

## Status of Aquatic Biodiversity of Selected Wetlands in District Hisar: A Case Study Of Haryana, India

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### ABSTRACT

The present study was intended to record the biodiversity status of selected village ponds in district Hisar (Haryana) from August, 2012 to July, 2013. Periodic fortnightly visits were carried out to determine the species composition and distribution pattern of birds, phytoplankton and zooplankton. A total number of 17 species of birds belonging to 9 orders (Anseriformes, Charadriiformes, Ciconiformes, Coraciiformes, Cuculiformes, Gruiformes, Passeriformes, Pelecaniformes and Psittaciformes) were identified in the study area. Charadriiformes was the most dominant order. The study revealed the presences of 18 species of phytoplankton belonging to Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae. Bacillariophyceae having 7 species was found to be dominant among all. In case of zooplankton, 11 species were encountered of which 7 were Rotifers, 3 were Cladocera and 1 was Copepoda. Thus Rotifers represented the maximum number of species among zooplankton.

**Key words:** Biodiversity, Phytoplankton, Zooplankton, Village ponds, Hisar

### INTRODUCTION

Biodiversity refers to the variability among living organisms from all sources including inter alia, terrestrial, freshwater and marine aquatic ecosystems and the ecological complexes of which they are the part (Convention on biological diversity, UNEP, 1992). Hosetti (2002) has described it as the library of life, i.e., variety of all genes, species of microorganisms, plants animals and ecosystems that are found on our planet. India has rich biodiversity as it lies at the junction of three biogeographical provinces of Africa, Temperate Eurasia and Oriental and, as a result, it has biological heritage that qualifies it as one of the 12 mega diversity nations of the World (Kothari, 1994). According to Hosetti and Caplan (2001), more than 45000 species of plants and 65000 species of animals have been recorded from the Indian subcontinent representing 7 % and 6.5 % of the

world's flora and fauna respectively. Wetlands are one of the crucial natural resources and are areas of land that are either temporarily or permanently covered by water. This means that a wetland is neither truly aquatic nor terrestrial; it is possible that wetlands can be both at the same time depending on seasonal variability. Thus, wetlands exhibit enormous diversity according to their genesis, geographical location, water regime and chemistry, dominant plants and soil or sediment characteristics (National Wetland Atlas, 2010). Water resources support rich biodiversity. The qualitative and quantitative studies have been utilized to assess the quality of water (Adoni *et al.*, 1985; Shekhar *et al.*, 2008). Phytoplankton are the primary producers forming the first trophic level in the food chain. Many phytoplankton species have served as bio-indicators (Tiwari and Chauhan, 2006; Hoch *et al.*, 2008). In an aquatic system zooplankton play a critical role not only as primary consumer but also

they themselves serve as a source of food for higher organisms. Zooplankton provide the main food for fishes and can be used as an indicator of trophic status of any aquatic body (Verma and Munshi, 1987). There are many wetlands available in different parts of the country. The wetlands are highly productive areas with rich biodiversity. They serve



Fig. 1. Showing Map of study area

as spawning and nursery ground for birds and hence can be used as an excellent area for conservation of rare and endangered species (Rao, 2008). According to Buckton (2007), wetlands are among the most productive ecosystems in the world and their functions include flood control, aquifer recharge, nutrient absorption and erosion control. In addition, they provide home for huge diversity of wildlife such as birds, mammals, fish, frogs, insects and plants. Very scanty information is available on biodiversity of wetlands in the study area. Therefore, the present investigation was planned to record the biodiversity (avian diversity, phytoplankton diversity and zooplankton diversity) prevalent in wetlands of district Hisar (Haryana).

Table1: Wetland bird species and their distribution in the selected study sites

Order	Common Name	Scientific Name	Study sites			
			Dabra	Dhamana	Kanwari	Nalwa
1	Anseriformes Spotbilled Duck	<i>Anas poecilorhyncha</i>	+	+	+	+
2	Coraciiformes Pied Kingfisher	<i>Ceryle rudis</i>	+	+	+	+
	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	+	+	+	+
3	Cuculiformes Asian Koel	<i>Eudynamis scolopacea</i>	+	+	+	+
	Crow Pheasant	<i>Centropus sinensis</i>	+	+	+	+
4	Psittaciformes Rose ringed Parakeet	<i>Psittacula krameri</i>	+	+	+	+
	Gruiformes White breasted Waterhen	<i>Amaurornis phoenicurus</i>	+	+	+	+
6	Indian Purple Moorhen	<i>Porphyrio poliocephalus</i>	+	+	+	+
	Charadriiformes Common Sandpiper	<i>Actitis hypoleucos</i>	+	+	+	+
	Black winged Stilt	<i>Himantopus himantopus</i>	+	+	+	+
7	Red-wattled Lapwing	<i>Vanellus indicus</i>	+	+	+	+
	Pelecaniformes Little Cormorant	<i>Phalacrocorax niger</i>	+	+	+	+
8	Indian Pond Heron	<i>Ardeola grayii</i>	+	-	+	+
	Ciconiformes Little Egret	<i>Egretta garzetta</i>	+	+	-	+
9	Great Egret	<i>Casmerodius albus</i>	+	+	-	+
	Passeriformes White-browed Wagtail	<i>Motacilla maderaspatensis</i>	+	+	+	+
	Red-vented Bulbul	<i>Pycnonotus cafer</i>	+	+	+	+

+ indicates presence, – indicates absence

## MATERIALS AND METHODS

### Study area

The Hisar district, a part of the Indo-Gangetic alluvial plain is situated between 28°53'45" to 29°49'15" N latitudes and 75°13'15" to 76°18'15" E longitudes (Fig. 1). The area experiences a sub-tropical climate. To record the prevalent avian, phytoplankton and zooplankton diversity in the study area, four ponds were selected, one from each of the village, namely, Dabra, Dhamana, Kanwari and Nalwa.

