Study of Ramaua Dam with special reference to bird diversity and their conservation, Gwalior, Madhya Pradesh, India

*R. K. Lodhi, **Banwari Dandotiya, *R. K. Gurjwar, *S. N. Rawat, **Rambaboo and *R.J.Rao
*Conservation biology Lab, School of studies in Zoology, Jiwaji University, Gwalior
**School of studies in Environmental Science, Jiwaji University, Gwalior, India

Abstract

The present Study was conducted on Ramaua dam to illustrate the present status of diversity of dam and physico-chemical parameters. Birds, the most fascinating creatures of nature have always been a subject of research since times immemorial. Now a day's birds are being studied based on field observations concerning wider domain of avian natural history including, amongst others, diversity, habitat, distribution on local, regional and continental basin etc. Also birds have been studied focusing attention on breeding, feeding, mating, courtship dance, clutch size, territorial behavior, camouflaging etc. Total 28 species belonging to … orders and families of bird were identifying by using the standard point count methods. A significant variation in the water quality of different sites at Ramaua Dam was observed during the study period.

Keywords: Fascinating, Ramaua Dam, Bird, Water quality

Introduction:

Water covered 71% of the Earth's surface. It is vital for all known forms of life. On Earth, 96.5% of the planet's crust water is found in seas and oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, and 0.001% in the air as vapor, clouds (formed of ice and liquid water suspended in air), and precipitation. Only 2.5% of this water is fresh water, and 98.8% of that water is in ice (excepting ice in clouds) and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products. A greater quantity of water is found in the earth's interior.

Avifauna is one of the most important ecological indicators to evaluate the quality of habitats. Most of the birds are useful to mankind. Birds play a useful role in the control of insect of 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. (Simone et al., 2002). Birds are often common denizens of the ecosystems and they have been considered as an indicator species of inhabited areas (Blair, 1999). 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). Population of birds is a very sensitive indicator of degree of pollution in both terrestrial and aquatic ecosystem (Hardy et al. 1987). The estimation of local densities of avifauna helps to understand the abundance of various species of other organisms (Turner, 2003). One of the major priorities in conserving animals is monitoring their populations to find methods for their long term survival (Caughley, 1982).

The bird assemblages are affected by various factors like the food availability, the size and the abiotic changes in the wetlands (Paracuellos, 2006, Jaksic, 2004, Lagos et.al, 2008). Not only the birds but all the organisms, belonging to the plant and the animal communities, are affected by the physical characteristics of the environment (Eulies et.al, 2004, Gillis et.al, 2008). In a wetland ecosystem these biotic factors are mostly dependent on the season and hydrology (Hussain, 1995). Thus wetland being an integrated system is affected by the changes in the physical as well as chemical parameters of hydrosphere at the catchment scale. These in turn, affect the wetland dependent communities as well as ecosystem attributes such as species richness, its distribution and density (Burkert, 2004). 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. A first step toward that is the evaluation of physico-chemical and biological feature of wetlands that influenced their use by water birds. Thus, the physical and chemical properties of water body are characteristics of the climatic, geochemical, geomorphologic as well as pollution conditioned reviling in the drainage basin and the underlying aquifer (Ramachandra, 2002). These characteristics with natural and manmade changes determine the quality of water (Anonymous, 2003). Thus wetlands are highly complex ecosystem due to various interactions between the components like water, soil, biosphere and atmosphere (Bodegom et.al, 2004).

Study Area:

The study region include Ramaua dam in Gwalior near in Ramaua village .The dam is surrounded by hilly area .The river attached with it is the Morar river .The area of this dam is about 3177 hectare , from which 4400 hectare is used for the cultivation of kharif crops the remaining is used for the cultivation of rabi crops .the low reservoir level (214.88 M) and the full reservoir level is (225.55 M) .the difference between the two 10.06 M and the maximum water level capacity is about 226.77 M and the dead store water capacity is 0.141 cubic meter Fig 1).

