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A brief survey of the migratory and resident water-birds of Mangalajodi village, Odisha

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Abstract
Wetlands provide a vast variety of faunal diversity among which avian diversity is much important as wetlands offer them a variety of habitats and they occupy these habitats according to their niches. We conducted a study during the winter season in Mangalajodi wetland, which is located in the northern part of Chilika Lake, an important Ramsar site of Orissa, India. During this study, the diversity of the waterbird community was observed in Mangalajodi Wetland and in total, 50 species of water birds belonging to 37 genera and 17 families were recorded. Among them, the families Anatidae and Ardeidae both have recorded the highest observed number of species; as well as the highest percentage of occurrence (16%) in the avian community. The family Scolopacidae has recorded the second highest observed rate of relative abundance (14%); mostly due to the huge abundance of its sole member, the Black-tailed Godwit (*Limosa limosa*). The community consists of 52% Resident; 42% Resident-migrant and 6% Migrant water bird species. In the feeding guild analysis, the Insect and other terrestrial invertebrate feeder (I) and the Aquatic invertebrate feeder (IN) guilds have the most number of recorded avian species. The feeding guild affiliations also point out that the overall community of the wetland site is fairly rich in its composition as it houses bird species belonging to various feeding guilds.

Keywords: water-birds, poaching, eco-tourism, Mangalajodi, Odisha

Introduction

Wetlands are complex ecosystems that share the characteristics of both wet and dry environment and can be defined as lands between terrestrial and aquatic eco-systems where the water table is usually at or near the surface or the land is covered by shallow water [1]. They exhibit enormous floral and faunal diversity and are the most productive life support systems with great ecological importance to mankind, but at the same time, ecologically fragile, liable to degradation and degeneration under the prevailing anthropogenic pressure [2], which in turn affects the biodiversity around them. Among faunal diversities, wetlands can support a congregation of a large number of bird species both migratory and resident [3, 4, 5]. As per Ali and Ripley [6], 273 species of birds in India can be considered as waterfowls; the birds that depend on wetland habitats either throughout or during a certain part of their life preciously for breeding, nesting, and rearing young ones [7].

Besides bird species is one of the crucial components of a wetland in its functions as bio-reserve as well as recreation and ecotourism because bird viewing is now becoming a major component of wildlife tourism activities. Thus, the relationship between wetland and bird species could be said to be bidirectional because the water-bird species provides an array of services to the wetland. These services range from ecosystem balance through insect and rodent population control, seed dispersal, bioindicator of habitat health and so on. Wetlands are also found to play an important role in shaping bird species richness [8].

In recent years, the wetlands in India, as elsewhere, are facing tremendous anthropogenic pressures [9]. The wetland which we have surveyed in this study is also no exception. Being a part of the Chilika lake, one of India's Ramsar sites, this wetland is blooming into a prominent wildlife tourism destination. This blooming tourism industry brings along with it an ever-increasing anthropogenic pressure to the habitat; which can greatly influence the structure of their bird communities [10]. By extensively studying the bird community of this region over a timeline, one can sufficiently investigate the adverse effects brought about by such anthropogenic disturbances.

Besides, the avifaunal diversity of a region can be considered as a very prompt indicator of the environmental conditions of the concerned place. Ornithological survey data can be used to indicate the effects of environmental changes on its biodiversity which eventually helps in monitoring biodiversity of the said area and can also be useful in future planning for environmental management.

Keeping all these views in mind, the present study has been undertaken to produce a scientific report on the avifaunal diversity with emphasis on water birds of the Mangalajodi wetland. We chose to study only the bird community since they are identified as indicators of aquatic and terrestrial habitat quality, changes in landscape pattern, composition and function.

There are not many published scientific records regarding the avifaunal diversity of the Mangalajodi wetland [11]; although a vast array of works are there for Chilika lake [12]. So, our work is aimed at filling in this gap. Besides, this study may also be justified for establishing a baseline data on the water-bird species of this wetland which in turn reveal the composition of the ecological community present in the region and may also help in assessing the effects of wildlife tourism on the bird

community of this habitat as Mangalajodi has now become a bird watchers destination.

