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Status of Wetland Birds around Hetauda, Makawanpur

Kanchan Parajuli[1,2]

[1]Makawanpur Multiple Campus, Hetauda
[2]Nepal Zoological Society
*Corresponding Author: kanchanparajulimsc@gmail.com
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Abstract

The major objective of this study was to update the status of wetlands birds around Hetauda valley, based on recent observations. The study was conducted in different wetlands and riverine ecosystems of the Hetauda sub-metropolitan city. The present study recorded 81 species of wetland-dependent birds representing 41.9% of the total wetland birds of the country, belonging to nine orders and twenty-three families. Charadriiformes were found to be the most dominant order. Out of the total wetland bird recorded, 36 species were winter visitors, 38 were residents, and seven were summer visitors. It is found to be a good roosting site for many migratory and residential birds. The fishery complex and its adjoining areas were found to be more diverse in comparison to other study sites. Major threat issues observed in the study area are habitat fragmentation and degradation, pollution and sewage from the industrial belts and urban areas, overfishing, poaching, mining of sand and gravel from rivers, lack of awareness, etc. Recently the human activities and population of Hetauda is raising rapidly after the declaration of Hetauda as the capital city of Bagmati province. Furthermore, the important highways of the country like the east-west highway, Tribhuwan highway from Hetauda to Kathmandu, Dharan-Chatara highway, and the Nijgadh-Kathmandu fast track which is under construction are passes through Hetauda. This confirms that Hetauda is rising rapidly and will be converted into a big city soon. So an Instant plan should be developed to ensure sustainable conservation and development in an eco-friendly manner.

Keywords: Bird diversity, Fishery complex, Karra River, Wetland birds

1. Introduction

Wetlands can be defined as moist and damp places or a halfway environment between terrestrial and aquatic ecosystems. Wetlands are considered fertile land for agriculture and rich from the point of view of biological diversity. Wetlands provide many benefits and services. A large number of birds occupy all or parts of their life in a wetlands habitat. Wetlands provide important feeding and nesting places for many animals and Nepal's wetlands are the important habitats for many rare/endangered/threatened species (Bhandari 2009). Nepal's wetlands are facing tremendous anthropogenic pressure (IUCN, 2004; Bhandari, 1998; Sah, 1997), which can greatly influence the structure of the bird community (Francl and Schnell, 2002). Wetlands form only 5% of Nepal's area (DOAD, 1992), but 193 bird species (22% of the total recorded in the country) depend on them (IUCN, 2004). Many of the wetland birds found in the country are passage migrants and winter visitors (Inskipp and Inskipp, 1991). Wetlands in the lowlands and lower hills are the most important for birds as the waters are richer in nutrients and support more aquatic plants, invertebrates, and fish, which are vital food sources (Inskipp and Baral 2010).

Nepal is rich in avian diversity, comprising 886 bird species (DNPWC and BCN 2018). Diverse topographical and climatic variations have provided a wide variety of forest and ecosystem types that have contributed to booming avian diversity. Nearly 200 species of birds in the country are found heavily dependent on wetland habitats (Bhandari, 1998). Many of the wetland birds found in Nepal are migratory in nature (Inskipp and Inskipp, 1991). Water birds, both migratory and non-migratory, are important components of the wetlands ecosystem throughout the world (Davidson and Delany, 2000).

Despite rich avian diversity, very few studies have been carried out. Studies of birds, especially wetland birds, seem to have concentrated on only a specific area or region of the country. Study areas like Hetauda were still insufficiently explored. Some previous studies have looked at overall bird diversity including wetland diversity (Inskipp and Inskipp 2001, Shrestha and Lakhey 2000, Parajuli 2016, Bhusal and Paudel 2021). Parajuli, K. (2016) recorded 153 species of birds in the Karra river transect. Bhusal and Paudel (2021) recorded 2335 individuals of 164 avian species including 117 terrestrials and 47 wetland-dependent species.