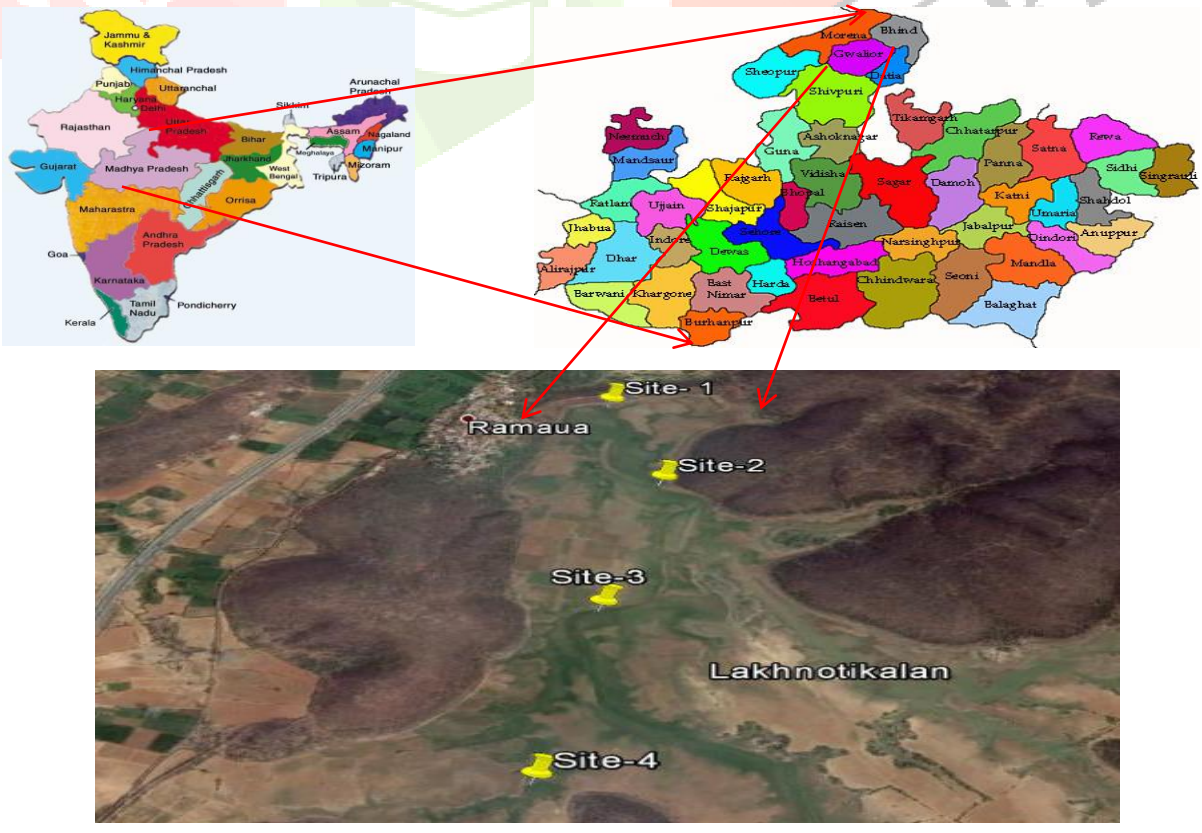

Fig 1: Showing Ramaua Dam at Gwalior

Material and Methods:

The samples were collected from two different sites of the Dam. Field visit were made to collect the water sample and observation of birds. Surface Water samples were taken for analysis. The atmospheric temperature and water temperature were recorded with the help of mercury filled centigrade thermometer. The specific conductivity was determined with the help of conductivity meter (DREL 2000 HACH, USA) and expressed as µmhos/cm. The hydrogen ion concentration was recorded with the help of pH strips and digital pH meter. Total Alkalinity was analyzed by titration method using strong acid and methyl orange and phenolphthalein solutions as indicators. Total hardness of water was determined by ethylene diamine tetra acetic acid (EDTA) titration method using Erichrome black-T as indicator and colour by visual estimation. Physico-chemcial characters of water, temperature, colour, pH, Hardness and total alkalinity were determined at the sampling sites immediately after the collection of water samples, while rest of the parameters were analyzed in the laboratory within a period of 6 hours after the collection of water samples .samples were fixed for DO and BOD and then brought to the laboratory for analysis. Water samples were analyzed for different parameters using standard methods (APHA, 1981, Trivedi and Goel, 1984).

The birds were identified and counted with the help of Binoculars (Nikon Action 8X40) 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).

Result:

Four sampling sites of dam were decide to collected the water sample depicted as Site-1, Site-2, Site-3 and Site-4 with GPS location in Table 1.