2. Study Area

Mangalajodi is a fishing village (19º55'5" N and 85º26'8" E) located about 5 km from Tangi town in Khurda district, Orissa (Fig. 1). It is one of the villages situated along the north-eastern edge of the Chilika lake, one of the most important Ramsar sites of India [13]. The lake is actually a freshwater swamp. Thousands of migratory waterfowls and resident birds visit and breed each year in the wetland marshes near the village [13].

Our study site is primarily a fresh-water zone with marshes, emergent vegetation and reed-beds consisting mostly of *Typha angustata* and *Phragmites karka*. The Mangalajodi village is connected to the northern sector of the Chilika lake and Kalupada ghat by way of channels dug through the *Phragmites karka* reed beds [13]. The region houses thousands of migratory birds that journey from different corners of the world; making this place a waterfowl heaven and bird paradise. This site has also been recognized as one of India's important bird and biodiversity areas (IBA) by the BirdLife International organization under the A1 + A4i + A4iii internationally accepted criteria for establishing an IBA site [11].

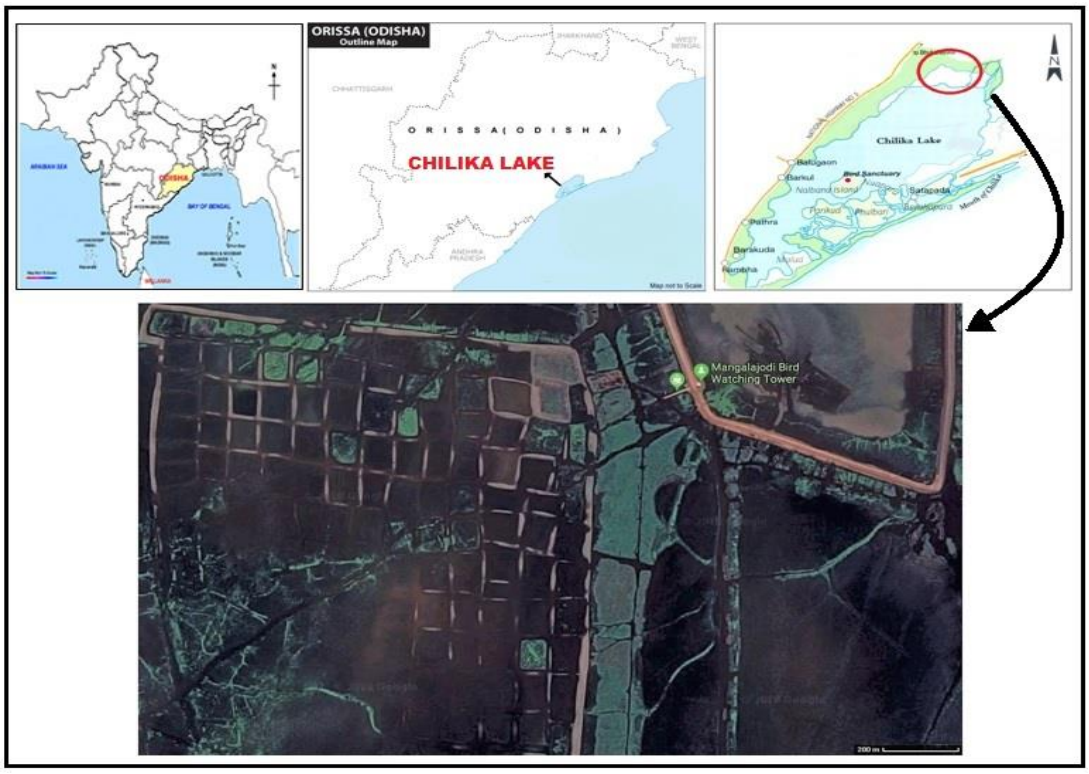

Fig 1: Satellite image of the study site at Mangalajodi, Odisha

3. Materials and Methods

3.1 Bird Sampling Protocol

Data on bird species composition and abundances were obtained through surveys using an amalgamation of the Line Transect and Point Count methods described by Gibbons and Gregory [14]. Along the 1 km stretch of each transect, point counts were done every 200 m. In this way, we performed 4 transect surveys and 20 point counts. All these survey protocols had to be done using a boat, as the wetland was inaccessible by foot. During transect surveys, two people were actively sampling the area; one scanned the surface waters to the right of the boat while the other one scanned to the