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Research article

Seasonal variation and threat assessment of bird diversity at Gajedi Wetland, Rupandehi, Nepal

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Abstract

Wetlands provide important breeding, feeding, and resting habitats that support bird species; however, these wetlands are under anthropogenic pressure. This study aimed to record the diversity of birds and identify the major threats to them. The study was conducted in Gajedi Wetland, Rupandehi, Nepal. The point count method was used, where six vantage points separated by 300 m were taken. The observation was carried out from October 2022 to January 2023 using direct observation and call record methods. We recorded 1067 individual birds of 84 species under 61 genera belonging to 38 families of 16 orders. Out of 84 species, 67 were residents, 16 were winter migrants, and one was summer migrant. Shannon-Wiener function, Simpson's diversity index and Margalef's Richness Index were higher in winter, compared to autumn. However, Pielou's evenness index was greater in the autumn season than in the winter season. The rose-ringed parakeet (*Psittacula krameria*) was the most abundant species. We observed eight nationally threatened, one globally threatened, two globally near-threatened species and five species listed under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Recreational activities were among the major threats to birds in Gajedi Wetland. We recommend a complete survey including all season to produce a more comprehensive checklist and reduce anthropogenic activities around the wetland.

Keywords: Bird diversity; Relative abundance; Seasonal bird survey; Threatened species; Wetland birds

1 | Introduction

Birds use wetlands for various activities such as breeding, nesting, and foraging (Mutagwaba 2010). Although wetlands as rivers, streams, lakes, reservoirs, village ponds, paddy fields, marshes, and swamps occupy about 5% of the total area of Nepal (CSUWN 2009), provide habitats for 25% of bird species in the country (Inskipp et al. 2016). Wetlands are known to harbor various critically endangered, endangered, and vulnerable species (BirdLife International 2022). Wetlands of Nepal support a total of 40 (27%) nationally threatened birds (BCN & DNPWC 2016).

A recent bird checklist reveals that there are 892 species of birds recorded in Nepal (DNPWC & BCN 2022). Among them, 42 species are globally threatened, of which 10 are listed as Critically Endangered (CR), eight as Endangered (EN), and 24 as Vulnerable (VU) (DNPWC & BCN 2022; BirdLife International 2022). Further, 172 species are nationally threatened, of which 68 are Critically Endangered, 38 are Endangered, and 66 are Vulnerable (DNPWC & BCN 2022). The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has listed 100 species of birds in the CITES appendices (DNPWC & BCN 2022). Nine bird species are nationally protected by the National Park and wildlife Conservation Act 1973 (DNPWC 2020).

Seasonality is one of the crucial factors affecting the availability of essential resources and hence the bird diversity (Katuwal et al. 2016; Pandey et al. 2020). Seasonal differences in the bird assemblage are caused by the presence of migratory species, reproductive activity, and seasonal changes in the composition and abundance of birds that depend on specific seasonal resources (Almazan et al. 2015). Nearly one-third of all bird species recorded in Nepal are migrants, both in the summer and the winter (Inskipp et al. 2016).

Wetlands have profound ecological and economic importance. Mostly, they are highly productive but ecologically fragile, liable to degradation and degeneration under the prevailing anthropogenic pressure (Gupta & Singh 2003). In many of the wetlands of the Terai region, monsoon rains are the only consistent

source of water. After being drained, often by large pumps used for irrigation or fish harvesting, these wetlands quickly dry out (Jha 2008), impacting the birds and other species depending on the wetlands. Threats to lowland wetland birds have risen to an alarming level in recent years (Inskipp et al. 2016). Increased human interference, like the construction of roads and footpaths very close to the water's surface, retaining walls, and other activities like boating, and hunting lead to habitat destruction, poses a threat to the diversity and abundance of birds (Bhusal et al. 2020). The introduction of alien species, alterations to water regime and water quality, and decline in area are the primary effects of anthropogenic activities on wetlands (Galatowitsch 2018). Furthermore, wetlands are now popularly used as recreational areas such as picnic spots; however, this growing picnic culture is incompatible with birds, especially to the sensitive and endangered ones (Baral & Inskipp 2020).

