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Diversity of aquatic birds of Titilagarh Wetlands of Balangir District, Odisha, India

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ABSTRACT

Restoration projects have been implemented worldwide to diminish the adverse effects of the loss and degradation of wetland habitats and made into tourist spot for bird lovers. Observation was made on the bird population, abundance and diversity of aquatic birds in two ponds of Maharaja Sagar Pond and Deobandh pond in Titilagarh of Balangir District during 2018 – 2019. During study period 16 species of aquatic birds belonging to 7 families were recorded. The maximum (37%) species of Ardeidae family followed by 36% of Rallidae, and 9% Jacanidae, Charadriidae, Phalacrocoracidae in each in Maharaja Sagar Pond. In this way there is (56%) species of Ardeidae family followed 22% Jacanidae and 11% of Charadridae, Podicipedidae, Phalacrocoracidae species were recorded in Deobandh pond.

Keywords: Abundance, Diversity, Dominance, Evenness, Seasonal occurrence, Wetland birds.

INTRODUCTION

Birds constitute one of the common fauna of all habitat types and because they are responsive to change their diversity and abundance can reflect ecological trends in other biodiversity (Chapman and Reich 2007). Birds are an integral part of the whole system of life on this earth (Ali and Futehally, 2009). Birds are ideal bio-indicator and use-ful models for studying a variety of environmental problems (Newton and Anim 1995). They are often common denizens of the ecosystem and they have been considered as indicator species of inhabitated areas (Blair, 1999). 1226 birds species were threatened globally. India being a mega-diversity center harbors about 1301 species of birds that amounts to 13% of the total birds of the world (Ali and Futehally, 2009). Birds are the most conspicuous and significant component of different habitats, their presence or absence may indicate the ecological conditions of the particular area (Rajpar and Zakaria, 2011).

Water birds occur on wetlands, often in spectacular concentrations and are one of the most obvious indicators of the richness and diversity of these productive ecosystems (Jules, 1997). India has 243 species of water birds and 67 species of wetland dependent and associated birds (Kumar *et al*, 2005). Wetlands are areas of marsh, fen, and peat land or water whether natural or artificial, permanent or temporary with water, that is static or flowing, fresh, brackish or salt including areas of marine water the depth of which does not exceed 6 meters (Kusler *et al*, 1994). Wetland supports congregation of large number of migratory and resident species of birds as it has high nutritional value as well as productivity (Gibbs, 1993, and Paracuellos, 2004). As per Ali and Ripley in 1983, 273 species of birds in India can be considered as waterfowls and the birds that depend on wetland ecosystem. The bird assemblages are affected by various factors like the food availability, the size of the wetland (Paracuellos, 2004) and the biotic changes in the wetlands (Mahapatra and Hussain 1989).

The conservation and management of threatened and endangered species is the most pressing issue. It is the primary requirement of any conservation program to analyze the status of avian diversity to conserve birds in that area. The present study was therefore taken up with a view to assess the Avi-faunal diversity of Titilagarh wet lands and its different habitat type (Blair, 1999). An attempt has also been made to identify the local status of birds along with the population trends of migratory species. The outcome of present work would help in understanding the status of avifauna in the district and devising better plan for its conserva-tion and management in future (Mitsch & Gosselink 1986).

Although the Titlagarh district has a dry climate the ponds of Maharaja sagar and Deobandh pond have large number of fauna and flora which attract the birds. But the Maharaja sagar pond has more diverse number of aquatic weed which are submerged as well as floating state which is a habitat of large number of organisms compare to Deobandh pond. The food availability is always attracts a large number of birds throughout the year.

MATERIAL AND METHOD

Study Area

Titlagarh is a Town in Titlagarh Tahasil in Balangir District of Odisha State, India. It is located 68 KM towards South from District headquarters Balangir. It is a Tehsil head quarter. Titlagarh is located at 20.3°N 83.15°E. Titlagarh have many pond but we were taken the study sites comprises water bodies (Maharaja Sagar pond and Deobandh pond). Maharaja sagar pond around 4.6 Acres (fig-1) and Deobandh pond around 3.5 Acres (fig-2).