The major objective of this study is to update the status of wetlands birds around Hetauda valley, based on recent observations. Sadly, the wetlands are deteriorating today due to pollution from sewage and industrial effluents and the over-exploitation of natural resources. Many wetlands are being drained and filled for land plotting for expanding human settlements, agriculture, and other purposes. Water pollution from agricultural chemicals has been identified as a particularly serious threat to lowland wetlands (Kafle et al. 2007, 2008). Overfishing, fish poisoning and agricultural pesticides have dramatically reduced the food supply of fish-eating birds. As a result of this barrage of threats, a large percentage of Nepal's wetland birds (29species, 75%) are considered Critically Endangered or Endangered (BCN and DNPWC 2011). Hence the aim of the study is not only to explore the wetland birds but also to determine the ongoing threats.

2. Study Area

Hetauda sub-metropolitan city lies in Makawanpur district, 76 Km south of the capital city of Nepal. The area is surrounded by the Mahabharata range in the north and the Churia range in the south. It is also called the Inner Tarai region of Rapti valley and the average elevation is 450 m from sea level (UNDP/ERRRP 2009). The climate of Hetauda valley is humid subtropical monsoon. The temperature condition of Hetauda varies from quite hot in summer and warm in winter. The average annual precipitation is little more than 2,200 mm of which about 80% falls during the monsoon period from mid-June to October (UNDP/ERRRP 2009).

Lithologically, the region consists of sandstones, mudstone, and conglomerate UNDP/ERRRP (2009) moreover flood plain deposits consist of the boulder to sand size sediments of quartzite, gneiss, dolomites, and limestone of the lesser Himalayan rocks and sandstone of the Siwalik rocks.

The major river stream of Hetauda consists of the Rapti, Karra, and Samari. Rapti, the perennial river, comes from the north and flows down the Hetauda to get mixed with the Narayani river in the west. Karra river is a small-sized perennial river that originated from North-eastern Siwalik Hill and flows towards the west to join with the Rapti River, near Hetauda city. Samari river is a small-sized river that lies north of Hetauda. The fishery complex is located in the middle part of the Hetauda sub-metropolitan city. It was established in 1967 AD for fisheries breeding as well as for the enhancement of the aquaculture sector. It consists of 42 pond sand occupies an area of 47.9 hectares. Birds were observed in different locations like the whole Karra river transect, the upper Rapti stream at Samari, the lower Rapti stream at Kushmandav Sarowar Dham, the lower Rapti stream at Lamitar, the fishery complex of Hetauda, and the marshy agricultural land at Kumaltar.

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Fig 1: *Map of study area*

3. Materials and Methods

Wetland birds were surveyed in the major river, ponds, marshy land, and paddy field of different locations of Hetauda from September 2016 to August 2022. Most of the birds were observed from the following different locations: The whole Karra river transect, the upper Rapti stream at Samari, the lower Rapti stream at Kushmandav Sarowar Dham, the lower Rapti stream at Lamitar, the fishery complex of Hetauda, and marshy agricultural land at Kumaltar site. Each location was repetitively surveyed and the data were compiled. Binocular and Zoom cameras were used to observe and photograph the birds. Data on the threatened category of birds were derived from the status of Nepal's Birds: The national red list series (2016). Field guide books viz. (Grimmett et al. 2016) were used for bird identification. The various categories are winter migratory (Birds recorded in the winter season only), Resident (Birds recorded during all the months of the year), and summer visitor (birds observed in the summer season only).

Potential threats to the birds were qualitatively judged based on intensive field visits and interaction with local people. The category of threatened bird's status was identified with the help of the IUCN and CITES threat categories. It was categorized as critically endangered, endangered, vulnerable, near threatened, and to respective CITES appendix.

4. Result and Discussion

The present study recorded 81 species of wetland-dependent birds during the field visit from September 2016 to August 2022. It represents about 41.9% percent of the total 193 wetland-dependent birds found in Nepal and 9.14% of the total 886 birds in Nepal. Recorded birds were belonging to nine orders and twenty-three families. Charadriiformes was found to be the most dominant order with 22 species of nine families followed by Ciconiiformes with 17 species, Anseriformes with 13 species, Passeriformes with 10 species, Gruiiformes with seven species, Coraciformes with five species, Siluriformes with three species, Podicepiformes and Acceptriformes with two species in each. Of the total wetland bird recorded, 36 species were winter visitors, 38 were residents, and seven were summer visitors.

