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Winter Avian Aggregation at Santragachi Jheel: An Urban Wetland in West Bengal, India

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ABSTRACT

India has an estimated 58.2 million hectares of wetlands that are important repositories of aquatic biodiversity. The variety of wetlands in India perfectly matches the diverse eco-climatic regimes of the country. This includes wetland systems ranging from high altitude cold desert wetlands to hot and humid wetlands in coastal zones with its characteristically diverse flora and fauna. Around 15 km away from the center of Kolkata city, West Bengal, lies a 12.77 ha (mean depth 1.5 m) freshwater lake, known as the Santragachi Jheel, in the district of Howrah of West Bengal, India (Lat. 22º 34' 60N Long. 88° 17' 60E; Altitude 8m msl) which has recently attracted the attention of avian migrant watchers India-wide. The Jheel plays an important role as the host of thousands (4000-5000) of migratory water birds as well as many resident species during the colder months of the year (October – March). More than twenty-five bird species colonize this lake during the winter months including the most abundant Lesser Whistling Duck and comparably infrequent Northern Pintail, Northern Shoveller, Gargany, Gadwall, Cotton Pigmy Goose, Common Teal and Baikal Teal. But this urban wetland most recently has been subjected to a wide variety of turbulences that includes incessant anthropogenic activities, improper development and management structures and lack of awareness about the vital role played by this ecosystem. So it was felt important to identify the status of Santragachi Jheel with reference to urbanization and various anthropogenic interventions to formulate suitable conservation, restoration and management strategies for this unique wetland with its magnificent avian repository.

***Keywords*:** Conservation, Habitat alteration, Santragachi Jheel, Waterbirds, Winter migrants

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1. INTRODUCTION

Wetlands being the transitional zone between land and water are perhaps the most attractive landscapes that have earned explicit global importance during the last few decades. These are the areas where, water being the primary factor controls the ecological functioning and associated wildlife and plant life. They provide important habitats for a wide variety of waterbirds. The Government of India has listed almost all of the 655 Prioritized Indian Wetlands for their importance as waterbirds habitat. However Rapid urbanization has led to the conversion of natural wetlands by means of addition of pollutants, nutrients, sedimentation and introduction of alien species. Ever increasing anthropogenic activities have resulted in the alteration of wetlands and as a consequence many of them around the globe are on the verge of decline and loss, leading to decrease in both wetland fauna and flora.

Despite of marked decline in the number of migratory waterbirds from the wetlands of West Bengal, a small lake (Santragachi Jheel) near the crowded and noisy Santragachi railway station, 20 km from the East Calcutta Wetlands (a Ramsar site), regularly supports 4000-5000 migratory waterbirds between the colder months of October to March. Lesser Whistling Ducks (*Dendrocygna javanica*) mostly dominate this lake, but several other species have also been reported from this lake (Mazumder *et al*. 2005; Roy *et al*. 2011). Unfortunately in recent years many of them have stopped migrating to this lake and most recent studies have reported that both the number and abundance of different waterbirds have reduced remarkably. Most probable cause of this waterbird loss is the immense pressure of different anthropogenic activities and increasing vegetation cover (mainly water hyacinth) over the lake.

Local people around Santragachi Jheel along with several dynamic Non-Government organizations and the State Government holistically have taken a number of notable measures to protect this lake. We carried out the present study with an objective to evaluate the effectiveness of the steps taken so far for saving the avian population of this lake and to spot light on the future perspective for management, restoration and conservation of Santragachi Jheel.

2. MATERIALS AND METHODS

2. 1. Study Area

The present study was undertaken during the colder months (October – March) of 2004 – 2014. Santragachi Jheel is an urban wetland situated adjacent to the Santragachi railway station, in the district of Howrah of West Bengal, around 8 km away from the center of Kolkata (Fig. 1). It is surrounded by dense human habitations, small scale industries and railway yards. The lake lies in an area of around 12.77 hectare with an average depth of 1.5 m. The lake is generally dominated by *Eichhornia crassipes* which covers whole water surface of lake by its rapid propagation in the months of migratory bird non-colonization (*i.e*. during April – September). There are twelve small islands at the center of the lake that plays an important role as the shelter of many migratory waterbirds like lesser whistling duck, fulvous whistling duck, northern pintail, northern shoveller and gargany. A large number of local non-migratory bird species that include bronzed winged jacana, pond heron and cattle egret also inhabit this lake.

The Jheel has large trees along its bank which provides shelter and food for many wetland dependent avian species like kingfishers and drongos. More than 25 species of waterbirds use this wetland as their roosting ground during the winter months of the year (October – March).