The birds were identified using field Binocular during the morning (6 to 8 AM) and evening (4 to 6 PM) and photograph were taken by of Nikon 56 300D camera with lens 100-400 mm used. Data were collected using two methods: lines transect and points transect Woodcock (1980). And identification of species was done with the help of standard literature of Ali and Ripley (1987).

The birds survey starts during November 2019 to March 2019 at Maharaja Sagar pond and Deobandh pond. The number of population of birds at the study

Fig.1: Maharaja Sagar pond

Fig.2: Deobandh pond

site was taken as one population count. The average value of 10 such counts represents the populations of birds (Bellrose and Trudeau, 1988).

Line transect method

In this method large areas were divided into small transect or section of hundred meters or more (Vandermeer, 1997).

Point count method

A point count method is a count undertaken from a fixed location for a fixed time period. It can be undertaken at any time of year, and is not restricted to the breeding season. All birds are seen, heard and recorded. The following formulas are used for calculation of Percent Occurrence and Relative Abundance (Woodcock, 1980).

Data analysis

Birds Species diversity and Evenness

The relative abundance of a species was obtained by dividing the abundance of a species by the total abundance of all species combined based on the assumption that the frequently seen the species the more abundant it is. Bird's diversity was calculated using both Shannon-Weiner and Simpsons diversity indices. Shannon-Weiner diversity Index 'H' was calculated using the formula:

$$H' = -\sum_{i=1}^{R} p_i \ln p_i$$

Where, *Pi* = Proportion of individual species and *R* = total number of species of the community (number seen and heard).

Simpson"s diversity Index , "D" was calculated using the formula:

$$D = \frac{\sum n_i(n_i - 1)}{N(N-1)}$$

Where, n*i* = the total number of birds of each individual species and N = the total number of birds of all species. The value of D ranges between 0 and 1. With this index, 1 represents infinite diversity and 0, no diversity.

$$\% \text{ Occurrence} = \frac{\text{No. of species of each family}}{\text{Total no. of different species seen}} \times 100$$

$$\text{Relative Abundance} = \frac{\text{No. of individuals of the species}}{\text{No. of individuals of all species}} \times 100$$

RESULT AND DISCUSSION

In present study period 16 species of aquatic birds belonging to 7 families were recorded. The maximum (37%) species of Ardeidae family followed by 36% of Rallidae and 9% Jacanidae, Charadriidae, Phalacrocoracidae in each in Maharaja Sagar pond. In this way there is (56%) species of Ardeidae family followed 22% Jacanidae and 11% of Charadridae, Podicipedidae, Phalacrocoracidae species were recorded in Deobandh pond.

In December-February highest species richness was found in both ponds. But in the month of March shows low species richness of both residents and migrants (Table-3). This is due to the fact that summer migrants leave back to their feeding grounds and resident birds move towards residential areas and nearby paddy fields. Burning of emergent vegetation in the month of October and November by wildlife authorities making grounds for the winter migrants who hamper the nesting and breeding sites for birds that breed in early spring (Bellrose and Trudeau, 1988).

Seasonal distribution and residential status of the birds have been done and different categories like resident, migrant have been assigned with reference to the study area. The status of Cattle Egret, Large Egret, Grey Egret, Indian pond Heron, White breasted Water hen, Red Wattled Lapwing are resident and migrant Great cormorant , little cormorant, little Egret are either resident or migrant but Indian Common Moorhen, Common Coot, Purple Moorhen, Bronze winged Jacana, Pheasent tailed Jacana, Swan, Little Grebe are resident (R) (Table -1).

Among the recorded species of birds Ardeidae family was maximum (37%) and Jacanidae, Charadriidae, Phalacrocoracidae families were minimum found in Maharaja pond depited in fig -1 In Deobandh pond Ardeidae family was maximum (56%) and Anhingidae, Phalacrocoracidae families were minimum (11%) fig-2.

Both Shannon-Wiener index and Simpson's index of diversity were used to determine the diversity and evenness of avifauna at the wetlands of Titilagarh. The results show highest diversity as well as evenness of avifauna during December to February and lowest in November and March. Table-3 (Shannon-Wiener Index and Simpsons Index of Diversity).

