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The Waterbird Community of A Village Wetland System - A Case Study of Amgaon Tehsil In Gondia District of Maharashtra

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Abstract

Among various biological components of freshwater, the waterbirds play an important role not only in trophic dynamics of ecosystem but also in the indication of changes in the quality of water due to pollution or degradation because of their ability to respond quickly to such changes. The present study conducted under Nav Talav at Amgaon in Gondia district of Maharastra (India) recorded 824 waterbirds in 30 belonging to 6 orders: Pelecaniformes, Ciconiiformes, Anseriformes, Gruiformes, Charadriiformes, and Coraciiformes. The waterbird families were grouped on the basis of foraging behaviour as follows: 1) surface and aerial diving birds (Phalacrocoracidae, Alcedinidae, Meropidae), 2) wading birds (Ardeidae, Ciconiidae, Threskiornithidae, Recurvirostridae, Charadriidae, Scolopacidae), 3) ducks (Anatidae), and 4) marsh birds. Red-crested Pochard, Cotton Pygmy-goose, Little Egret and Little Cormorant were common, while the globally-near threatened Black headed Ibis and 15 species of local or regional conservation concern were also observed. Seasonal variation in waterbird assemblage structure reflected the arrival and/or passage of migrants, and few species were present between May and August. Further studies are required to uncover the factors contributing to the observed seasonal variations in bird assemblage within Nav Talav, Amgaon.

Keywords: Waterbirds, Anatidae, Ardeidae, Seasonal variation

Introduction

Wetland ecosystems harbor loads of biodiversity as it is being rich in nutritional value and productivity (Gibbs, 1993; Paracuellos, 2006) and are one of ecologically important conservation concern sites owing to its trophic dynamics. The waterbirds uses wetland habitats either throughout their life or during certain part of their life for nesting, breeding, feeding, sheltering and migration stopovers (Weller, 1999; Getzner, 2002). They are beneficial not only in trophic dynamics of ecosystem but also in the indication of changes in the quality of water due to pollution or degradation because of their ability to respond quickly to such changes. The spatial and seasonal distributions of waterbirds are influenced by conditions such as habitat types, climatic conditions, resource stability and immediate human impact. Different workers like, Osmatston (1922), Singh (1929), Ali (1932), Ghazi (1962), Kannon (1980), Mujumdar (1984), Davidar (1985), Newton *et al.*, (1986), Jhingram (1988), Ghosal (1995), Wadatkar and Kasambe (2002), Yardi *et al.*, (2004), Kulkarni *et al.*, (2005) and Harney (2014) have examined waterbird communities for annual variations in abundance and species composition from different freshwater bodies of India.

The present study was carried to investigate to overall assemblage composition and seasonal variations of waterbirds at Nav Talav, Amgaon in Gondia district of Maharashtra. The results would be useful in suggesting strategies for the conservation of Nav Talav and the waterbird diversity that it contains.

Materials and Methods

Study sites

Nav Talav at Amgaon in Gondia district is situated in eastern region of Maharashtra state at the geographical coordinate of 20°359′0″N latitude and 80°384′0″E longitude (Fig-1).

Waterbird Survey

Waterbird surveys were carried out in Nav Talav from January 2013 to December 2013 on a monthly basis covering a complete wet season (June to September) and dry season (March to June); rainy days were avoided because rain interfere with visibility (Ralph *et al.*, 1993). Birds were identified by sight using binoculars (Olympus 10×50). During field studies, guidebooks were used to identify the birds (Ali, 2002, Grimmett *et al.*, 2011and Manakadan *et al.*, 2011).

Obligate wetland users waterbirds from the avian fauna were selected and all other species were excluded from the analysis (Weller, 1999). All individuals of each waterbird species were counted in each visit within several parts of Nav Talav following the bird census techniques (Bibby *et. al.*, 2000).

Since preliminary observations showed that waterbirds started to enter the study site for

resting and foraging when the water level was high, all waterbird surveys were conducted when the water level was high. Waterbirds were defined as comprising species of cormorants, herons, egrets, ibises, ducks, rails and jacanas normally associated with wetlands and also birds species in the families Charadriidae (Lapwing) and Scolopacidae (Sandpipers) in the present study.

