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Migratory Wings over Wetlands: Avian diversity at Vikramshila Gangetic Dolphin Sanctuary

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Abstract

Vikramshila Gangetic Dolphin Sanctuary (VGDS) primarily established for the protection of endangered Gangetic dolphin, the national aquatic animal, also provides key habitat for different avian species, particularly migratory birds. This study examines the behavioural patterns including foraging, roosting and social interactions of migratory birds within the wetlands of VGDS. Field observations were conducted over multiple migratory seasons to document species diversity and habitat utilization. Several key species were identified that use the sanctuary as a wintering site, including the Bar-headed Goose (*Anser indicus*), Northern Pintail (*Anas acuta*), Black-tailed godwit (*Limosa limosa*) and Eurasian coot (*Fulica atra*). Behavioural analysis revealed that wetlands are crucial for foraging and roosting, with food availability and habitat health significantly affecting bird activity patterns. Wetlands are also important for resident and migratory birds' interaction as many passerine birds' activity increases near wetlands during the migratory season. The presence of endangered and near-threatened species within wetlands emphasises the need for effective conservation measures to ensure the protection and sustainability of the sanctuary's rich birdlife.

Keywords: Avian diversity, Migration, Wetlands

1. Introduction

The Vikramshila Gangetic Dolphin Sanctuary (VGDS) located in the Bhagalpur district of Bihar, India, is not only a crucial conservation area for endangered Gangetic dolphin (*Platanista gangetica gangetica*) but also significant habitat for avian diversity comprising of resident and migratory birds.

Migratory birds are fundamental indicators of environmental changes. Their migratory patterns can reveal habitat destruction, climate change, and the health of ecosystems (Sekarcioglu et al., 2012). Understanding the dynamics of bird migration and the factors affecting it is essential for biodiversity conservation and maintaining healthy ecosystems. The Waterbirds' monitoring programme is conducted by many researchers worldwide which makes waterbirds the most studied group of animals on earth (Bhatt et al., 2015). Wetlands continuously hold more than 1% of the waterbird population and are considered internationally important under the Ramsar Convention on Wetlands for conservation and research for maintenance of wetland birds' diversity (Kumar and Bhatt, 2000). Studies of Islam and Rahmani (2004) have shown that Indian wetlands are being degraded by developmental activities, population growth and over-exploitation of natural resources.

The present research investigates the rich birdlife, resident and migratory within the wetlands of VGDS. The sanctuary's unique ecosystem characterised by its floodplain and its zig-zag channels, provides a

habitat for numerous birds. In this research behavioural patterns, including feeding, roosting and social interactions of the migratory birds within the wetlands were assessed.

2. Materials and methods

Study area: The present experiment was carried out in VGDS, a 60 km stretch along the Ganges River from Sultanganj (25° 14′ 23″ N, 86° 43′ 48″ E) to Kahalgaon (25° 15' 37" N 87° 14' 10" E). It was established in 1991 by the Government of Bihar for the conservation of endangered Gangetic dolphins (Kelkar et al., 2010). Many wetlands have evolved from the Ganges backwaters and channel diversion, depositing significant amounts of sediment from the Himalayas and other upstream regions. They have become a good source of habitat for migratory and resident waterbirds. Bhagalpur has three prominent seasons, winter (October to March), summer (April to June) and monsoon (July to September) and the temperature ranges from a minimum of 11°C in winter to a maximum of 45 °C in summer.

Field data collection: The study was conducted between December 2022 and April 2024 in the range of 10 km downstream between Bhagalpur and Sabour. Regular boat trips were made in the VGDS area in the morning (07.00 to 11.00) and evening (15.00 to 17.00). Surveys were carried out for the migratory birds during the trip and sometimes along the bank of the river and the population was estimated by point-count method (Bibby et al., 2000). Migratory birds were identified using correlated literature (Ali, 2002; Grimmet et al., 2013; Mohan and Sondhi., 2014). Activities of birds were observed using binoculars (Olympus 8x50) and digital photographs were taken using a telephoto lens (Nikon B700 60x) for the identification and record.

