Breeding biology of some wetland birds in Malkhed lake & Chhatri lake of Amravati, Maharashtra

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Abstract

Wetland birds not only attract the attention of individuals towards wetlands but also serve as bio-indicators and models for conducting research regarding the environmental issues of the place. The present study was conducted during the study period June 2021 to July 2022 at the Malkhed Lake and Chhatri Lake situated around the Amravati city of Maharashtra State, India. Visits were made to the area on 2 days per week in the morning from 08:00 am to 10:00 pm and 4:00 pm to 6:00pm in the evening. During the study, the nesting of wetland birds belonging to the family Jacanidae, Charadriidae, Glareolidae, Laridae, Rallidae, Rostratulidae which includes Pheasant-tailed jacana, Black-winged stilt, Red-wattled lapwing, Kentish plover, Small pratincole, Little tern, Common coot, Greater painted-snipe, Purple moorhen were observed. For the detailed study, nest characteristics and egg characteristics including outer and inner diameter of nest, shape of nest, colour, shape and length of eggs were noted. Further clutch size, incubation period and hatching success were also noted during the study. Total 25 nests were detected in 2021 out of which breeding success of three species were recorded. Whereas 18 nest which were located on the island got failed due to early monsoon unexpected heavy rain fall, hence island was submerged in water. In 2022, Total 13 nests were recorded at Malkhed Lake and 21 nests in Chhatri Lake were recorded. Breeding success could not be observed of Purple moorhen and Small Pranticole in 2022 at Chatri Lake. Many threats were recorded during the study which includes early monsoon heavy rain, soil mining, grazing, and fodder crop cultivation by locals, fishing activities, black kite, feral dogs, and house crows.

Key Words: Breeding, Wetland birds, Malkhed Lake, Chhatri Lake, Amravati, Maharashtra.

Introduction

Wetlands are an essential part of natural environments offering a number of ecosystem services and they occur naturally and can either be freshwater, brackish water or saltwater wetlands (Bassi et al., 2014). It can be described as transitional zones existing between upland and aquatic habitats. Birds are considered to be one of the potential indicators of environmental change. Wetland birds have a powerful role in the wetland ecosystem. They showcase a prominent role in understanding the present and overall status of a wetland habitat (Rais et al., 2010; Raut and Gupta, 2020). The population and frequency of birds in a particular wetland habitat depicts the areas environmental quality, level of pollution, availability of food and security of habitat. Natural and man-made wetlands serve as effective breeding sites for various wetland bird species. Water birds migrate in search of suitable climatic conditions, proper nesting and food supply. Wetlands offer optimum conditions to

the migratory birds and serve as exclusive breeding sites (Da Silva et al., 2017; Giese et al., 2018).

Around 1340 species of birds have been identified in India out of which 310 bird species are known as wetland birds (Pravin J.et al., 2021).Wetland bird species observed in the wetland habitats of Amravati region include Little grebe (*Tachybaptus ruficollis*), Grey heron (*Ardea cinerea*), Purple heron (*Ardea purpurea*), Purple moorhen (*Porphyrio porphyrio*), Common coot (*Fulica atra*), Red-wattled lapwing (*Vanellus indicus*), Yellow-wattled lapwing (*Vanellus malabaricus*), Common moorhen (*Gallinula chloropus*), Little plover (*Charadrius dubius*), Black-winged stilt (*Himantopus himantopus*), Common Sandpiper (*Actitis hypoleucos*), Blue kingfisher (*Alcedo atthis*), Open-billed stork (*Anastomus oscitans*), Black ibis (*Pseudibis papillosa*) and several other wetland bird species (Pachlore and Chandrakar, 2011). Wader birds including Little Stint, Snipes, and Sandpipers live in wetland habitats and are observed wading around shore or in open flat mud. These play a vital role in various ecological aspects (Wagh et al., 2015).

A large number of workers carried out the study on breeding biology of avian fauna of their respective regions. Some of them gave emphasis on breeding biology of wetland birds such as, Boukrouma (2016) studied breeding biology in Northeast Algeria. Harisha and Hosetti (2018) investigated the status and conservation strategies of wetland migratory birds in Komaranahalli Kere Lake in Davanagere district, Karnataka. Similarly, Khalil et al. (2019) surveyed in the Bhawalpur district of southern Punjab, Pakistan, whereas, Raut and Gupta (2020) in Makhana field of Darbhanga district, Bihar. Sharma et al. (2020) investigated in the agricultural fields of Sirsa, Haryana Siva (2021) at the Cauvery riverside, Tamil Nadu about the breeding biology of wetland birds.