The majority of bird research in Nepal have focused on wetlands of international significance, like the Ramsar sites (Chhetry 2006; Adhikari et al. 2018; Khatri et al. 2019; Bhusal et al. 2020). Less research has been carried out on the biodiversity of wetland outside the protected areas, such as Gajedi Wetland. Hence, several wetlands biodiversity is undermined, making them more susceptible to degradation (Baral & Inskipp 2020). The only previous study on birds in the Gajedi Wetland (Nepal & Thapa 2018) recorded the diversity of water birds. However, we recorded bird species in two seasons with, relative abundance, threatened and migratory status, and identifies the major threats in the study area. It is therefore hoped that this study will be of valuable for conservationists and policymakers working for the long-term conservation of Gajedi Wetland. The threat assessment is expected to provide baseline knowledge and encourage local and national bodies to mitigate the problems by providing a safer habitat for threatened and migratory birds.

2 | Materials and methods

2.1 | Study area

Gajedi Lake, local name Danapur Tal (27°39'51" N and 83°16'34" E, elevation 133 meter above sea level), lies in Kanchan Rural Municipality-1, Rupandehi district, which covers a total of 19 hectares areas (DFO 2073) (Figure 1). It lies 21 kilometres west of Butwal, Rupandehi, and is close to the famous pilgrimage site of Lumbini. The dominant tree species found around the periphery of wetlands is *Shorea robusta*. Other species like *Adina cordifolia*, *Dalbergia sissoo*, *Terminalia alata*, etc. are

