

Full Length Research Paper

Spatial relations of migratory birds and water quality management of Ramsagar reservoir, Datia, Madhya Pradesh, India

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Ramsagar reservoir is constructed over Nichroli nallah, in the Basin of Sindh River in district Datia, Madhya Pradesh, India. The present study has been carried out from April, 2003 to March, 2005. Eighteen species of birds belonging to 5 different orders and 11 families were recorded. Out of these, family Ardeidae with 4 species was dominant followed by Charadriidae, Anatidae, Rallidae, Palacrocoridae, Sturnidae, Muscipidae, Alcedinidae, Dacelonidae, Cerylidae and Meropidae. Coot (*Fulica atra*, Linnaeus) have been the most common and abundant species of family Rallidae in the reservoir. Reservoir is getting shallower each year due to silt deposition and accumulation of decomposed vegetation resulting winter birds visiting the site having decreased over the years. The shallow areas of the reservoir are facing the danger of eutrophication, which in turn may cause anoxic conditions thereby destroying the habitats for migratory birds forever.

Key words: Birds migration, diversity, aquatic environment, pollution, aquatic habitat, water quality management.

INTRODUCTION

Avifauna is an important constituent as well as an important link in the food chain of any ecosystem. Birds have been considered as useful biological indicators because they are ecologically versatile and inhabit all kinds of habitats (Jarvinen and Vaisanen, 1979; Sivaperuman and Jayson, 2006). The aquatic avifauna is quite susceptible to the changes in wetlands; similarly, they are more conspicuous in an ecosystem and hence can be easily observed for monitoring the changes taking place in them (Morrison, 1986). Some birds are migratory and are responsible for fluctuations in the population of birds that occur during different seasons of the year. This helps us to know whether the area is ecologically healthy or getting polluted, as total absence of birds from area may

be considered as pollution indication or human disturbance such as excessive hunting or human pressure (Borale et al., 1994). Submerged vegetation can attract more number of migratory birds in freshwater bodies (Sahu and Rout, 2005).

Various reports are available on the avifauna of Madhya Pradesh such as Sharma and Singh (1986) which studied wetlands birds in National Chambal Sanctuary. These studies have clearly showed seasonal fluctuations in avifauna along with their preferred localities. Sharma et al. (1995a) surveyed National Chambal Sanctuary in summer season and showed that no migratory birds were observed in the Sanctuary during this period. They also suggested that the migratory birds prefer muddy or stony