The purpose of this study was, as there is a lack of data regarding breeding biology of wetland birds. Many freshwater bodies around the Amravati city are still unexplored. Scientific study is not being carried out; therefore, the study will provide the documentation of breeding biology of wetland birds and to know the threats associated to wetland birds and its habitat. The present study was undertaken to assess the occurrence and breeding biology of wetland birds in Malkhed Lake and Chhatri Lake around Amravati city, Maharashtra.

Materials and Methodology:

Study Area

Two study sites from the Amravati city including Malkhed Lake and Chatri Lake were selected for the study. Malkhed lake is situated at 20º49' N, 77º53' E, 23m East of Amravati city near Pohara-Malkhed Reserve forest. The prime water source for the lake is Kholad River. The surface area of the lake is 6,717 Km^2 and its height from river-bed is 19m. Chatri lake is situated at 20º53'42.6" N and 77º 46'66.2" E, 372m and covering an area of 111.232m^2. The lake is located at the outskirts of the city Amravati and famously known as "Chhatri Talao"

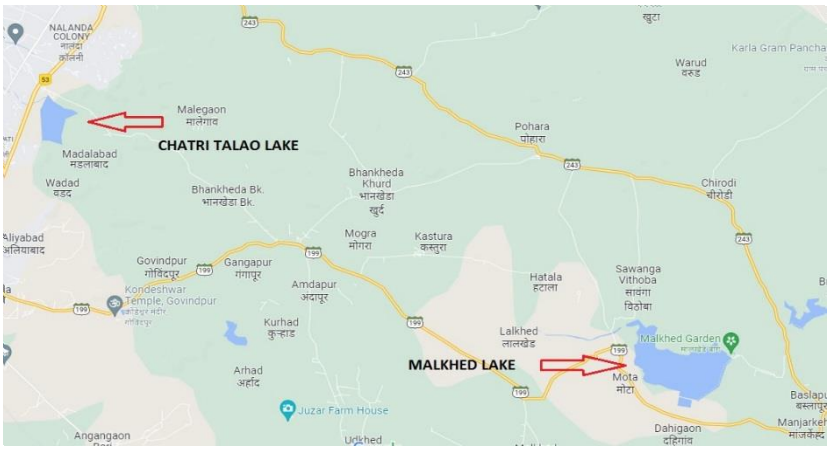

Figure 1: Map showing study area (Malkhed and Chatri Lake)

Method

Visits were conducted towards the study on 2 days per week from 8:00 am to 12:00 pm in the morning and 4:00pm to 6:00pm in the evening. The study was performed for one-year time period from June 2021 to June 2022. The breeding behaviour of the wetland birds was done using a Nikon 10 x 50 mm Binocular. Photographic observations were performed using Nikon D5300 DSLR camera with 70-300mm Zoom Lens, 200-500mm. Nest building and breeding of birds starts principally between June and July and hence the time period was selected. Nest characteristics including outer and inner diameter of the nest, shape and colour of the nest and its distance from water and the distance between two nests was also recorded during the study. Eggs laid by the water birds were observed for shape, length and width of the eggs, clutch size, incubation period and hatching success. Nest and egg parameters were measured using a 50m open reel measuring tape; nest locations were recorded using the GPS (Global Positioning System) of the camera (Kumar et al., 2020). Nest building, hatching and incubation were concluded based on direct observations and photographs.

Result

The breeding biology study of wetland birds was performed at two sites i.e. Malkhed Lake and Chatri Lake during the study period of June 2021 to June 2022. Total 208 successive visits were made to the study site during one year of the survey.

During the study period of June 2021, 11 nests of Black-winged stilt (BWS) *(Himantopus himantopus)* were observed in Malkhed Lake with the mean nest size of 152.4mm, the mean distance from water was observed to be 9 m and the clutch size was observed to two. The nests of the Black-winged stilt (BWS) were built on muddy substrate in shallow water in open land areas. In around 80% of the built nest the nest structure of almost 20-100% of the nests was made using aquatic plants, one nest of Red-wattled lapwing (RWL) (*Vanellus indicus)* were observed at Malkhed Lake with mean nest size of 203.2 mm with average clutch size of four. Three nests of Little tern *(Sternula albifrons)* were observed with mean nest size of 152.4mm, average distance from water of 6 feet and clutch size of two at Malkhed lake. Similarly, two nests of small Pratincole (*Glareola lactea)* were also observed with mean nest size of 101.6mm, average distance from water of 5 feet and clutch size of one at Malkhed Lake. One nest of Kentish Plover *(Charadrius alexandrines)*, one nest of Greater painted-snipe *(Rostratula benghalensis)* was observed during the study. Similarly, 04 nest of Common coot *(Fulica atra)* with the mean nest size of 153 mm and two nests of Purple moorhen (*Porphyrio porphyrio*) with mean nest size of 123 mm were observed. The clutch size was observed to be 2 to 4. In the family wise distribution study, highest number of bird nests was observed of Recurvirostridae followed by Charadriiformes, rallidae, Jacanidae, Glareolidae, Laridae, Charadiidae and Rostratulidae.

