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Present status of aquatic bird diversity in Atal Sagar Dam Shivpuri Madhya Pradesh, India

Lodhi RK, Rao RJ
Conservation biology Lab, School of studies in Zoology, Jiwaji University, Gwalior, Madhya Pradesh, India

Abstract
In the present study, avifaunal diversity of Atal Sagar Dam has been studied to know the present status of this dam during June 2016 to May 2017. Four sites have been selected for the observation of current status of bird depicted as Sluice of Dam (Near Madikhada village), Ukayala village, Udwaha village and Amola village. Visual encounter surveys was by using the line transect and point count methods, picture were also taken for identification of bird. Total 34 species of aquatic birds were recorded belonging to 15 families and 9 orders during the study period.

Keywords: avifauna, diversity, aquatic bird, atal sagar dam

1. Introduction
Biodiversity at present is better understood for birds in many respects than any other major group of organisms because they probably inspire more extreme interest in humans, are often spectacular, relatively easily observed and not too cryptic to identify (Jalander *et al.* 2015) [10]. Most of the birds are useful to mankind. Birds play a useful role in the control of insect or pests of agricultural crops, as predators of rodents, as scavengers, as seed dispensers and as pollinating agents. Therefore birds are reared not only for preserving ecological balance but also for products of economic importance such as downs feather (Simeone *et al.* 2002) [14]. Birds are often common denizens of the ecosystems and they have been considered as an indicator species of inhabited areas (Blair, 1999) [2]. Studies have shown that depressed abundance of various bird species in most human inhabited parts of the world today is of concern as cities are growing rapidly both in area and in population (Donaldson *et al*, 2007) [5].
Population of birds is a very sensitive indicator of degree of pollution in both terrestrial and aquatic ecosystem (Hardy *et al.* 1987) [8]. The estimation of local densities of avifauna helps to understand the abundance of various species of other organisms (Turner, 2003) [16]. One of the major priorities in conserving animals is monitoring their populations to find methods for their long term survival (Caughley, 1982) [3]. Thus the present study attempts to know the status of bird in Atal Sagar dam and their surrounding area to understand the value of aquatic bird species with scientific point of view.

2. Study Area
Atal Sagar Dam is being constructed at the Sindh River near Madikheda village, about 35 km away from Shivpuri town (district headquarter) of Madhya Pradesh in India. The Dam is surrounded by hills and dense forest. The extension of MDP lies at latitude 25° 33’ 20’’ N and longitude 77° 51’ 10’’ E. The Sindh River is one of the sub-systems of Ganges, which confluences with Yamuna River near Etawa (Uttar Pradesh). It has 5540 sq. km watershed area. Mean monsoon rainfall is about 763.42 mm while mean annual rainfall is 923.29 mm. Maximum height of dam is 59 m. Gross storage capacity is 970.50 m cum and production capacity is 60 MW. The total submerged area of the dam is 5679.91 ha, which includes 3050 ha of forestland. There are thirteen villages in the submerged area with 7.9 per cent of total agricultural land, while its command area has a large proportion of rain-fed agricultural land. The irrigation facilities in the command area of reservoir are just negligible.

- **Site- I: Sluice:** This site established near the dam gate covering the whole area of stagnant water. Below the dam area site is dominant site for cultivation. This site is selected on basis of human presence in this area. This site is covered by dense and thick forest and grassland.
- **Site- II: Ukayala village:** This site was selected on the basis grazing area and also consists of sloppy topography with mixed forest good habitat to wild animals and birds. This site is used by cattle, wild animals, sheep, goat and other animals for grazing purpose. Agricultural activities also done inside the dam site and lower site of sluice gate.
- **Site- III: Udwaha village:** At this site land was used for agriculture, which is important food source for birds and animals. It is an important area for animal and avifaunal study, as they often visit this area from August to March for food. Nesting of various birds also found at this area.
- **Site- IV: Amola village:** This study site was selected on the basis of occurrence of rich biodiversity. Presence of different bird species during winter seasons was another reason for selection of this area.