Figure 1. Satellite image of the Santragachi Jheel showing the infestation of water hyacinth and its intimate location to the Santragachi railway station.

3. METHODOLOGY

3. 1. Avian population estimation

For the estimation of the avian population of the lake mainly line transect method (Hutto *et al*. 1986; Bibby *et al*. 1992; Buckland *et al*. 1993) was applied. Sampling was done randomly; however, each of the four sides of the lake was traversed at each sampling time; each side was traversed by walking along a transect line and all birds seen were counted within 50 m of the transect, all parts of which were at least 50 m from the edge of the shoreline. Birds were counted as seen more than 50 m in front or behind as long as they were within 50 m perpendicular to the transect (Fig. 2). The time and weather was recorded at the beginning of each sampling. Birds flying over the habitat were recorded separately from those using the habitat.

But for more precise estimation random hand-frame method and binocular-frame counts (Gopal, 1995) of the birds were also applied in three selected distance-ranges, viz., 50m, 100m and 150m. Areas of both hand-frame and binocular-frame were standardized by the average of three measurements, working out the ground cover on land at the pre-set distances. Such frame-counts encompass all the avian species, either resting on the bank or islands, or wandering on

the water surface. Three individual counts at three time intervals were averaged to get the representative data of a particular month.

Observations were made by the help of Olympus 8x40 DPS I binocular while Digital cameras were used for identification and supporting pictures. Ali (1996), Grimmett *et al.* (1998) and Kazmierczak & Perlo (2000) were followed for avifaunal identification work and common and scientific names.

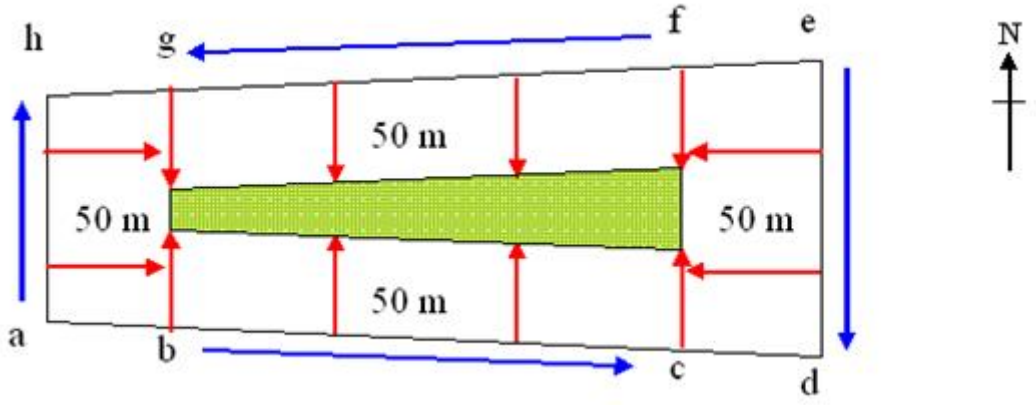

Figure 2. As Santragachi Jheel is almost rectangular in shape (average length X width = 1300 X 100 m) the line transect was laid at 50 m distance from shoreline (shown by red arrows in the figure). For north and south section of the lake, sampling was done from point f-g and from b-c respectively. The terminal 50 m left on both north and south sections were taken into account while sampling the east and west side of the lake i.e., from point e-d and a-h respectively. Area falling beyond 50 m was sampled by hand frame method and binocular frame method, which ultimately were calculated and averaged together to supplement the transect counts.

3. 2. Measurement of anthropogenic pressure over the Jheel

Anthropogenic pressure in and around the lake was measured by direct count method of all solid and liquid pollutant sources that included domestic and wastewater inlets, garbage dumps and dustbins.

4. RESULTS AND DISCUSSION

Santragachi wetland plays host to more than 5,000 migratory and resident birds while, more than twenty-five species of water birds use this wetland during the colder months of the year (October – March). Lesser Whistling Duck is most common in this lake and they occupy the lake invariably in the winter months. Northern Pintail, Northern Shoveller, Gargany, Gadwall, Cotton Pigmy Goose also visits this lake during the winter season. Table 1 shows the monthly density (Mean ± SD Nos. ha^{-1}) and diversity of waterfowl during the study period. The abundance of different bird species was found to be highest in the month of December and January. But the matter of concern is that the number of birds has been found to decrease consistently during the study period. Though the population of most abundant bird species migrating to the lake i.e. the Lesser Whistling Duck was found to maintain regularity in their

assemblage number, most other migratory bird species including Ferruginous Pochard, Common Teal and Fulvous Whistling-Duck was found to be disappearing from the lake in more recent years.