During the study period of June 2022, 4 nests of Black-winged stilt were observed at Malkhed lake and four nests were observed at Chhatri lake with mean nest size of 152mm, the mean outer diameter of the nests was 149.3mm and the mean inner diameter of the nests was observed to be 77.3mm while, the average distance of the nest from water was 7 feet. The mean clutch size was observed to be four. The average incubation period was 24-27 days with a mean hatching success of 25%. Both the parents take turns in incubating the eggs.

During the study period of 2022 at both the study locations, seven nests of Red-wattled lapwing at Malkhed Lakeand two nests at Chatri Lake with mean nest size of 201mm were observed, the mean outer diameter of the nest was observed to 112.5mm while the inner diameter was observed to be 30mm. The shape of the nests varied from round to partially round to deep round. The nests were observed both in grassy land and open land. The mean

distance of nest from water was 5 feet. The average clutch size was observed to be of two to four eggs and the eggs were arranged in a form that their small ends met in the centre which facilitated even sitting and thus better incubation of the eggs. The eggs of the water bird were in plover form broad at one end and pointed towards the other end and were dusty off white to pale olive-green colour with dark black spots; after laying the first eggs Lapwings started incubating it by sitting on them both male and female Lapwings incubated the eggs, average clutch size of four was observed in all the seven study sites. The average incubation period of the eggs was observed to be 25-28days. A total of 28 eggs were observed in seven nests during the study; the mean percentage of hatched eggs was 50% some of the eggs due to anthropogenic activities were destroyed and, in some cases, due to trampling of cattles. Predators like *Corvus splendens*; *Milvus migrans* and feral dogs are also a threat to the eggs. Six nest of Pheasant tailed jacana (*Hydrophasianus chirurgus)* was observed at Chhatri Lake, with outer diameter of nest 111mm and inner diameter 30mm and mean nest size of 115mm. The nest was flat to hold the eggs and observed floating on the aquatic vegetation. The clutch size of Jacana was four. The texture of eggs was glossy with a hatching success of 25%. The breeding of Jacana is commonly observed on floating vegetation in rainy season. The nest is built using stalks and leaves of the aquatic plants. During the preliminary period of incubation, the female protects the nest by chasing other water birds. Both male and female birds incubate the eggs. The males vigorously feed in the earlier part of the day and incubates the eggs during the hottest part of the day. Egg predators like pond herons and kites are a constant threat to the eggs and the hatchlings.

Eight Nests of Common coot with mean nest size of 152mm was observed at Chhatri Lake. Two nests of Small Pratincole with mean nest size of 101.6mm was observed at Malkhed Lake. Also, single nest with clutch size of four of Purple Moorhen and mean nest size of 123mm was observed but any further data could not be collected due to heavy rainfall