Table 1: Birds Identified in Maharaja Sagar pond and Deobandh pond During sampling period from November 2018 to March 2019.

Sr. No.	Common name	Families	Maharaja Sagar	Status	Deobandh	Status
1	Great cormorant	Anhingidae	×	x	√	RM
2	Little cormorant	Phalacrocoracidae	√	RM	×	x
3	Little egret	Ardeidae	×	x	√	RM
4	Cattle egret	Ardeidae	√	RM	√	RM
5	Large egret	Ardeidae	√	RM	√	RM
6	Grey heron	Ardeidae	√	RM	√	RM
7	Indian pond heron	Ardeidae	√	R	√	R
8	Common moorhen	Rallidae	√	RM	×	x
9	Purple moorhen	Rallidae	√	R	×	x
10	White breasted water hen	Rallidae	√	RM	√	RM
11	Common coot	Rallidae	√	R	×	x
12	Bronzed winged jacana	Jacanidae	×	R	√	R
13	Pheasant tailed jacana	Jacanidae	√	R	×	x
14	Red wattled lapwing	Charadriidae	√	RM	√	RM
15	Swan	Anatidae	√	R	×	x
16	Little grebe	Podicipedidae	√	R	×	x

RM- Resident with Migrant R- Resident

Table 2: Avifaunal Community Indices of Maharaja Sagar pond, Titlagarh during November to March

Indices	November	December-February	March
Shannon-Wiener Index of Diversity	2.12	2.06	1.92
Simpson Index of Dominance	0.14	0.09	0.13
Evennes Index	0.38	0.35	0.37

Table 3: Avifaunal Community Indices of Deobandh pond, Titlagarh During November-March

Indices	November	December-February	March
Shanon- Wiener Index of Diversity	2.012	2.086	2.048
Simpson index of Dominance	0.145	0.152	0.141
Evennes Index	0.417	0.952	0.426