3. Material and Methods
The survey was conducted in early hours in the morning from 06:00 to 10:00 hours and evening 17:00 to 18:30 hours last week of each month during June 2016 to 2017. Bird diversity and identities were done by Line Transect and Point Count methods for gathering the information on bird (Bibi and Ali, 2013) [1]. The birds were identified and counted with the help

of Binoculars (Nikon Action 8X40), photographed by using Camera (Canon D-60) at different spots at every location and field guides such as a Pictorial Guide to the Birds of the Indian Subcontinent (Ali, 2006) and Water birds of Northern India (Alfred *et al*. 2001), were used for identifying the birds. The birds were identified up to order level and check list was prepared using the standardized common and scientific names of the birds of the Indian subcontinent by Manakkadan and Pittie, (2001) [11]. The Bird species were categorized based on their IUCN status and also classified as resident, resident migrant and migrant.

4. Results

Total 34 species of birds belonging to 15 families and 9 orders were recorded from the study sites of Atal Sagar Dam during the study period. The check list of recorded bird species along with heir order, family, scientific name, occurrence status and residential status is given in Table 1. The observed bird belong to Three IUCN Categories, viz. Least Concerned (LC), Near Threatened (NT) and Vulnerable (VU) (IUCN, 2001). Three near threatened, two vulnerable and remaining all other species found during this survey are categorized as least concerned according to IUCN red data book. Chowdhury (2015) [4] reported same study on avifaunal species diversity of Purbasthali Oxbow Lake in West Bengal. The family Ardeidae represented by 6 species, dominated the dam bird community of the study area (Fig. 1). Kumar 2006 recorded Ardeidae to be the most dominant family in Bharatpurzha river basin.

Table 1: Check list of avifaunal species with taxonomic distribution in Atal Sagar Dam

S. No.	Order	Family	Scientific Name	Species Name	Occurrence Status	Residential Status
1	Pelecaniformes	Ardeidae	*Ardeola grayii*	Indian Pond-Heron	LC	R
2			*Egretta garzetta*	Little Egret	LC	R
3			*Bubulcus ibis*	Cattle Egret	LC	R
4			*Ardea alba*	Great White Egret	LC	RM
5			*Ardea cinerea*	Grey Heron	LC	RM
7			*Ardea intermedia*	Intermediate Egret	LC	RM
6		Threskiornithidae	*Threskiornis melanocephalus*	Black-headed Ibis	NT	R
8			*Eudocimus albus*	White Ibis	LC	M
10	Charadriiformes	Charadriidae	*Vanellus indicus*	Red-wattled Lapwing	LC	R
13			*Vanellus malabaricus*	Yellow-wattled Lapwing	LC	R
14			*Charadrius dubius*	Little Ringed Plover	LC	R
11		Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	LC	RM
12			*Actitis hypoleucos*	Common Sandpiper	LC	RM
9		Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	LC	R
15		Laridae	Sterna aurantia	River Tern	NT	M
16	Anseriformes	Anatidae	*Tadorna ferruginea*	Ruddy Shelduck	LC	M
17			*Anas poecilorhyncha*	Indian Spot-billed Duck	LC	M
18			*Dendrocygna javanica*	Lesser Whistling-duck	LC	M
19			*Aythya ferina*	Common Pochard	VU	M
20	Ciconiiformes	Ciconiidae	*Mycteria leucocephala*	Painted Stork	NT	M
21			*Ciconia episcopus*	White-necked Stork	VU	M
22			*Anastomus lamelligerus*	Openbill Stork	LC	M
26	Coraciiformes	Alcedinidae	*Alcedo atthis*	Common Kingfisher	LC	R
27			*Ceryle rudis*	Pied Kingfisher	LC	R
28			*Halcyon smyrnensis*	White-breasted Kingfisher	LC	R
29	Gruiformes	Rallidae	*Amaurornis phoenicurus*	White-breasted Waterhen	LC	R
30			*Gallinula chloropus*	Common Moorhen	LC	R
31			*Fulica atra*	Common Coot	LC	M
24	Suliformes	Phalacrocoracidae	*Microcarbo niger*	little cormorant	LC	RM
25			*Phalacrocorax carbo*	Great Cormorant	LC	RM
23		Anhingidae	*Anhinga melanogaster*	Oriental Darter,	NT	RM
32	Passeriformes	Hirundinidae	*Hirundo rustica*	Barn Swallow	LC	R
33		Motacillidae	*Motacilla cinerea*	Grey Wagtail,		R
34	Coraciiformes	Coraciidae	*Coracias benghalensis*	Indian Roller	LC	R

