

ECOLOGICAL STUDY AND BIRD DIVERSITY OF TAWA RESERVOIR AND ITS SURROUNDING AREAS OF HOSHANGABAD DISTRICT (MADHYA PRADESH)

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ABSTRACT

The avian diversity of Tawa Reservoir and its surrounding areas at Hoshangabad district was studied for a period of two years during January 2009 to December 2010. The Line Transect Method was used for bird survey. This area inhabits many residential and migratory bird species. This habitat attracted 74 bird species belonging to 33 families and 14 orders. *Saxicoloides fulicata* (Indian Robin), *Passer domesticus* (House Sparrow), *Nectarinia asiatica* (Purple Sunbird), *Bubulcus ibis* (Cattle Egret) *Acridotheres tristis* (Common Mayna), *Turdoides Striatus* (Jungle Babbler) were prominent residents and *Ardea alba* (Great Egret), *Mesophoyx intermedia* (Intermediate Egret), *Pseudibis papillosa* (Black Ibis), *Threskiornis melanocephalus* (Oriental white Ibis) *Anthracoceros coronatus* (Malabar pied Hornbill) were migratory uncommon species and *Sturnus pagodarum* (Brahminy Starling) *Ammomanes phoenicurus* (Rufus tailed Finch Lark) *Eremopteris grisea* (Ashy crowned Sparrow Lark), *Hirundo rustica* (Barn Swallow) were migratory common species of the study area. Availability of food in different seasons, different type of vegetation, agricultural land, water availability in surrounding areas, field activities were favorable conditions observed for birds' survival in this area. The determination of bird species will help in the evaluation and comparison of possible changes regarding the bird fauna in the future.

INTRODUCTION

Birds are found almost everywhere because they are very dynamic, they can easily be seen and observed for several purposes. For example, birds have been used recently to monitor Environmental Impact Assessment (E.I.A) because they are very sensitive to environmental changes. Some birds are generally believed by local people to be both indicators of season and time, and to some extent certain bird species can be used to predict the period of the day and night, e.g., cock crows at dawn. Birds are well-adapted to many diverse terrestrial and aquatic habitats. India is one such destination which provides wintering grounds for migratory water birds and has a rich variety of wetland habitats. To study any ecosystem the birds serve as important component as they have the ability to fly away and avoid any obnoxious condition. Hence, they are considered as important health indicators of the ecological conditions and productivity of an ecosystem (Newton, 1995; Desai and Shanbhag, 2007; Li and Mundkur, 2007). The most important parameters of the bird study are the species richness (Nilsson and Nilsson, 1978; Weller, 1978; Murphy, et al., 1984), their density (Patterson, 1976; Nilsson and Nilsson, 1978) and diversity (Krebs, 1985). The bird assemblages are affected by various factors like the food availability, the size of the wetland (Paracuellos, 2006) and the abiotic changes in the wetlands (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 (Wilson and Keddy, 1986;

Gaudet and Keddy, 1995; Weiher et al., 1996; Euliss et al., 2004; Gillis et al., 2008).

Density and abundance are the essential ecological information required for population ecology. The scope of ecology covers distribution of organism and its abundance (Buckland et al., 1993; 2001). And estimating the abundance has been a challenge in wildlife science because many previous surveys used indices to estimate relative abundance (Rusk, 2007). In this study, the avian fauna is studied at Tawa Reservoir in Hoshangabad district of Madhya Pradesh. The Tawa is the Narmada's longest tributary, at 172 km. The river provides feeding, roosting, nesting sites for many of bird species like sparrow (*Passer domestic*) pigeon (*Columba livia*), green bee eater (*Merops apiaster*), kingfisher (*Alcedo atthis*), parakeet (*Psittacula eupatria*), cattle egret (*Bubulcus ibis*) etc. There are countless variety of plants and animals in a state of interdependence. This paper provides a list of avifauna of Tawa Reservoir and its surrounding areas.