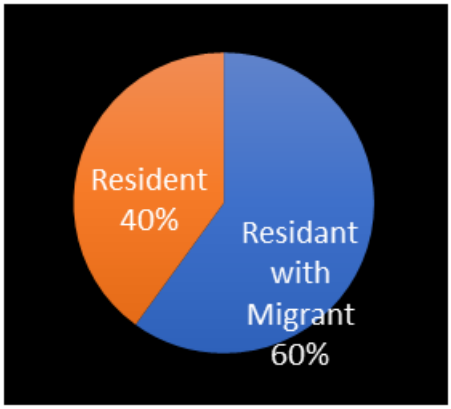

Fig. 3 : Status of Birds in Titlagarh Wetland

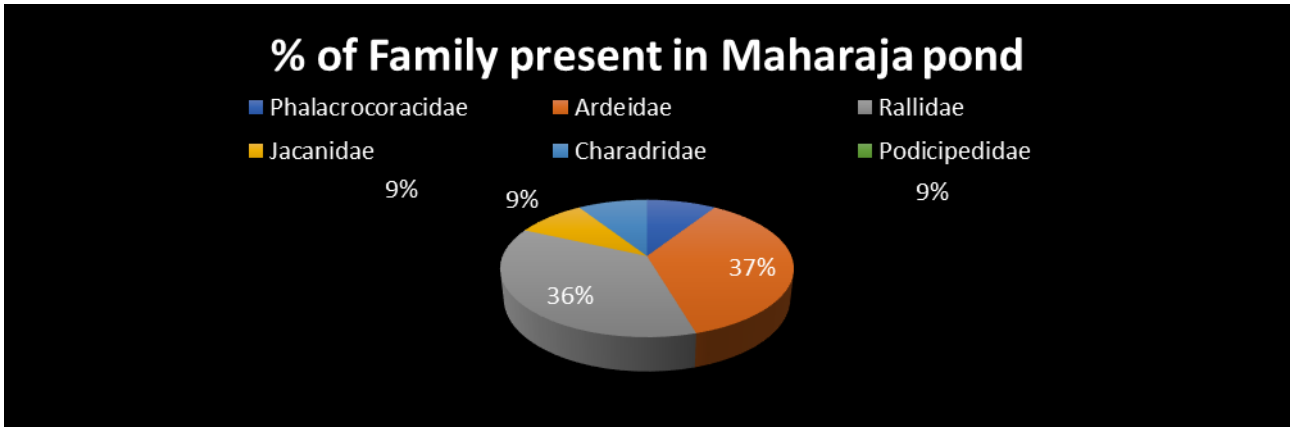

Fig. 4 : Percent of Birds Family present in Maharaja Pond

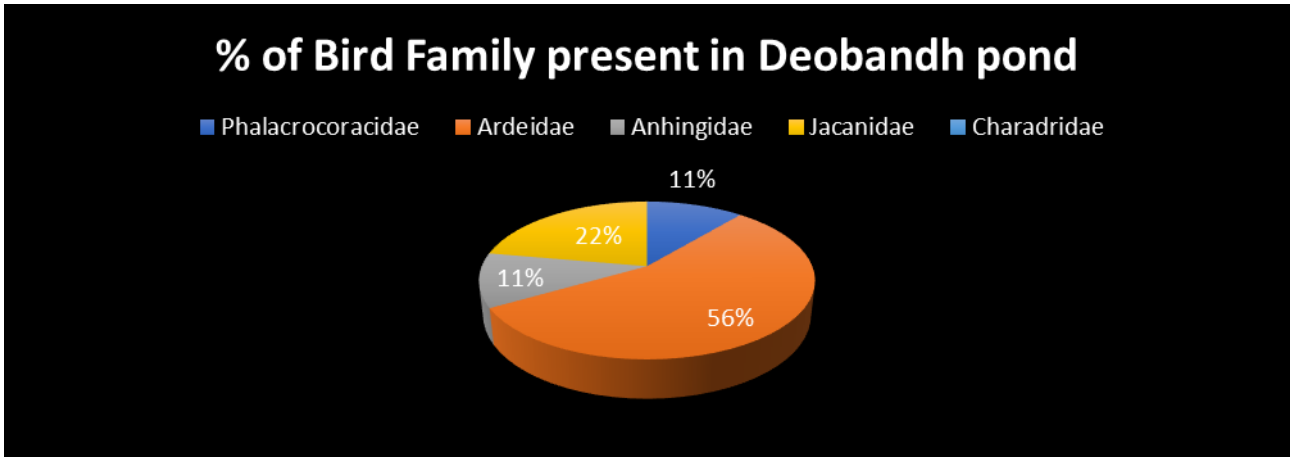

Fig. 5 : Percent of Birds Family Present in Deobandh pond

The reports stated that the highest bird density and diversity was recorded during winter months also because of availability of varied sources of feed as well as foraging and safety, almost all of them leave the wetland by March-end. The result shows that the study areas are supportive to a number of bird species and diversity.

CONCLUSION:

Water birds being generally at or near the top of most wetland food chains are highly susceptible to habitat disturbances and are therefore good indicators of the general condition of wetland habitats (Kushlan, 1992). From this studies we conclude that the species like Large Egret, Common Moorhen, Red Watlled Lapwing, Pheasent Tailed Jacana, Common Coot were highly diversified form Nov to March because of low tolerance of temperature and so it is Migrant species for this study area and species like Little Cormorant, Cattle Egret, Indian pond Heron, Grey Heron, Purple Moorhen were less diversified and tolerate to high temperature so they resident to the local area. Various factors may be responsible like open defecation, sewage discharges were some of the human activities found in the wetland showed this types of changes. Unfortunately, there are no laws till date to protect urban wetlands in particular, and we highlight here the urgent need for a policy to conserve wetlands and related ecosystems. However, 2nd February is observed as World Wetlands Day each year. Each year since 1997 government agencies, non-governmental organizations and groups of citizens undertake actions aimed at raising public awareness of wetland values. Through this study we suggest that Deobandh pond being situated near Kumda Pahad Shiva temple a famous heritage spot and Maharaja Sagar pond also the largest pond of Titilagarh where the verities of bird species migrated can be made into a tourist spot for Bird lovers if these ponds are properly cleaned and maintained which would attract more number of bird species.

Conflicts of Interest: The authors declare no conflict of interest.

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