oriolus xanthornus</i> (Linnaeus, 1758)	LC	IV
b	Artamidae			
82	Ashy Woodswallow	<i>Artamus fuscus</i> Vieillot, 1817	LC	IV
c	Dicruridae			
83	Ashy Drongo	<i>Dicrurus leucophaeus</i> Vieillot, 1817	LC	IV
84	Black Drongo	<i>Dicrurus macrocercus</i> Vieillot, 1817	LC	IV
85	White-bellied Drongo	<i>Dicrurus caerulescens</i> (Linnaeus, 1758)	LC	IV
d	Laniidae			
86	Brown Shrike	<i>Lanius cristatus</i> Linnaeus, 1758	LC	IV
87	Bay backed Shrike	<i>Lanius vittatus</i> Valenciennes, 1826	LC	IV
e	Corvidae			
88	House Crow	<i>Corvus splendens</i> Vieillot, 1817	LC	V
89	Large-billed Crow	<i>Corvus macrorhynchos</i> Wagler, 1827	LC	IV
90	Rufous Treepie	<i>Dendrocitta vagabunda</i> (Latham, 1790)	LC	IV
f	Nectariniidae			
91	Purple Sunbird	<i>Cinnyris asiaticus</i> (Latham, 1790)	LC	IV

	Common name	Scientific name	IUCN status	Schedule (WPA, 1972)
92	Purple-rumped Sunbird	<i>Leptocoma zeylonica</i> (Linnaeus, 1766)	LC	IV
g	Ploceidae			
93	Baya Weaver	<i>Ploceus philippinus</i> (Linnaeus, 1766)	LC	IV
94	Streaked Weaver	<i>Ploceus manyar</i> (Horsfield, 1821)	LC	IV
h	Estrildidae			
95	Indian Silverbill	<i>Euodice malabarica</i> (Linnaeus, 1758)	LC	IV
96	Black-headed Munia	<i>Lonchura malacca</i> (Linnaeus, 1766)	LC	IV
i	Passeridae			
97	House Sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)	LC	IV
j	Motacillidae			
98	Grey Wagtail	<i>Motacilla cinerea</i> Tunstall, 1771	LC	IV
99	Paddyfield Pipit	<i>Anthus rufulus</i> Vieillot, 1818	LC	IV
100	Richard's Pipit	<i>Anthus richardi</i> Vieillot, 1818	LC	IV
101	Blyth's Pipit	<i>Anthus godlewskii</i> (Taczanowski, 1876)	LC	IV
102	Western Yellow Wagtail	<i>Motacilla flava</i> Linnaeus, 1758	LC	IV
103	White-browed Wagtail	<i>Motacilla maderaspatensis</i> J.F. Gmelin, 1789	LC	IV
k	Alaudidae			
104	Ashy-crowned Sparrow-Lark	<i>Eremopterix griseus</i> (Scopoli, 1786)	LC	IV
105	Jerdon's Bushlark	<i>Mirafra affinis</i> Blyth, 1845	LC	IV
i	Cisticolidae			
106	Ashy Prinia	<i>Prinia socialis</i> Sykes, 1832	LC	IV
107	Common Tailorbird	<i>Orthotomus sutorius</i> (Pennant, 1769)	LC	IV
108	Plain Prinia	<i>Prinia inornata</i> Sykes, 1832	LC	IV
m	Acrocephalidae			
109	Booted Warbler	<i>Iduna caligata</i> (M.H.C. Lichtenstein, 1823)	LC	IV
110	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i> Blyth, 1849	LC	IV
111	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i> (Hemprich & Ehrenberg, 1833)	LC	IV
n	Hirundinidae			
112	Barn Swallow	<i>Hirundo rustica</i> Linnaeus, 1758	LC	IV
113	Wire-tailed Swallow	<i>Hirundo smithii</i> Leach, 1818	LC	IV
o	Pycnonotidae			
114	Red-vented Bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	LC	IV
115	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i> (Linnaeus, 1758)	LC	IV
p	Sylviidae			
116	Yellow-eyed Babbler	<i>Chrysomma sinense</i> (J.F. Gmelin, 1789)	LC	IV
q	Leiothrichidae			
117	Yellow-billed Babbler	<i>Turdoides affinis</i> (Jerdon, 1845)	LC	IV
118	Jungle Babbler	<i>Turdoides striata</i> (Dumont, 1823)	LC	IV
r	Sturinidae			
119	Asian Pied Starling	<i>Gracupica contra</i> (Linnaeus, 1758)	LC	IV
120	Brahminy Starling	<i>Sturnia pagodarum</i> (J.F. Gmelin, 1789)	LC	IV
121	Common Myna	<i>Acridotheres tristis</i> (Linnaeus, 1766)	LC	IV
122	Jungle Myna	<i>Acridotheres fuscus</i> (Wagler, 1827)	LC	IV
s	Muscicapidae			
123	Indian Robin	<i>Saxicoloides fulicatus</i> (Linnaeus, 1766)	LC	IV
*Taken from previous records, but not sighted during the current study period.				



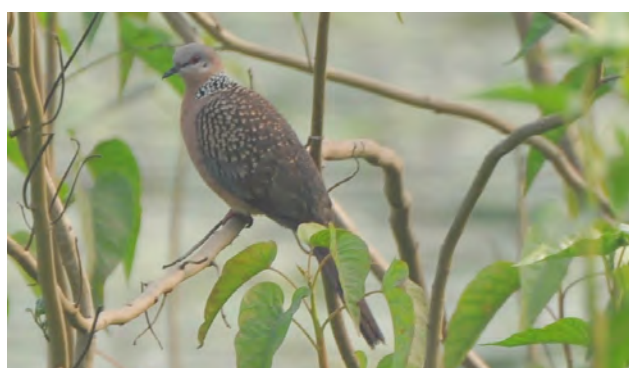
Egrets in Kondakarla Ava Lake. ©VNR.



Grey-headed Swamphen. ©VB.



Common Moorhen. ©VB.



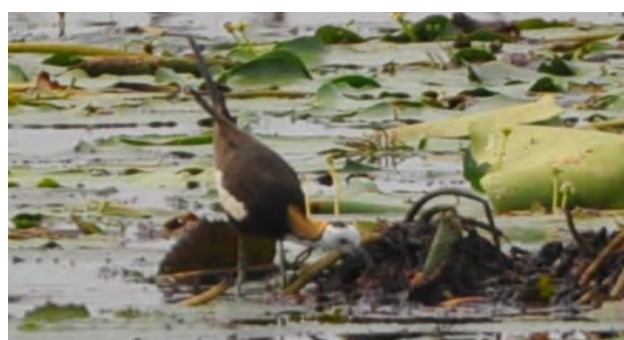
Spotted Dove. ©VB.



Richard's Pipit. ©VB.



Plain Prinia. ©VB.



Pheasant-tailed Jacana. ©VB.



Black-winged Stilt. ©VNR.



Great White Egret. ©VNR.



White-throated Kingfisher. ©VB.



Red-wattled Lapwing. ©VB.



Little Grebe. ©VB.



Eurasian Collared Dove. ©VB.

study is supported by previous work and observations too (Lakshmi 2001; ENVIS 2016). With the tremendous pressure from different sectors of developmental forces, the lake is now at the verge of losing its suitability for the migrants. This study reveals the lake harbouring an almost equal number of water birds, terrestrial birds and water dependant

birds. The lake can be divided into different habitat types like open waters, deep shallow lake bed area, wet borders of channels, drains, & lake fringes, and marginal areas. The multiple micro habitats present within the lake have stabilized over years forming what can be seen now as the perfect habitat for different requirements of birds, mammals,

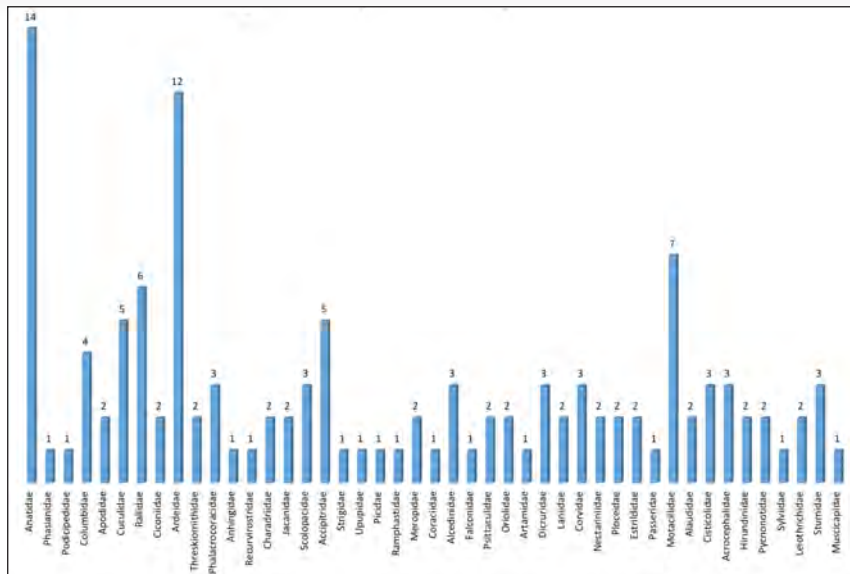


Figure 3. Number of species in each family in Kondakarla Ava.

reptiles, and other living organisms too.

Conclusion

Avian diversity in an ecosystem designs the fate of the same. With Kondakarla Ava harbouring over 100 different species of birds, it plays an important role in giving shelter to the feathered friends and thus to the occupants of the entire trophic tree here.

This paper concludes the importance of this place in terms of its avian diversity, thus making it clear why there is an urgent need to take steps towards its conservation and prevention from further deterioration.