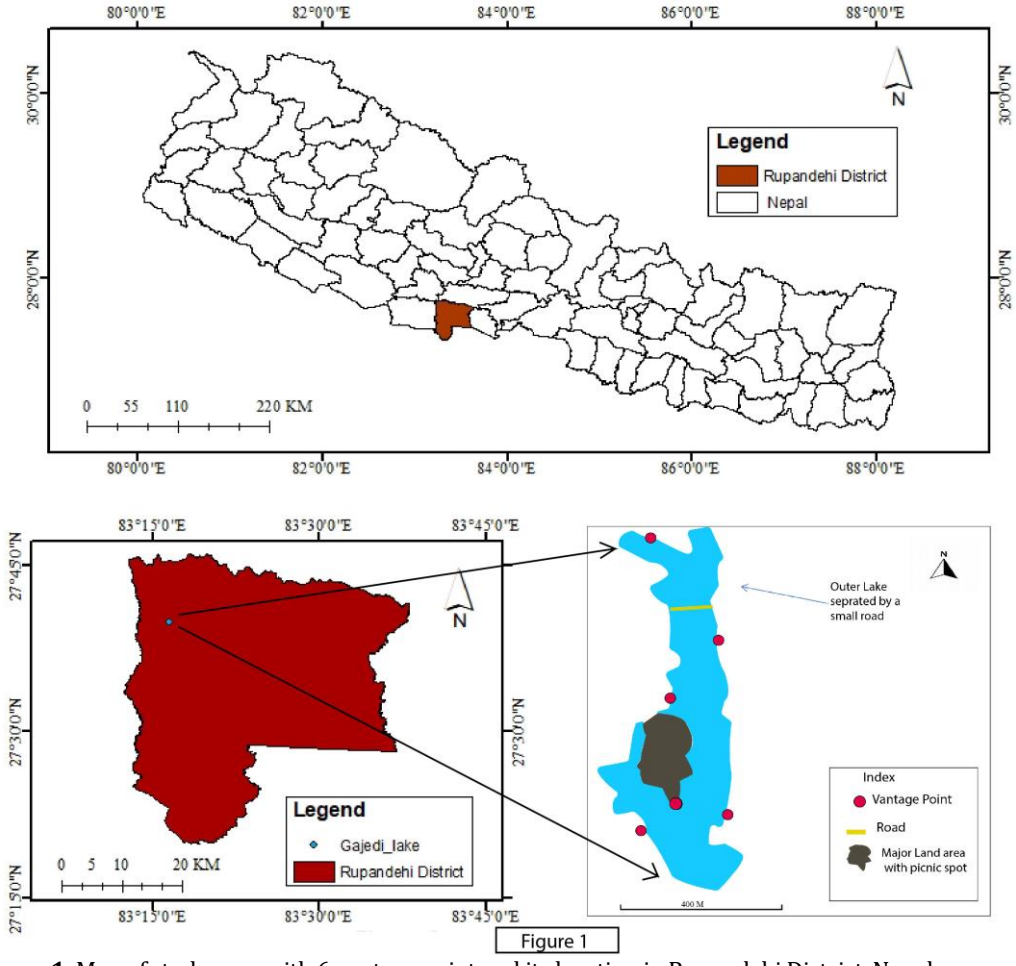

Figure 1. Map of study area with 6 vantage point and its location in Rupandehi District, Nepal

found on the eastern and north-western sides of the wetland. However, there is private farmland and houses on the south-western facing side (Sharma et al. 2019).

2.2 | Bird survey

The survey was carried out using point count methods. All six vantage points are separated by 300 meters (as described by Huff et al. 2000) and were determined by a preliminary survey done in August 2022. We spent 20 minutes at each point. A total of 14 visits, seven each in autumn (Oct 7– Oct 13 of 2022) and winter (Jan 1–Jan 8 of 2023), were made. The observation was carried out in the morning (7:00–10:00 hr) and evening (16:00–18:00 hr). Birds were observed with Olympus 7*35 binoculars. Photographs were taken using a Nikon D3200 with a 55–200mm lens. Identification was made using the field guide book "Birds of Nepal" (Grimmett et al. 2016) and the Merlin bird ID by Cornell Lab of Ornithology.

2.3 | Questionnaire survey

Houses near the lake's periphery were a priority in conducting the questionnaire. A total of 60 respondents were interviewed using a semi-structured questionnaire to collect information and identify threats to the bird diversity of Gajedi Lake. The survey was carried during the winter, and it took three days on the field to complete the survey. Local residents were asked the possible reason of bird population decline in the area.

2.4 | Data analysis

The Birds of Nepal, an official checklist (DNPWC & BCN 2022), was used to determine the systematic nomenclature, classification of birds. The "Birds of Nepal" Helm field guides book (Grimmett et al. 2016) was used to identify the status of resident and migratory birds, while the IUCN Red List was used to determine species conservation status (IUCN 2023). National status was retrieved from The National Red List Series (Inskipp et al. 2016). The checklist of birds recorded at the study area follows the taxonomic order from The Birds of Nepal, an official checklist (DNPWC & BCN 2022). Following metrics were also calculated:

Shannon-Weiner diversity function (Shannon & Weaver 1949) was calculated by the following formula:

$$H = -\sum (Pi \times \ln Pi)$$

Pielou's evenness was calculated as:

$$E = (H / H_{max})$$

Where, H is the Shannon-Weiner diversity index, pi is the proportion of individual, and E is the Pielou's index (Pielou 1966) and H max = ln(S), S being species richness.

Simpson's diversity index (1-D) was calculated as the probability that any two individuals drawn from a large group belong to different species (Simpson 1949).

$$1\text{-}D = 1 - \Sigma n(n-1) / N(N-1)$$

Where, n is the total number of birds of a particular species and N is the total number of birds of all species.

Margelef's Richness Index (Margalef 1968) was calculated as:

$$d = (S - 1) / \ln(N)$$

Here, d is the richness index, S is the total number of species and N is the total number of individuals.

Relative abundance was calculated using following equation:

$$(R.A.) = n/N \times 100\%$$

Where, n is the number of individuals of a species that has been identifies. N = the total species abundance

3 | Results

3.1 | Species composition and seasonal diversity

We recorded 1067 individuals of birds, consisting of 84 species (Appendix 1) under 61 genera belonging to 38 families within 16 orders. Passeriformes was the order with the highest number of species, representing 44 species, followed by Pelecaniformes, Ciconiiformes. Among recorded families, the Ardeidae have the greatest species richness, consisting of seven species. Ardeidae was followed by Muscicapidae, Dicruridae, and Ciconiidae. Among the bird species surveyed, 22 were water birds. Overall, Shannon Diversity Index (H) was found to be 3.49, Simpson's diversity index (D) was 0.94 and Pielou's evenness (E) was 0.78. In comparison to autumn (H=3.14, D=0.91), winter has the highest Shannon-Wiener (H= 3.36) and Simpson's diversity index (1-D=0.93). Similarly, Margalef's Richness Index was higher in winter (S=10.07) compared to autumn (S=7.77). However, greater Pielou's evenness index (E=0.82) was observed in autumn than in winter (E=0.79) (Table 1).