left. Point counts were closed to a radius of 50 m for recording purposes. Each round of counting lasted for 15 minutes. Birds that flew overhead but did not land within the counting radius were also recorded. The survey was carried out for two consecutive days in the month of February 2018.

During the surveys, birds were identified early in the morning from 06:30 to 09:30 hours and the afternoon from 14:00 to 16:00 hours. Observers used Olympus 8x40 DPS I binoculars for identification in the field. Bird species recorded from opportunistic encounters have also been included in the checklist (Appendix 1). Birds were identified following a standard guide-book by Grimmett, Inskipp and Inskipp [15]. Only water-birds were included in the checklist. The checklist was prepared following the standardized common and scientific names of the birds of India by Praveen *et al.* [16].

3.2 Data Analysis

The recorded bird species have been classified on the basis of their IUCN categories [17], shared feeding guild affiliations and migration status [6]. According to the observed abundance of each species, we have classified them into four abundance categories: Common (C; >50 individuals), Rare (RA; 10–50 individuals), Very Rare (VR; <10 individuals) and Opportunistic (OP; only 1 individual). The family-wise list of

bird species categorized accordingly is provided in Appendix 1.

4. Results and Discussion

The overall scenario of the avifaunal community observed at the Mangalajodi wetland during our study is provided in Appendix-1. In this short span of the study 50 species of water birds belonging to 37 genera and 17 families were recorded. The dominant families are Anatidae and Ardeidae with 8 species each (16%) followed by the family Scolopacidae with 7 species (14%) [shown in Fig. 2]. The Black-tailed Godwit (*Limosa limosa*) is the dominant species of this bird community, in terms of its abundance.