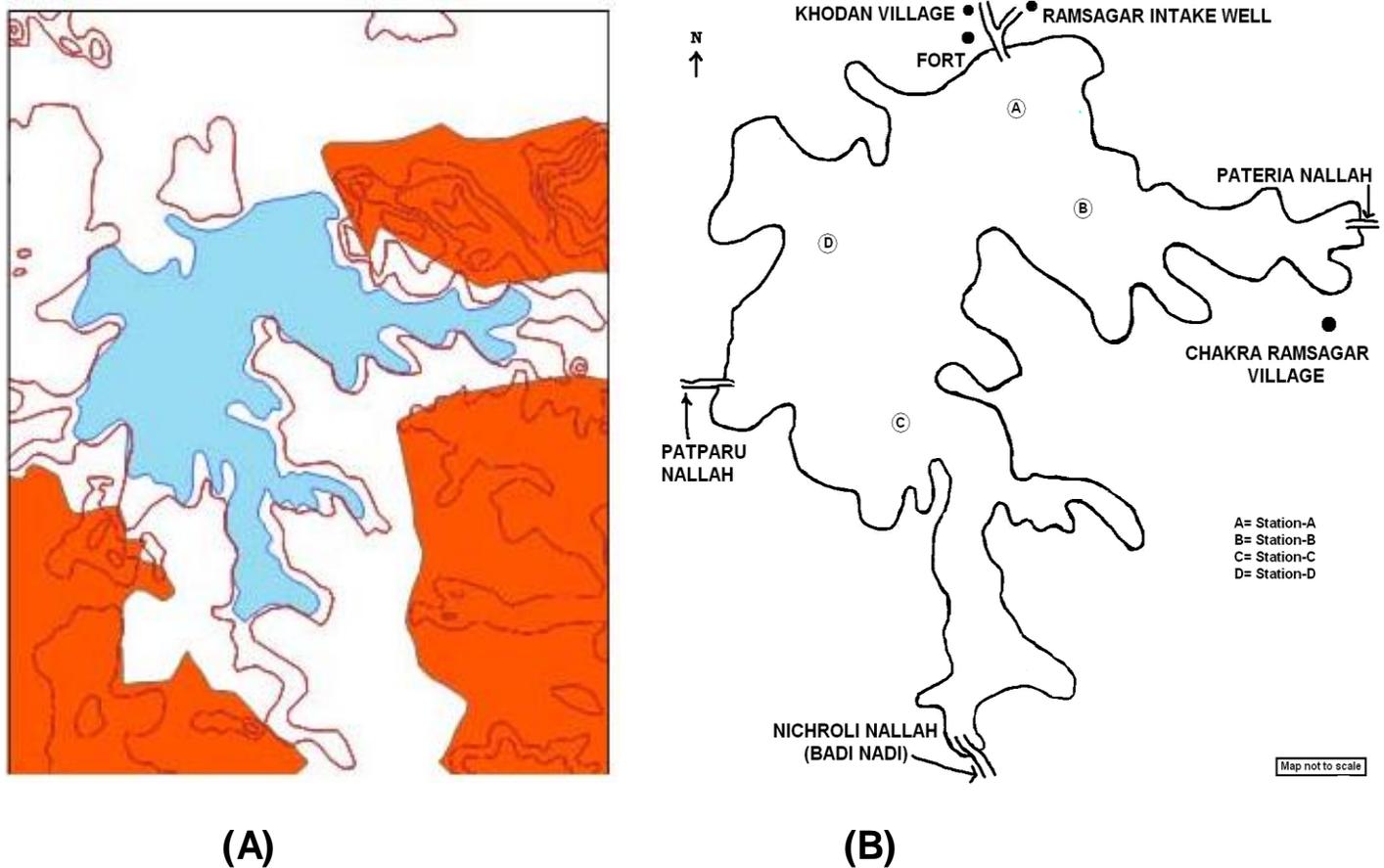


Figure 1. (A) Water spread area of Ramsagar reservoir (B) Study sites where birds were recorded.

habitat with well grown *Typha* grass. Faunal diversity of river Mahanadi, Madhya Pradesh includes 55 species of birds on the banks of this river.

In the present study, we attempted to investigate the status of migratory, local migratory and residential birds in the catchments area of Ramsagar reservoir, Datia Madhya Pradesh (India). The evaluation of avifauna of this reservoir may suggest habitat protection and may call for some measure of conservation.

MATERIALS AND METHODS

Description of study site

Ramsagar, a small man-made reservoir with 140.097 ha water spread area, was built over a Nichroli Nallah in the basin of Sindh river. The reservoir is located approximately 8 km northwest of Datia city in Madhya Pradesh and approximately 80 km south of Gwalior. Geographically, it lies between 25° 40' N latitude and 78° 23' E longitude and at an altitude of 229 m from mean sea level. Reservoir is used for different purposes like drinking water supply, irrigation, fisheries and thus is true a multipurpose tank. Four study sites namely: Station-A, B, C and D were established for counting of birds covering whole area of reservoir (Figure 1 A and B).

Detailed methodology

Birds were observed during winter season at most active period in the day that is, morning (6.00 am to 10.00 am) and late afternoon (4.30 pm to 7.00 pm) during April, 2003 to March, 2005. A direct visual count with binoculars was done and wherever possible an actual count was taken. Where there were a large number of birds, an estimate (up to the nearest 100 individuals) was made. Along with the water birds, other terrestrial birds sighted in that locality were also noted. Birds sighted during the study period were categorized according to their status as residents (R) (birds that have been known to breed in the study area and were encountered during every visit) and local migrants (LM) (birds which were encountered many times during the study period and breeding in neighboring areas). Some birds sighted occasionally during specific season and which were not residents of the area have been considered as migrant birds (M). The birds were identified following Grimm et al. (1999), Ali and Ripley (2001).