The relative diversity (RDi) of families was calculated by using following formula (Koli, 2014):

RDi = (No. of birds species in the family /Total no. of species)*100

Results and Discussion

A total of 824 waterbirds in 30 species were recorded in Nav Talav at Amgaon in Gondia district during the study period. The species belong to 6 orders: Pelecaniformes, Ciconiiformes, Anseriformes, Gruiformes, Charadriiformes, and Coraciiformes (Fig. 2). Based on foraging behavior and habitat use the waterbird families were grouped as follows: 1) surface and aerial diving birds (Phalacrocoracidae, Alcedinidae, Meropidae), 2) wading birds (Ardeidae, Ciconiidae, Threskiornithidae, Recurvirostridae, Charadriidae, Scolopacidae), 3) ducks (Anatidae), and 4) marsh birds. Most were Anatidae (26.57%), while Ardeidae (20.50%) ranked the second among families in terms of relative diversity (Table- 1). This agreed with the finding of Kumar (2006), who reported that, Ardeidae to be the most dominant family in Bharathpuzha river basin in Kerala and Surana *et al.,* (2007) according to them Anatidae to be the most dominant family in Chimdi lake Nepal.

The most common species (making up > 7% of total counts over the study period) were Red-crested Pochard (*Netta rufina*), Cotton Pygmy-goose (*Nettapus coromandelianus*), Little Egret (Egretta garzetta) and Little Cormorant (*Phalacrocorax niger*) (Table-3). 21 species are very common, 03 are common,04 are uncommon, 01 are occasional and 01 were rare to Nav Talav (Table-2). Black-headed Ibis (*Threskiornis melanocephalus*), Blue-tailed Bee-eater (*Merops philippinus*), Marsh Sandpiper (*Tringa stagnatilis*) and Great Cormorant (*Phalacrocorax carbo*), all of these species were relatively rare (< 0.5% of total counts). Similar observation was also recorded from Shrungarbandh lake (Bhandarkar and Paliwal, 2014), Zaliya lake (Puri, 2015) and Bothalkasa lake (Puri and Virani, 2016) in Gondia District of Maharastra.

Of the 30 waterbird species recorded during the present study, 50% are of local or regional conservation concern (Kulkarni 2005, Kulkarni *et. al.,* (2006 (a), 2006 (b), 2006 (c)**),** among which Black-headed Ibis (*Threskiornis melanocephalus*), the globally-near threatened species (NT; BirdLife International, 2006), had the highest conservation value. Black-headed Ibis were recorded in Nav Talav in December and January, 2013 but the present study provides the first record of this species in Amgaon tehsil. Although only few individuals were recorded during the study period, 3 juveniles were seen roosting within the Nav Talav. These sighting records of Black-headed Ibis suggest that Nav Talav might be another location in Gondia District.

The Red-crested Pochard (*Netta rufina*) occupied first position in order of dominance in respect to total number of wetland birds (Table-3). The population maximum of this species was in the month November. The second predominant species was Cotton Pygmy-goose (*Netta puscoromandelianus*). This species exhibited its population peak in the month of November (Table-3). The third numerical dominant species was Little Egret (*Egretta garzetta*). It showed its maxima in February (Table-3). The other numerically important species observed were Spot-billed Duck (*Anas poecilorhyncha*), Tufted Duck (*Aythya fuligula*), Cattle Egret(*Bubulcus ibis*), Red-wattled Lapwing (*Vanellus indicus*), Asian Openbill (*Anastomus oscitans*) and Green Bee-eater (*Merops orientalis*). Great Cormorant (*Phalacrocorax carbo*), Black-headed Ibis (*Threskiornis melanocephalus*), Marsh Sandpiper (*Tringa stagnatilis*) and Blue-tailed Bee-eater (*Merops philippinus*) occured in individual in very poor number in relation to total wetland bird community (Table-3).

