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Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

SHORT COMMUNICATION

POPULATION AND CONSERVATION THREATS TO THE GREATER FLAMINGOS *PHOENICOPTERUS ROSEUS* (AVES: PHOENICOPTERIFORMES: PHOENICOPTERIDAE) AT BASAI WETLAND AND NAJAFGARH JHEEL BIRD SANCTUARY, HARYANA, INDIA

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26 June 2021 | Vol. 13 | No. 7 | Pages: 18894–18898

DOI: [10.11609/jott.6258.13.7.18894-18898](https://doi.org/10.11609/jott.6258.13.7.18894-18898)



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Population and conservation threats to the Greater Flamingos *Phoenicopterus roseus* (Aves: Phoenicopteriformes: Phoenicopteridae) at Basai Wetland and Najafgarh Jheel Bird Sanctuary, Haryana, India

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Abstract: Greater Flamingos are the largest and most widespread, among other species of Phoenicopteridae. This study documents the population structure and conservation threats affecting the population and habitat of the flamingos at Najafgarh Jheel Bird Sanctuary and Basai wetland in Haryana, India. The study areas were surveyed monthly between May 2019 to February 2020 at regular intervals. A Nikon 8 X 40 field binoculars and a Nikon SX60 camera were used to observe flocks of *P. roseus*. A total of 65 flocks of flamingo were observed, and 6,768 individuals were counted using point counts method. Najafgarh Jheel Bird Sanctuary holds a major proportion of their population comprising about 91.78 % and Basai wetland holds about 8.21 % of their population, while 52.46 % of the total population were classified as adults, and 47.53 % were juveniles (sub-adults). Habitat fragmentation resulting from construction of roads is one of the major threats, while overgrowth of water hyacinth, cattle grazing and fishing activities at Basai Wetland; adversely affected the flamingos. At the Najafgarh Jheel, cattle grazing was considered to be the major threat, followed by the overgrown water hyacinth, fishing activities and collision with high tension power lines.

Keywords: Cattle grazing, Gurugram, habitat, population, water hyacinth, wetland.

Flamingos are gregarious birds that live in flocks, ranging from a few to thousands often referred to as Pat (Tere 2005; Johnson & Cezilly 2007). The Greater

Flamingos *Phoenicopterus roseus* are the largest, and most common among all the species of flamingos. Food and suitable habitat are key factors affecting its distribution (Ali 1987; Jenkin 1957). The Greater Flamingos primarily feed on phytoplankton, zooplankton, crustaceans, molluscs, sedge seeds and the remains of higher plants (Ali 1987; Tere 2005). Availability of food, water quality, depth, and influence of predator are some important factors that influence the population and distribution of waterbirds (Arenco & Baldassarre 1995; Baldassarre & Arenco 2000; Pirela 2000; Tuite 2000).

Flamingos use habitats including fresh and salt water, brackish water, shallow lagoons, alkaline lakes, salt pans, and mudflats (Ali 1987; Grimmett et al. 1998). Being wetland specialists, Greater Flamingos are found to feed, roost, and nest in the wetlands, hence any change or loss in their habitat is considered a significant threat.

The present study was conducted to assess the population structure and to document conservation threats at Basai wetland and Najafgarh Jheel Bird Sanctuary, which are declared Important Bird Areas

Editor: Zafar-ul Islam, National Wildlife Research Center Ecology and Biology, Taif, Saudi Arabia.

Date of publication: 26 June 2021 (online & print)

Citation: Kumar, A. & S. Rana (2021). Population and conservation threats to the Greater Flamingos *Phoenicopterus roseus* (Aves: Phoenicopteriformes: Phoenicopteridae) at Basai Wetland and Najafgarh Jheel Bird Sanctuary, Haryana, India. *Journal of Threatened Taxa* 13(7): 18894–18898. <https://doi.org/10.11609/jott.6258.13.7.18894-18898>

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Funding: Council of Scientific & Industrial Research (CSIR).

Competing interests: The authors declare no competing interests.

Acknowledgements: One of the authors Mr. Amit Kumar is thankful to the Human Resource Development Group (HRDG) Council of Scientific & Industrial Research (CSIR), New Delhi, India for providing financial assistance to carry out this research work with the file no. 09/105(0278)/2018- EMR-1. The authors are thankful to the Department of Zoology, Kurukshetra University, Kurukshetra for providing necessary facilities to carry out this study. The authors are also thankful to Mr. Harsh Gulati, Miss Parul, and Miss Anjali for giving their valuable time and help in data collection.