### METHODOLOGY

#### To Achieve the Proposed Objectives, Following Methodology was Used:

##### To identify the avian diversity of the study area

Periodic fortnightly visits were conducted in the selected sites in the morning (06:00 to 10:00 hrs) and later in the evening (15:00 to 18:00 hrs) using line transect method (Gaston, 1975; Sales and Berkmuller, 1988), and point count method (Altman, 1974). Birds were photographed and were

subsequently identified using "A pocket guide of the birds of the Indian subcontinent" by Grimmett *et al.* (1999). Classification of the observed bird species was done following Manakandan and Pittie (2001).

##### To study the diversity of phytoplankton and zooplankton

Approximate 50 L of water from each selected site was filtered through planktonic net (50µm mesh size). Samples were preserved in 4% formalin and were analyzed as per the standard methodologies (Needham and Needham, 1962; APHA, 1998; Shrivastava, 2005).

## RESULTS AND DISCUSSION

### Avian Diversity

A total number of 17 wetland bird species (Table 1) belonging to 9 orders (Anseriformes, Charadriiformes, Ciconiformes, Coraciiformes, Cuculiformes, Gruiformes, Passeriformes, Psittaciformes, Pelecaniformes) were recorded from all the selected sites in the study area. However,

**Table 2: Phytoplankton species and their distribution in the selected study sites**

S. No.	Phytoplankton	Study Sites				
		Dabra	Dhamana	Kanwari	Nalwa	
1.	Chlorophyceae (5 species)	<i>Chlorella vulgaris</i>	+	+	+	+
		<i>Scenedesmus</i> sps	+	+	+	+
		<i>Ulothrix</i> sps	+	+	+	+
		<i>Tetraspora</i> sps.	+	+	+	+
		<i>Coelastrum</i> sps	+	+	+	+
2.	Cyanophyceae (4 species)	<i>Microcystis aeruginosa</i>	+	+	+	-
		<i>Oscillatoria</i> sps	+	+	+	+
		<i>Spirulina</i> sps	+	+	-	-
		<i>Synechococcus</i> sps	+	-	-	-
3.	Bacillariophyceae (7 species)	<i>Navicula radiosa</i>	+	+	+	+
		<i>Navicula oblonga</i>	-	+	+	-
		<i>Cyclotella</i> sps	+	+	+	+
		<i>Gomphonema gracile</i>	+	-	+	+
		<i>Nitzschia</i> sps	+	+	+	+
		<i>Cymbella</i> sps	+	-	-	+
		<i>Cocconeis placentula</i>	+	+	+	-
4.	Euglenophyceae (2 species)	<i>Euglena</i> sps	-	+	-	+
		<i>Phacus</i> sps	-	+	-	+

+ indicates presence, - indicates absence

**Table 3: Zooplankton species and their distribution in the selected study sites**

S. No.	Zooplankton	Study Sites				
		Dabra	Dhamana	Kanwari	Nalwa	
1.	Rotifera (7 species)	Brachionus angularis	+	+	+	+
		Brachionus quadridentatus	+	+	+	+
		Brachionus forficula	+	-	-	+
		Brachionus caudatus	+	-	+	-
		Asplanchna sps	+	+	+	+
		Testudinella sps	+	+	+	+
		Keratella sps	+	+	-	+
2.	Cladocera (3 species)	Daphnia sps	+	+	+	+
		Miona sps	+	+	-	+
		Bosmina sps	-	+	-	+
3.	Copepoda (1 species)	Cyclops sps	+	+	+	+

+ indicates presence, - indicates absence

Gupta and Bajaj (1997) recorded 23 wetland bird species at Brahmsarovar, Kurukshetra (Haryana). Similarly, Bajaj (2002) observed 88 wetland bird species in 4 bird sanctuaries in Haryana. Tirshem (2008) reported 80 waterbirds from Northern districts of Haryana, India.

#### Phytoplankton Diversity

Eighteen species of phytoplankton (Table 2) were recorded from the selected sites during the study period. Bacillariophyceae was predominant accounting for 7 species, followed by Chlorophyceae with 5 species, Cyanophyceae with 4 species and Euglenophyceae with 2 species. Dominance of Bacillariophyceae was also reported

in earlier studies (Das and Panda, 2010; Mary Kensa, 2011).

#### Zooplankton Diversity

During the present investigation, a total number of 11 species of zooplankton were encountered. Out of these, 7 species belonged to Rotifera, 3 species to Cladocera and only 1 species to Copepoda. Rotifers were dominant in comparison with Cladocera and Copepod. This is supported by different research articles (Güher, 2003; Saksena, 1987; Kumar *et al.*, 2011) in which predominance of rotifers were observed. Dominance of Rotifers is characteristic of tropical water bodies as it has been reported by various authors (Egborge, 1981 and Mwebaza-Nadwula, 2005).

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