There was an obvious reduction in waterbird species richness in Nav Talav from March to September 2013 (when no more than 20 species were recorded in any month), while the number of species seen from October 2013 to February 2013 was greater (24 to 30). Nav Talav is an important stopover and wintering site for migrating birds, and the majority of birds in Gondia are either passage migrants or winter visitors. From mid-November to early January (winter migration), migrants birds pass through Gondia District from the northern breeding sites to wintering grounds near the equator and they fly back to the breeding sites, passing through and staying in Gondia district in April and May (Summer migration) (Viney *et al.*, 2005). All winter visitors and passage migrants leave Gondia district to their summer breeding grounds by the begining of autumn (Dudgeon & Corlett, 2004). Since few of the waterbirds (20%

of total) recorded in Nav Talav were either passage migrants or winter visitors, it is not surprising that the number of waterbird species recorded in Nav Talav dropped from 30 species in December to 19 species in February 2013, followed by a summer-low where only resident species including all egrets except the Intermediate Egret, and summer visitors were recorded.

Prey abundance, distribution and composition among areas have a direct influence on habitat use by waterbirds (Murkin & Kadlec, 1986; Colwell & Landrum, 1993; Sánchez *et al.*, 2006a; Sánchez *et al.*, 2006b). Aquatic invertebrates are an important food of wetlandbirds (Skagen & Oman, 1996; Pérez-Hurtado *et al.*, 1997; Gammonley & Laubhan, 2002), and positive correlations between waterbird and benthic invertebrates is common (Colwell & Landrum, 1993; Yates *et al.*, 1993; Safran *et al.*, 1997; Placyk & Harrington, 2004; Sánchez *et al.*, 2006a; Sánchez *et al.*, 2006b). Since the assemblage structures of aquatic macroinvertebrates in different areas have yet to be studied in Nav Talav, it is not possible to relate the distribution of wetland birds to their prey.

The greater counts of Little Egret, Red-crested Pochard and Cotton Pygmy-goose recorded in Nav Talav may be due to the fact that Nav Talav harbor loads of mollusca, crustacean and insects. The greater number of Cattle Egrets, which prey on insects, frogs and lizards (Strange, 2000), in Nav Talav may be explained by the presence of grazing cattle which helped to flush out preys (MacKilligan, 2005). Habitat selection by waterbirds has been shown to be affected by predation risk (Caldwell, 1986; Yasué, 2006). For instance, waders may avoid profitable feedings sites in the proximity of trees and shrub cover from which raptors launch surprise attacks (Cresswell & Whitfield, 1994).

Since the bird survey was conducted only once a month, it is inevitable that some waterbird species were missed, especially during the spring passage and autumn passage. In order to have a better understanding of the relationship between the distributions of prey and waterbirds in Nav Talav, further studies on the invertebrate assemblage structure and sediment characteristics, which affects the type and abundance of invertebrates (Yates *et al.*, 1993; Bolduc & Afton, 2003; Sarkar *et al.*, 2005) and waterbirds (Grant, 1984; Mouritsen & Jensen, 1992; Granadeiro *et al.*, 2007) will be needed.

Figure 1: A satellite view of Nav Talav, Amgaon in Gondia district of Maharashtra

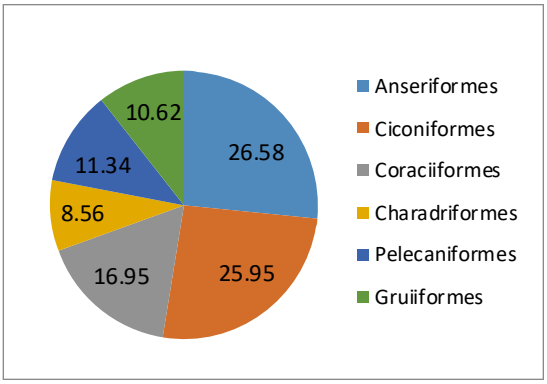

Figure 2 Abundance (no./sq.m) of waterbirds Order at Nav Talav, Amgaon in Gondia district of Maharashtra (January, 2013 to December2013): (expressed in %)