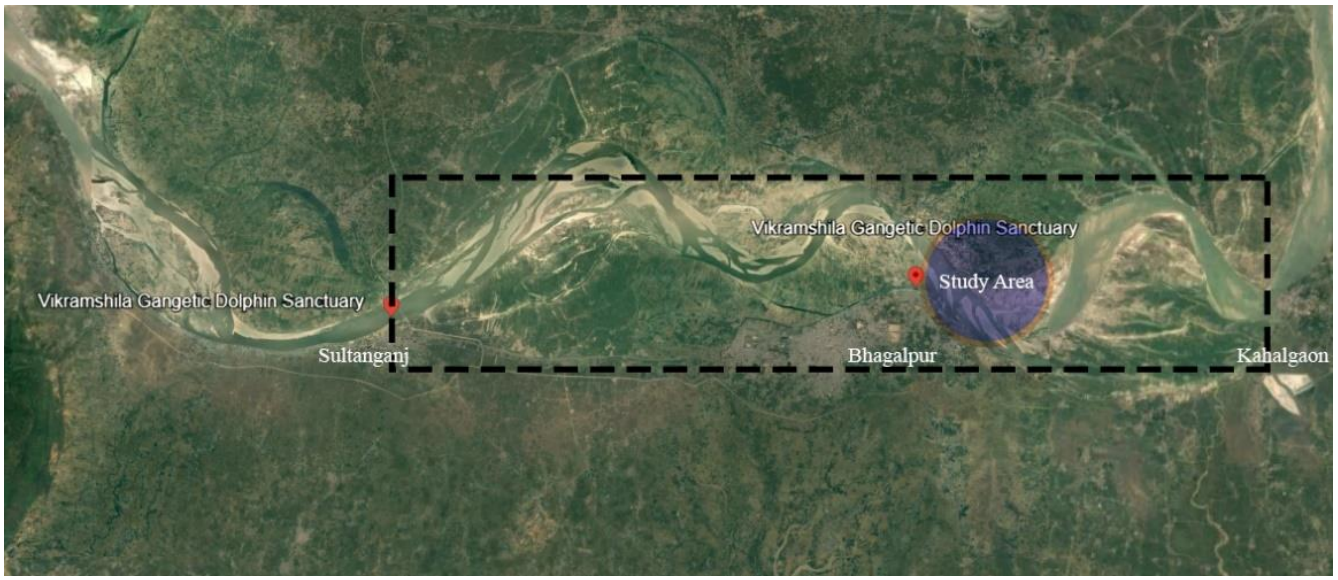

Figure 1. Showing the study area (Blue circle) in the wetlands of VGDS, Bhagalpur, Bihar, India. Dotted black rectangle represent the 60km stretch of VGDS from Sultanganj to Kahalgaon. (Source: Google Earth).

3. Results and Discussion

VGDS is the only dolphin sanctuary in India and is identified as an “Important Bird Area” by BNHS for its rich avifauna. The sanctuary is a habitat for hundreds of Indian skimmers (*Rynchops albicollis*), Greater adjutants (*Leptoptilos dubius*), Lesser adjutants (*Leptoptilos javanicus*), Greater spotted eagle (*Clanga*

clanga), Pallas's fish eagle (*Haliaeetus leucoryphus*) and many other waterbirds (Islam and Rahmani, 2004). Migratory birds typically start arriving at the sanctuary around mid-December and leave by the first week of April, staying for a period of 3 to 4 months (Bailey, 1911). In the present study, 27-28 different avian species were observed belonging to different families. The presence of Bar-headed Goose (*Anser indicus*) flocks was noted around December, with their numbers rising in January.

Figure 2. Waterbirds diversity in the wetlands of VGDS. a) Flocks of Great cormorant (*Phalacrocorax carbo*) b) Flocks of Ruddy shelduck (*Tadorna ferruginea*) c) Common pochard – female (*Aythya ferina*) d) Eurasian coot (*Fulica atra*) e) Asian openbill stork (*Anastomus oscitans*) f) Indian pond-heron (*Ardeola grayii*).

Ruddy shelduck and Northern Pintail are the winter migrants and were also observed in large numbers, the same reported earlier by Bhatt et al., 2014. Other migratory birds that were observed in VGDS are the Eurasian coot, Black-tailed godwit, Pied avocet, Wood sandpiper, Common teal, Brown-headed gull and Osprey (Table 1). Out of these migratory birds, Black-tailed godwit, Mallard and Eurasian coot were not observed in December 2023 – April 2024.

Among resident birds, Indian Pond Heron, Great Egret, Cattle Egret, Greater adjutant, Pied Kingfisher, White-throated Kingfisher, Great Cormorant and Red-naped ibis were observed in large numbers (Table 1). Around fifteen (15) Gangetic dolphins and five (5) dolphin calves were sighted during this survey. One (1) Gharial (*Gavialis gangeticus*) was sighted at Ghat behind Bhagalpur Engineering College.