Table 1: Different study sites with GPS Location at Ramaua Dam

S. No.	Sampling site	GPS Location
1	Site-1	26°9'32.20"N 78°13'24.91"E
2	Site-2	26° 9'21.20"N 78°13'28.69"E
3	Site-3	26° 9'5.82"N 78°13'25.06"E
4	Site-4	26° 8'48.35"N 78°13'21.85"E

The physico-chemical properties of Ramaua Dam are summarized in Table 2.

Odour, Taste & Colour:

Odourless water was found at all the sampling sites; taste of water samples was normal at all sites while at the site-1 and site-2 were muddy and at site-3 were yellow while no colour was at site-4.

Depth:

Depth of water was varying at different site between 80 cm to 230 cm. The maximum depth was found at site 4 while minimum depth of water body at site 3.

Water Temperature:

The water temperature levels on surface layers were found in the range 15.5 °C to 16.92 °C. The water temperature was found to be almost same at all the sampling sites in water body.

Air Temperature:

The Air temperature levels were found to vary in the range 13.4 °C to 13.7 °C. The air temperature was recorded almost same at all the sites in study area.

pH:

The pH values were recorded from 7.2 to 8.1. The minimum pH value was recorded at Site-1 while maximum value was recorded at site-3 unit indicating that at site 3 the water was alkaline while other sites were neutral.

Hardness:

The hardness was found to be medium, ranging from 489 mg/Lit to 624 mg/Lit. Highest hardness of 624 mg/Lit. was observed in same.

Electrical Conductivity:

The EC in the Ramaua Dam varies in the range of 732 to 912 µmho/cm. The minimum EC was 732 µmho/cm Observed at site-4 while the maximum EC was 912 µmho/cm observed at site-1. The possible reasons for these high EC values may be the input of large amounts of surface runoff containing sediments from the catchment areas, which have intensive agriculture crops and human habitation near these stations.

Dissolve Oxygen

The o2 were recorded between 16 mg/Lit to 18 mg/Lit with minimum and highest. The most important parameters of water directly affected the presence biota of the water body.

Table 2: Physico -chemical parameters of Ramaua Dam during December, 2016

S. No.	Parameters	Unit	Site-1	Site-2	Site-3	Site-4
1	Odour	-	Fish smell	Fish smell	No	No
2	Taste	-	Normal	Normal	Normal	Normal

3	Colour	-	Muddy	Muddy	Yellow	No colour
4	Depth	Cm	110	126	80	230
5	Water Temperature	°C	15.5	16.1	15.7	16.92
6	Air Temperature	°C	13.4	13.5	13.5	13.7
7	pH	-	7.2	7.4	8.1	7.9
8	COD	mg/Lit	42.3	39.9	36.2	32.4
9	DO	mg/Lit	16	17.7	17.01	18
10	Hardness	PPM	642	567	512	489
11	Conductivity	µmho/cm	912	903	875	732

Twenty eight species of wetlands birds belonging to 11 genera and 11 families were recorded from the sites of Ramaua Dam at first week December, 2016. The check list of recorded bird species along with heir order, family, scientific name, occurrence status and residential status is given in Table 3. The family Scolopacidae represented by 7 species, dominated the dam bird community of the study area (Table 4 & Fig. 2). Different bird species are showing in figure 3.

Table 3: Check list of avifaunal species with taxonomic distribution in Ramaua Dam

S. No.	**Order**	**Family**	**Scientific Name**	**Species Name**	**Occurrence Status**	**Residential Status**
1	Charadriiformes	Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	LC	RM
2			*Tringa totanus*	Common Redshank	LC	RM
3			*Tringa ochropus*	Green Sandpiper	LC	R
4			*Calidris minuta*	Little Stint	LC	R
5			*Tringa totanus*	Common Redshank	LC	R
6			*Actitis hypoleucos*	Common Sandpipe	LC	RM
7			*Actitis hypoleucos*	Common Sandpiper	LC	RM
8	Pelecaniformes	Ardeidae	*Ardea cinerea*	Grey Heron	LC	RM