Table 1: Relative diversity (RDi) of various families at Nav Talav, Amgaon in Gondia district of Maharashtra (January, 2013 to December2013)

Anatide	26.58
Ardeidae	20.51
Threskiornithidae	2.67
Ciconiidae	2.79
Alcedinidae	13.23
Meropidae	3.76
Charadriidae	3.28
Recurvirostridae	2.18
Scolopacidae	0.49
Jacanidae	2.55
Phalacrocoracidae	11.41
Rallidae	10.56

Table 2: Systematic List of Bird Species at Nav Talav, Amgaon in Gondia district of Maharashtra (January, 2013 to December2013)

Sr. No	Order	Family	Scientific name	Common name	Population IUCN status	Residential status
1	Anseriformes	Anatide	*Nettapus coromandelianus*	Cotton Pygmy-goose	LC	RVc
			Netta rufina	Red-crested Pochard	LC	WVc
			Anas poecilorhyncha	Spot-billed Duck	LC	RC
			Aythya fuligula	Tufted Duck	LC	RO
2	Ciconiformes	Ardeidae	*Bubulcus ibis*	Cattle Egret	LC	RVc
			Ardeola grayii	Indian Pond Heron	LC	RVc
			Egretta garzetta	Little Egret	LC	RVc
			Ardea purpurea	Purple Heron	LC	RVc
			Mesophoyx intermedia	Intermediate Egret	LC	RVc
		Threskiornithidae	*Threskiornis melanocephalus*	Black-headed Ibis(White Ibis)	NT	SVUc
			Pseudibis papillosa	Black Ibis	LC	RVc
		Ciconiidae	*Anastomus oscitans*	Asian Openbill	LC	RVc
3	Coraciiformes	Alcedinidae	*Alcedo attthis*	Common Kingfisher	LC	RVc
			Ceryle rudis	Pied Kingfisher	LC	RVc
			Halcyon smyrnensis	White-throated Kingfisher	LC	RVc
		Meropidae	*Merops orientalis*	Green Bee-eater	LC	RVc
			Merops philippinus	Blue-tailed Bee-eater	LC	WVUc
4	Charadriformes	Charadriidae	*Vanellus indicus*	Red-wattled Lapwing	LC	RVc
		Recurvirostridae	*Himantopus himantopus*	Black winged Stilt	LC	RC
		Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	LC	WVUc
		Jacanidae	*Metopidius indicus*	Bronze-winged Jacana	LC	RC
			Hydrophasianus chairurgus	Pheasant-tailed Jacana	LC	RUc
5	Pelecaniformes	Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant	LC	WVc
			Phalacrocorax fuscicollis	Indian Cormorant	LC	WVc
			Phalacrocorax niger	Little Cormorant	LC	RVc
6	Gruiiformes	Rallidae	*Porzana pusilla*	Baillon's Crake	LC	WVRr
			Gallinula chloropus	Common Moorhen	LC	RVc
			Porphyrio porphyrio	Purple Swamphen		RVc
			Amauromis phoenicurus	White –breasted Waterhen	LC	RVc
			Fulica atra	Common Coot	LC	RVc

Abbreviations:- NT-Nearly Threatened; **LC-** Least Concern; **R**-Resident; **WV-** Winter Visitor; **SV-** Summer visitor; **Rr**-Rare (<5%); **O** – Occasional (5-24%); **Uc**-Uncommon (25-49%); **C**- Common (50-74%); **Vc**- Very common(75-100%)

Table 3: Abundance of waterbirds obtained per month from all sampling sites at Nav Talav, Amgaon in Gondia district of Maharashtra (January, 2013 to December2013): (expressed in % of total population)