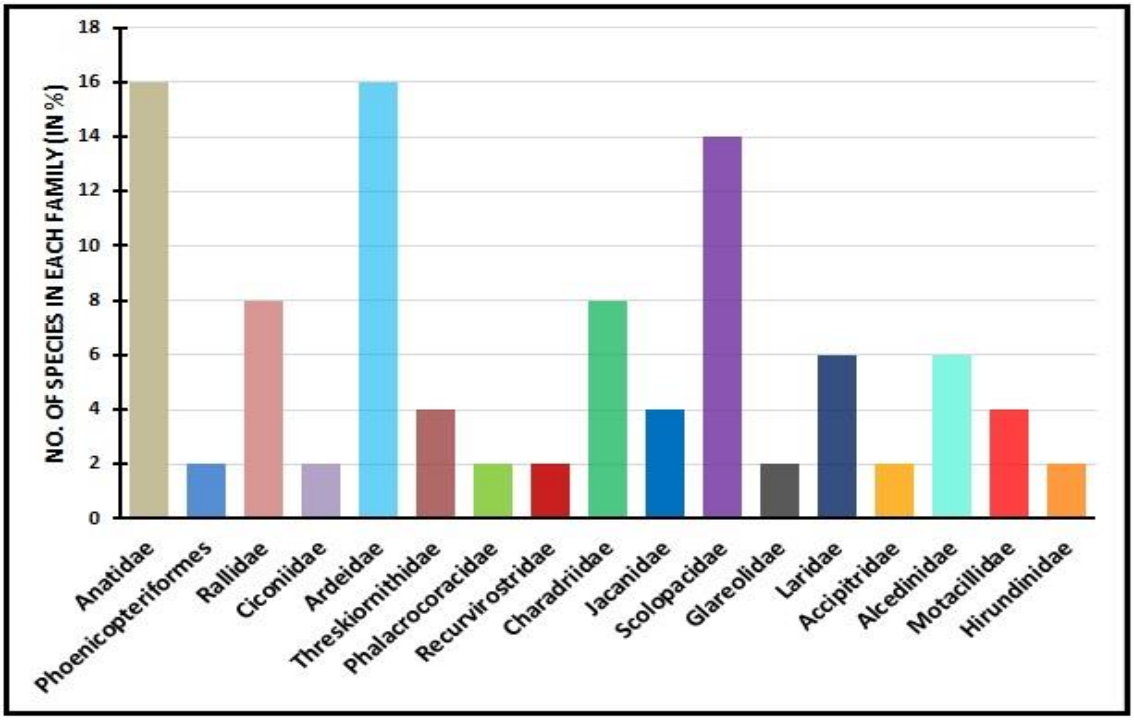

Fig 2: Family-wise water-bird species composition of Mangalajodi, Odisha

The observed birds have been tabulated according to IUCN Categories (Table 1) and are found to belong to only two Categories, viz. Least Concerned (LC) and Near Threatened (NT). Among the observed 50 avian species, 47 of them (94%), belong to the Least Concerned category; whereas, only 3 bird species (6%) viz. Black-headed Ibis (*Threskiornis* sp.), Black-tailed Godwit (*Limosa limosa*, River Tern (*Sterna aurantia*) belong to the Near Threatened category. Black-tailed Godwit being spotted in good numbers suggest that their preferable habitat for nesting and feeding is present in this wetland.

Table 1: Different categorical composition of the recorded bird species

Name of the category		No. of bird species
IUCN Category	Least Concerned (LC)	47
	Near Threatened (NT)	3
Migration Status	Resident (R)	26
	Resident-Migrant (RM)	21
	Migrant (M)	3
Abundance Categories	Common (C)	7
	Rare (RA)	16
	Very Rare (VR)	18
	Opportunistic (OP)	9

Regarding the migration status, the observed birds are categorized as Resident bird (26 species; 52%), Resident-Migrant bird (21 species; 42%) and Migratory bird (only 3 species; 6%, viz. Northern Pintail (*Anas acuta)*, Eurasian Golden Plover (*Pluvialis apricaria)* and Black-tailed Godwit (*Limosa limosa*). Therefore, in total, 24 migratory bird species have been recorded (Table 1; Fig. 3A); which account for 48% of the observed avian community.

The wetland birds are in general being heterogeneous in their feeding habits as wetlands being a highly productive area offer them so. Six different kinds of feeding guilds, viz. Aquatic invertebrate-feeder (IN), Piscivore (P), Insect and other terrestrial invertebrate feeder (I), Ophidiovore (OP), Amphibian-feeder (A) and Weedivore (W) have been identified among the water bird species of this area during the study period (Fig. 3B). Here, the I and IN guilds are the most

frequent; with 29% and 28% incidence respectively. Whereas the OP guild is least frequent in terms of incidence (with only 3%). Besides, P, W and A guilds occupy moderate values which include 17%, 13% and 10% of observed water-bird species under these categories, respectively. This indicates that the habitat is more suitable and supports all the visitor as well as resident birds by providing affluent food sources which in other way reflects the good condition of this wetland.