Table 1. Comparison between of seasonal diversity, richness and evenness indices

Indices	Autumn	Winter	Overall
Shannon Weiner Diversity Index (H)	3.14	3.36	3.49
Simpsons Diversity index (D)	0.91	0.93	0.94
Pielou's Evenness (E)	0.82	0.79	0.78
Margalef's Richness Index (S)	7.77	10.07	11.9

3.2 | Relative abundance

Rose-ringed parakeet (*Psittacula krameri*) was the most abundant species in autumn (R.A.=24.73). In contrast, Great Cormorant (*Phalacrocorax carbo*) (R.A.=18.85) has the highest relative abundance in winter. The top five species with the highest relative abundance throughout the study were Rose-ringed Parakeet (R.A.=15.18), great cormorant (R.A.=13.3), large-billed crow (*Corvus macrorhynchos*) (R.A.=6.37), Red-vented Bulbul (*Pycnonotus cafer*) (R.A.=4.49), and jungle myna (*Acridotheres fuscus*) (R.A.=4.12). Among water birds, the

great cormorant, Indian pond-heron (*Ardeola grayii*), red-naped ibis (*Pseudibis papillosa*), common moorhen (*Gallicrex chloropus*), white-breasted waterhen (*Amaurornis phoenicurus*) were the most prevalent species (Table 2).

Table 2. Relative abundance of five most abundant birds in Gajedi Wetland

S. N	Relative Abundance of Wetland Birds	
	Species	**R.A.**
1	Great cormorant	13.3
2	Indian pond-heron	3.93
3	Red-naped ibis	3.84
4	Common moorhen	1.4
5	White-breasted waterhen	1.31

(Abbreviation: R. A= Relative Abundance)

3.3 | Conservation and migratory status

Among the 84 species, eight were classified as nationally threatened, including the black bittern (*Ixobrychus flavicollis*) under Endangered categories. Lesser adjutant, Himalayan griffon (*Gyps himalayensis*), Asian openbill (*Anastomus oscitans*), cotton pygmy-goose (*Nettapus coromandelianus*), and black stork (*Ciconia nigra*) were categorized as vulnerable, which is also a protected bird species in Nepal by the National Parks and Wildlife Conservation (NPWC) Act 1973. Great cormorant, Asian woolly-neck fall under the Near Threatened categories. Based on the global IUCN status, Lesser Adjutant was categorized as Vulnerable (VU). Moreover, Asian woolly-neck and Himalayan griffon were categorized as Near-threatened (NT). The present study recorded five species included in Appendix II of CITES categories (Convention on International Trade in Endangered Species of Wild Fauna and Flora), i.e. Himalayan griffon, jungle owlet (*Glaucidium radiatum*), plum-headed parakeet, shikra (*Accipiter badius*) and black stork.

We identified 67 bird species as resident species (representing 79.76%), 16 were classified as winter migrants (accounting for 19.05%), and one species, crow-billed drongo (*Dicrurus annectens*), which was observed in the autumn season (presumably on passage) was noted as a summer migrant (representing 1.19%). Among 16 winter migrants, three were observed in autumn, i.e., October, great cormorant, taiga flycatcher (*Ficedula albicilla*), and black stork.

3.4 | Threat assessment

We observed anthropogenic activities like picnics and boating, mostly during the winter season. The sound from motorboat and speakers, as well as other anthropogenic effects, disturbed many birds. During our field trip, we noticed that the main wetland area, which was used for picnics and boating, had a very low species richness of wetlands birds. In contrast, on the other side of the wetland (the northern side, separated by a short road), there were many wetlands birds that were less disturbed by human activity.