MATERIALS AND METHODS

Study area

Tawa Reservoir is situated at Hoshangad district of Madhya Pradesh, India (Fig.1). It is almost 1,815 meters long and 57.91 meters high which extends over approximately an area of 204 km² and located at 22°33'44" North latitude and 77°58'30" East longitude. Due to the Tawa Reservoir water availability is much better in Hoshangabad district. There are two canals supplying water to both right and left sides of the

Tawa Reservoir. The left canal supplies water to Hoshangabad district for agriculture passing through Itarsi which located at a distance of about 33 km from the Tawa Reservoir. Average annual rain fall in the district is 134 cm. and the average maximum and minimum temperatures recorded in the district are 32°C and 19°C respectively. Overall, the climate of the district is pleasant throughout the year which fascinating to avian fauna habitat.

The following five sites were selected for the present study

Site- Chicha-Pipariya-which is about 5-6 km from Left Earthen Dam these villages selected from submergence area.

Site- Ghogra Nallah-it is situated 0.5Km away from LBMC (Left Bank Main Canal)

Site- Garden area-there are two gardens in Tawa Reservoir area, namely -Main garden and downstream garden at D/s (Down- stream) of Tawa Left Earthen Dam.

Site -Ranipur village-which is near river D/s (Down- stream) of Tawa Dam. Rainpur has been chosen for birds study under forest area.

Site- Belawada village-the agriculture land starts 6 km from Tawa dam /Intake of LBMC.

The study was carried out over every seasonal period of the year. Regular field trip was continuing throughout these periods at intervals of two or five days. Field data of birds of the Reservoir and surrounding area were collected during morning hours between 5.00am to 10.00am, from 12Noon to 2pm and evening 4.00pm to 7.00 pm by using binocular (20 x 50 magnification).

The Line Transect Method (Burnham *et al.*, 1980) used for birds survey. The number of transects lay was based on the relative extents of the habitats. Separate transects were established in each habitat and data were collected and analyzed separately. Length of transect ranged upto 3km according to the habitat size. The appropriate transect width (W) depended on the species was counted. Different transect

widths were used for different bird species even in the same survey. Transect run through various micro habitats in a specified habitat to get representative census data. The Identification of birds was done using the field guide by Ali (2002) and with the help of forest department of Itarsi and Hoshangabad. Photographs and videos were taken by using DCR-DVD 610E Digital Video Camera Recorder (Sony Handy cam, 40x Zoom).

RESULTS AND DISCUSSION

74 bird species belonging to 33 families and 14 orders were recorded in study areas (Table 1). It seems the climatic condition of this region is very favorable for order Passeriformes. Thirty species of order Passeriformes, the highest number of birds observed in the study area. Nine species of order Ciconiiformes and six species of Charadiiformes were noted during the study period. Only five species belonging to order Coraciiformes were found in Tawa Reservoir area. Four species from each order of Pelecaniformes, Columbiformes were recorded during the study period. Three species of order Galliformes were observed. Birds of order Anseriformes, Falconiformes, Gruiformes ,Psittaciformes, Cuculiformes, Bucerotiformes were represented by only two species of each order. Upupiformes shows less interest in this region. It may be due to food choice or habitat choice, only one bird species from this order was recorded during the study period. *Phalacrocorax niger* (Little Cormorant), *Phalacrocorax carbo* (Indian Shang), *Phalacrocorax fuscicollis* (Indian Cormorant), *Anhinga melanogaster* (Darter), *Tringa nebularia* (Common green Shank), *Metropidius indicus*(Bronze winged Jacana), *Motacilla flava* (Yellow Wagtail), *Motacilla alba* (White Wagtail), *Motacilla Maderraspatisensis* (Large pied Wagtail) were winter common (WC) found in the study areas, *Tringa tetanus*(Common red Shank) , *Lanius schach* (Rufous backed Shrike) were winter uncommon birds (WU), *Ardea alba* (Great egret), *Mesophoyx intermedia* (Intermediate egret), *Pseudibis papillosa* (Black ibis), *Threskiornis melanocephalus* (Oriental