9			*Ardea alba*	Great White Egret	LC	RM
10			*Ardea intermedia*	Intermediate Egret	LC	RM
11			*Egretta garzetta*	Little Egret	R	R
12			*Bubulcus ibis*	Cattle Egret	LC	R
13			*Ardeola grayii*	Indian Pond-Heron	LC	R
14	Coraciiformes	Alcedinidae	*Ceryle rudis*	Pied Kingfisher	LC	R
15			*Halcyon smyrnensis*	White-breasted Kingfisher	LC	R
16			*Alcedo atthis*	Common Kingfisher	LC	R
17	Charadriiformes	Charadriidae	*Charadrius hiaticula*	Common Ringed Plover,	LC	M
18			*Charadrius dubius*	Little Ringed Plover	LC	R
19			*Vanellus indicus*	Red-wattled Lapwing	LC	R
20	Suliformes	Phalacrocoracidae	*Microcarbo niger*	little cormorant	LC	RM
21			*Phalacrocorax carbo*	Great Cormorant	LC	RM
22	Gruiformes	Rallidae	*Amaurornis phoenicurus*	White-breasted Waterhen	LC	R
23			*Fulica atra*	Common Coot	LC	M
24	Pelecaniformes	Threskiornithidae	*Platalea leucorodia*	Eurasian spoonbill	LC	M
25	Charadriiformes	Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	LC	R
26	Ciconiiformes	Ciconiidae	*Mycteria leucocephala*	Painted Stork	NT	M

27	Anseriformes	Anatidae	*Dendrocygna javanica*	Lesser Whistling-duck	LC	M
28	Charadriiformes	Laridae	Sterna aurantia	River Tern	NT	M

Little Egreat

Common Sandpiper

Little Ringplover

Large Cormorant

White throat Kingfisher

Eurasian Spoonbill

Figure 1: Showing Birds species of Ramaua Dam

Large Egreat

Black wingstilt

Painted Stork

Pond heron

Grey heron

Lesser whitling duck

Figure 2: Showing Birds species of Ramua Dam

Table 4: Family-wise distribution of bird species in Ramaua Dam

S. No.	Family	No. of Family
1	Scolopacidae	**7**
2	Ardeidae	**6**
3	Alcedinidae	**3**
4	Charadriidae	**3**
6	Phalacrocoracidae	**2**

7	Rallidae	**2**
8	Threskiornithidae	**1**
9	Recurvirostridae	**1**
10	Ciconiidae	**1**
11	Anatidae	**1**
12	Laridae	**1**