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A checklist of avifauna of the Central University of Tamil Nadu (CUTN) campus, Thiruvarur, Tamil Nadu, India

Introduction

Water birds depend on wetlands for survival. Wetlands are one of the most productive ecosystems and water birds play a vital role in their ecological functioning (Raju 2015). Common water birds include numerous groups of birds, such as grebes, pelicans, cormorants, darters and its allies, herons, bitterns, storks, ibises and spoonbills, flamingos, and ducks (wildfowl), raptors, cranes, rails and its allies, jacanas, waders (or shorebirds), gulls, skimmers, terns, and coucals (Article 1.2 of the Ramsar Convention text). In India, there are about 744 universities with varying land size, and most of them have at least a few patches of natural vegetation and plantations. Documentation of birds in such areas, however, was not given importance on par with natural and reserve forests (Pragasan & Madesh 2018). Few bird diversity studies have been carried out in the Thiruvarur District. The present study is the

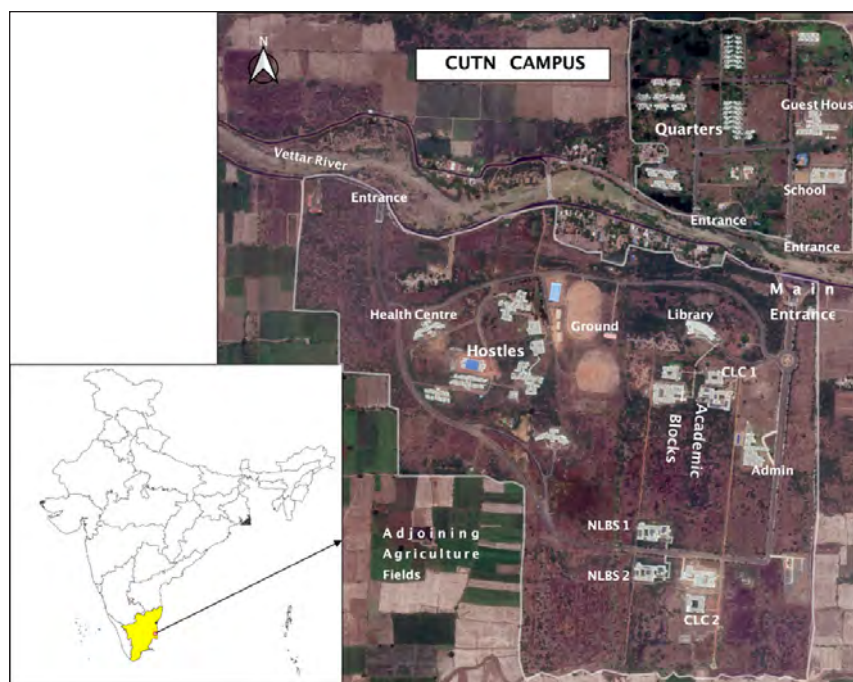


Image 1. Central University of Tamil Nadu campus adjoining agricultural fields and Vettaru River in Thiruvarur, Tamil Nadu, India. The campus boundaries are drawn roughly, only for representational purpose (Source: QGIS using Google Earth Imagery).

first attempt to document the bird diversity in the CUTN campus (10.8193° N, 79.6102° E) located in the Thiruvarur District, Tamil Nadu, India. The campus is spread on both sides of the River Vettaru (the major tributary of Cauvery River in the heart of the delta). The campus is situated seven kilometres to the north-west of Thiruvarur Town and spread across 516.76 acres of land in two revenue villages

Neelakudi and Nagakudi (Image 1). Thiruvarur District has a tropical dry climate with annual mean temperature of 28.5°C and annual mean rainfall of about 1178mm. The campus is located near a riverine freshwater wetland and hence it is characterised by productive alluvial soil with many permanent and temporary ponds and water pools that support rich diversity of flora and fauna. It is located

82km from Point Calimere Wildlife Sanctuary in Nagapattinam District, which is a Ramsar site; 52km from Udhayamarthandapuram Bird Sanctuary; and 46km from Vaduvor Birds Sanctuary in Thiruvavur District, therefore, apart from common birds, the campus attracts a large number of wetland birds. The CUTN campus has a range of microhabitats within the campus such as grasslands, woodlands, shrubs, herbs, many ponds and water bodies. Additionally, both academic and residential campuses are surrounded by rich vegetation and agricultural lands.

We conducted the bird surveys from November 2017 to May 2019. We observed the birds using a standard 10x binoculars and recorded the images with a DSLR camera (18MP) with lens (55–250mm). We also photographed the bird habitats. We designed and carried out the present study in two ways (a) routine bird surveys, (b) casual bird watching. Routine bird surveys involved observing and recording bird species in fixed locations using line transect and point count method. We carried

out the study on a regular basis, except during heavy rains. Regular visits were made to different areas of the campuses for 2–4 hours, starting from 6am in the summer and 6.30am in the winter. Short visits were also made for an hour to a specified site in the evenings. During the routine bird surveys, a pre-defined line transect of 200m in length were laid in the campus. During the casual bird watching, we recorded different types of information such as visual sightings which include shape, size, colour, beak, and also flight pattern. We also recorded acoustic information including bird calls, perch location, and habitat (wherever possible). The roads and pathways in the campus were divided into transects for bird watching and ease of counting. For those areas which are inaccessible by walk, songs/calls of birds were observed from a distance.

For bird identification standard field guides by Ali (2012) and Grimmett & Inskipp (2005), various standard journal articles for diagnostics and online databases which provided

images and recorded calls of birds were used. For taxonomy work we followed Praveen et al. (2016).

Residential status as, R–resident; R/LM–resident with local movements; WM–winter migrant; R/AM–resident with altitudinal movements; R/LM/SM–resident with local as well as summer movements; R/WM–resident with winter influx. The roosting and foraging zones of birds in and around the campus were observed. There were 29 foraging zones and seven roosting zones during the study period, partitioned by roads, pathways and buildings. Habitats of the CUTN campus were categorized as garden (G), cropland (CL), light forest having moderately high trees and bushes underneath (LF), open woodland which includes trees of different height, bushes and vines on the trees, varieties of herbs and grasses underneath (OW), grassland (GL), wetland which includes all types of water bodies (WL), and human habitation, the buildings (HH).

We recorded 79 bird species belonging to 16 orders and 43 families (Table 1).

We found that university campus is dominated by Passeriformes, followed by Pelecaniformes and Cuculiformes (Fig 1). The birds in the campus are diversified with different types of micro habitats such as grassland, woodland, river and ponds and these micro habitats were classified as given in the table. Some species like Rock Pigeon, Spotted Dove, Jungle Babbler, Common Myna, Large-billed Crow, Black Drongo, Red-vented Bulbul are very common and can be seen almost everywhere. The number of species with residential status — resident 17; resident with local movements 52; winter migrant 6; resident with local as well as summer movements 1; resident with winter influx 1. There were 29 foraging zones and seven roosting zones during the study period, partitioned by roads, pathways, and buildings.

There is little information on checklist of birds and related studies in Thiruvavur region (Asokan 1998a,b; Chandru & Asokan, 1999; Asokan et al. 2009; Sivakumaran & Thiyagesan 2003; Neelanarayanan 2007), and

most of this information is related to the population and feeding ecology of birds. However, very few studies reported the nesting behavior of birds (Thiyagesan 1991; Sivakumar & Jayabalan 2004; Asokan et al. 2009) in this region. The Cauvery River bank attracts a greater diversity of birds due to its diverse ecosystem and vegetation types, and hence availability of a variety of food sources for birds. Along both sides of the river bank in the CUTN campus, there are many wooded tree species, scrub and bushy type stumpy vegetation which provide both roosting and nesting habitats for many bird species. Even in the surrounding agricultural fields a number of bird species were recorded.

Accounts of species of interest

Species that are rare in the region and observed for the first time in the campus during study period.

Circaetus gallicus: Rarest among the raptors found in CUTN campus. One individual was sighted and photographed near the main gate during May 2018.

Tringa nebularia: One individual was found foraging near roundabout (near New Girls Hostel) on 3 Dec 2018.

Phaenicophaeus viridirostris: One individual was observed in the campus (Residential) on 13 Feb 2019 and one on 22 Mar 2019 near CLC 1 (Department of Life Sciences building), but no observation after that.

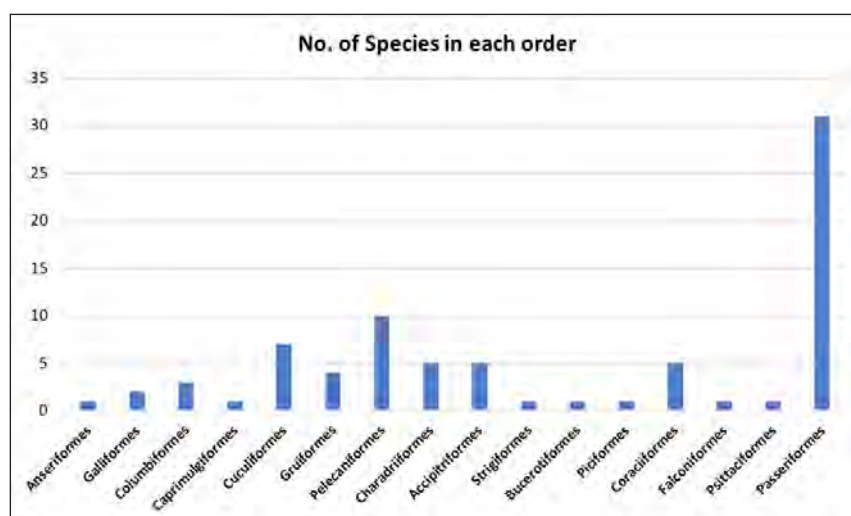


Fig 1. Number of bird species in each order recorded during the study.

Table 1. List of bird species in each order with their IUCN Red List, Indian Wildlife (Protection) Act, 1972 status, Residential status and their Habitat.

	Family	Name of the Species	Scientific Name	IUCN Category	WPA	Residential Status*	Habitat**
Accipitriformes							
1	Accipitridae	Short-toed Snake Eagle	<i>Circaetus gallicus</i> (J.F.Gmelin, 1788)	LC	Sch I	R/LM	CL
2		Black-winged Kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	LC	Sch I	R/LM	OW
3		Shikra	<i>Accipiter badius</i> (J.F.Gmelin, 1788)	LC	Sch I	R/LM	OW
4		Brahminy Kite	<i>Haliastur indus</i> (Boddaert, 1783)	LC	Sch I	R/LM	OW
5		Black Kite	<i>Milvus migrans</i> (Boddaert, 1783)	LC	Sch I	R/LM	OW
Anseriformes							
6	Anatidae	Lesser Whistling Duck	<i>Dendrocygna javanica</i> (Horsfield, 1821)	LC	Sch IV	R/LM	CL
Bucerotiformes							
7	Upupidae	Common Hoopoe	<i>Upupa epops</i> Linnaeus, 1758	LC	Sch IV	R/LM	G, LF, OW
Caprimulgiformes							
8	Apodidae	Asian Palm Swift	<i>Cypsiurus balasiensis</i> (J.E.Gray, 1829)	LC	Sch IV	R	OW
Charadriiformes							
9	Charadriidae	Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	LC	Sch IV	R	GL, WL
10	Jacanidae	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i> (Scopoli, 1786)	LC	Sch IV	R/LM/SM	WL
11	Recurvirostridae	Black-winged Stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)	LC	Sch IV	R/WM	WL
12	Rostratulidae	Greater painted-Snipe	<i>Rostratula benghalensis</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	WL
13	Scolopacidae	Common Greenshank	<i>Tringa nebularia</i> (Gunnerus, 1767)	LC	Sch IV	WM	WL
Columbiformes							
14	Columbidae	Rock Pigeon	<i>Columba livia</i> J.F.Gmelin, 1789	LC	Sch IV	R	LF, OW, HH
15		Eurasian Collared-Dove	<i>Streptopelia decaocto</i> (Fridvaldszky, 1838)	LC	Sch IV	R	CL, OW, GL
16		Spotted Dove	<i>Streptopelia chinensis</i> (Scopoli, 1786)	LC	Sch IV	R	LF, OW, HH
Coraciiformes							
17	Alcedinidae	Common Kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	WL
18		Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	WL
19		White-throated Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	LF, OW, WL