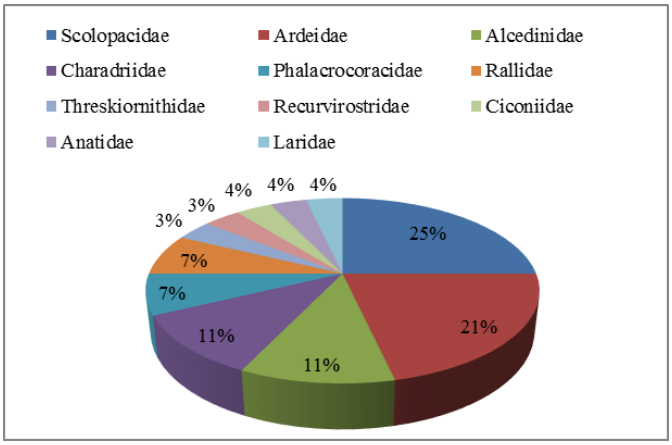

Fig 1: Pie chart showing the family wise birds species contribution in Atal Sagar Dam

Total of recorded species 47% migrant, 29% resident and 24% were resident migrant (fig. 2). The most of birds observed during the study were migrant and rest of all resident and resident migrant. Walwert *et al.* 2004 observed that the species that are migrant use wetlands for rest and other activities while waiting for the favorable condition of their home range. During the study period total 1626 number of bird in different season were recorded. The highest numbers of bird 633 recorded at site-4 in winter season and 31 numbers of bird were recorded at site 1 in summer season (Table 2). In Rainy season 327, 1023 in winter and 276 numbers of bird recorded in summer season which indicate seasonal variation in this study. The species diversity index fluctuated from 0.095 at site-IV (Amola village) in Rainy season to 0.149 at site-III (Near Manikhada village) (Fig. 3).