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The most dominant and frequently observed wetland birds recorded were Common Greenshank, Common Sandpiper, Green Sandpiper, Little-ringed Plover, Red-wattled Lapwing, Cattle Egret, Indian Pond Heron, White-browed Wagtail, and Grey Wagtail. These birds were recorded from all sites with good numbers. Twenty-two species of birds in the threatened category were recorded, viz., one critically endangered, three endangered, nine nationally threatened, and nine vulnerable species. Fifty-nine species were in the least concern category according to IUCN red list series 2016.

Site one or Fishery complex area was found more diverse than other sites with 55 species (Fig. 1). Seventeen (17) species of birds were recorded only from the fishery complex and not from other sites. These are Eurasian Wigeon, Garganey, Common Pochard, Tufted Duck, Little Grebe, Great Crested Grebe, Oriental Darter, Water Cock, Purple Swamphen, Black-winged Stilt, Greater Painted-snipe, Small Pratincole, Pheasant-tailed Jacana, Grey Heron, Black-crowned Night Heron, Black Bittern and, Slaty-backed Fork-tail. Sighting of these birds only from fishery ponds throughout the study period indicates that they prefer ponds rather than running water of the river. The main cause of rich avian diversity in fishery sites is the pristine habitat and rich water supply throughout the year. Apart from that, there were more than 40 ponds adjoining the site used for fish farming that too holds the potential sites for water birds. The next important factor is that the area lies next to the perineal Karra river in the south and pristine greenery forest in the north and also consists of marshy agricultural land adjacent to the sites that make the area to be more suitable for both resident and migratory wetlands birds. Parajuli (2016), and Bhushal and Paudel (2021) found the area to be suitable habitat for wetland-dependent birds. Bhushal and Paudel (2021) recorded 164 species of birds belonging to 19 orders and 59 families including 47 wetland-dependent birds from the fishery sites.