RESULTS AND DISCUSSION

The family, taxonomic name, common name and status of aquatic and terrestrial avifauna in Ramsagar reservoir area are given in Table 1. In the present investigation, eighteen species of birds belonging to 5 orders and 11 families were recorded. Family Ardeidae with 4 species

Table 1. Taxonomic position of avifauna of Ramsagar reservoir, Datia, Madhya Pradesh.

Order	Family	Genus and Species	Common name	Status
Anseriformes	Anatidae	<i>Netta rufina</i> (Pallas)	Redcrested Pochard	M
		<i>Nettapus coromandelianus</i> (Gmelin)	Cotton Teal	R
Coraciiformes	Alcedinidae	<i>Alcedo atthis</i> (Linnaeus)	Small Blue Kingfisher	RM
	Dacelonidae	<i>Halcyon smyrnensis</i> (Linnaeus)	Whitebreasted Kingfisher	R
	Cerylidae	<i>Ceryle rudis</i> (Linnaeus)	Pied Kingfisher	R
	Meropidae	<i>Merops superciliosus</i> (Linnaeus)	Bluecheeked Bee-eater	R
Gruiformes	Rallidae	<i>Fulica atra</i> (Linnaeus)	Coot	RM
		<i>Amaurornis phoenicurus</i> (Pennant)	Whitebreasted Waterhen	R
	Phalacrocoracidae	<i>Phalacrocorax carbo</i> (Linnaeus) <i>Phalacrocorax niger</i> (Vieillot)	Large Cormorant Little Cormorant	RM RM
Ciconiiformes	Ardeidae	<i>Ardea cinerea</i> (Linnaeus)	Grey Heron	RM
		<i>Ardeola grayii</i> (Sykes)	Pond Heron	R
		<i>Ardea alba</i> (Linnaeus)	Large Egret	RM
		<i>Egretta garzetta</i> (Linnaeus)	Little Egret	R
	Charadriidae	<i>Vanellus indicus</i> (Boddaert)	Redwattled Lapwing	R
		<i>Himantopus himantopus</i> (Linnaeus)	Blackwinged Stilt	R
Passeriformes	Sturnidae	<i>Sturnus contra</i> (Linnaeus)	Pied Myna	R
	Muscicapidae	<i>Saxicoloides fulicata</i> (Linnaeus)	Indian Robin	R
05	11	18		

Abbreviations: R = Resident, RM = Resident migrant, M = Migrant.

was relatively dominant (22.22%) followed by Charadriidae (11.11%), Anatidae (11.11%), Rallidae (11.11%), Palacrocoracidae (11.11%), Sturnidae (5.56%), Muscicapidae (5.56%), Alcedinidae (5.56%), Dacelonidae (5.56%), Cerylidae (5.56%) and Meropidae (5.56%) (Figure 2). The most common and abundant species of Ardeidae were the Little Egret (*Egretta garzetta*) and Pond Heron (*Ardeola grayii*) followed by Grey Heron and Large Egret as these birds are heterogeneous in their feeding habits. Large Cormorant (10), Little Cormorant (40), Grey Heron (02), Pond Heron (05), Large Egret (02), Little Egret (10), Coot (100), Redwattled Lapwing (05), Pied Kingfisher (01), Small Blue Kingfisher (02), Pied Myna (02), Indian Robin (02) Blue Cheeked Bee-eater (07) and Blackwinged Stilt (02) were seen in the reservoir during 2003-2004 (Table 2). During 2004-2005 Large Cormorant (25), Little Cormorant (15), Grey Heron (04), Pond Heron (20), Large Egret (18), Little Egret (30), Redcrested Pochard (11), Cotton Teal (25), Coot (30), Redwattled Lapwing (04), Blackwinged Stilt (02), Pied Kingfisher (02), Small Blue Kingfisher (02) Whitebreasted Kingfisher (01) and Whitebreasted Waterhen (12) were seen in the reservoir (Table 2). The available fauna, viz., crabs, snails, calms, worms, insect's

larvae and pupae in the surrounding area of water body constitute their feed.