	Family	Name of the Species	Scientific Name	IUCN Category	WPA	Residential Status*	Habitat**
Coraciiformes							
20	Coraciidae	Indian Roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	LC	Sch IV	R	LF, OW
21	Meropidae	Green Bee-eater	<i>Merops orientalis</i> Latham, 1801	LC	Sch IV	R/LM	LF
Cuculiformes							
22	Cuculidae	Greater Coucal	<i>Centropus sinensis</i> (Stephens, 1815)	LC	Sch IV	R	LF, OW
23		Blue-faced Malkoha	<i>Phaenicophaeus viridirostris</i> (Jerdon, 1840)	LC	Sch IV	R/LM	G, LF, OW
24		Pied Crested Cuckoo	<i>Clamator jacobinus</i> (Boddaert, 1783)	LC	Sch IV	R	LF, OW
25		Asian Koel	<i>Eudynamys scolopaceus</i> (Linnaeus, 1758)	LC	Sch IV	R	LF, OW
26		Grey-bellied Cuckoo	<i>Cacomantis passerinus</i> (Vahl, 1797)	LC	Sch IV	R/LM	LF, OW
27		Drongo Cuckoo	<i>Surniculus lugubris</i> (Horsfield, 1821)	LC	Sch IV	R/LM	LF, OW
28		Common Hawk Cuckoo	<i>Hierococcyx varius</i> (Vahl, 1797)	LC	Sch IV	R	LF, OW
Falconiformes							
29	Falconidae	Common Kestrel	<i>Falco tinnunculus</i> Linnaeus, 1758	LC	Sch IV	WM	LF, OW
Galliformes							
30	Phasianidae	Indian Peafowl	<i>Pavo cristatus</i> Linnaeus, 1758	LC	Sch I	R	CL, GL
31		Grey Francolin	<i>Francolinus pondicerianus</i> (J.F.Gmelin, 1789)	LC	Sch IV	R	CL, GL
32	Rallidae	White-breasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	LC	Sch IV	R/LM	GL, WL
33		Watercock	<i>Gallicrex cinerea</i> (J.F.Gmelin, 1789)	LC	Sch IV	R/LM	GL, WL
34		Purple Swampphen	<i>Porphyrio porphyrio</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	GL, WL
35		Common Moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)	LC	Sch IV	R/WM	GL, WL
Passeriformes							
36	Acrocephalidae	Paddyfield Warbler	<i>Acrocephalus agricola</i> (Jerdon, 1845)	LC	Sch IV	WM	LF
37	Alaudidae	Indian Bushlark	<i>Mirafra erythroptera</i> Blyth, 1845	LC	Sch IV	R/LM	CL, GL
38	Cisticolidae	Ashy Prinia	<i>Prinia socialis</i> Sykes, 1832	LC	Sch IV	R/LM	LF, GL
39		Plain Prinia	<i>Prinia inornata</i> Sykes, 1832	LC	Sch IV	R/LM	LF, GL
40		Common Tailorbird	<i>Orthotomus sutorius</i> (Pennant, 1769)	LC	Sch IV	R/LM	G, LF, OW

	Family	Name of the Species	Scientific Name	IUCN Category	WPA	Residential Status*	Habitat**
41	Corvidae	Rufous Treepie	<i>Dendrocitta vagabunda</i> (Latham, 1790)	LC	Sch IV	R/LM	G, LF, OW
42		Large-billed Crow	<i>Corvus macrorhynchos</i> Wagler, 1827	LC	Sch IV	R	ALL HABITATS
43	Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i> Vieillot, 1817	LC	Sch IV	R	G, LF, OW
44	Estrildidae	Indian Silverbill	<i>Euodice malabarica</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	GL
45		Scaly-breasted Munia	<i>Lonchura punctulata</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	GL
46		Black-headed Munia	<i>Lonchura malacca</i> (Linnaeus, 1766)	LC	Sch IV	R/LM	GL
47	Hirundinidae	Wire-tailed Swallow	<i>Hirundo smithii</i> Leach, 1818	LC	Sch IV	R/LM	LF, HH
48		Barn Swallow	<i>Hirundo rustica</i> Linnaeus, 1758	LC	Sch IV	WM	LF
49	Laniidae	Brown Shrike	<i>Lanius cristatus</i> Linnaeus, 1758	LC	Sch IV	WM	LF, OW
50	Leiothrichidae	Jungle Babbler	<i>Turdoides striata</i> (Dumont, 1823)	LC	Sch IV	R	ALL HABITATS
51	Monarchidae	Indian Paradise Flycatcher	<i>Terpsiphone paradisi</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	LF, OW
52	Motacillidae	Paddyfield Pipit	<i>Anthus rufulus</i> Vieillot, 1818	LC	Sch IV	R/LM	CL, GL
53		White-browed Wagtail	<i>Motacilla maderaspatensis</i> J.F. Gmelin, 1789	LC	Sch IV	R/LM	GL
54	Muscicapidae	Indian Robin	<i>Saxicoloides fulicatus</i> (Linnaeus, 1766)	LC	Sch IV	R/LM	LF, OW, HH
55		Oriental Magpie Robin	<i>Copsychus saularis</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	LF, OW, HH
56	Nectariniidae	Purple-rumped Sunbird	<i>Leptocoma zeylonica</i> (Linnaeus, 1766)	LC	Sch IV	R/LM	G, HH
57		Loten's Sunbird	<i>Cinnyris lotenius</i> (Linnaeus, 1766)	LC	Sch IV	R/LM	G, HH
58	Oriolidae	Eurasian Golden Oriole	<i>Oriolus oriolus</i> (Linnaeus, 1758)	LC	Sch IV	WM	G, LF, OW
59	Ploceidae	Baya Weaver	<i>Ploceus philippinus</i> (Linnaeus, 1766)	LC	Sch IV	R/LM	LF, OW
60	Pycnonotidae	Red-vented Bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	LC	Sch IV	R/LM	G, LF, OW, HH
61		White-browed Bulbul	<i>Pycnonotus luteolus</i> (Lesson, 1841)	LC	Sch IV	R/LM	LF, OW
62	Sturnidae	Rosy Starling	<i>Pastor roseus</i> (Linnaeus, 1758)	LC	Sch IV	WM	LF, OW
63		Brahminy Starling	<i>Sturnia pagodarum</i> (J.F.Gmelin, 1789)	LC	Sch IV	R/LM	LF, OW
64		Common Myna	<i>Acridotheres tristis</i> (Linnaeus, 1766)	LC	Sch IV	R	ALL HABITATS

	Family	Name of the Species	Scientific Name	IUCN Category	WPA	Residential Status*	Habitat*
65	Vangidae	Malabar Woodshrike	<i>Tephrodornis sylvicola</i> Jerdon, 1839	LC	Sch IV	VA	LF, OW
66		Common Woodshrike	<i>Tephrodornis pondicerianus</i> (J.F.Gmelin, 1789)	LC	Sch IV	R/LM	LF, OW
Pelecaniformes							
67	Anhingidae	Oriental Darter	<i>Anhinga melanogaster</i> Pennant, 1769	NT	Sch IV	R/LM	WL
68	Ardeidae	Yellow Bittern	<i>Ixobrychus sinensis</i> (J.F.Gmelin, 1789)	LC	Sch IV	R/LM	CL, GL, WL
69		Indian Pond Heron	<i>Ardeola grayii</i> (Sykes, 1832)	LC	Sch IV	R/LM	CL, GL, WL
70		Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus, 1758)	LC	Sch IV	R/AM	CL, GL, WL
71		Purple Heron	<i>Ardea purpurea</i> Linnaeus, 1766	LC	Sch IV	R/LM	CL, GL, WL
72		Intermediate Egret	<i>Ardea intermedia</i> Wagler,1829	LC	Sch IV	R/LM	CL, GL, WL
73		Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	LC	Sch IV	R/LM	CL, GL, WL
74	Ciconiidae	Asian Openbill Stork	<i>Anastomus oscitans</i> (Boddaert, 1783)	LC	Sch IV	R/LM	CL, GL, WL
75	Phalacrocoracidae	Little Cormorant	<i>Microcarbo niger</i> (Vieillot, 1817)	LC	Sch IV	R/LM	WL
76	Threskiornithidae	Black-headed Ibis	<i>Threskiornis melanocephalus</i> (Latham, 1790)	NT	Sch IV	R/LM	CL, GL, WL
Piciformes							
77	Picidae	Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i> (Linnaeus, 1758)	LC	Sch IV	R/LM	LF, OW
Psittaciformes							
78	Psittaculidae	Rose-ringed Parakeet	<i>Psittacula krameri</i> (Scopoli, 1769)	LC	Sch IV	R/LM	LF, OW
Strigiformes							
79	Strigidae	Spotted Owlet	<i>Athene brama</i> (Temminck, 1821)	LC	Sch IV	R	LF, OW

* R- Resident; R/LM- Resident with Local Movements; WM- Winter Migrant; R/AM- Resident with altitudinal movements; R/LM/ SM- Resident with local as well as summer movements; R/WM- Resident with winter influx.

** Garden (G), Cropland (CL), Light Forest having moderately high trees and bushes underneath (LF), Open Woodland which includes trees of different height, bushes and vines on the trees, varieties of herbs and grasses underneath (OW), Grassland (GL), Wetland which includes all types of water bodies (WL) and Human Habitation, the buildings (HH).

Cacomantis passerinus: Sighted and photographed near residential campus on 13 Feb 2019. The population seems very less compared to the other members of the Cuculidae family.

Surniculus lugubris: Observed near NLBS 2 only once during mid-September. No observations after that.

Falco tinnunculus: Winter Migrant to the region. One individual was observed and photographed near main gate on 6 Nov 2018.

Lanius cristatus: Winter migrant to the region. An individual was found near New Girls Hostel on 14 Dec 2018.

Tephrodornis sylvicola: A species endemic to the Western Ghats. This species is suspected to be a 'partial migrant' (Partial migration describes intra-population variation in migratory tendency, i.e., when just a fraction of a population migrates and a fraction remains resident within a single habitat the whole year around). One individual was found foraging near residential campus on 13 Feb 2019.