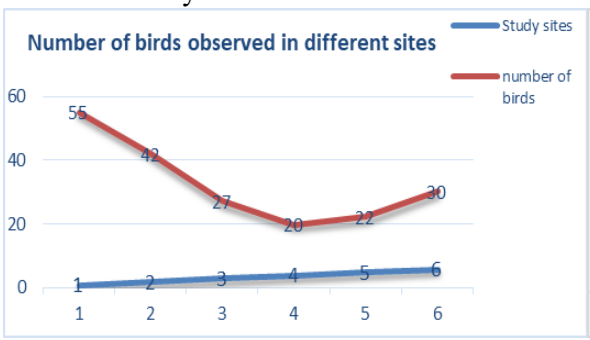

Fig 2: *Birds observed in different sites*

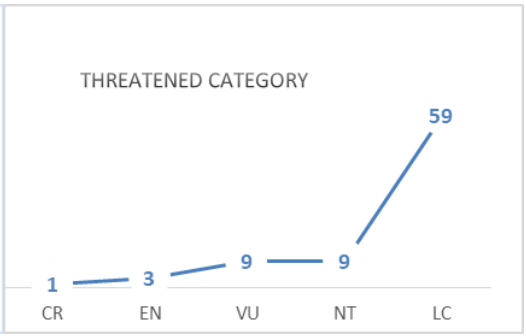

Fig: 3 *Number of birds with threatened category*

Forty-two species of wetland-dependent species were recorded from site two or Karra river transect. Parajuli (2016) recorded 153 bird species in 18 km transects of the Karra river including 48 species (1034 individuals) of wetland-dependent birds. More birds were recorded in the site where the river width is buffered with good vegetation structure. Vegetation around the river width protects water quality, enriches oxygenation, and helps to maintain a fresh ecosystem that promotes biodiversity. Riparian buffer strip protects water quality and provides good habitat for plant and animals and movement corridors for a variety of wildlife species (Fischer 2000). Demoiselle Crane, a vulnerable species that were listed in CITES appendix II was recorded from the site. Two individuals were sighted flying towards the east above the Karra river. Demoiselle Crane is an uncommon passage migrant (Inskipp et. al 2016). Scully (1879) described the bird as common in the central terai and Hetauda dun in winter during the 19thcentury.Similarly, a globally threatened species Pallas's Fish Eagle was observed and photographed at the Karra river transect near the fishery complex. Pallas's Fish Eagle is a very rare visitor and has a minimum population size of five and a maximum population size of ten (Inskipp et. al, 2016). Similarly, a Black-capped Kingfisher was

sighted at the Karra river transect near Campa danda site in march 2019. Parajuli K. (2016) observed two individuals of Black-capped Kingfishers photographed in the eastern transect of the Karra river in 2014. There are no regular records of the Black-capped Kingfisher, therefore its population status is unknown (Inskipp et. al, 2016). Similarly, some other birds like Purple Heron, Yellow Bittern, and Ruddy-breasted Crake were sighted only in the Karra river site.

Twenty-three species of wetland birds were observed in the Kumaltar site. Birds were mainly observed in marshy agricultural land near the Karra river. Pintail Snipe and Indian Thick-knee are sighted from this site only. The region is moderately disturbed with rural settlements around.

Twenty species of wetland birds were observed in the upper Rapti stream at the Samari river confluence. Birds like Long-billed Plover, White-capped Water Redstart, and Black-backed Fail were recorded barely from this site only. Endangered birds like Ibisbill, were recorded regularly from November to March from this site. It was also sighted in the lower Rapti stream at Kushmandav Dham. According to Inskipp et. al (2016), ibisbill is a very uncommon altitudinal migrant.

Twenty-two species of wetland birds were observed in the Lower Rapti stream at Kushmandav Sarowar Dham. It is the site where Karra and Rapti rivers meet. Kushmandav Sarowar Dham is a famous holy place for Hinduism in Hetauda. Crowding of pilgrimage in the Dham and increasing urbanization recently has caused a drastic decline of water birds in this site.

Thirty species of wetland birds were observed in the lower Rapti stream at Lamitar site. Wetland birds like Bar-headed Goose, Northern Pintail, and Little Tern were sighted barely from this site only. Two species of Bar-headed Goose were observed wallowing in the river in December 2017. Similarly, five individuals of the Northern Pintail, an endangered bird were also sighted at a similar site. A single individual of Little Tern was observed foraging at the same site in July 2017. Little Tern is a local and very uncommon summer visitor to the lowlands and is assessed as vulnerable species with a declining population trend (Inskipp et. al, 2016).

4.1 Threats

Most of the species were found threatened by habitat loss and degradation. Major threat issues observed in the study area are habitat fragmentation and degradation, pollution and sewage from the industrial belts and urban areas, overfishing, poaching, mining of sand and gravel from rivers, lack of awareness, etc. Water pollution from agricultural chemicals has been identified as a particularly serious threat to lowland wetlands (Kafle et al. 2008). Industrial discharges, urban sewage, and agricultural run-off were seriously degrading the wetland of Hetauda.

Overfishing is a big problem for wetland birds as fishes are the staple food for birds like Cormorants, fish Eagles Ospreys, Kingfishers, etc. Overfishing leads to a marked decline in fish which poses serious threats to all fish-eating birds such as Pallas's Fish Eagle, Black-bellied Tern, Indian Skimmer, and Tawny Fish Owl (BCN and DNPWC 2011).Local ethnic groups below the age of 20 were found engaged in poaching activities. Children with catapults were encountered in the study area.

Site four and five where Ibisbills were sighted, are also under serious threat. It lies just adjacent to Hetauda city and many people go there for fishing, bathing, and washing clothes from morning to late evening. Many people from the surrounding district as well as from Bihar, India come to these sites for picnic and river fun purposes. Hundreds of cars and Scorpio vehicles can be seen during day time at the bank of rivers in winter seasons. People play loud music speakers and uproar.