(IBA) by BirdLife International (Islam & Rahmani 2004). Population abundance and conservation threats for Greater flamingos were carried out in Gurugram District of Haryana. The current study recommends conservation measures to mitigate threats to flamingos and other species of waterbirds in these IBA sites.

STUDY AREA

Basai wetland

Basai wetland (28.468N, 76.981E; 216–219 m) is named after the village Basai, in Gurugram District in Haryana, India. The wetland close to Basai-Dhankot railway station and 8 km from the Sultanpur National Park. It is a perennial shallow water wetland with an area of 250 acres and is an IBA that has global conservation significance as it supports populations of several endangered, vulnerable, and threatened bird species (Islam & Rahmani 2004).

Najafgarh Jheel Bird Sanctuary

Najafgarh Jheel Bird Sanctuary (28.498N, 76.946E), located on the Delhi-Haryana border, and estimated around 7 km long, is the part of Sahibi River. The Najafgarh Jheel Bird Sanctuary extends to two villages, Kherki-Majra and Dhankot with an area of 298 acres, in

the Gurugram District of Haryana, India. As untreated sewage flows into it, the Jheel is one of the most contaminated, though still an important habitat for many species of birds and plants.

METHODS

The selected sites were surveyed on a monthly basis, from May 2019 to February 2020. The data were collected from sunrise to sunset. A combination of field observations, and time series imagery were used to identify changes in the open water area. Observations were carried out by using a Nikon 8 X 40 field binoculars and a Nikon SX60 camera. Birds were counted monthly using the point count method (Sutherland 2006; Bibby et al. 2000) and locations of each sighting of flocks were recorded by means of a hand-held GPS device. To construct a distribution map of the study area the geographic information system (GIS) software (ArcGIS 10.5) was used. Various threats were determined through direct observations. A total of 17 people were interviewed throughout the study period. To reach study sites at various locations, different modes of transport were used. Adults and immature (sub-adults) birds were identified based on their plumage (Allen 1956; Johnson & Cezilly 2007).