Figure 3. Passerine birds' behaviour affected by wetland diversity of VGDS. a) Black hooded oriole (*Oriolus xanthornus*) b) Black redstart (*Phoenicurus ochruros*) c) Olive-backed pipit (*Anthus hodgsoni*) in which increased activity around wetlands was recorded in the month of January-March when migratory waterbirds number increased.

Birds are one of the most sensitive species to weather, climate change, landscape modifications and the presence of pollutants (Baker and Tingey, 1992). A significant decrease was observed in the number of migratory bird visits in the year 2023-2024 as compared to 2022-2023 which might be due to the increasing pollution, and human activity such as poaching hunting and fishing. It may be pointed out that there was also a significant decrease in the avian population after the flood and loss of a vegetated island in the month of August. The presence of endangered and near-threatened species (IUCN) around the wetlands of VGDS indicates the importance and richness of wetlands in the area.

Figure 4. Behavioural displays around wetlands of VGDS. a) Sun-Basking behaviour performed by Great Cormorant (*Phalacrocorax carbo*). b) Little egret (*Egretta garzetta*) and c) Greater Adjutant (*Leptoptilos dubius*) performing foraging behaviour.

Table 1. List of Avian species observed at wetlands of VGDS, Bhagalpur, Bihar in the year 2022-2024.

S/N	Common name	Scientific name	Status	IUCN status	Number recorded in 2023	Number recorded in 2024
1	Asian openbill stork	*Anastomus oscitans*	M	LC	08	06
2	Bar-headed goose	*Anser indicus*	M	LC	06	04
3	Black-hooded oriole	*Oriolus xanthornus*	R	LC	11	13
4	Black redstart	*Phoenicurus ochruros*	R	LC	07	09
5	Black-tailed godwit	*Limosa limosa*	M	NT	03	■
6	Brown headed gull	*Chroicocephalus brunnicephalus*	RM	LC	04	04
7	Common pochard	*Aythya ferina*	M	LC	06	04
8	Common teal	*Anas crecca*	M	LC	12	10
9	Eurasian coot	*Fulica atra*	M	LC	07	■
10	Great cormorant	*Phalacrocorax carbo*	M	LC	29	21
11	Great egret	*Ardea alba*	R	LC	11	08
12	Greater adjutant	*Leptoptilos dubius*	RM	E	13	15
13	Indian-pond heron	*Ardeola grayii*	R	LC	22	25
14	Lesser adjutant	*Leptoptilos javanicus*	RM	NT	03	03
15	Mallard	*Anas platyrhynchos*	M	LC	04	■
16	Northern pintail	*Anas acuta*	M	LC	11	07
17	Olive backed pipit	*Anthus hodgsoni*	R	LC	13	06

18	Pallas's fish eagle	*Haliaeetus leucoryphus*	M	E	03	01
19	Pied avocet	*Recurvirostra avosetta*	RM	LC	33	39
20	Pied kingfisher	*Ceryle rudis*	RM	LC	02	06
21	Red crested pochard	*Netta rufina*	M	LC	16	17
22	Red-naped ibis	*Pseudibis papillosa*	R	LC	11	15
23	Ruddy shelduck	*Tadorna ferruginea*	RM	LC	24	19
24	Western cattle egret	*Bubulcus ibis*	R	LC	18	21
25	Western osprey	*Pandion haliaetus*	M	LC	02	01
26	White-throated kingfisher	*Halcyon smyrnensis*	R	LC	15	11
27	Wood sandpiper	*Tringa glareola*	M	LC	03	02

R: Resident; M: Migratory; RM: Resident Migratory; LC: Least Concern; E: Endangered; NT: Near Threatened; Solid square represent absence of the species in particular year.

4. Conclusion

The present study suggests that natural wetlands of the VGDS are critical for the roosting and foraging behaviour of the waterbirds and habitat conditions significantly affect the bird's activity patterns. Findings indicate that fluctuations in water levels due to seasonal changes or anthropogenic activities directly influence the availability of feeding grounds and nesting sites, thus affecting the overall health of the wetland and the avian population. The presence of endangered and near-threatened species around the wetland also underscores the need for integrated conservation strategies to protect these species in this environment.

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