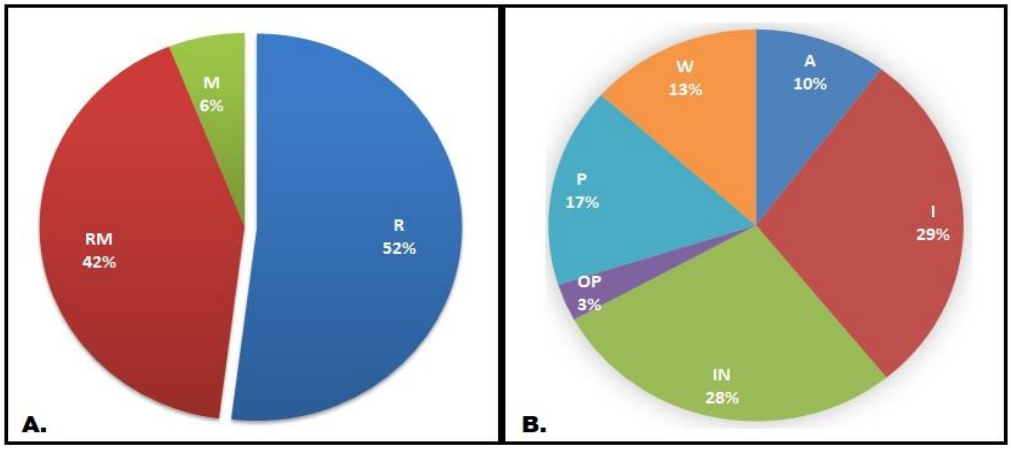

Fig 3: Water-bird species composition according to two different categories viz., Migration status (A) and Feeding guilds (B). Please refer text for abbreviations

Recent reports suggest that Mangalajodi harbors the second largest congregation of migratory birds in this area of the Chilika Lake [13]. Although, just two decades ago, it was considered a poacher's den. Birds, especially winter migrants, were hunted by the local villagers mainly by poisoning and shooting. It became their main profession during this season and they used to earn about 40 thousand Indian Rupees a month [18]. This obviously affected the migratory bird population of this area in an adverse way. So, to sustain bird population, and to reduce the poaching activity in this wetland, a unique initiative was undertaken by different authorities like the State Forest Department, NGOs and local participants. Together, they constituted a bird protection committee, named Sri Mahavir Pakhshi Surakshya Samiti, in Mangalajodi village during December 2000 [19]. This committee involves local people mainly one-time poachers and motivates them to undertake conservation of this wetland along with its wildlife [19]. But at the same time attention is to be paid that the poachers-turned-conservationists could earn some livelihood while protecting the birds as many of them have had to give up their major source of income. For this, an eco-tourism project has been started at village Mangalajodi since October 2002 which could enhance the income of the villagers involved in the conservation activities [19, 20]. This project has already drawn a good response by attracting visitors to this area from far and wide and thus developed Mangalajodi as a destination for bird watchers and tourists, alike.

But with this blooming eco-tourism, the avian heritage of this landscape is now facing serious anthropogenic pressure. Increased human movements may cause disturbances to the birds, their nest-building and nesting/rearing processes and may even cause habitat destruction. This could be an alarming sign for the conservation of the avian diversity of this area. So necessary measures should be taken so that disturbance to the birds could be nullified and the eco-tourism project could run smoothly.

5. Conclusion

With the introduction of eco-tourism as an alternate source of income for the native residents, poaching of migratory birds has diminished greatly. But, this remedial measure has brought about an ever-increasing degree of anthropogenic pressure on the habitat. For this reason, it has become imperative to assess the adverse effects of the present and ever-increasing anthropogenic disturbances on the water-bird community of Mangalajodi. This can be best achieved by studying the water-bird community over a long period of time. The present study only provides the baseline information for the water-bird communities in and around the Mangalajodi wetland. Through this study, it is clear that this region hosts a rather diverse avian community, as can be inferred from its feeding guild composition.

But, from this study alone, we cannot make any significant deductions regarding the impacts of the blooming tourism industry on the region's avian community. For this, we will be conducting a series of further extensive surveys in the near future. The results from future studies combined with this one may give a clearer picture of the current conditions of this wetland and also justify any need for revising the conservation practices that are presently in effect.

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