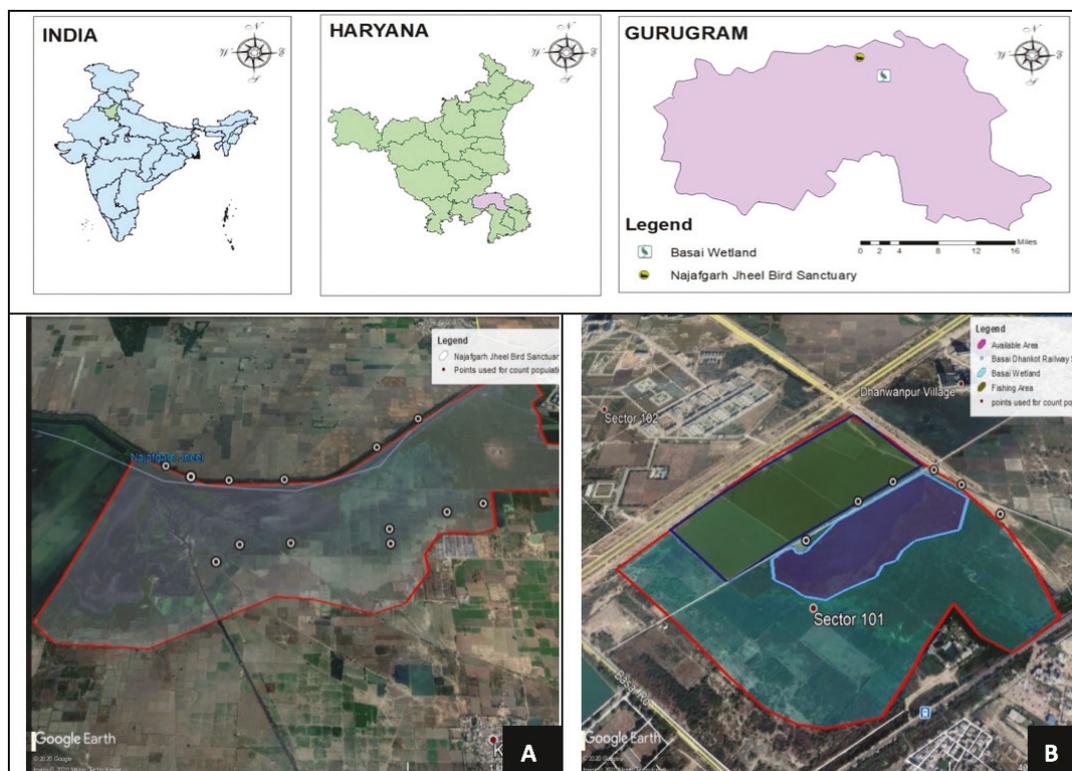


Figure 1. Study area: A—Najafgarh Jheel Bird Sanctuary | B—Basai Wetland (23.v.2020).

RESULTS

Population structure

A total of 65 flocks of flamingos were observed, and 6,768 individuals of Greater Flamingos were counted from May 2019 to February 2020. Najafgarh Jheel Bird Sanctuary holds a major proportion of their population comprising 91.78 % and Basai wetland holds 8.21% of their population (Table 1).

Among 6,768 individuals of Greater Flamingos 52.46 % were classified as adults and 47.53 % were juveniles (sub-adults), while chicks were not observed. The number of adults observed were slightly more as compared to juveniles at both the wetlands (Figure 2).

Threats

Major threats in study area including habitat destruction, fragmentation, collision with power line, Invasion of water hyacinth, fishing activities, dumping of solid wastes, release of untreated sewage, diverting of water flow, cattle herds, and feral dogs. Being larger in size, Greater Flamingos are attacked by very few predators though a Black Kite *Milvus migrans* was observed attacking them.

Construction of roads along wetlands and draining of wetland are some main anthropogenic activities at Basai Wetland that result in fragmentation and shrinkage of habitats (Image 1). Overgrowth of water hyacinth, cattle grazing, and fishing activities at Basai Wetland, also adversely affect the flamingo population.

At the Najafgarh Jheel, cattle grazing was observed to be the major threat, followed by the overgrown water hyacinth, fishing activities, and collision with high tension power lines. There is a huge network of powerlines in the area of Najafgarh Jheel Bird sanctuary that pose a high risk to Greater Flamingos (Image 2) and other birds. As this site was not frequently visited by birdwatchers, incidents of bird collisions with powerlines remained unnoticed.

Both study sites, wetlands are infested with water hyacinth observed throughout the year and that confines the feeding area (Image 3).

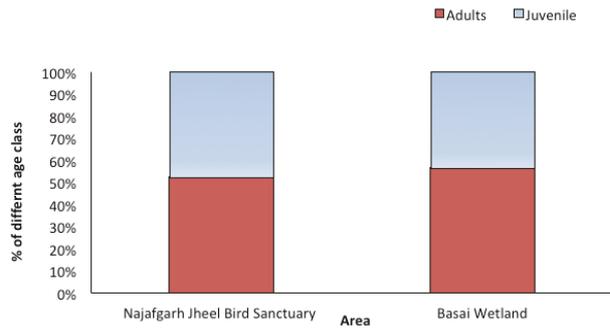


Figure 2. Population age structure of Greater Flamingos observed at study area.

DISCUSSION

Distribution of Greater flamingos is associated with their habitat as these birds are habitat specialists and depend thoroughly on wetlands as they roost, feed, and nest in an aquatic habitat. During the present studies, 91.78 % Flamingo were recorded at Najafgarh Jheel Bird Sanctuary. It is important to monitor flamingo population and how they adapt to current conservation threats, to find out strategies for ensuring their survival. The above-mentioned conservation threats are observed to affect flamingos’ distribution and abundance at both the wetlands. Wetlands are constantly facing enormous anthropogenic pressures (Prasad et al. 2002), owing to the rapid urbanization that causes the native species to become eventually extinct in a specific area (Godefroid 2001). Regular decline in level of water at Basai wetland due to various anthropogenic activities (Figure 3), reduces the population of Flamingos. Less number of birds were recorded near human houses or where people move around. It is observed at the nesting colony elsewhere, with a slight disturbance (anthropogenic or natural) flamingos abandon the colony and, consequently, to a failure of nesting (Rameshchandra 2014). Here at both these study locations no breeding and nesting were observed, probably due to human disturbances including fishing and cattle grazing activities.