The campus houses a wide variety of flora ranging from herbs, weeds, grasses to big trees. The swamps and bushes surrounding it, attracts migratory birds during winter and rainy seasons. The trees (avenue, ornamental, fuel wood, timber, fodder and fruit bearing) has created a typical habitat and several ecological niches for the birds. Although the vegetation is dominated by grasses, shrubs and bushes, the marshy spots surrounded by reeds provide good habitat for small birds like munias and

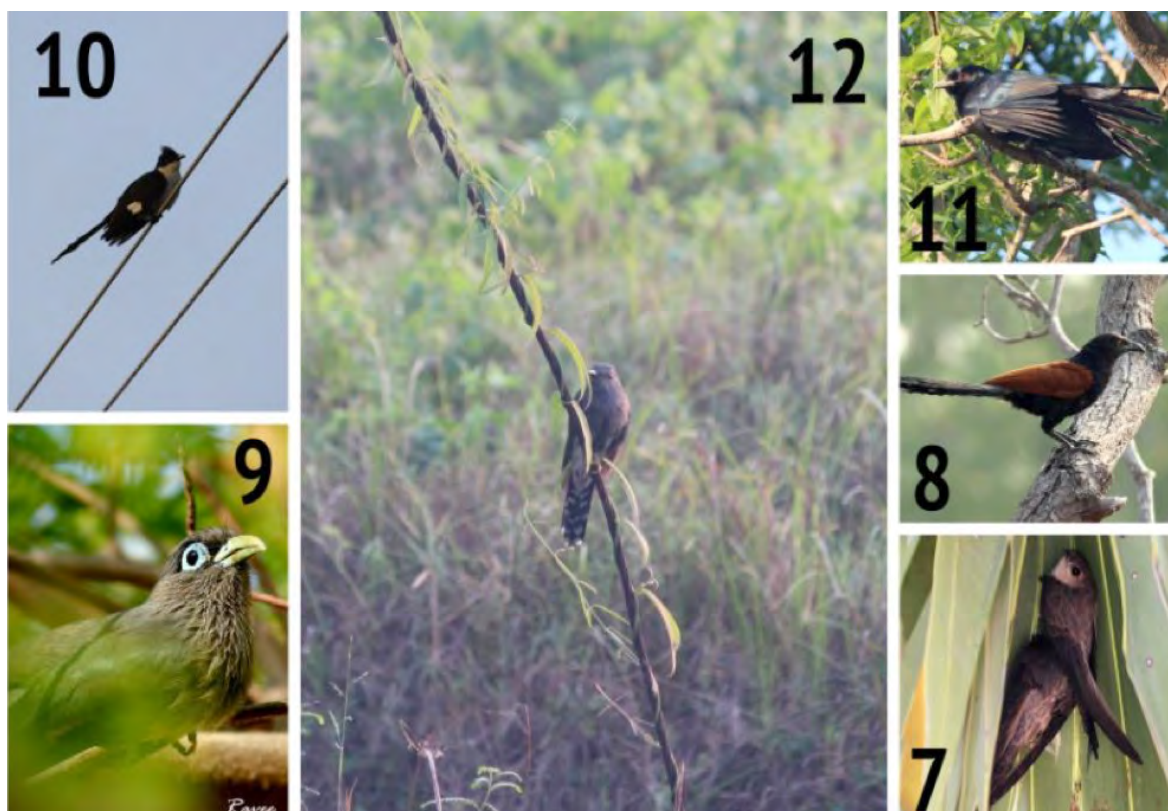
warblers. The herbs which provide fruits and nectar, attract birds like cuckoos, bulbuls, and sunbirds. All the roads and the infrastructures are surrounded by bushes and trees. The fauna includes plethora of insects, mollusks, reptiles, fishes and amphibians. The rise in population of these fauna during the north-east monsoon months (September–January) attracts migratory birds.

Future research on the behaviour and feeding ecology of birds in the campus will help to understand the birds more accurately and thereby pave the way for their better conservation measures. Although, there are natural vegetation such as grasslands, woodlands, water bodies and shrublands in the CUTN campus as habitat for birds of this region, conservation measures are of immense need for their future survival. The present study also suggests the planting of native fruit trees such as Jamun, figs, etc. inside the campus will increase the habitat size for birds. Keeping micro catchments all over the university campus help drive the thirsts of birds during drought season. Initiating bio monitoring program is necessary for monitoring and conservation of the birds and promotion of conservation education for university students. A further complete study is required to understand species assemblage with changes in the habitats and climatic and other resources. This could be an ideal ecosystem to study the avifauna with respect to changes in the habitat over the period of time.

Images of Birds spotted in CUTN campus.



1. Lesser Whistling Duck; 2. Indian Peafowl; 3. Grey Francolin; 4. Rock Pigeon; 5. Eurasian Collared-Dove; 6. Spotted Dove.



7. Asian Palm Swift; 8. Greater Coucal; 9. Blue-faced Malkoha; 10. Pied Crested Cuckoo; 11. Asian Koel; 12. Grey-bellied Cuckoo.



13. Drongo Cuckoo; 14. Common Hawk Cuckoo; 15. White-breasted Waterhen;
16. Watercock; 17. Purple Swamphen; 18. Common Moorhen.



19. Asian Openbill Stork; 20. Yellow Bittern; 21. Indian Pond Heron; 22. Cattle Egret;
23. Purple Heron; 24. Intermediate Egret.



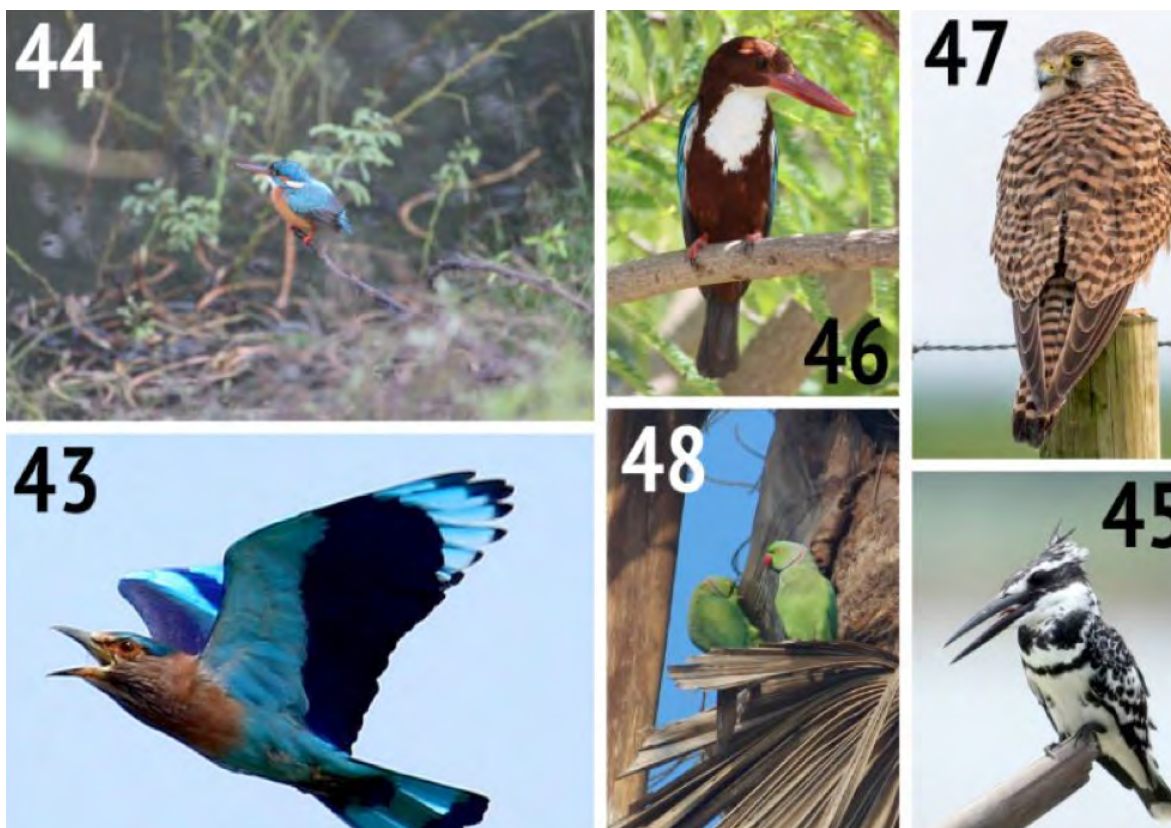
25. Little Egret; 26. Black-headed Ibis; 27. Little Cormorant; 28. Oriental Darter; 29. Black-winged Stilt; 30. Red-wattled Lapwing.



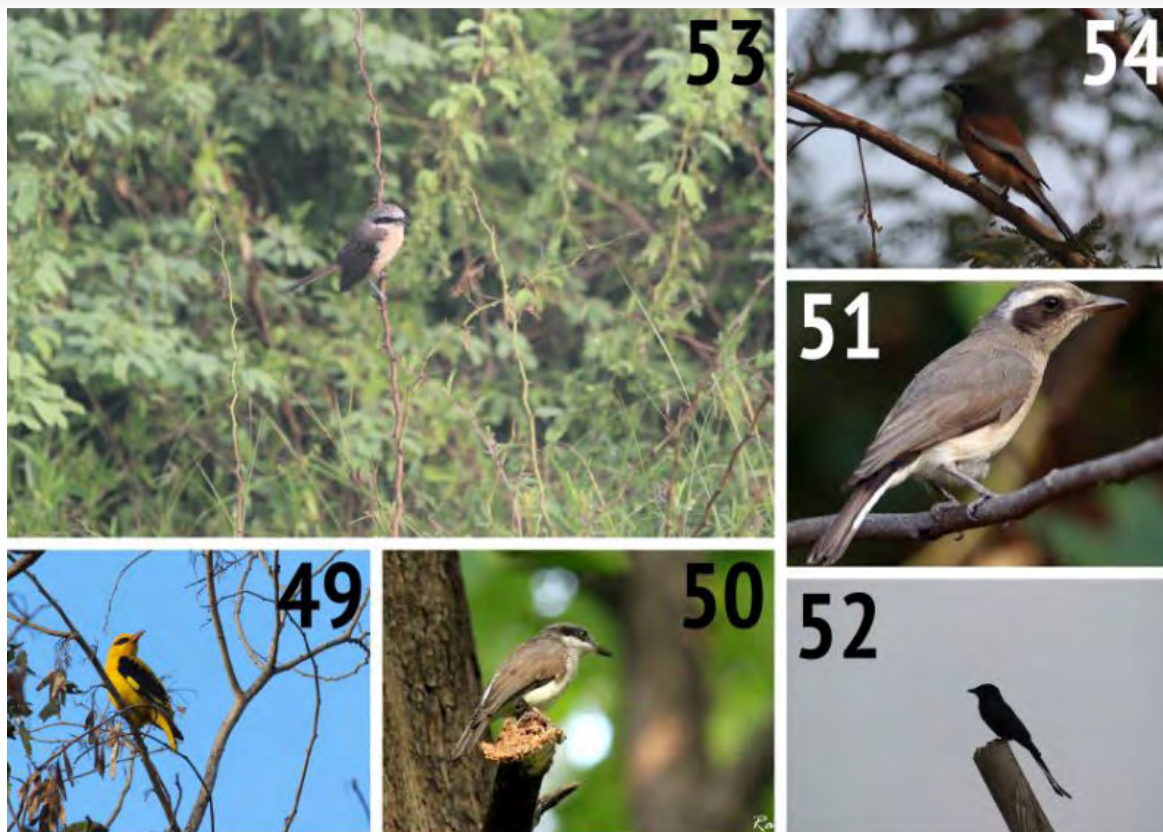
31. Greater painted-snipe; 32. Pheasant-tailed Jacana; 33. Common Greenshank; 34. Short-toed snake eagle; 35. Black-winged Kite; 36. Shikra.