Resident migrant birds (that is, birds that breed in one part of the area in one season and move to other parts within the state or country in a different season) such as Large Cormorant, Little Cormorant, Grey Heron, Large Egret and Coot were winter migrants in this region. Out of these Coots were seen in large numbers in winter season during both the years of study which reflected that coots prefers winter season for their food, breeding etc. It was also observed that the maximum bird species were recorded during spring season, early monsoon and late winter while comparatively less number of species were observed during late summer, late rainy and early winter season. In few cases hunting of migratory birds was also reported. Local people are neither aware of the importance of migratory birds nor the legislation. Awareness among the local population is needed so that hunting of birds should be prevented. From this study it is very clear that the Ramsagar reservoir is an ideal habitat for migratory and local migratory birds, especially the winter visitors. Fish and macrophytic resources of the Ramsagar reservoir are important sources of food for wetland birds.

The major threats to wetlands are expressed as percen-

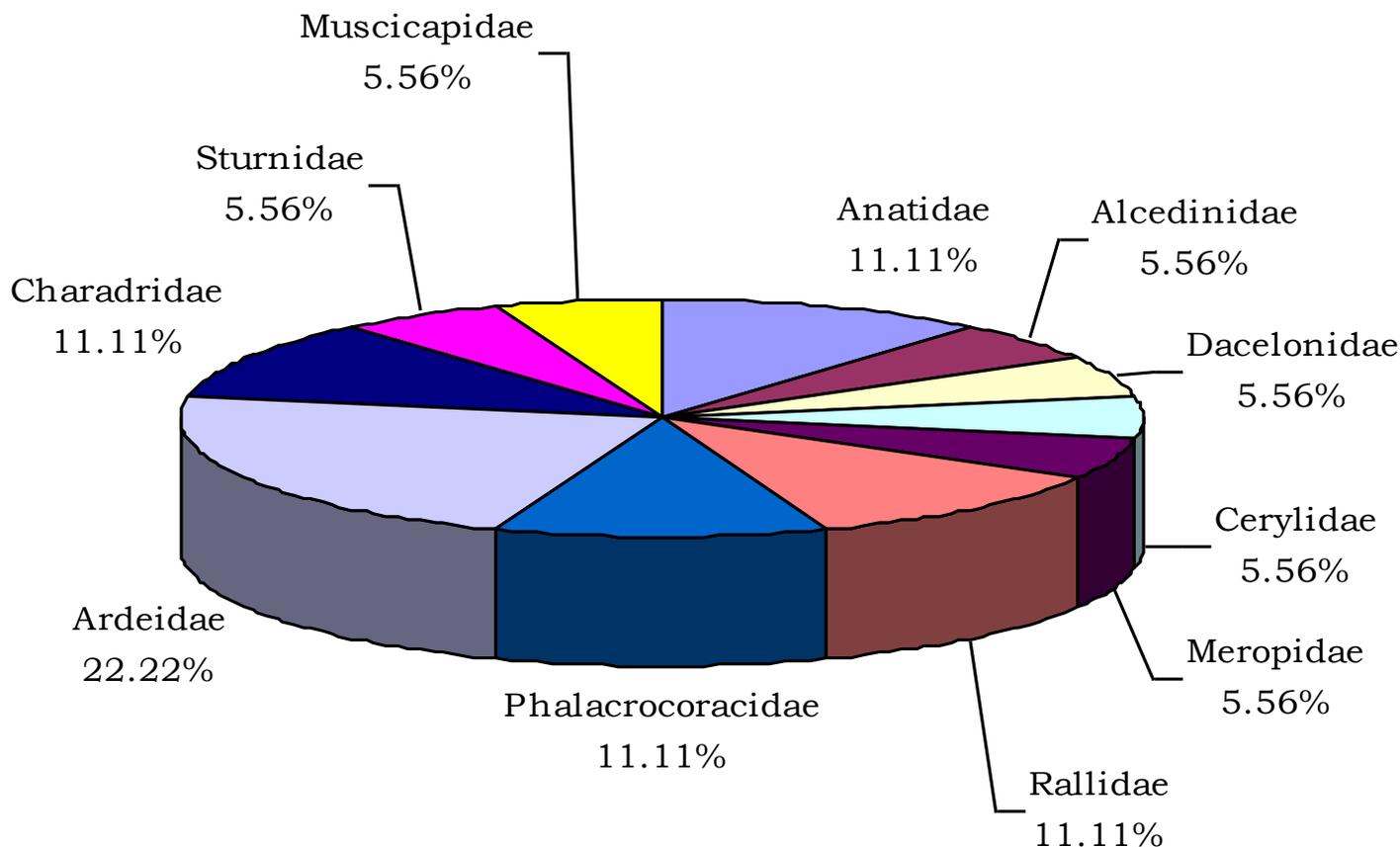


Figure 2. Percentage of contribution of different families of bird species in Ramsagar reservoir.

Table 2. List of avifauna of Ramsagar reservoir and their composition for two years.

Common name	Taxonomic name	Status	Number of individuals during 2003-2004	Number of individuals during 2004-2005
Blackwinged Stilt	<i>Himantopus himantopus</i> (Linnaeus)	R	02	01
Blue cheeked Bee-eater	<i>Merops superciliosus</i> (Linnaeus)	R	07	04
Coot	<i>Fulica atra</i> (Linnaeus)	RM	100	11
Cotton Teal	<i>Nettapus coromandelianus</i> (Gmelin)	R	-	25
Grey Heron	<i>Ardea cinerea</i> (Linnaeus)	RM	02	04
Indian Robin	<i>Saxicoloides fulicata</i> (Linnaeus)	R	02	02
Large Cormorant	<i>Phalacrocorax carbo</i> (Linnaeus)	RM	10	25
Large Egret	<i>Ardea alba</i> (Linnaeus)	RM	02	18
Little Cormorant	<i>Phalacrocorax niger</i> (Vieillot)	RM	40	15