Species	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Nettapus coromandelianus	0.196	0.26	0.11	0.036	0.03	0.02	N.C.	N.C.	0.25	0.12	0.55	0.49
Netta rufina	0.52	0	0	0	0	0	N.C.	N.C.	0	0	0.64	0.203
Anas poecilorhyncha	0.08	0.07	0.12	0	0	0	N.C.	N.C.	0	0.4	0.39	0.345
Aythya fuligula	0.196	0	0	0	0	0	N.C.	N.C.	0	0	0.175	0.155
Bubulcus ibis	0.203	2.57	0.64	0.52	0.226	0.26	N.C.	N.C.	0.345	0.4	0.39	0.08
Ardeola grayii	0.47	0.04	0.003	0.04	0.01	0.04	N.C.	N.C.	0.035	0.045	0.04	0.04
Egretta garzetta	0.323	0.556	0.37	0.145	0.117		N.C.	N.C.	0.02	0.12	0.55	0.33
Ardea purpurea	0.053	0.016	0.023	0	0	0	N.C.	N.C.	0.045	0.004	0.035	0.056
Mesophoyx intermedia	0.023	0	0	0	0		N.C.	N.C.	0	0	0.11	0.115
Threskiornis melanocephalus	0	0	0	0	0	0	N.C.	N.C.	0	0	0.045	0.035
Pseudibis papillosa	0.06	0.006	0	0.01	0.004	0	N.C.	N.C.	0.12	0.004	0.04	0.12
Anastomus oscitans	0.07	0.22	0.086	0.018	0.03	0.6	N.C.	N.C.	0.5	0.04	0.19	0.155
Alcedo attthis	0.03	0.03	0.016	0.035	0.035	0	N.C.	N.C.	0.045	0.04	0.045	0.5
Ceryle rudis	0.023	0.02	0.013	0.005	0.02	0.11	N.C.	N.C.	0.02	0.03	0.175	0.115
Halcyon smyrnensis	0.07	1.04	1.71	0.213	0.18	0.05	N.C.	N.C.	0.23	0.4	0.59	0.35
Merops orientalis	0.153	0.14	0.043	0.026	0.017	0.13	N.C.	N.C.	0.125	0.045	0.08	0.065
Merops philippinus	0.047	0.04	0.003	0.04	0.01	0.04	N.C.	N.C.	0.005	0.035	0.04	0.04
Vanellus indicus	0.023	0.02	0.0133	0.005	0.003	0.05	N.C.	N.C.	0.29	0.05	0.01	0.25
Himantopus himantopus	0.06	0.006	0	0	0	0	N.C.	N.C.	0	0.03	0.04	0.12
Tringa stagnatilis	0.023	0	0	0	0	0	N.C.	N.C.	0	0	0.023	0.02
Metopidius indicus	0.12	0.03	0.03	0.015	0.003	0.05	N.C.	N.C.	0.29	0.05	0.01	0.025
Hydrophasianus chairurgus	0.023	0.02	0.013	0.005	0.02	0.11	N.C.	N.C.	0.02	0.005	0.035	0.04
Phalacrocorax carbo	0.005	0	0	0	0	0	N.C.	N.C.	0.013	0.01	0.004	0.007
Phalacrocorax fuscicollis	0.01	0.03	0	0	0	0	N.C.	N.C.	0.045	0.045	0.35	0.35
Phalacrocorax niger	0.23	0.12	0.18	0.08	0.03	0.145	N.C.	N.C.	0.117	0.12	0.55	0.33
Porzana pusilla	0.047	0.04	0.003	0.04	0.01	0.04	N.C.	N.C.	0.005	0.035	0.04	0.035
Gallinula chloropus	0.153	0.14	0.043	0.026	0.016	0.13	N.C.	N.C.	0.115	0.01	0.065	0.01
Porphyrio porphyrio	0.28	0.29	0.08	0.05	0.003	0.017	N.C.	N.C.	0.05	0.055	0.03	0.065
Amaurorni sphoenicurus	0.07	0.22	0.086	0.018	0.03	0.6	N.C.	N.C.	0.5	0.04	0.1	0.125
Fulica atra	0.053	0.016	0.023	0.056	0.01	0.004	N.C.	N.C.	0.04	0.045	0.004	0.035

N.C.:- Survey Not Conducted

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