37. Brahminy Kite; 38. Black Kite; 39. Spotted owl; 40. Common Hoopoe; 41. Lesser Golden-backed Woodpecker; 42. Green Bee Eater.



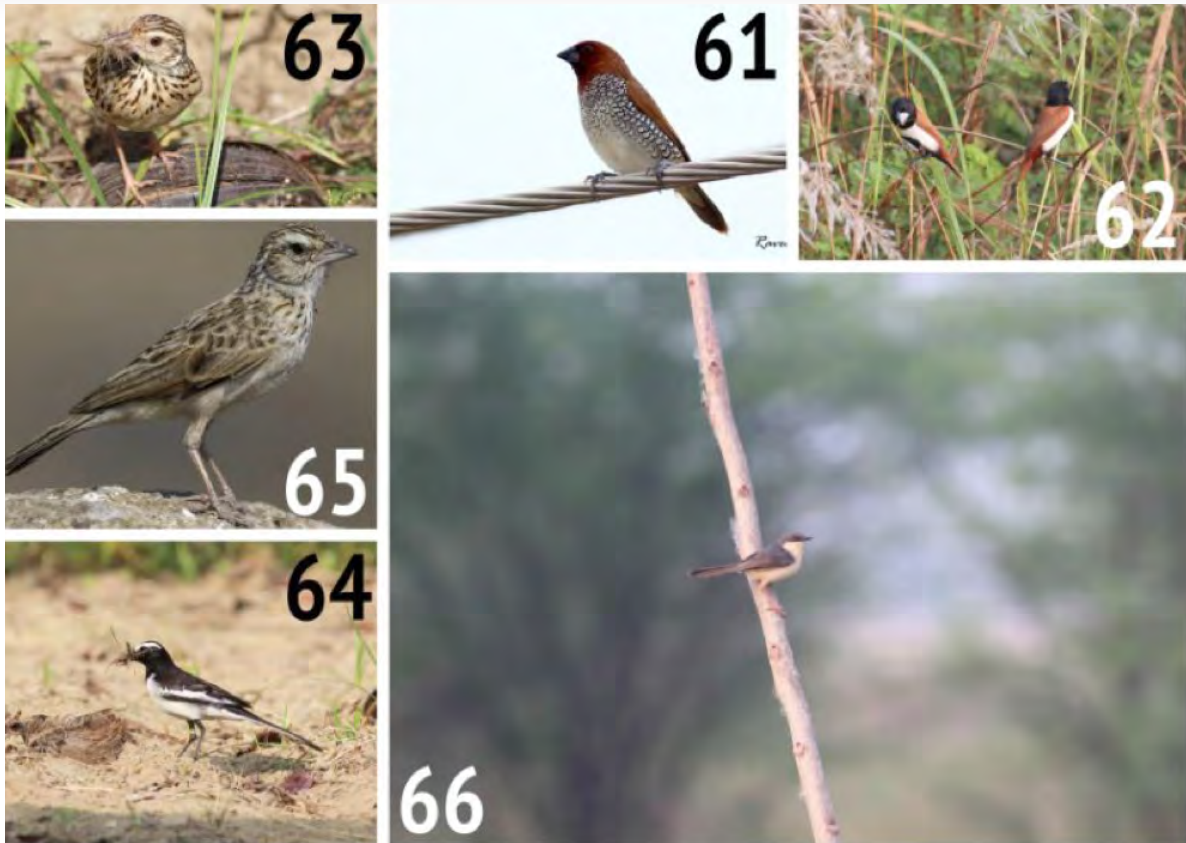
43. Indian Roller; 44. Common Kingfisher; 45. Pied Kingfisher; 46. White-throated Kingfisher; 47. Common Kestrel; 48. Rose-ringed Parakeet.



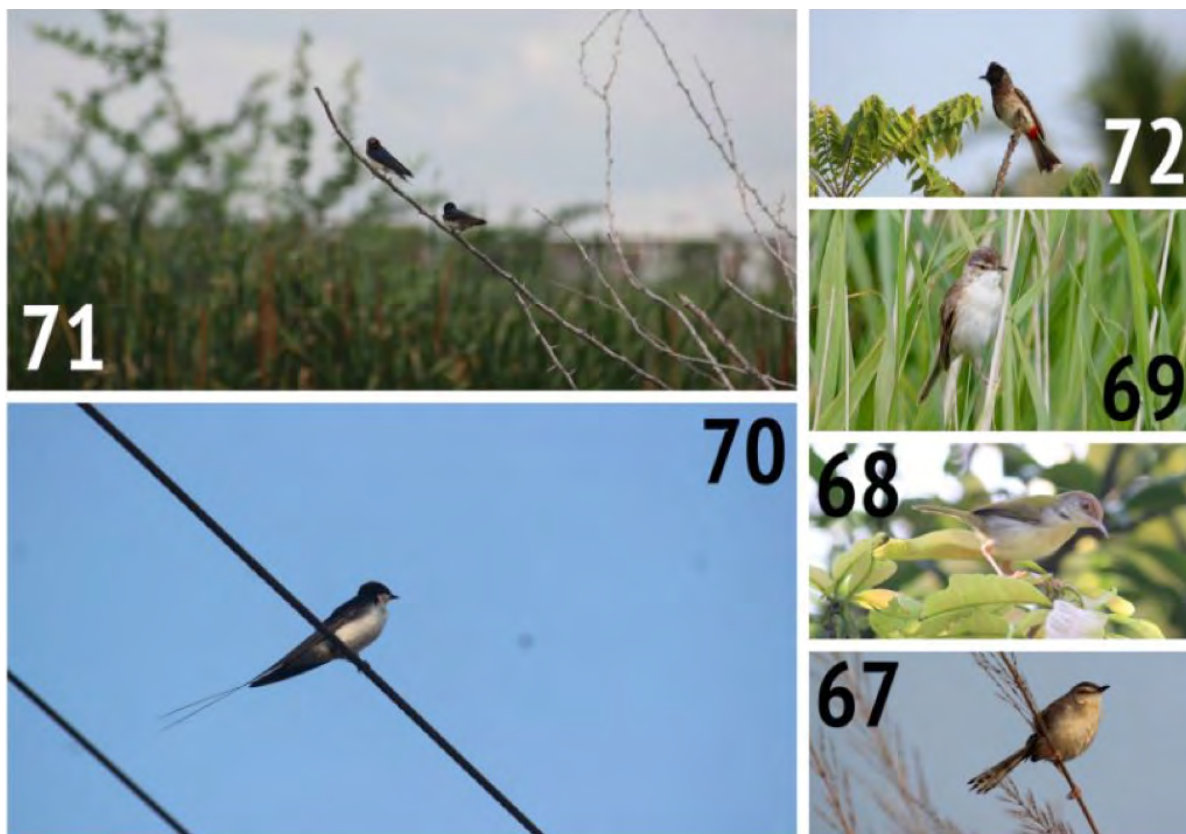
49. Eurasian Golden Oriole; 50. Malabar Woodshrike; 51. Common Woodshrike; 52. Black Drongo; 53. Brown Shrike; 54. Rufous Treepie.



55. Large-billed Crow; 56. Indian Paradise Flycatcher; 57. Purple-rumped Sunbird; 58. Loten's Sunbird; 59. Baya Weaver; 60. Indian Silverbill.



61. Scaly-breasted Munia; 62. Black-headed Munia; 63. Paddyfield Pipit; 64. White-browed Wagtail; 65. Indian Bushlark; 66. Ashy Prinia.



67. Plain Prinia; 68. Common Tailorbird; 69. Paddyfield Warbler; 70. Wire-tailed Swallow; 71. Barn Swallow; 72. Red-vented Bulbul.



73. White-browed Bulbul; 74. Jungle Babbler; 75. Rosy Starling; 76. Brahminy Starling; 77. Common Myna; 78. Indian Robin; 79. Oriental Magpie Robin.

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A checklist of birds of Haridwar, Uttarakhand



Flock of Cormorants.

Birds are thought to be excellent biological indicators that reflect the health conditions of ecosystems (Collar & Andrew 1988) and its high and low diversities are directly related to environmental conditions of any area (Loreau et al. 2001). The change in the vegetation cover has also affected the diversity, abundance, and distribution of avian species (Gregory et al. 2010; Balodi et al. 2018). Many avian species migrate from short to very long distances in search

of favorable environmental conditions; meanwhile, other species are non-migratory and spend their life cycle in a particular area (Arya et al. 2019). Haridwar hosts many resident avian

species as well as migratory birds (Bhatt et al. 2015). A number of migratory avian species visits Chilla Forest Range, Bheemgoda Barrage, Missarpur Ganga Ghat, Gurukula Kangri University

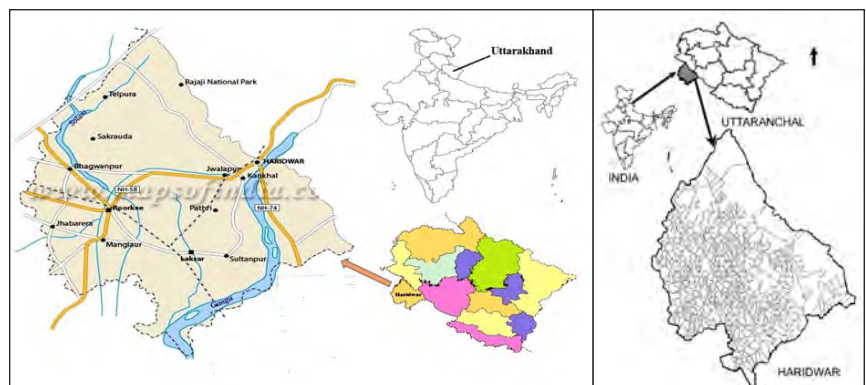


Fig 1. Map of the Study Area. (Source: Map of India)