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Recently the human activities and population of Hetauda is raising rapidly after the declaration of Hetauda as the capital city of Bagmati province. The important highways of the country like the east-west highway, Tribhuwan highway from Hetauda to Kathmandu, Dharan-Chatara highway, and the Nijgadh-Kathmandu fast track which is under construction are passes through Hetauda. This confirms that Hetauda is rising rapidly and will be converted into a big city soon. These are some serious issues that are posing threats to wetland birds and will pose serious threats to wetland birds as well as the whole ecosystem in near future. So, early strategies should be developed that keeps human and wildlife including wetland birds together in harmony with nature.

5. Conclusion and Recommendation

The present study revealed that the overall diversity of wetland birds is good in the study area despite the lack of conservation activities. Representing 41.9% of the total wetland birds of the country, the area exhibits its ecological value, research opportunity, and conservation necessity. It is a good roosting site for many migratory and residential birds. The recording of one critically endangered bird, three endangered birds, nine nationally threatened birds, and nine vulnerable birds indicate the importance of the study area. The fishery complex and its surrounding area carry a good potential habitat for wetlands as well as other bird diversity. So conservation plans should be developed immediately in an integrated fashion so that fishery production and bird conservation run smoothly and side-by-side. So, I strongly recommend the local stakeholder and conservation manager's focus on further study and the development of a conservation action plan immediately in the study area to conserve important wetland birds and pristine habitats.

Figure 4: *Photography of some birds from the study area*

1. Striated Heron *2. Black Bittern* *3. Lesser Whistling Duck* *4. Little Grebe*

5. Common Teal *6. Tufted Duck*

7.Mallard *8. Common Snipe* *9. Black-backed Forktail* *10. Grey Heron*


11. Slaty-backed Forktail


12. Pheasant-tailed Jacana

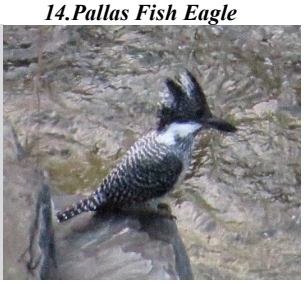

13. Ibisbill1


14.Pallas Fish Eagle


15. Black-capped Kingfisher


16. Little Forktail


17. Ruddy Shelduck


18. Creasted Kingfisher

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7. Appendices

1. Checklist of bird species recorded during field visit

S.no	Common name	Scientific name	Threatened Status	Migration status	Observed location	Remarks
	ANSERIFORMES					
	Anatidae					
1	Bar-headed Goose	*Anser indicus*	**NT**	**WV**	**6**	
2	Cotton Pigmy Goose	*Nettapus coromandelianus*	**VU**	**SV**	**1,5**	
3	Ruddy Shelduck	*Tadorna ferrogenia*	**NT**	**WV**	**1, 2, 5, 6**	
4	Gadwall	*Anas strepera*	**LC**	**WV**	**1,2**	
5	Eurasian Wigeon	*Anas penelope*	**LC**	**WV**	**1**	
6	Mallard	*Anas platyrhynchos*	**LC**	**WV**	**1, 6**	
7	Garganey	*Anas querquedula*	**VU**	**WV**	**1**	
8	Goosander	*Mergus merganser*	**LC**	**WV**	**4, 6**	
9	Lesser Whistling-duck	*Bhushan*	**LC**	**R**	**1,2,5,6**	
10	Common Teal	*Anas crecca*	**LC**	**WV**	**1,2**	
11	Northern Pintail	*Anas acuta*	**EN**	**WV**	**6**	
12	Common Pochard	*Aythya ferina*	**NT**	**WV**	**1**	
13	Tufted Duck	*Aythya fuligula*	**LC**	**WV**	**1**	
	PODICIPEDIFORMES					
	Podicipedidae					
14	Little Grebe	*Tachybaptus ruficollis*	**LC**	**WV**	**1**	
15	Great Crested Grebe	*Podiceps cristatus*	**LC**	**WV**	**1**	
	SULIFORMES					
	Phalacrocoracidae					
16	Little Cormorant	*Phalacracorax niger*	**LC**	**R**	**1,2,5**	
17	Great Cormorant	*Phalacrocorax carbo*	**NT**	**WV**	**1,6**	
	Anhingidae					
18	Oriental Darter	*Anhinga melanogaster*	**NT**	**R**	**1**	
	GRUIFORMES					
	Gruidae					
19	Demoiselle Crane	*Grus virgo*	**VU, II**	**WV**	**2**	**2, flying from east to west 2016**
	Rallidae					
20	Ruddy-breasted Crake	*Porzana fusca*	**LC**	**R**	**2**	
21	Watercock	*Gallicrex cinerea*	**NT**	**R**	**1**	
22	White-breasted Waterhen	*Amaurornis phoenicurus*	**LC**	**R**	**1,2,3**	
23	Common Moorhen	*Gallinula chloropus*	**LC**	**R**	**1,2**	
24	Eurasian Coot	*Fulica atra*	**LC**	**WV**	**1,2**	
25	Purple Swamphen	*Porphyriop orphyrio*	**LC**	**WV**	**1**	
	CHARADRIIFORMES					
	Scolopacidae					
26	Common Snipe	*Gallinago gallinago*	**LC**	**WV**	**1,2,3**	
27	Pintail Snipe	*Gallinago stenura*	**LC**	**WV**	**3**	
28	Common Greenshank	*Tringa nebularia*	**LC**	**WV**	**1,2,3,4,5,6**	
29	Common Sandpiper	*Actitis hypoleucos*	**LC**	**WV**	**1,2,3,4,5,6**	