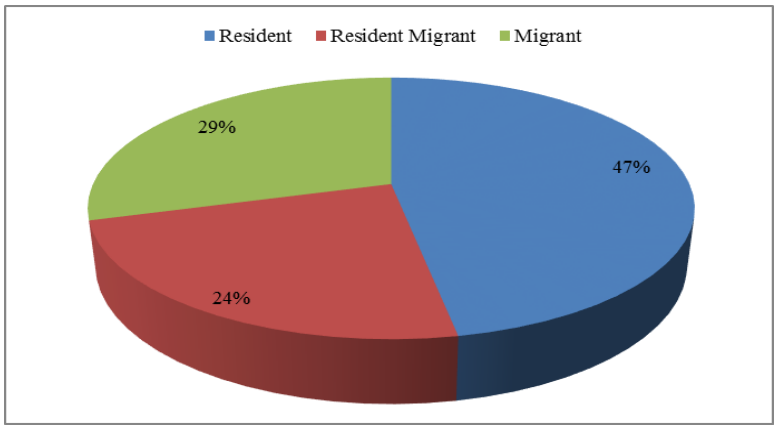

Fig 2: Residential Status of the birds recorded in Atal Sagar Dam

Table 2: Abundance of bird species in Atal Sagar Dam at different sites

S. No.	Species Name	Rainy Season				Winter season				Summer Season			
		Site-1	Site-2	Site-3	Site-4	Site-1	Site-2	Site-3	Site-4	Site-1	Site-2	Site-3	Site-4
1	Black wing stilt	4	6	1	11	8	2	4	11	6	0	0	15
2	Red wattled lapwing	10	8	7	13	8	6	10	18	8	3	4	20
3	Ruddy shield duck	0	0	0	2	0	0	0	12	2	0	0	4
4	Little cormorant	6	2	0	6	23	14	5	67	16	20	4	15
5	Large cormorant	2	0	0	6	5	0	0	13	0	0	0	0
6	Spot bill duck	0	0	0	6	0	0	0	4	0	0	0	25
7	Small blue king fisher	1	0	1	3	2	1	1	3	1	0	1	2
8	Pied kingfisher	2	0	0	1	0	0	0	2	2	0	0	2
9	white throught kingfisher	1	1	0	2	0	0	1	2	0	0	0	0
10	Lesser whisling duck	0	0	0	9	2	0	0	25	0	0	0	8
11	River turn	0	0	0	14	0	0	0	0	0	0	0	29
12	Pond heron	2	1	2	1	2	2	3	8	1	2	0	4
13	Little egreat	5	0	0	35	12	7	4	70	0	0	0	0
14	Cattle egreat	28	20	14	46	25	18	43	106	7	3	2	35
15	Large egreat	0	0	0	0	2	0	0	5	0	0	0	0
16	Grey wagtail	1	1	0	3	0	0	0	1	1	3	0	3
17	Painted stork	0	0	0	4	2	0	0	17	2	0	0	8
18	White ibis	0	0	0	2	0	0	0	4	0	0	0	6
19	Indian roller	0	0	2	1	1	2	0	0	1	0	0	0
20	Black headed ibis	0	0	0	0	0	0	0	12	0	0	0	0
21	White necked stork	0	0	0	4	0	0	0	8	6	0	0	1
22	Common poachard	0	9	0	0	0	30	44	80	0	0	0	0
23	Coot	0	0	0	16	0	7	81	114	0	0	0	0
24	yellow wattled lapwing	0	0	0	2	0	0	0	2	0	0	0	0

25	Grey heron	0	0	0	0	2	0	2	3	0	0	0	0
26	Open billed strok	0	0	0	0	0	0	0	6	0	0	0	0
27	White breasted water hen	0	0	0	0	3	1	2	3	0	0	0	0
28	Barn swallow	0	0	0	2	0	0	0	2	4	0	0	0
29	Darter	0	0	0	0	0	1	0	0	0	0	0	0
30	Common sandpiper	0	0	0	0	0	0	0	5	0	0	0	0
31	Little ring plover	0	0	0	0	0	0	0	6	0	0	0	0
32	Marsh sandpiper	0	0	0	1	1	0	0	3	0	0	0	0
33	Intermediate egret	0	0	0	0	1	0	0	17	0	0	0	0
34	Common moorhen	0	0	0	0	0	0	0	4	0	0	0	0
	Total	62	48	27	190	99	91	200	633	57	31	11	177

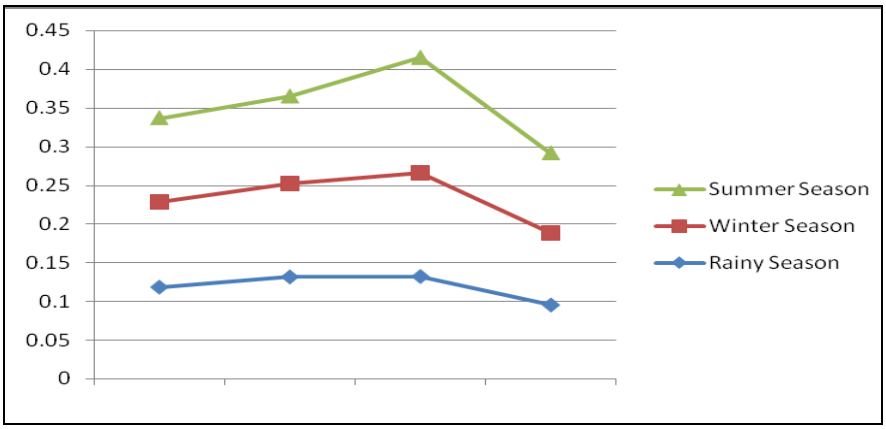

Fig 3: Species diversity indices at different site in different season

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