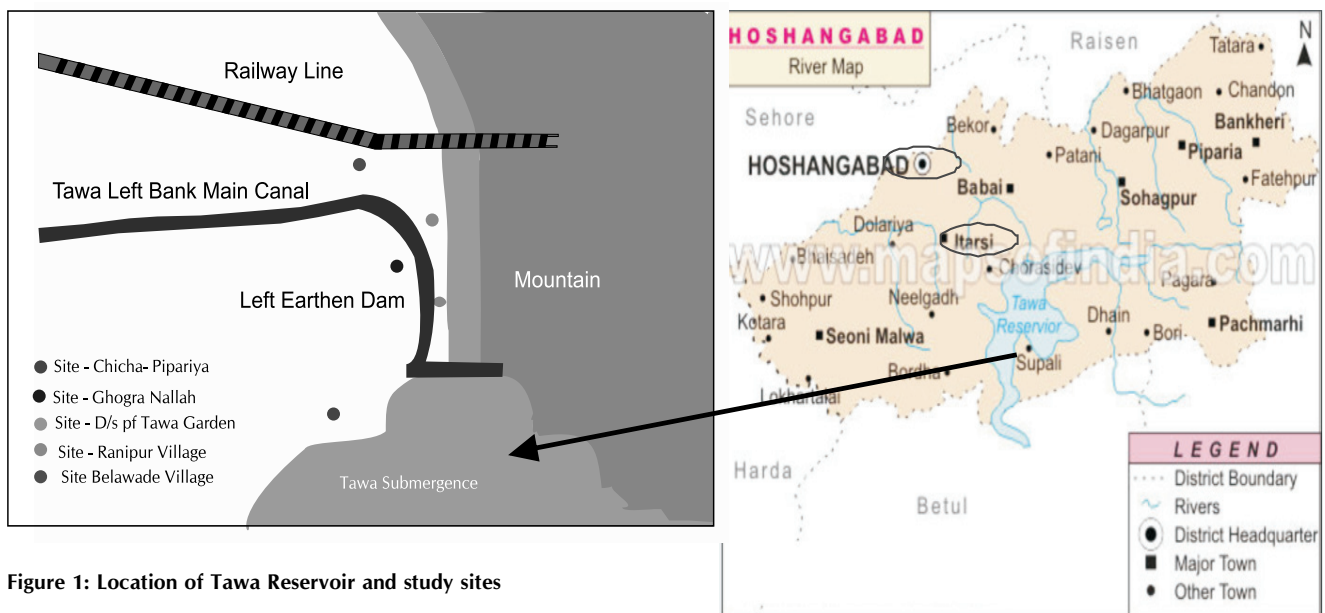


Figure 1: Location of Tawa Reservoir and study sites

Table 1: List of birds species observed in Tawa Reservoir area

S.no	Order	Family	Scientific Name	Common Name	Status
1	Pelecaniformes	Phalacrocoracidae	<i>Phalacrocorax niger</i>	Little cormorant	WC
		Phalacrocoracidae	<i>Phalacrocorax carbo</i>	Indian shang	WC
		Phalacrocoracidae	<i>Phalacrocorax fuscicollis</i>	Indian cormorant	WC
		Phalacrocoracidae	<i>Anhinga melanogaster</i>	Darter	WC
2	Ciconiformes	Ardeidae	<i>Bubulcus ibis</i>	Cattle egret	RC
		Ardeidae	<i>Egretta garzetta</i>	Little egret	RC
		Ardeidae	<i>Ardeola grayii</i>	Indian pond heron	RC
		Ardeidae	<i>Ardea alba</i>	Great egret	MU
		Ardeidae	<i>Mesophoyx intermedia</i>	Intermediate egret	MU
		Threskiornithidae	<i>Pseudibis papillosa</i>	Black ibis	MU
		Threskiornithidae	<i>Threskiornis melanocephalus</i>	Oriental white Ibis	MU
		Ciconiidae	<i>Anastomus oscitans</i>	Asian openbill	RO
		Ciconiidae	<i>Ciconia episcopus</i>	White necked Stork	RO
		3	Anseriformes	Anatidae	<i>Dendrocygna bicolor</i>
Anatidae	<i>Anas platyrhynchos</i>			Mallard	RM
4	Falconiformes	Accipitridae	<i>Elanus caeruleus</i>	Black shoulder kite	RC
		Accipitridae	<i>Accipiter badius</i>	Shikra	RC
5	Galliformes	Phasianidae	<i>Pavo cristatus</i>	India peafowl	RC
		Phasianidae	<i>Gallinula chloropus</i>	Common moorhen	RC
		Phasianidae	<i>Gallus gallus</i>	Red jungle fowl	RC
		Phasianidae	<i>Gallus sonneratii</i>	Grey jungle fowl	RC
6	Gruiformes	Rallidae	<i>Amaurornis phoenicurus</i>	White breasted waterhen	RC
		Recurvirostridae	<i>Himantopus himantopus</i>	Blackwinged Stilt	RC
7	Charadriiformes	Charadriidae	<i>Vanellus indicus</i>	Red wattled lapwing	RC
		Charadriidae	<i>Vanellus malabaricus</i>	Yellow wattled lapwing	RC
		Charadriidae	<i>Tringa nebularia</i>	Common green shank	WC
		Charadriidae	<i>Tringa totanus</i>	Common red Shank	WU
		Jacaniidae	<i>Metropidius indicus</i>	Bronze winged jacana	WC
		Columbidae	<i>Columba livia</i>	Blue rock pigeon	RC
8	Columbiformes	Columbidae	<i>Streptopelia senegalensis</i>	Laughing dove	RC
		Columbidae	<i>Streptopelia chinensis</i>	Spotted dove	RC