Table 1. Seasonal changes in the migratory waterfowl densities (Nos·ha^{-1}) and diversity at Santragachi Jheel during the study period (2004 - 2014). (0 = Not Recorded; values given as Mean±SD)

Common Name	Scientific Name	October	November	December	January	February	March
Northern Pintail	*Anas acuta*	0.05±0.03	0.28±0.13	9.45±5.22	12.99±4.52	5.58±2.46	0.31±0.10
Mallard	*Anas platyrhynchos*	0.00±0.00	0.00±0.00	0.00±0.00	0.06±0.03	0.00±0.00	0.00±0.00
Lesser Whistling Duck	*Dendrocygna javanica*	11.56±7.87	142.25±26.78	245.23±22.45	198.54±16.14	158.18±11.63	46.16±18.67
Fulvous Whistling Duck	*Dendrocygna bicolour*	0.00±0.00	0.00±0.00	0.00±0.00	0.06±0.03	0.00±0.00	0.00±0.00
Gadwall	*Anas strepera*	0.26±0.15	0.85±0.33	6.90±2.40	5.29±2.47	2.56±1.15	0.61±0.24
Gargany	*Anas querquedula*	0.06±0.03	0.12±0.04	0.18±0.06	0.29±0.06	0.16±0.04	0.06±0.03
Northern Shoveller	*Anas clypeata*	0.00±0.00	0.06±0.03	0.39±0.12	1.46±0.63	1.27±0.58	0.09±0.03
Cotton Pigmy-Goose	*Nettapus coromandelianus*	0.25±0.09	0.57±0.18	7.36±5.21	6.09±3.87	0.89±0.53	1.67±0.87
Ferruginous Pochard	*Aythya nyroca*	0.06±0.03	0.06±0.03	0.12±0.06	0.00±0.00	0.00±0.00	0.00±0.00
White Breasted Waterhen	*Amaurornis phoenicurus*	0.45±0.11	0.67±0.23	0.58±0.32	0.57±0.49	1.47±0.88	0.89±0.42
Common Moorhen	*Gallinula chloropus*	0.06±0.03	0.29±0.07	0.85±0.32	1.74±0.41	1.24±0.48	1.39±0.61
Bronze Winged Jacana	*Metopidius indicus*	0.29±0.06	1.45±0.38	1.78±0.47	1.58±0.52	2.68±0.67	0.95±0.24
Common Coot	*Fulica atra*	0.00±0.00	0.36±0.12	0.58±0.29	0.68±0.31	0.47±0.23	0.00±0.00
Little Cormorant	*Phalacrocorax niger*	1.48±0.37	1.52±0.47	3.73±1.03	1.87±0.29	2.41±0.72	4.25±1.39
Asian Openbill	*Anastomus osciatans*	0.00±0.00	0.06±0.03	0.06±0.03	0.06±0.03	0.00±0.00	0.00±0.00
Pond Heron	*Ardeola grayii*	0.48±0.22	0.76±0.27	1.69±0.86	0.57±0.14	1.99±0.78	1.70±1.01

Grey Heron	*Ardea cinerea*	0.00±0.00	0.12±0.03	0.12±0.03	0.17±0.06	0.12±0.06	0.00±0.00
Purple Heron	*Ardea purpurea*	0.00±0.00	0.00±0.00	0.12±0.06	0.12±0.05	0.00±0.00	0.00±0.00
Common Sandpiper	*Actitis hypoleucos*	0.00±0.00	0.00±0.00	0.36±0.12	0.47±0.25	0.37±0.13	0.18±0.07
White Wagtail	*Motacilla alba ocularis*	0.38±0.16	0.35±0.15	0.46±0.16	0.34±0.14	0.28±0.11	0.10±0.04
Citrine Wagtail	*Motacilla citreola citreola*	0.00±0.00	0.00±0.00	0.00±0.00	0.26±0.07	0.12±0.06	0.00±0.00
Grey Wagtail	*Motacilla cinerea*	0.06±0.03	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00

Both the solid and liquid wastes were found to contaminate the Jheel and its water. Solid wastes especially domestic garbage was found to be dumped throughout the entire bank of the Jheel. Wastewater from train washing, industries, hotels and households come directly to the Jheel, untreated through inlets of different sizes. Though there are dustbins encircling the entire bank of Jheel, due to irregular cleaning and less aware inhabitants they were mostly found to be of no use. Solid and liquid wastes coming to the Jheel that contaminated the water of the Jheel found to deteriorate the habitat conditions affecting the bird population. The major causes of Santragachi Jheel contamination and degradation were generalized as follows:

- Dumps of domestic solid wastes throughout the bank of the Jheel, containing both biodegradable and non-biodegradable waste materials.
- Trains are regularly washed in the Santragachi Railway Station, the wastewater containing petroleum and other pollutants flows into the adjacent water bodies and through connectives the polluted water contaminates the Santragachi Jheel.
- There are many hotels adjacently located to the wetland and they have been found to use water of the wetland for various purposes like washing utensils. Leftovers of the hotels along with their other waste materials are directly released into the Santragachi Jheel. Further, there are about 40 shops around the lake that were found to use and pollute the Jheel's water in different ways.
- Unfortunately there is a slum located at the bank of the wetland. The inhabitants were found to use the Jheel's water for their daily uses such as bathing, washing clothes and cooking utensils. They also have open toilets, the wastewater was found to flow directly into the Jheel.
- Dustbins that were placed by Santragachi municipality encircling the bank of Jheel have been found rendered to be mostly of no use due to irregular cleaning and less aware inhabitants.
- The vegetation of the Jheel was found to be dominated by water hyacinth which covered almost the whole water surface of lake by its rapid propagation. As these plants cover the whole water body the dissolved oxygen and light penetration were

found to decrease which altogether hampered the optimum physical condition of the Jheel. More than 50% of the Jheel (57.92±13.15%) was found to remain covered by water hyacinth, during the early winter, when the water birds starts migrating to the lake the weed coverage remained to be the highest. Whimsical clearing of weeds by the Forest Department found to be of little help to winter migrants.

Santragachi Jheel which attracts a large population of water birds, have been observed to become degraded and polluted during the present investigation resulting in a decrease in the population of migratory water birds. To mitigate this problem and protect the migratory birds Government has already taken many steps that include:

- Fencing over the entire Jheel by iron net.
- Fishing, bathing, cloth washing and domestic use of water has been declared strictly prohibited.
- The wetland has been decaled to be protected from contamination of waste water and solid waste.
- Plenty of dustbins have been placed throughout the bank of lake /Jheel.
- The whole area has been proposed as a plastic free zone.
- Clearing of water hyacinth is performed ever year during the winter season for space allocation to waterbirds.
- Artificial roosting ground has been made for the water birds.

5. CONCLUSION

Though these governmental steps have an important role in conservation of the Jheel but still the sanctuary is suffering from various problems. Santragachi Jheel is unique in its characters and with thousands of migratory avifauna in the winter it becomes a perfect birders paradise. But of late it was found to face conversion, primarily from anthropogenic activities. To overcome these problems and restore the Jheel as a waterfowl habitat a proper scientific management plan is most urgently needed to be implemented.

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References

[1] Ali, S. 1996. The Book of Indian Birds, BNHS, Oxford University Press, Mumbai, 310 pp.

[2] Bibby, C.J., Burgess, N.D. & Hill, D.A. 1992. Bird census techniques, Academic Press, London, 257 pp.

[3] Buckland, S. T., Anderson, D. R., Burnham, K. P. & Laake, J. L. 1993. Distance sampling: estimating the abundance of biological populations, Chapman and Hall, New York, reprinted 1999 by RUWPA, University of St. Andrews, Scotland, 446 pp.

[4] Gopal, B. 1995.WWF handbook of wetland management, World Wildlife Fund (WWF) publication, New Delhi, 395 pp.

[5] Grimmet, R., Inskipp, C.& Inskipp, T. 1998. Birds of the Indian Subcontinent. Oxford University Press, Delhi, 480 pp.

[6] Hutto, R. L., Pletschet, S. M. & Hendricks, P. 1986. A fixed-radius point count method for nonbreeding and breeding season use. *Auk,* 103: 593-602

[7] Kazmierczak, K. & Perlo, B.V. 2000. A field guide to the birds of the Indian Subcontinent, Yale University Press, 356 pp.

[8] Mazumdar, S., Ghosh, P. & Saha, G. K. 2005. Diversity and behaviour of waterfowl in Santragachi Jheel, West Bengal, India, during winter season. *Indian Birds* 1(3): 22-23

[9] Roy, U. S., Goswami, A. R., Aich, A. & Mukhopadhayay, S. K. 2011. Changes in Densities of Waterbird Species in Santragachi Lake, India: Potential Effects on Limnochemical Variables. *Zoological Studies,* 50(1): 76-84