Checklist of birds of Haridwar

	Family	Name	Scientific name	Status	Status IUCN
1	Accipitridae	Bonelli's Eagle	<i>Aquila fasciata</i>	R	LC
2		Crested Serpent Eagle	<i>Spilornis cheela</i>	R	LC
3		Changeable Hawk Eagle	<i>Nisaetus (cirrhatus) limnaeetus</i>	R	LC
4		Palla's Fish Eagle	<i>Haliaeetus leucoryphus</i>	RM	EN
5		Oriental Honey Buzzard.	<i>Pernis ptilorhynchus</i>	R	LC
6		Short-toed Snake Eagle	<i>Circaetus Gallicus</i>	R	LC
7		Steppe Eagle	<i>Aquila nipalensis</i>	R	EN
8		Black Kite	<i>Milvus migrans</i>	R	LC
9		Black-winged Kite	<i>Elanus caeruleus</i>	R	LC
10		Shikra	<i>Accipiter badius</i>	R	LC
11		Cinereous Vulture	<i>Aegypius monachus</i>	WM	NT
12		Egyptian Vulture	<i>Neophron percnopterus</i>	R	EN
13		Griffon Vulture	<i>Gyps fulvus</i>	WM	LC
14		Himalayan Vulture	<i>Gyps himalayensis</i>	WM	NT
15		Red-headed Vulture	<i>Sarcogyps calvus</i>	RM	CR
16		White-rumped Vulture	<i>Gyps bengalensis</i>	RM	CR
17	Aegithinidae	Common Iora	<i>Aegithina tiphia</i>	R	LC
18	Alcedinidae	Common Kingfisher	<i>Alcedo atthis</i>	R	LC
19		White-throated Kingfisher	<i>Halcyon smyrnensis</i>	R	LC
20		Pied Kingfisher	<i>Ceryle rudis</i>	R	LC
21		Crested Kingfisher	<i>Megaceryle lugubris</i>	R	LC
22		Stork-billed Kingfisher	<i>Pelargopsis capensis</i>	WM	LC
23	Anatidae	Indian Spot-billed Duck	<i>Anas poecilorhyncha</i>	R	LC
24		Ruddy Shelduck	<i>Tadorna ferruginea</i>	WM	LC
25		Northern Pintail	<i>Anas acuta</i>	RM	LC
26		Mallard	<i>Anas platyrhynchos</i>	WM	LC
27		Red-crested Pochard	<i>Netta rufina</i>	WM	LC
28		Bar-headed Goose	<i>Anser indicus</i>	WM	LC
29	Anhingidae	Oriental Darter	<i>Anhinga melanogaster</i>	R	NT
30	Ardeidae	Indian Pond Heron	<i>Ardeola grayii</i>	R	LC
31		Grey Heron	<i>Ardea cinerea</i>	R	LC
32		Black- crowned Night Heron	<i>Nycticorax nycticorax</i>	R	LC
33		Purple Heron	<i>Ardea purpurea</i>	R	LC
34		Yellow Bittern	<i>Ixobrychus sinensis</i>	R	LC
35	Bucerotidae	Indian Grey Hornbill	<i>Ocyroceros birostris</i>	R	LC
36		Oriental Pied- Hornbill	<i>Anthracoceros albirostris</i>	R	LC
37		Great Hornbill	<i>Buceros bicornis</i>	R	NT

	Family	Name	Scientific name	Status	Status IUCN
38	Burhinidae	Stone-Curlew	<i>Burhinus oedicephalus</i>	R	LC
39	Campephagidae	Scarlet Minivet	<i>Pericrocotus (flammeus) speciosus</i>	R	LC
40		Small Minivet	<i>Pericrocotus cinnamomeus</i>	R	LC
41		Rosy Minivet	<i>Pericrocotus roseus</i>	R	LC
42		Long-tailed Minivet	<i>Pericrocotus ethologus</i>	R	LC
43	Charadriidae	Red-wattled Lapwing	<i>Vanellus indicus</i>	R	LC
44		River Lapwing	<i>Vanellus duvaucelii</i>	R	NT
45		Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	R	LC
46		Little Ringed Plover	<i>Charadrius dubius</i>	R	LC
47	Chloropseidae	Golden-fronted Leaf bird	<i>Chloropsis aurifrons</i>	R	LC
48	Ciconiidae	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	WM	NT
49		Black Stork	<i>Ciconia nigra</i>	WM	LC
50		Painted Stork	<i>Mycteria leucocephala</i>	WM	NT
51		Woolly-necked Stork	<i>Ciconia episcopus</i>	WM	VU
52	Cisticolidae	Ashy Prinia	<i>Prinia socialis</i>	R	LC
53		Grey-breasted Prinia	<i>Prinia hodgsonii</i>	R	LC
54		Zitting Cisticola	<i>Cisticola juncidis</i>	R	LC
55		Striated Prinia	<i>Prinia criniger</i>	R	LC
56		Common Tailorbird	<i>Orthotomus sutorius</i>	R	LC
57	Columbidae	Emerald Dove	<i>Chalcophaps indica</i>	R	LC
58		Oriental Turtle Dove	<i>Streptopelia orientalis</i>	R	LC
59		Eurasian Collared Dove	<i>Streptopelia decaocto</i>	R	LC
60		Red Collared Dove	<i>Streptopelia tranquebarica</i>	R	LC
61		Spotted Dove	<i>Stigmatopelia chinensis</i>	R	LC
62		Laughing Dove	<i>Stigmatopelia asenegalensis</i>	R	LC
63		Common Pigeon	<i>Columba livia</i>	R	LC
64		Yellow-footed Green Pigeon	<i>Treron phoenicopterus</i>	R	LC
65	Coraciidae	Indian Roller	<i>Coracias benghalensis</i>	R	LC
66	Corvidae	Indian Jungle Crow	<i>Corvus ulminates</i>	R	LC
67		Large-billed Crow	<i>Corvus macrorhynchos</i>	R	LC
68		House Crow	<i>Corvus splendens</i>	R	LC
69		Rufous-Treepie	<i>Dendrocitta vagabunda</i>	R	LC
70		Grey-Treepie	<i>Dendrocitta formosae</i>	R	LC

	Family	Name	Scientific name	Status	Status IUCN
71	Cuculidae	Asian Koel	<i>Eudynamys scolopaceus</i>	R	LC
72		Greater Coucal	<i>Centropus sinensis</i>	R	LC
73		Common Hawk Cuckoo	<i>Hieroccyx varius</i>	R	
74		Indian Cuckoo	<i>Cuculus micropterus</i>	R	LC
75		Eurasian Cuckoo	<i>Cuculus canorus</i>	R	LC
76		Jacobin Cuckoo	<i>Clamator jacobinus</i>	WM	LC
77		Grey-bellied Cuckoo	<i>Cacomantis merulinus</i>	R	LC
78	Dicruridae	Ashy Drongo	<i>Dicrurus leucophaeus</i>	R	LC
79		Spangled Drongo	<i>Dicrurus hottentottus</i>	WM	LC
80		Black Drongo	<i>Dicrurus macrocercus</i>	R	LC
81		White-bellied Drongo	<i>Dicrurus caerulescens</i>	R	LC
82	Dicaeidae	Thick-billed Flowerpecker	<i>Dicaeum Agile</i>	R	LC
83		Pale-billed Flowerpecker	<i>Dicaeum erythrorhynchos</i>	R	LC
84	Emberizidae	White-capped Bunting	<i>Embriza stewarti</i>	RM	LC
85	Estrildidae	Scaly-Breasted Munia	<i>Lonchura punctulata</i>	R	LC
86		Indian Silverbill	<i>Euodice malabarica</i>	R	LC
87		Tricoloured Munia	<i>Lonchura malacca</i>	RM	LC
88	Falconidae	Collared Falconet	<i>Microhierax caerulescens</i>	RM	LC
89		Shaheen Falcon	<i>Falco peregrinus peregrinator</i>	M	LC
90	Fringillidae	Yellow-breasted Greenfinch	<i>Chloris spinoides</i>	RM	LC
91	Hirundinidae	Barn Swallow	<i>Hirundo rustica</i>	R	LC
92		Streak-throated Swallow	<i>Petrochelidon fluvicola</i>	R	LC
93		Wire-tailed Swallow	<i>Hirundo smithii</i>	R	LC
94		Red-rumped Swallow	<i>Cecropis daurica</i>	R	LC
95		Dusky Crag Martin	<i>Ptyonoprogne concolor</i>	R	LC
96	Laniidae	Bay-Backed Shrike	<i>Lanius vittatus</i>	R	LC
97		Long-tailed Shrike	<i>Lanius schach</i>	R	LC
98		Large Cuckoo Shrike	<i>Tephrodornis virgatus</i>	R	LC
99	Leiothrichidae	White-crested Laughingthrush	<i>Garrulax leucolophus</i>	R	LC
100		Jungle Babbler	<i>Turdoides striata</i>	R	LC
101		Red-billed Leiothrix	<i>Leiothrix lutea</i>	R	LC
102		Rufous Sibia	<i>Heterophasia capistrata</i>	R	LC
103	Laridae	Palla's Gull	<i>Ichthyaeetus ichthyaeetus</i>	WM	LC
104		Brown-headed Gull	<i>Chroicocephalus brunnicephalus</i>	WM	LC
105		Black-headed Gull	<i>Chroicocephalus ridibundus</i>	WM	LC
106		Bar-headed Goose	<i>Anser indicus</i>	WM	LC
107		Indian River Tern	<i>Sterna aurantia</i>	WM	NT
108	Megalaimidae	Coppersmith Barbet	<i>Megalaima haemacephala</i>	R	LC
109		Blue-throated Barbet	<i>Megalaima asiatica</i>	R	LC
110		Brown Headed Barbet	<i>Megalaima zeylanica</i>	R	LC
111		Lineated Barbet	<i>Megalaima lineata</i>	R	LC
112		Great Barbet	<i>Megalaima zeylanica</i>	R	LC