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30	Temminck's stint	*Calidris temminckii*	**LC**	**WV**	**2,3**	**May/June**
31	Common Redshank	*Tringa tetanus*	**LC**	**WV**	**2,4**	
32	Green Sandpiper	*Tringa ochropus*	**LC**	**WV**	**1,2,3,4,5,6**	
33	Little Stint	*Calidris alba*	**LC**	**WV**	**1,2**	
	Burhinidae					
34	IndianThick-knee	*Burhinus oedicnemus*	**LC**	**R**	**3**	
	Ibidorhynchidae					
35	Ibisbill	*Ibidorhyncha struthersii*	**EN**	**R**	**4, 5**	
	Recurvirostridae					
36	Black-winged Stilt	*Himantopushimantopus*	**LC**	**WV**	**1**	
	Rostratulidae					
37	Greater Painted-snipe	*Rostratula benghalensis*	**LC**	**R**	**1**	
	Glareolidae					
38	Small Pratincole	*Glareola lacteal*	**NT**	**R**	**1**	
	Jacanidae					
39	Bronze-winged Jacana	*Metopidius indicus*	**LC**	**R**	**1, 3**	
40	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	**VU**	**R**	**1**	
	Charadriidae					
41	Little-ringed Plover	*Charadriusdubius*	**LC**	**WV**	**1,2,4,5,6**	
42	Long-billed Plover	*Charadrius placidus*	**LC**	**WV**	**4**	
43	River Lapwing	*Vanellusduvaucelii*	**NT**	**R**	**2,6**	
44	Grey-headed Lapwing	*Vanelluscinereus*	**LC**	**WV**	**2,3**	
45	Red-wattled Lapwing	*Vanellusindicus*	**LC**	**R**	**1,2,3,4,5,6**	
	Laridae					
46	Black-headed Gull	*Larus ridibundus*	**VU**	**WV**	**1,5**	
47	Little Tern	*Sterna albifrons*	**VU**	**SV**	**6**	
	CICONIIFORMES					
	Ardeidae					
48	Little Egret	*Egrettagarzetta*	**LC**	**R**	**1,2,3**	
49	Cattle Egret	*Bubulcus ibis*	**LC**	**R**	**1,2,3,4,5,6**	
50	Intermediate Egret	*Mesophoyxintermedia*	**LC**	**R**	**1,2,3,5,6**	
51	Great Egret	*Casmerodiusalbus*	**LC**	**R**	**1,2,3,5,6**	
52	Striated Heron	*Butoridesstriatus*	**LC**	**SV**	**1,2**	
53	Grey Heron	*Ardeacinerea*	**LC**	**R**	**1**	
54	Purple Heron	*Ardea purpurea*	**LC**	**SV**	**2**	
55	Indian Pond Heron	*Ardeolagrayii*	**LC**	**R**	**1,2,3,4,5,6**	
56	Black-crowned Night Heron	*Nycticorax nycticorax*	**LC**	**SV**	**1**	
57	Cinnamon Bittern	*Ixobrychuscinnamomeus*	**LC**	**SV**	**1,2,3**	
58	Yellow Bittern	*Ixobrychus sinensis*	**LC**	**SV**	**2**	
59	Black Bittern	*Dupetorflavicollis*	**EN**	**R**	**1**	
	Threskiornithidae					
60	Red-naped Ibis	*Pseudibispapillosa*	**LC**	**R**	**1,2,3,6**	
	Ciconiidae					
61	Asian Openbill	*Anastomusoscitans*	**VU**	**R**	**1,3,5**	
62	Black Stork	*Ciconianigra*	**VU, II,**	**R**	**1,3**	