Half of the people also reported that recreational activities like picnics and boating were the major threat to bird species. Fourteen households believed that habitat loss was causing a threat to birds. In contrast, a very small number of households reported pollution, and illegal hunting as the causes of the threat. However, 10 households responded there were no any threats to avifauna in the study area (Fig. 2).

4 | Discussion

Nepal and Thapa (2018) performed a wetland bird count on Gajedi wetland and counted 18 species of waterfowl. Among them, lesser whistling-duck (*Dendrocygna javanica)* was the most abundant species. We recorded 84 bird species, among which 27 were water birds. Great Cormorant (R.A.= 13.31) was the most abundant waterfowl species. Large-billed crow and jungle myna were seen foraging for leftovers from picnics left indicating human activities and food waste have led to a high abundance of these terrestrial birds. The present study recorded greater species richness and abundance in winter compared to autumn which is to be expected because of the large number of migratory birds wintering in Nepal (Sonal et al. 2010).

Bhusal et al. (2020) reported 56 species of wetland birds from Jagdishpur Reservoir. However, present study reported 22 species of wetland birds. Greater bird diversity and abundance, both for residents and nearby migrants, were supported by larger wetland areas; however, in structurally more heterogenous wetlands, winter migrant density and diversity reached higher values (Datta 2011). In this study, higher Shannon-Weiner, Simpson's diversity index and Margalef's Richness Index were found in the winter (H= 3.36, D=0.93, S= 10.07) than in the autumn (H=3.14, D=0.91, S=7.77). The winter season had greater bird diversity and richness than the autumn season; this could be because of the environmental conditions and the availability of food. (Jha & Devkota 2023). A high value for Margalef's Richness Index in winter indicates a high degree of bird richness (Poudel et al. 2021). Increased community diversity may be the cause of the autumn's high index of species evenness (Yimer & Mengistou 2009).

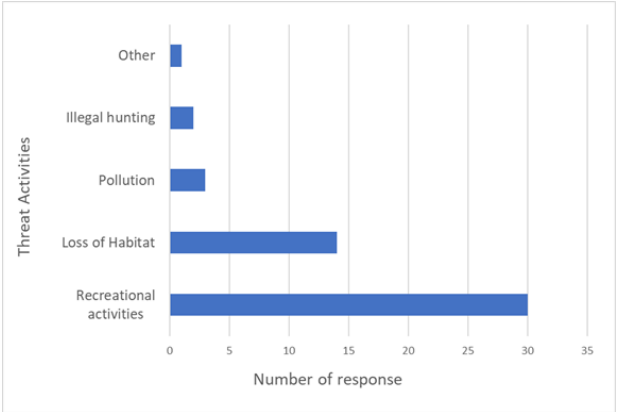

Figure 2. The major threat activities with number of responses

Jha (2018) also reported greater value of Shannon-Weiner diversity Index in the winter than in the autumn season. Similarly, greater diversity, evenness and richness of birds were higher in winter season than autumn. However, Thapa and Saund (2012) found the highest Shannon diversity index in the autumn season compared to another season.

We documented that the Gajedi Wetland harbours eight nationally threatened bird species, encompassing 4.65% of Nepal's nationally threatened species. Globally, one species was Vulnerable, and two species were near-threatened. However, the water birds count at Gajedi Lake by Nepal and Thapa (2018) reported only three nationally threatened species: great cormorant, woolly-neck, and Asian openbill. The greater diversity of nationally threatened species in the present study might be due to difference in objective, as previous study only recorded the water birds only. However, our study recorded all the bird species in multiple seasons.

We recorded recreational activities as the major threats to bird diversity at Gajedi Wetland. Recreational activities affect the diversity and habitat use of water birds directly (Cardoni et al. 2008). During our field observation, greater abundance and richness of water-bird distribution was seen in the other side (separated by a road) of the wetland, which was located far from picnic spot, than the main wetland area, in close proximity with recreational activities. Similar observation was made by Quan et al. (2002) where, human disturbance had an impact on water bird distribution, with the least disturbed area hosting more than one-third of the species and almost half of the individuals.