	Family	Name	Scientific name	Status	Status IUCN
113	Meropidae	Blue-Bearded Bee-eater	<i>Nyctornis athertoni</i>	R	LC
114		Blue-tailed Bee-eater	<i>Merops philippinus</i>	R	LC
115		Green Bee-eater	<i>Merops orientalis</i>	R	LC
116		Chestnut headed Bee-eater	<i>Merops leschenaultia</i>	R	LC
117	Motacillidae	White Wagtail	<i>Motacilla alba</i>	RM	LC
118		Grey Wagtail	<i>Motacilla cinerea</i>	RM	LC
119		Citrine Wagtail	<i>Motacilla citreola</i>	RM	LC
120		Yellow Wagtail	<i>Motacilla flava</i>	RM	LC
121		White-browed Wagtail	<i>Motacilla maderaspatensis</i>	RM	LC
122	Monarchidae	Indian Paradise Flycatcher	<i>Terpsiphone paradisi</i>	R	LC
123	Muscicapidae	Little Forktail	<i>Enicurus scouleri</i>	R	LC
124		Blue Whistling Thrush	<i>Myophonus caeruleus</i>	R	LC
125		Chestnut-bellied Rock Thrush	<i>Monticola rufiventris</i>	R	LC
126		Blue-capped Rock Thrush	<i>Monticola cinclorhynchus</i>	R	LC
127		Black-throated Thrush	<i>Turdus atrogularis</i>	R	LC
128		Indian Robin	<i>Copsychus fulicatus</i>	R	LC
129		Oriental Magpie Robin	<i>Copsychus saularis</i>	R	LC
130		White-capped Water Redstart	<i>Chaimrornis leucocephalus</i>	RM	LC
131		Plumbeous Water Redstart	<i>Rhyacornis fuliginosa</i>	RM	LC
132		Black Redstart	<i>Phoenicurus ochruros</i>	WM	LC
133		Grey Bushchat	<i>Saxicola ferreus</i>	R	LC
134		Pied Bushchat	<i>Saxicola caprata</i>	R	LC
135		Bluethroat	<i>Luscinia svecica</i>	WM	LC
136		Small Niltava	<i>Niltava macgrigoriae</i>	RM	LC
137		Slaty-blue Flycatcher	<i>Ficedula tricolor</i>	R	LC
138		Blue-throated Blue Flycatcher	<i>Cyornis rubeculoides</i>	R	LC
139		Taiga Flycatcher	<i>Ficedula albicilla</i>	RM	LC
140		Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i>	R	LC
141		Red-breasted Flycatcher	<i>Ficedula albicilla</i>	RM	LC
142		Ultramarine Flycatcher	<i>Ficedula superciliaris</i>	RM	LC
143		Verdict's Flycatcher	<i>Eumyias thalassinus</i>	R	LC
144	Nectariniidae	Purple Sunbird	<i>Cinnyris asiaticus</i>	R	LC
145		Crimson Sunbird	<i>Aethopyga siparaja</i>	R	LC
146	Oriolini	Black-hooded Oriole	<i>Oriolus xanthornus</i>	R	LC
147		Maroon Oriole	<i>Oriolus trailli</i>	R	LC
148		Indian Golden Oriole	<i>Oriolus kundoo</i>	R	LC
149	Paridae	Great Tit	<i>Parus major</i>	R	LC
150		Green-backed Tit	<i>Parus monticolus</i>	R	LC
151		Fire-capped Tit	<i>Cephalopyrus flammiceps</i>	R	LC
152		Black-throated Tit	<i>Aegithalos concinnus</i>	R	LC

	Family	Name	Scientific name	Status	Status IUCN
153	Passeridae	House Sparrow	<i>Passer domesticus</i>	R	LC
154		Russet Sparrow	<i>Passer cinnamomeus</i>	R	LC
155		Chestnut-shouldered Petronia	<i>Gymnoris xanthocollis</i>	R	LC
156	Paradoxornithidae	Yellow-eyed Babbler	<i>Chrysomma sinense</i>	R	LC
157	Pellorneidae	Puff-throated Babbler	<i>Pellorneum ruficeps</i>	R	LC
158	Phalacrocoracidae	Great Cormorant	<i>Phalacrocorax carbo</i>	R	LC
159		Little Cormorant	<i>Phalacrocorax niger</i>	R	LC
160	Phasianidae	Red Jungle Fowl	<i>Gallus gallus</i>	R	LC
161		Indian Peafowl	<i>Pavo cristatus</i>	R	LC
162		Grey Francolin	<i>Francolinus pondicerianus</i>	R	LC
163		Black Francolin	<i>Francolinus francolinus</i>	R	LC
164		Khalij Pheasant	<i>Lophura leucomelanos</i>	R	LC
165		Chukar Partridge	<i>Alectoris chukar</i>	R	LC
166		Grey-Hooded Warbler	<i>Phylloscopus xanthoschistos</i>	R	LC
167	Phylloscopidae	Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	R	LC
168		Sulphur-bellied Warbler	<i>Phylloscopus griseolus</i>	R	LC
169		Lemon-rumped Warbler	<i>Phylloscopus chloronotus</i>	R	LC
170		Hume's Warbler	<i>Phylloscopus humei</i>	R	LC
171	Picidae	Fulvous-breasted Woodpecker	<i>Dendrocopos macei</i>	R	LC
172		Brown-capped Pygmy Woodpecker	<i>Dendrocopos nanus</i>	R	LC
173		Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i>	R	LC
174		Rufous Woodpecker	<i>Micropternus brachyurus</i>	R	LC
175		Brown-fronted Woodpecker	<i>Dendrocopos auriceps</i>	R	LC
176		Lesser Yellow-naped Woodpecker	<i>Picus chlorolophus</i>	R	LC
177		Greater Yellow-naped Woodpecker	<i>Picus flavinucha</i>	R	LC
178		Himalayan Golden-backed Woodpecker	<i>Dinopium shorii</i>	R	LC
179		Greater Golden-backed Woodpecker	<i>Chrysocolaptes lucidus</i>	R	LC
180		White-naped Woodpecker	<i>Chrysocolaptes festivus</i>	R	LC
181		Streak-throated Woodpecker	<i>Picus xanthopygaeus</i>	R	LC
182		Wryneck	<i>Jynx torquilla</i>	WM	LC
183	Pittidae	Indian Pitta	<i>Pitta brachyura</i>	R	LC
184	Psittaculidae	Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	R	LC
185		Alexandrine Parakeet	<i>Psittacula eupatria</i>	R	NT
186		Rose-ringed Parakeet	<i>Psittacula krameri</i>	R	LC
187		Slaty-headed Parakeet	<i>Psittacula himalayana</i>	R	LC

	Family	Name	Scientific name	Status	Status IUCN
188	Pycnonotidae	Ashy Bulbul	<i>Hemixos flavela</i>	R	LC
189		Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	R	LC
190		Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	R	LC
191		Red-vented Bulbul	<i>Pycnonotus cafer</i>	R	LC
192		Black-crested Bulbul	<i>Pycnonotus (melanicterus) flaviventris</i>	R	LC
193	Rallidae	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	R	LC
194	Rhipiduridae	White-browed Fantail	<i>Rhipidura aureola</i>	R	LC
195		White-throated Fantail	<i>Rhipidura albicollis</i>	R	LC
196	Saxicolinae	Brown Rock Chat	<i>Oenanthe fusca</i>	R	LC
197	Scolopacidae	Green Sandpiper	<i>Tringa ochropus</i>	R	LC
198		Common Sandpiper	<i>Actitis hypoleucos</i>	R	LC
199		Common Greenshank	<i>Tringa nebularia</i>	R	LC
200	Sittidae	Chestnut-bellied Nuthatch	<i>Sitta (castanea) cinnamoventris</i>	R	LC
201		Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	R	LC
202	Stenostiridae	Grey-headed Canary-Flycatcher	<i>Culicicapa ceylonensis</i>		
203		Yellow-bellied Fantail	<i>Chelidorhynch hypoxantha</i>	R	LC
204	Strigidae	Barn Owl	<i>Tyto alba</i>	R	LC
205		Indian Scops Owl	<i>Otus bakkamoena</i>	R	LC
206		Spotted Owlet	<i>Athene brama</i>	R	LC
207		Jungle Owlet	<i>Glaucidium radiatum</i>	R	LC
208		Brown Fish Owl	<i>Ketupa zeylonensis</i>	R	LC
209	Sturnidae	Brahminy Starling	<i>Sturnia pagodarum</i>	R	LC
210		Common Starling	<i>Sturnus vulgaris</i>	WM	LC
211		Asian Pied Starling	<i>Gracupica contra</i>	R	LC
212		Common Myna or Indian Myna	<i>Acridotheres tristis</i>		
213		Bank Myna	<i>Acridotheres ginginianus</i>	R	LC
214	Sylviidae	Lesser Whitethroat	<i>Sylvia curruca</i>	R	LC
215	Treskiornithidae	Red-naped Ibis	<i>Pseudibis papillosa</i>	R	LC
216		Black-headed Ibis	<i>Threskiornis melanocephalus</i>	R	NT
217		Glossy Ibis	<i>Plegadis falcinellus</i>	R	LC
218	Tichodromadidae	Wallcreeper	<i>Tichodroma muraria</i>	RM	LC
219	Timaliidae	Tawny-bellied Babbler	<i>Dumetia hyperythra</i>	R	LC
220		Black-chinned Babbler	<i>Cyanoderma pyrrhops</i>	R	LC
221	Turdidae	Orange-headed Thrush	<i>Zoothera citrina</i>	R	LC
222		Scaly Thrush	<i>Zoothera dauma</i>	RM	LC
223	Upupidae	Common Hoopoe	<i>Upupa epops</i>		
224	Vangidae	Bar-winged Flycatcher-shrike	<i>Hemipus picatus</i>	R	LC
225		Common Woodshrike	<i>Tephrodornis pondicerianus</i>	R	LC
226	Zosteropidae	Indian White-eye	<i>Zosterops palpebrosus</i>	R	LC

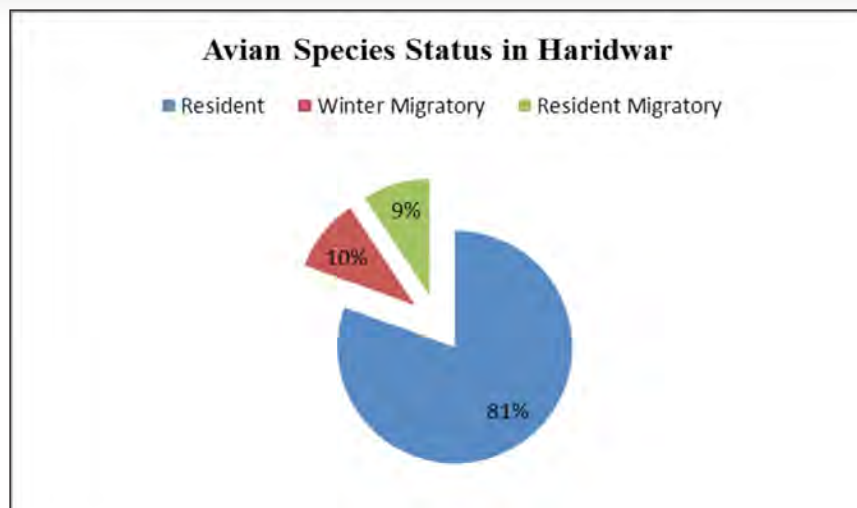


Fig 2. Avian species status in study area.

campus, Haridwar and Rajaji National Park of Haridwar District (which is parallel to river Ganga) every year from different parts of the world through central Asian Flyway, East Asian Australian Flyway & West Pacific Flyway etc. Most of the migratory birds arrived in India through Asian-Central Flyways. Some of these fly

over the higher Himalaya to reach India. We observed the resident and migratory avian species from 2017–2020 and prepared a checklist of avian species. The research area consists of a forest cover and river Ganga which provides plenty of food and shelter to these birds for their breeding and roosting. We recorded a total number of

226 species of birds in the district Haridwar, Uttarakhand that includes 57 water birds. Twelve species fall under the various categories of IUCN. This study was conducted in urban, suburban and wetlands/Ganga River and Chilla Forest Range of Rajaji National Park (29.96861°N, 78.19861°E), Bheemgoda Barrage (29.95638°N, 78.18083°E), Missarpur Ganga Ghat (29.89055°N, 78.14027°E) and adjacent areas in Haridwar.