Little Egret	<i>Egretta garzetta</i> (Linnaeus)	R	10	30
Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus)	R	01	30
Pied Myna	<i>Sturnus contra</i> (Linnaeus)	R	02	02
Pond Heron	<i>Ardeola grayii</i> (Sykes)	R	05	20
Redcrested Pochard	<i>Netta rufina</i> (Pallas)	M	-	12
Redwattled Lapwing	<i>Vanellus indicus</i> (Boddaert)	R	05	25
Small Blue Kingfisher	<i>Alcedo atthis</i> (Linnaeus)	RM	02	04
Whitebreasted Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus)	R	-	01
Whitebreasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant)	R	-	12

Abbreviations: R = Resident, RM = Resident migrant, M = Migrant

percentage of sites by the World Conservation Monitoring Centre (2002). The activities that contribute towards the loss of the resources are: hunting and allied activities, human settlement, drainage of agriculture, disturbance due to recreation, reclamation for urban and industrial development, pollution, catchment degradation, alteration of water, soil erosion and siltation. Wetlands in India are facing one or multiple of above mentioned factors. The lack of proper management and ignorance of the importance of healthy wetlands became evident. However, most accepted view is that the crisis of the aquatic environment is basically an economic issue and it is the most decisive factor playing a role in degradation of wetlands.

The Ramsagar reservoir is harnessed for the water supply to the Datia city. It also provides livelihood to the human population of adjoining villages. Major threats include diversion of water, overgrown vegetation resulting in increased grazing pressure and agriculture practices in the catchments area. The numbers of winter birds visiting the site have decreased over the years. It has been observed that the reservoir is getting shallower each year due to silt deposition and accumulation of decomposed vegetation. The shallow areas of the reservoir are facing the danger of eutrophication, which in turn may cause anoxic conditions thereby destroying the habitats for migratory birds forever.

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