We recommend that a complete seasonal survey be conducted at regular intervals to produce a more comprehensive checklist of birds. A more in-depth study would be worthwhile to measure the impacts of anthropogenic activities in the daily lives of birds. In order to make the wetland a suitable habitat for bird species, local authorities should relocate all the picnic spots a little further from the wetland. Monitoring of the habitats used and behaviour of threatened species should be carried out to safeguard their population status in Gajedi Wetland.

5 | Conclusions

The study recorded a greater diversity of birds in winter than in autumn in the Gajedi Wetland. The rose-ringed parakeet followed by great cormorant were the two most abundant species recorded. The Gajedi wetland is inhabited by number of threatened as well as migratory birds. We recorded recreational activities as the main threats to bird diversity. This study has shown that Gajedi Wetland is an important wetland for migratory and threatened species. There is an urgent need for conservation activities to minimize anthropogenic impact and provide a safer habitat for birds. Lack of awareness and conservation measures are leading to the exploitation of Gajedi Wetland by anthropogenic activities.

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Authors' contributions

Regmi, S.R designed research, collected the data, and wrote the manuscript; Jha, P.K supervised the research; Gyawali, S. contributed in research design and species identification. All the researcher contributed to the draft and gave final approval for publication.

Conflicts of interest

Authors declare no conflict of interest.

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Appendix 1. Checklist of birds recorded at the study area with threat and migratory status.

S.N	Family	Species	Scientific name	MS	NCS	GCS	Aut	Win	R.A	WB
Order: Anseriformes										
1	Anatidae	Lesser whistling-duck	*Dendrocygna javanica*	R	LC	LC	-	11	1.03	+
2	Anatidae	Cotton pygmy-goose	*Nettapus coromandelianus*	R	VU	LC	1	-	0.09	+
Order: Columbiformes										
3	Columbidae	Western spotted dove	*Stigmatopelia chinensis*	R	LC	LC	22	16	3.56	-
4	Columbidae	Rock dove	*Columba livia*	R	LC	LC	-	5	0.47	-
5	Columbidae	Yellow-footed green-pigeon	*Treron phoenicopterus*	R	LC	LC	1	-	0.09	-
Order: Caprimulgiformes										
6	Apodidae	White-rumped spinetail	*Zoonavena sylvatica*	R	LC	LC	8	-	0.75	-
Order: Cuculiformes										
7	Centropodidae	Greater coucal	*Centropus sinensis*	R	LC	LC	6	6	1.12	-
Order: Gruiformes										
8	Rallidae	White-breasted waterhen	*Amaurornis phoenicurus*	R	LC	LC	6	8	1.31	+
9	Rallidae	Ruddy-breasted crake	*Zapornia fusca*	R	LC	LC	-	1	0.09	+
10	Rallidae	Common moorhen	*Gallicrex chloropus*	R	LC	LC	3	12	1.41	+
Order: Ciconiiformes										
11	Ciconiidae	Asian woollyneck	*Ciconia episcopus*	R	NT	NT	4	4	0.75	+
12	Ciconiidae	Lesser adjutant	*Leptoptilos javanicus*	R	VU	VU	-	5	0.47	+
13	Ciconiidae	Asian openbill	*Anastomus oscitans*	R	VU	LC	2	-	0.19	+
14	Ciconiidae	Black stork	*Ciconia nigra*	W	VU	LC	1	-	0.09	+
Order: Pelecaniformes										
15	Threskiornithidae	Red-naped ibis	*Pseudibis papillosa*	R	LC	LC	17	24	3.84	+
16	Ardeidae	Little egret	*Egretta garzetta*	R	LC	LC	-	10	0.94	+
17	Ardeidae	Indian pond-heron	*Ardeola grayii*	R	LC	LC	21	21	3.94	+
18	Ardeidae	Cattle egret	*Bubulcus ibis*	R	LC	LC	-	7	0.66	+
19	Ardeidae	Black bittern	*Ixobrychus flavicollis*	R	EN	LC	-	2	0.19	+
20	Ardeidae	Purple heron	*Ardea purpurea*	R	LC	LC	-	1	0.09	+
21	Ardeidae	Black-crowned night-heron	*Nycticorax nycticorax*	R	LC	LC	9	-	0.84	+
22	Ardeidae	Intermediate egret	*Ardea intermedia*	R	LC	LC	2	-	0.19	+
Order: Suliformes										
23	Phalacrocoracidae	Great cormorant	*Phalacrocorax carbo*	W	NT	LC	10	132	13.31	+
24	Phalacrocoracidae	Little cormorant	*Microcarbo niger*	R	LC	LC	2	4	0.56	+
Order: Charadriiformes										
25	Jacanidae	Bronze-winged jacana	*Metopidius indicus*	R	LC	LC	3	8	1.03	+
26	Scolopacidae	Common sandpiper	*Actitis hypoleucos*	W	LC	LC	-	2	0.19	+
27	Scolopacidae	Green sandpiper	*Tringa ochropus*	W	LC	LC	-	2	0.19	+
Order: Strigiformes										
28	Strigidae	Jungle owlet	*Glaucidium radiatum*	R	LC	LC	3	-	0.28	-
Order: Accipitriformes										
29	Accipitridae	Himalayan griffon	*Gyps himalayensis*	W	VU	NT	-	4	0.37	-
30	Accipitridae	Shikra	*Accipiter badius*	R	LC	LC	1	-	0.19	-
31	Accipitridae	Black kite	*Milvus migrans*	R	LC	LC	1	2	0.28	-
Order: Bucerotiformes										
32	Bucerotidae	Indian grey hornbill	*Dicruridae*	R	LC	LC	2	-	0.19	-
Order: Coraciiformes										
33	Meropidae	Asian green bee-eater	*Merops orientalis*	R	LC	LC	15	-	1.41	-
34	Alcedinidae	White-breasted kingfisher	*Halcyon smyrnensis*	R	LC	LC	8	6	1.31	-
35	Alcedinidae	Common kingfisher	*Alcedo atthis*	R	LC	LC	-	4	0.37	-
Order: Piciformes										
36	Megalaimidae	Blue-throated barbet	*Megalaima asiatica*	R	LC	LC	-	4	0.37	-
37	Megalaimidae	Coppersmith barbet	*Psilopogon haemacephalus*	R	LC	LC	2	-	0.19	-
38	Picidae	White-naped woodpecker	*Chrysocolaptes festivus*	R	LC	LC	5	3	0.75	-
Order: Psittaciformes										