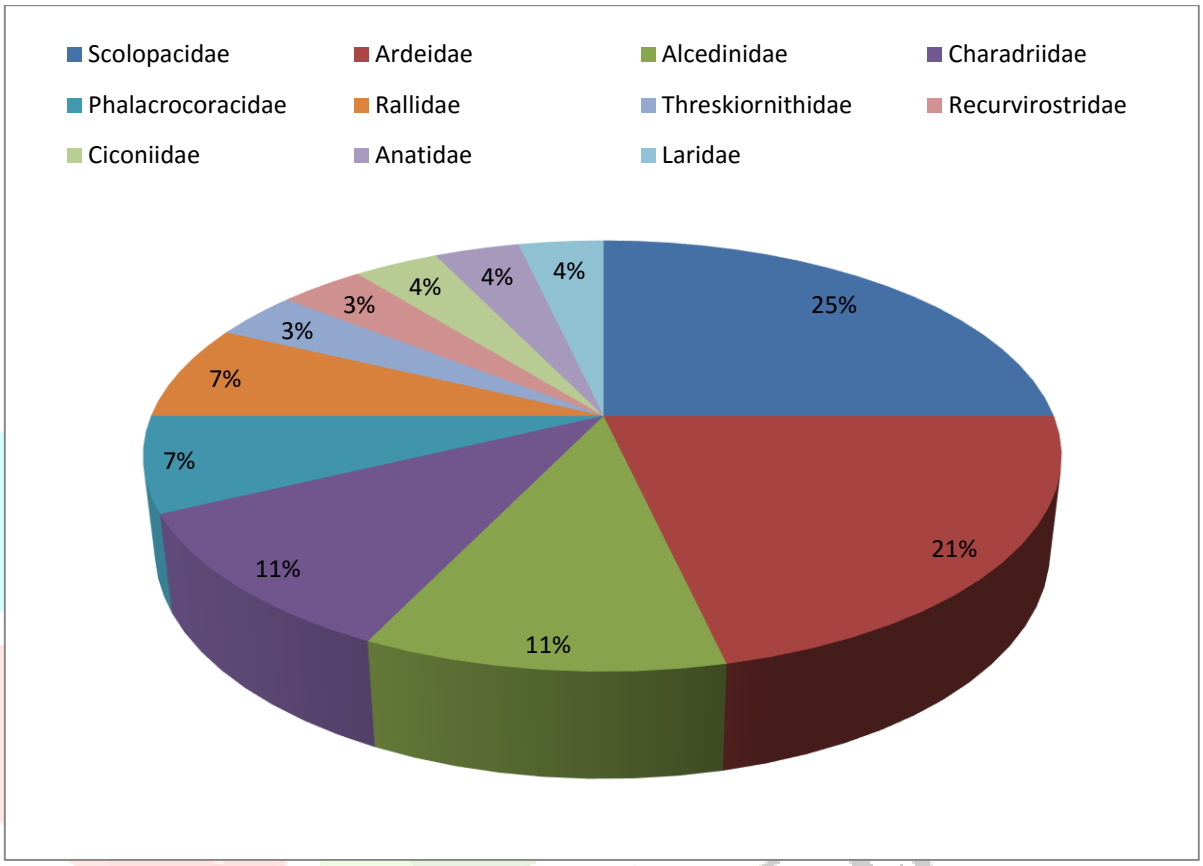

Fig 2: Family-wise status of bird species

Abundance of birds species in Ramaua dam were recorded the highest 391 numbers of birds at site-4 and lowest 32 numbers of bird were recorded at site 3 (Table 5). There were so many threats activities observed during the survey figure 5.

Table 5: Abundance of bird species in Ramaua Dam at different sites

S. No.	Species Name	Site-1	Site-2	Site-3	Site-4
1	Marsh Sandpiper	0	8	2	17
2	Common Redshank	1	6	7	43
3	Green Sandpiper	3	2	1	23
4	Little Stint	4	2	1	14
5	Common Redshank	0	6	0	24
6	Common Sandpiper	0	0	0	37

7	Common Sandpiper	0	0	0	82
8	Grey Heron	0	2	1	1
9	Great White Egret	2	8	1	2
10	Intermediate Egret	0	11	0	4
11	Little Egret	7	18	0	5
12	Cattle Egret	6	4	1	3
13	Indian Pond-Heron	4	2	0	1
14	Pied Kingfisher	1	0	0	0
15	White-breasted Kingfisher	1	0	0	1
16	Common Kingfisher	0	1	0	0
17	Common Ringed Plover,	2	0	1	6
18	Little Ringed Plover	0	0	0	9
19	Red-wattled Lapwing	12	4	2	2
20	little cormorant	6	0	0	9
21	Great Cormorant	0	0	0	2
22	White-breasted Waterhen	1	0	1	0
23	Common Coot	0	0	0	57
24	Eurasian spoonbill	0	3	0	0
25	Black-winged Stilt	6	38	14	10
26	Painted Stork	0	8	0	0
27	Lesser Whistling-duck	0	0	0	39
28	River Tern	0	11	0	0

Fishing Activities

Agriculture Crops inside Dam

Hunting of Bird

Dumping of waste material

Domestic Pig

Plugging agriculture field inside Dam

Figure 5: Showing different activities in Ramaua Dam

Conclusion

Study concludes that the water body is facing multifold pressure due to anthropogenic pressure. All the physico-chemical parameters were fluctuated unsustainable management of Ramaua Dam. Birds surveyed acknowledge that this water bodies is haven for the birds. It's is useful for birds for habitat, Breeding and nesting purpose. The above observation indicate that the wetland support at least 28 species of water birds and most of them are ducks feeding and foraging in open water zone. This study indicates that most of the members of family Anatidae are herbivore in nature and depend on aquatic flora. They dive up to the depth of 3 meter for feeding. Fluctuations in water quality may affect the health of resident and migratory birds. Human interaction was the measure concern and menace for near future because activity increases in the storage area. Hence a habitat with open water with submerged vegetation is the most suitable habitats should be mapped in Ramaua Dam and attempts should be made to keep them free from human interference.

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