		Columbidae	<i>Streptopelia decaoto</i>	Eurasian collared dove	RC
		Columbidae	<i>Streptopelia decaoto</i>	Eurasian collared dove	RC
9	Psittiformes	Pisittidae	<i>Psittecula eupatria</i>	Alexandrine parakeet	RC
		Pisittidae	<i>Psittecula krameri</i>	Rose ringed parakeet	RC
10	Cuculiformes	Cuculidae	<i>Eudynamis scolopacea</i>	Asian koel	RC
		Centropodidae	<i>Centropus sinensis</i>	Greater coucal	RC
11	Coraciiformes	Alcedinidae	<i>Ceryle rudis</i>	Lesser pied kingfisher	RC
		Alcedinidae	<i>Halcyon smyrnesis</i>	White breasted kingfisher	RC
		Alcedinidae	<i>Alcedo atthis</i>	Common kingfisher	RC
		Coraciidae	<i>Coracias benghalensis</i>	Indian roller	RC
		Meropidae	<i>Merops orientalis</i>	Small bee eater	RC
12	Bucerotiformes	Bucertidae	<i>Ocyeros birostris</i>	Indian grey hornbill	RC
		Bucertidae	<i>Anthracoceros coronatus</i>	Malabar pied hornbill	MU
13	Upupiformes	Upupidae	<i>Upupa epops</i>	Common hoopoe	RC
14	Passeriformes	Motacillidae	<i>Motacilla flava</i>	Yellow wagtail	WC
		Motacillidae	<i>Motacilla alba</i>	White wagtail	WC
		Motacillidae	<i>Motacilla Maderraspatis</i>	Large pied wagtail	WC
		Motacillidae	<i>Motacilla citreola</i>	Citrini wagtail	WC
		Muscicapidae	<i>Copsychus saularis</i>	Oriental magpie robin	RC
		Muscicapidae	<i>Saxicoloides fulicata</i>	Indian robin	RC
		Muscicapidae	<i>Turdoides Striatus</i>	Jungle babbler	RC
		Muscicapidae	<i>Prinia inornata</i>	Plain prinia	RC
		Muscicapidae	<i>Ceromela fusca</i>	Indian chat	RC
		Muscicapidae	<i>Terpsiphone paradisi</i>	Asian paradise flycatcher	RC
		Corvidae	<i>Corvus splendens</i>	House crow	RC
		Corvidae	<i>Corvus macrorhynchos</i>	Jungle crow	RC
		Corvidae	<i>Passer domesticus</i>	House sparrow	RC
		Corvidae	<i>Dendrocitta vagabunda</i>	Indian treepie	RC
		Sturnidae	<i>Acridotheres tristis</i>	Common mayna	RC
		Sturnidae	<i>Acridotheres fuscus</i>	Jungle mayna	RU
		Sturnidae	<i>Sturnus pagodarum</i>	Brahminy starling	MC
		Sturnidae	<i>Sturnus contra</i>	Asian pied starling	RC
		Nectarinidae	<i>Nectarinia asiatica</i>	Purple sunbird	RC
		Pycnonifidae	<i>Pynonotus cafer</i>	Red vented bulbul	RC