39	Psittacidae	Rose-ringed parakeet	*Psittacula krameri*	R	LC	LC	92	70	15.18	-
40	Psittaculidae	Plum-headed parakeet	*Psittacula cyanocephala*	R	LC	LC	6	-	0.56	-
Order: Passeriformes										
41	Oriolidae	Black-hooded oriole	*Oriolus xanthornus*	R	LC	LC	-	2	0.19	-
42	Oriolidae	Indian Golden oriole	*Oriolus chinensis*	R	LC	LC	1	-	0.09	-
43	Campephagidae	Indian cuckooshrike	*Coracina macei*	R	LC	LC	2	1	0.28	-
44	Campephagidae	Long-tailed minivet	*Pericrocotus ethologus*	W	LC	LC	-	4	0.37	-
45	Rhipiduridae	White-throated fantail	*Rhipidura albicollis*	R	LC	LC	-	2	0.19	-
46	Dicruridae	Black drongo	*Dicrurus macrocercus*	R	LC	LC	-	7	0.66	-
47	Dicruridae	Greater racquet-tailed drongo	*Dicrurus paradiseus*	R	LC	LC	2	2	0.37	-
48	Dicruridae	Ashy drongo	*Dicrurus leucophaeus*	W	LC	LC	-	4	0.37	-
49	Dicruridae	White-bellied drongo	*Dicrurus caerulescens*	R	LC	LC	1	1	0.19	-
50	Dicruridae	Crow-billed drongo	*Dicrurus annectens*	S	LC	LC	8	-	0.75	-
51	Laniidae	Long-tailed shrike	*Lanius schach*	R	LC	LC	3	1	0.37	-
52	Laniidae	Grey-backed shrike	*Lanius tephronotus*	W	LC	LC	-	2	0.19	-
53	Laniidae	Brown shrike	*Lanius cristatus*	W	LC	LC	-	3	0.28	-
54	Corvidae	Large-billed crow	*Corvus macrorhynchos*	R	LC	LC	16	52	6.37	-
55	Corvidae	House crow	*Corvus splendens*	R	LC	LC	-	18	1.69	-
56	Corvidae	Rufous treepie	*Dendrocitta vagabunda*	R	LC	LC	11	4	1.41	-
57	Stenostiridae	Grey-headed canary-flycatcher	*Culicicapa ceylonensis*	R	LC	LC	3	11	1.31	-
58	Paridae	Great tit	*Parus cinereus*	R	LC	LC	1	2	0.28	-
59	Paridae	Green-backed tit	*Parus monticolus*	R	LC	LC	-	1	0.09	-
60	Cisticolidae	Plain prinia	*Prinia inornata*	R	LC	LC	-	4	0.37	-
61	Cisticolidae	Ashy prinia	*Prinia socialis*	R	LC	LC	-	1	0.09	-
62	Cisticolidae	Common tailorbird	*Orthotomus sutorius*	R	LC	LC	-	2	0.19	-
63	Hirundinidae	Barn swallow	*Hirundo rustica*	R	LC	LC	-	6	0.56	-
64	Hirundinidae	Asian plain martin	*Riparia chinensis*	R	LC	LC	-	8	0.75	-
65	Pycnonotidae	Red-vented bulbul	*Pycnonotus cafer*	R	LC	LC	21	27	4.5	-
66	Pycnonotidae	Red-whiskered bulbul	*Pycnonotus jocosus*	R	LC	LC	5	21	2.44	-
67	Phylloscopidae	Hume's leaf-warbler	*Phylloscopus humei*	W	LC	LC	-	4	0.37	-
68	Phylloscopidae	Smoky warbler	*Phylloscopus fuligiventer*	W	LC	LC	-	2	0.19	-
69	Phylloscopidae	Tickell's leaf-warbler	*Phylloscopus affinis*	W	LC	LC	-	2	0.19	-
70	Phylloscopidae	Grey-hooded warbler	*Phylloscopus xanthoschistos*	R	LC	LC	2	-	0.19	-
71	Leiothrichidae	Jungle babbler	*Argya striata*	R	LC	LC	12	23	3.28	-
72	Sturnidae	Jungle myna	*Acridotheres fuscus*	R	LC	LC	-	44	4.12	-
73	Sturnidae	Common myna	*Acridotheres tristis*	R	LC	LC	11	8	1.78	-
74	Muscicapidae	Red-throated flycatcher	*Ficedula albicilla*	W	LC	LC	-	32	3	-
75	Muscicapidae	Common stonechat	*Saxicola torquatus*	R	LC	LC	-	2	0.19	-
76	Muscicapidae	Pied bushchat	*Saxicola caprata*	R	LC	LC	-	4	0.37	-
77	Muscicapidae	Grey bushchat	*Saxicola ferreus*	R	LC	LC	-	1	0.09	-
78	Muscicapidae	Black redstart	*Phoenicurus ochruros*	W	LC	LC	-	2	0.19	-
79	Muscicapidae	Oriental magpie robin	*Copsychus saularis*	R	LC	LC	2	-	0.19	-
80	Estrildidae	Scaly-breasted munia	*Lonchura punctulata*	R	LC	LC	2	4	0.56	-
81	Passeridae	Eurasian tree sparrow	*Passer montanus*	R	LC	LC	-	6	0.56	-
82	Motacillidae	White-browed wagtail	*Motacilla maderaspatensis*	R	LC	LC	7	6	1.22	-
83	Motacillidae	White wagtail	*Motacilla alba*	W	LC	LC	-	2	0.19	-
84	Motacillidae	Olive-backed pipit	*Anthus hodgsoni*	W	LC	LC	-	2	0.19	-

(Abbreviations: MS= Migratory Status, W= Winter migrants, R: Residental S= Summer Migrants; NSC= National Conservation Status, GCS: Global Conservation Status, LC= Least Concern, NT= Near Threatened, VU= Vulnerable; Aut: Abundance of birds in Autumn, Win: Abundance in Winter, R.A= Relative Abundance, WB= Wetland Bird).