We observed the resident and migratory avian species from 2017 to 2020 and prepared a checklist. Field visits were made almost fortnightly to these sites. Line transects and point count methods were used

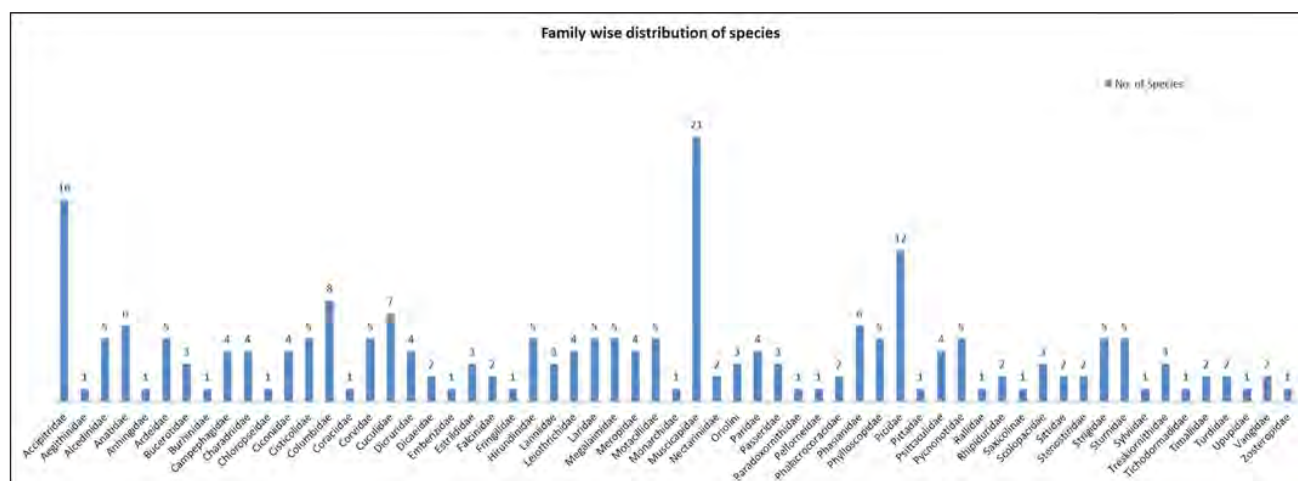


Fig 3. Familywise distribution of bird diversity recorded during the study period.



Image 2. Pallas' Fish Eagle.



Image 3. Bar-headed Goose.



Image 4. Black-necked Stork.

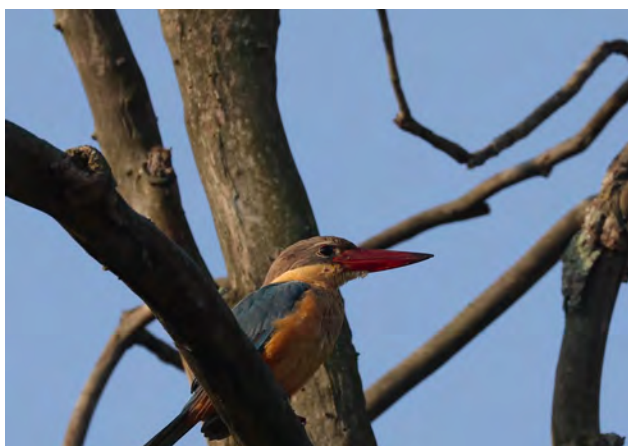


Image 5. Stork-billed Kingfisher.



Image 6. Flock of Northern Pintail and Red-crested Pochard.



Image 7. Flock of Gulls.

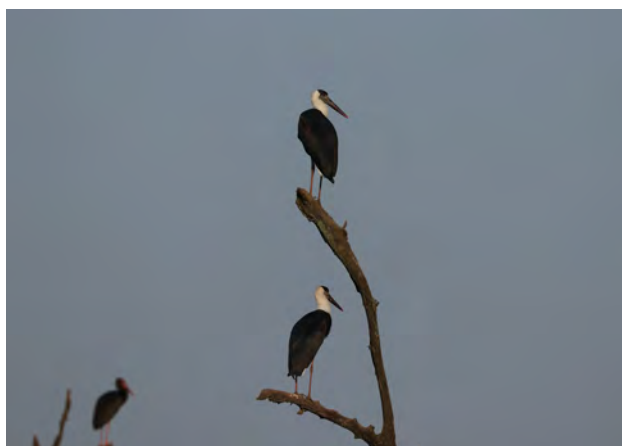


Image 8. Woolly-necked Stork and Black Stork.



Image 9. Eurasian Wryneck.

for bird survey. Line transects method was used for urban, suburban and forest habitats. A transect was one kilometer long and 20m wide on either side during the observation. Point count method was used for wetland bird survey (Bibby et al. 2000). Avifauna survey was done between 07.00–11.00 h and 15.30–19.30 h during April–September and between 08.00–11.00 h during October–March. The species diversity (familywise) indices were calculated by using Shannon-Weavers formula [$H' = -\sum p_i (\ln p_i)$] (Shannon & Weaver 1949). We used a pair of Nikon 10x50 prismatic field binoculars, Canon SX 60 HS, Canon 80D cameras and field guides (Grimmett et al. 2001) for identification and counting of the birds.

We observed a total number of 226 avian species belonging to 61 families during the study period (Table 1). Among these, 182 are resident, 23 are winter visitors and 21 are resident migratory species as identified. The percentage of resident, winter visitor

and resident migratory avian species was found to be 81%, 10%, and 9%, respectively (Fig-2). The maximum number of species recorded from family Muscicapidae (21) followed by Accipitridae (16), Picidae (12) Columbidae (8) (Fig. 3) of which 57 are water bird species found in Haridwar. A total of 12 species fall under the various category of IUCN. The value of diversity index (familywise) was found to be 3.79 during the study period. The study area comes under the western Himalayan region which is also considered as one of the important bird areas (IBAs) Islam et al. 2004). The environmental factors of the area like vegetation composition and canopy are the vital factors that are to blame for the habitat selection choice of the environment and distribution, diversity and richness of the water bird species. Vegetation composition influences the selection of food resources that increase the abundance of the aquatic bird species within the space. The deeper water supports the density of some species especially

ducks and cormorants as they prefer deep open water bodies for hunting (Saini et al. 2017). It's been reported that the population of water residential and migrant birds have declined considerably (Saini et al. 2017). The presence of Bar-headed Goose *Anser indicus* (Plate-4) at Misserpur Ghat arrived in winter season from the central part of Asia, most of the water birds migrate by Central Asian migration route on Indian landmass thereby indicating that natural land is favorable for water migratory birds (Arya et al. 2019). Northern pintail (Image 6) is winter migrant in northern region of Indian subcontinent as reported earlier by (Bhatt et al. 2014). The presence of vulnerable species like Woolly-necked Stork *Ciconia episcopus* (Image 8), Palla's Fish Eagle *Haliaeetus leucoryphus* (Image 2) and threatened species like the Great Hornbill *Buceros bicornis*, Black-necked Stork *Ephippiorhynchus asiaticus* (Image 4), and Painted Stork *Mycteria leucocephala*. Haridwar indicates the want of conservation effort in this space for bird species.

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A record on colour aberration in Fulvous-breasted Woodpecker in, Himachal Pradesh, India

Plumage coloration in birds is the result of the deposition of a combination of pigments in the feathers. The most common pigments are melanins that give rise to black and brown colours (Mcgraw 2006). Two types of melanin have been described in birds: eumelanin (black) and phaeomelanin (brown) (Mcgraw 2006). Plumage aberrations are not uncommon in wild birds (Hosner & Lebbin 2006). Several types of colour aberrations of plumage or bare parts of the body have been described in wild living birds. Albinism, leucism, “brown”, and “diluted” mutations are the most frequently reported (van Grouw 2013; Mahabal et al. 2016). Albinism is defined as a total lack of both melanins (eumelanin and phaeomelanin) in feathers, eyes, and skin as a result of an inherited absence of tyrosinase. Leucism is a partial or total lack of eumelanin and phaeomelanin in the feathers as a result



of an inherited disorder of the deposition of these pigments in the feathers. Leucistic birds always have normal coloured eyes. In the “brown” aberration, an inherited incomplete oxidation of eumelanin causes black feathers to turn dark brown.

In the case of dilution, the pigment itself is not changed, but a reduction in pigment concentration,

or “diluted” colour (called “pastel” if both melanins are affected or “isabelism” if only eumelanin is affected) is observed compared to the original colouration (van Grouw 2013; Mahabal et al. 2016). In this note reported on dilution in Fulvous-breasted Woodpecker *Dendrocopos macei* in Hamirpur (31. 686N & 76. 521E), in Himachal Pradesh, India. It is situated in the Shivalik Hills of Himalaya.



Dilution in a male Fulvous-breasted Woodpecker observed on 18 July 2020.

Two individuals of abnormal colour plumage variant birds were observed on 18 and 25 July 2020 from human-dominated areas of Hamirpur. The bird was completely white in colour and red tinges on the head with normal coloured eyes, hence the most likely aberration could be “dilution”. Photographs were taken for further identification. Dilution is defined as a quantitative reduction of melanins. In

this mutation, the amount of pigment is reduced (Kopf 1986; van Grouw 2013; Mahabal et al. 2016). The pigment itself is not changed but due to a reduction in pigment concentration, a ‘diluted’ colour is observed compared with the original coloration. Further the birds were identified as a male Fulvous-breasted Woodpecker based on the field guide (Grimmett et al. 2016). Fulvous-breasted Woodpecker is a medium-

sized woodpecker with stained yellowish-brown underparts. Note white barring on the back and thin stripes down the neck and chest. Male has an all-red crown, female an all-black one (Grimmett et al. 2016).

In India a total of 180 records of colour aberrations were reported in 72 different Indian bird species over a period of 129 years have been reviewed by Mahabal et al (2016). In that review there is no report on Woopecker’s colour aberration. On the other hand Khacher (1989) reported that colour abberation in Golden-backed Woodpecker (*Dinopium benghalense*) in Ahmedabad, Gujarat and he added that apart from the light golden colour the entire body was white with light creamy tint and he strongly stated that it was not albino. In this regard this is a first known case of dilution in Fulvous-breasted Woodpecker in India. Alaja & Mikkola (1997) and Forrest & Naveen (2000) stated that in certain cases, birds with plumage aberrations reproduced successfully and survived several years in

the wild. Colour aberration individuals have lower survival rates than normally colored individuals, because they are more easily detected by predators (Owen & Shimmings 1992). In conclusion, researchers must be encouraged to report the records of all type of colour aberration in wildlife in order to better understand this phenomenon (Samson et al. 2016).

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