			#			
63	Asian Woollyneck	*Ciconia episcopus*	**NT**	**R**	**2,3,6**	
64	Lesser Adjutant	*Leptoptilosjavanicus*	**VU**	**R**	**1,2,3,6**	
	ACCIPITRIFORMES					
	Pandionidae					
65	Osprey	*Pandionhaliaetus*	**LC, II**	**WV**	**1,6**	
	Accipitridae					
66	Pallas's Fish Eagle	*Haliaeetus leucoryphus*	**CR**	**WV**	**2**	
	Coraciiformes					
	Alcedinidae					
67	White-throated Kingfisher	*Halcyon smyrnensis*	**LC**	**R**	**1,2,3,4**	
68	Black-capped Kingfisher	*Halcyon pileata*	**LC**	**R**	**2**	
69	Common Kingfisher	*Alcedo atthis*	**LC**	**R**	**2,4,5,6**	
70	Stork-billed Kingfisher	*Pelargopsis capensis*	**LC**	**R**	**5,6**	
71	Crested Kingfisher	*Megaceryle lugubris*	**LC**	**R**	**4,6**	
	PASSERIFORMES					
	Muscicapidae					
72	Plumbeous Water Redstart	*Rhyacornis fuliginosa*	**LC**	**R**	**4,5,6**	
73	White-capped Redstart	*Chaimarrornis leucocephalus*	**LC**	**R**	**4**	
74	Black-backed Forktail	*Enicurus immaculatus*	**LC**	**R**	**4**	
75	Spotted Forktail	*Enicurus maculatus*	**LC**	**R**	**4,6**	
76	Slaty-backed Forktail	*Enicurus schistaceus*	**LC**	**R**	**1**	
	Motacillidae					
77	Yellow Wagtail	*Motacilla flava*	**LC**	**WV**	**1,2,5,6**	
78	Citrine Wagtail	*Motacilla citreola*	**LC**	**WV**	**1,2,3**	
79	White-browed Wagtail	*Motacillamaderaspatensis*	**LC**	**R**	**1,2,3,4,5,6**	
80	Grey Wagtail	*Motacillacinerea*	**LC**	**WV**	**1,2,3,4,5,6**	
81	White Wagtail	*Motacilla alba*	**LC**	**WV**	**1,2,3**	

Key to the site codes

1. Fishery complex
1. Karra river transect
2. Kumaltar site
3. Upper Rapti stream at Samari confluence
4. Lower Rapti stream at Kushmandav Sarowar Dham/ Karra+Rapti confluence
5. Lower Rapti stream at Lamitar site

Key on status

#: protected by NPWC Act 1973 (2029 BS)

Conservation Status

CR: Critically Endangered,
EN: Endangered
VU: Vulnerable

CITES Appendices

I: Appendix I
II: Appendix II
III: Appendix III