Flamingo collision with electrical lines is listed as a hazard (Parasharya & Tere 2006; Johnson & Ceilly 2007),

Table 1. Number of Greater Flamingo censuses from May 2019 to February 2020.

Study Area	Number of flock	Flock range	Adult	Juvenile	Total number	Average population
Najafgarh Jheel Bird Sanctuary	45	5 to 214	3238 ± 227	2974 ± 201	6212	621 ± 414
Basai Wetland	20	13 to 49	313 ± 16	243 ± 14	556	55.6 ± 26

*± = standard deviation



Image 1. Construction of roads along Basai wetland results in shrinkage of Basai wetland. © Amit Kumar

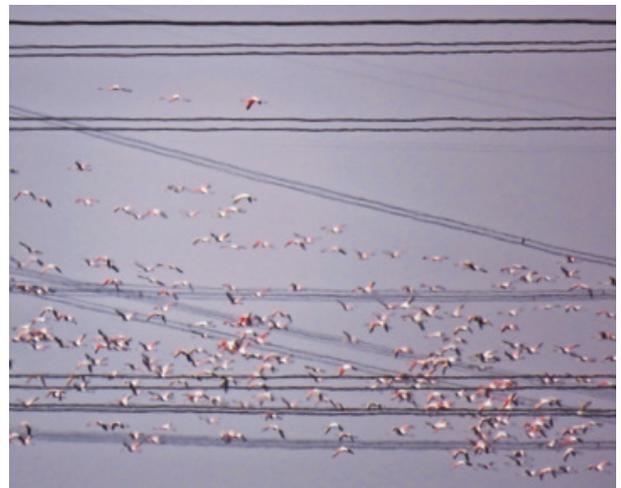


Image 2. Risk of collision with powerline at Najafgarh Jheel Bird Sanctuary. © Amit Kumar



Image 3. Invasion of water hyacinth: A—Basai Wetland | B—Najafgarh Jheel Bird Sanctuary. © Amit Kumar

which affect the population locality (Childress et al. 2008). Our finding shows that collision with powerlines is a threat that was observed at Najafgarh Jheel Bird Sanctuary that was responsible for the mortality of Flamingos and other birds (Figure 5) as observed by other researchers at other Flamingos inhabiting sites (Tere & Parasharya 2011; Rameshchandra 2014). Normally, birds collide with powerlines at night and sometimes during the day as well in some instances. Flamingos are reported to fly at night and in low light conditions (Ogilvie & Ogilvie 1986; Johnson & Cezilly 2007). Repeated instances of mortality due to wire collision have been reported at various sites of Gujarat, where a total of 76 flamingo death were recorded by Tere & Parasharya (2011); Rameshchandra (2014) reported that around 50 flamingos were found dead at Kumbharwada site of Gujarat. Mortality of Sarus Crane due to collision with power lines was reported by Sundar & Choudhury (2005); Gosai et al. (2016).

A rapid spread of water hyacinth has been noted by us, at both the habitats (Figure 5). This growth progressively reduces the open water area, available to the flamingos. If this encroachment by hyacinth is not controlled, it will adversely affect the population of flamingos.

Following are some measures to be considered:

1. Water Hyacinth *Eichhornia crassipes* could be utilized for bedding material for mushroom cultivation and as bio fuel (Bote et al. 2020), as an effective means of economic utilization of the weed. This would also raise the state's revenue, in addition to generating employment at local level and value added goods.

2. To reduce the collisions with powerlines at Najafgarh Jheel Bird Sanctuary, the effective measure suggested by Tere & Parasharya (2011) to be adopted.

3. Restriction of fishing during specified times of the year, licensing of capture permit and limits, fencing some of the selected portion, are possible protection measures.

4. Sewage water must be treated before release into these habitats. It will help to improve the water quality and effluents produced from treatment can be reused for agricultural and other purpose. This will also prevent the lake from being contaminated.

5. Our study shows that Najafgarh Jheel holds a large population of Greater Flamingos, so the conversion of Jheel into a protected flamingo park would help protect the population of Greater Flamingos, along with other water birds and associated fauna and flora. This would also help to increase the state's revenue as it will increase tourism.

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

June 2021 | Vol. 13 | No. 7 | Pages: 18679–18958
Date of Publication: 26 June 2021 (Online & Print)
DOI: 10.11609/jott.2021.13.7.18679-18958

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