Table 1: Nest characteristics of different birds observed at various study sites

Year	Study site	Nesting bird Species	# nest	Nest Size in average (mm)	Nest Habitat	Nest Shape	Distance from water in average (m)
2021	Malkhed Lake	Black-winged stilt (*Himantopus himantopus*)	11	152.4mm	Island in Shallow water	Round	7.5m
		Kentish plover (*Charadrius alexandrinus*)	01	114.3mm	Island in Shallow water	Round	17.5m
		Little tern (*Sternula albifrons*)	03	152.4mm	Island in Shallow water	Round	6.5m
		Small Pratincole (*Glareola lactea*)	02	101.6mm	Island in Shallow water	Round	5m
		Greater painted-snipe (*Rostratula benghalensis*)	01	127mm	Island in Shallow water	Round	8m
		Red-wattled Lapwing (*Vanellus indicus*)	01	203.2mm	Grassland	Round	4m
	Chatri Lake	Common coot (*Fulica atra*)	04	153.4mm	Shallow water	Oval	8.5m
		Purple moorhen (*Porphyrio porphyrio*)	02	124.3mm	Shallow water	Round	7.3m
2022	Malkhed Lake	Black-winged stilt (*H. himantopus*)	04	152mm	Open mud flat	Oval	9m
		Red-wattled lapwing (*V. indicus*)	07	200.2mm	Grassland	Oval	5m
		Small Pratincole (*G. lactea*))	02	101.6mm	Island in Shallow water	Oval	5m
	Chhatri Lake	Pheasant-tailed jacana (*Hydrphasianus chirurgus*)	06	115mm	Flat Nest to hold eggs	Round	6.9m
		Common coot (*F. atra*)	08	152mm	Shallow water	Oval	8m
		Black-winged-stilt (*H. himantopus*)	04	150.4mm	Open mud flat	Oval	9m
		Red-wattled lapwing (*V. indicus*)	02	201.3mm	Grassland	Oval	5m
		Purple moorhen (*P. porphyrio*)	01	123 mm	Shallow water	Round	7.2m

Figure 4: Some glimpses of birds with nest, eggs and chicks

Total 25 nests were detected in 2021 out of which breeding success of 3 species were recorded namely RWL, Purple moorhen, Common coot as it was present on the grass land area at the peripheral side of the Lake. Whereas 18 nest which were located on the island got failed due to early monsoon unexpected heavy rain fall, hence island was submerged in water. In 2022, Total 13 nests were recorded at Malkhed Lake and 21 nests in Chhatri Lake were recorded. Breeding success could not be observed of Purple moorhen and Small Pranticole in 2022 at Chatri Lake. Many threats were recorded during the study which includes early monsoon heavy rain, grazing around the lake in the catchment area, fodder crop cultivation by locals, fishing activities, predation by feral dogs, Black kite and House crows.

Discussion

Wetlands are excellent breeding and feeding grounds for migratory avian species. They play a critical role in maintaining natural cycles and also support biodiversity of the habitat. Wetlands offer an important link in the migration of wetland birds and serve as stopover sites in their migration journey. Migratory birds in search of wetlands travel from pole to pole (Rana and Gulati, 2022). Ashoori (2011) reported the breeding biology study of BWS in 22 Bahman wetland in Boujagh National Park, Gilan Province in early April 2005 to late July 2005. The nests of BWS were built on muddy substrates in open areas in shallow water. Twenty five nests were spotted during the study with a dominant clutch size of 4. Bouakkaz et al. (2017) studied the reproductive biology and nest selection site of Kentish Plover in a semi-arid marsh area, Eastern Plateaux, Northeast Algeria. Forty five clutches were observed in the study with average clutch size of two.

Balkhande and Shaikh Azeem (2017) studied nesting pattern and breeding biology of Red-wattled lapwing in the Nanded region. The hatching percentage of the bird was observed to be 50% as the bird's nest is not camouflaged hindrances like human interference, grazing cattle's and stray dogs are likely to destroy the nest. During our study it was observed that in RWL both the parents take care of the hatchling until it grew up and flew away and breeding success rate were 75%. Similarly, Kumar *et al*. (2020) reported the breeding behaviour of Red-wattled lapwing during the breeding season of 2017-2019 in the agricultural and non-agricultural nesting grounds of Khanna city, Punjab. During the study, nest characteristics and egg characteristics were recorded. The incubation period was observed to be from 27 to 30 days while, the hatching success was observed to be higher in grassland areas as compared to island.

Diallo et al. (2019) explored the biodiversity and nesting of Black winged stilt in the urban wetland areas of Tecnopole during the study period of August 2012 to August 2017.Whereas, during our survey breeding at both the study site were observed from May to June. Maximum number of nests building and hatching was observed in the month of May to July.

Conclusion

The present study was conducted at two study sites namely Malkhed Lake and Chhatri Lake. Breeding biology of Wetland birds including Red-wattled lapwing, Black-winged stilt, Little tern, Common coot, Small pranticole and Purple moorhen, Kentish plover were observed at both the study sites. The data observations made during the study period of June 2022 was more diverse compared to the observations made during the study period of June 2021. Thus, providing a more detailed investigation of the nest characteristics and egg characteristics of the wetland birds. The rising urbanization and the increasing human interference in the natural habitat of wetland birds has emerged has a great threat to the wetland birds, decreased migration and lower survival of water birds. Observations made during the current study can be used for the conservation of water birds of the study area.

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