Count....Table 1: Shows list of Birds species observed in Tawa Reservoir area

S.no	Order	Family	Scientific Name	Common Name	Status
		Aludidae	<i>Ammomanes phoenicurus</i>	Rufus tailed finch Lark	MC
		Aludidae	<i>Eremopteris grisea</i>	Ashy crowned sparrow lark	MC
		Oriolidae	<i>Oriolus oriolus</i>	Euration golden oriole	RC
		Lanidae	<i>Lanius schach</i>	Rufous backed shrike	WU
		Hirundinidae	<i>Hirundo rustica</i>	Barn swallow	MC
		Hirundinidae	<i>Hirundo tahitica</i>	House swallow	RC
		Campephagidae	<i>Tephrodornis gularis</i>	Large wood shrike	RC
		Dicruridae	<i>Dicrurus leucophaeus</i>	Ashy drongo	RC
		Dicruridae	<i>Dicrurus macrocerus</i>	Blank drongo	RC
		Irenidae	<i>Aegithina tipia</i>	lora	RC

R = Resident; U = Uncommon; W = Winter; O = Occasional migrant; C = Common; M = Migratory

white Ibis) *Anthracoceros coronatus* (Malabar pied Hornbill) were migratory uncommon (MU), *Sturnus pagodarum* (Brahminy Starling) *Ammomanes phoenicurus* (Rufus tailed Finch Lark) *Eremopteris grisea* (Ashy crowned Sparrow Lark), *Hirundo rustica* (Barn Swallow) were migratory common (MC), *Dendrocygna bicolor* (Large whistling Duck), *Anas platyrhynchos* (Mallard) RM, were found in winter season. The minimum diversity and species richness were recorded in rainy season (July-Oct) due to heavy rain, increased flow of water, less availability of food and return of migratory birds. *Anastomus oscitans* (Asian openbill), *Cionia episcopus* (White necked Stork) RO, *Acridotheres fuscus* (Jungle Mayna) RU species were observed which is uncommon and occasional in this area.

During rainy season, many birds shifted their place and moved to the surrounding agricultural and garbage area in search of food. Some birds, especially the Cattle Egret was also seen in less number during April-August. They started returning to the study sites in large number by September. The bird abundance was more in winter season from December to February and was less during May to July. Similar observations were made by Saxena (1975) on avifauna of Keoladeo National Park, Baratpur and Bhat et al. (2009) on avifaunal diversity of Anekere wetland, Karala, Udipi district, Karnataka.

Threskiornis melanocephalus (Oriental white Ibis) *Anthracoceros coronatus* (Malabar pied Hornbill), *Cionia episcopus* (White necked Stork), *Motacilla citreola*, *Dendrocitta vagabunda*, *Anhinga melangaster*, *Accipiter badius*, *Coracias benghalensis*, *Amouornis phoenicurus*, *Anas platyrhynchos*, were not seen during the year 2009 in winter, summer and rainy season while they were not seen in 2010. *Saxicoloides fulicata* (Indian Robin), *Passer domesticus* (House Sparrow) *Nectarinia asiatica* (Purple Sunbird), *Bubulcus ibis* (Cattle Egret) *Acridotheres tristis* (Common Mayna), *Turdoides striatus* (Jungle Babbler) some common species were seen in large number throughout the year. Wetland supports congregation of large number of migratory and resident species of birds, as it has high nutritional value as well as productivity (Whittaker and Likens, 1973; Gibbs, 1993; Paracuellos, 2006). Availability of food in different seasons, different type of vegetation, agricultural land, water availability in the area, field activities, favorable conditions were observed for birds' survival in this area. This also indicates that the study sites are equally important for bird watching and conservation of birds.

The determination of bird species will help in the evaluation

and comparison of possible changes regarding the bird fauna in the future

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