

DIVERSITY OF AVIFAUNA AND EFFECTS OF HUMAN ACTIVITIES ON BIRDS AT TAWA RESERVOIR AREA OF HOSHANGABAD DISTRICT (MADHYA PRADESH) INDIA

PRAGATI JOSHI and VINOD K. KRISHNA

Department Of Zoology, Govt. Mahatma Gandhi Memorial P.G. College, Itarsi (M.P)

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ABSTRACT: The birds of Tawa Reservoir (located at Hoshangabad district of Madhya Pradesh) were studied by using the Line Transect methodology. Five different stations were selected to determine bird species and seasonal diversity at Tawa Reservoir and its surrounding areas. The Shannon-Weinner Index was used to ascertain bird diversity. During the observation period totally 74 bird species belonging to 14 orders and 33 families were determined and listed. Among these species three near threatened species, namely Darter (*Anhinga melanogaster*), Oriental white Ibis (*Threskiornis melanocephalus*), and Malabar pied Hornbill (*Anthracoceros coronatus*) were also recorded. The density of these bird species were less but their presence indicated that the area is favorable for conservation of these species. The result also shows that the wetland area, agriculture land and surrounding vegetation are favorable environmental conditions suitable for the migratory, resident as well as the threatened species of birds. But apart from this, the interference of human activities i.e. agriculture, deforestation etc is also increasing day by day. So, the anthropogenic activities such as use of chemicals in agriculture land, and logging will affect adversely the bio-diversity of birds at this region in future.

INTRODUCTION

Biodiversity is a measure of the numbers of species that make up a biological community and is considered to be one of the most important aspects of community organization and structure. The diversity of bird species is expected to vary with habitat type even at the smallest spatial scales. Among the living organisms, birds are regarded as important indicators of environmental fluctuations. Many studies have demonstrated the importance of habitat heterogeneity in wetland bird richness and abundance ([Svingen and Anderson, 1998](#); [Edwards and Otis, 1999](#); [Fairbairn and Dinsmore, 2001](#); [Riffel et al., 2001](#); [Zarate-Ovando, 2008](#); [Datta, 2011](#)). Changes in landscape structure result in habitat loss and fragmentation which in turn affect biodiversity and ecosystem processes in urban areas ([Saunders et al., 1991](#); [Grimm et al., 2008](#); [Buyantuyev and Wu, 2009](#); [Buyantuyev and Wu, 2010](#); [Wu 2009](#)). The present study aim to document avian diversity at Tawa Reservoir and its surroundings in Hoshangabad District of Madhya Pradesh. The diversity was carried out at five different stations to determine diversity of bird species in three different seasons. The study will also indicate the anthropogenic activities which may affect avian diversity in future.

MATERIAL AND METHODS

2.1. Study area

Tawa Reservoir is situated at Hoshangad district of Madhya Pradesh, India. 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°05'30" 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 (Figure 1). Average annual rain fall in the district is 134 cm. and the average maximum and minimum temperatures recorded in the district are 32 degree Celsius and 19 degree Celsius respectively.

Corresponding Author: PRAGATI JOSHI, Department Of Zoology, Govt. Mahatma Gandhi Memorial P.G. College, Itarsi (M.P). Email: pjoshi182@rediffmail.com

Overall, the climate of the district is pleasant throughout the year which fascinating to avian fauna habitat.

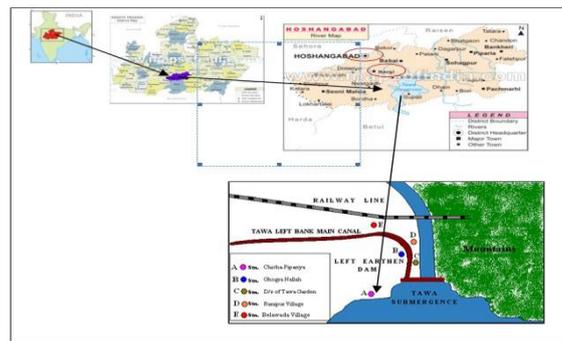


Figure 1: Location of Tawa Reservoir and study sites

During the preliminary survey of the study period, five stations were chosen at Tawa Reservoir area. The five stations were as follows:

Station A: Chicha-Pipariya; this station is about 5-6 Kms from Left Earthen Dam, submergence area near the village. During the time of heavy rainfalls this area gets flooded with water, the rest of the year local tribal cultivate a variety of crops.

Station B: Ghogra Nallah; It is situated 0.5Km away from LBMC (Left Bank Main Canal), here many times the nearby tribal people are seen in fishing activity.

Station C: Garden Area; There are two gardens in Tawa reservoir area, namely –“Main Garden” and “Downstream Garden”. The main gardens spread over 5-6 acres area of land have wide variety of vegetation. The tourists visit Tawa-Dam and Tawa Resort to view the reservoir from the garden area.

Station D: Ranipur Village; which is near river (Downstream) of Tawa Dam. The soil of this region is sandy and is not suitable for cultivation but it has variety of vegetation.

Station E: Belawada Village; It is an agricultural area and situated on the right side of LBMC (Left Bank Main Canal) at a distance of 6 Km.

2.2. Data Collection Techniques

- Field data of birds of the reservoir and surrounding areas were collected during winter season at morning hours between 6.30 am to 9.00 am, at noon from 12 Noon to 2 pm and evening from 4.00 pm to 6.00 pm, during summer season at morning hours between 5.00 am to 7.00 am, at noon from 12 Noon to 2 pm and evening from 5.00 pm to 7.00 pm while, during rainy season at morning hours between 6.00 am and 8.30 am, from 12 Noon to 2 pm and evening from 4.30 pm to 6.30 pm respectively by using binocular (20 x 50 magnification). Photographs and video graphs taken by using DCR-DVD 610E Digital Video Camera Recorder (Sony Handy cam, 40x Zoom), and recorded census data. The Identification of birds was done by using the field guide “The book of Indian birds (Thirteenth Edition)” by [Ali, \(2002\)](#) and with the help of Forest Department of Itarsi and Hoshangabad. The bird species diversity was determined by using [Shannon-Weinner Index \(1949\)](#).
- Direct observations (bird watching) as well as personal interviews with local people were taken during the study period.

RESULT AND DISCUSSION

In our study 74 bird species belonging to 33 families and 14 orders were recorded. Among these species three near threatened species, namely Darter (*Anhinga melanogaster*), Oriental white Ibis (*Threskiornis melanocephalus*), and Malabar pied Hornbill (*Anthraceros coronatus*) were also recorded. Pesticide and insecticide used during various season in the study area was gathered from the local farmers and effect of these on the birds were observed.

Farmers use huge quantity of fertilizers, weedicides, insecticides and other pesticides for pest control and to get best quality of crops. Due to the use of these chemicals the availability of avian food was affected which was noticed during the study period in different seasonal crops *i.e.* Rabi and Khariff. Agricultural pesticides can reduce the abundance of weeds and insects that are important food sources for many bird species. Availability of insects were affected adversely which are mainly eaten by Cattle Egrets and other birds (Figure 2). Insecticides also affect invertebrate populations in the fields; herbicides also affect weed seed production thereby potentially reducing the availability of seed food for granivorous bird species ([Heard et al., 2003](#)).



Figure 2: Birds in agriculture land

To identify the habitat selection of Egrets, their feeding sites were investigated by [Kim et al., \(2001\)](#) and it was found that Egret (*Egretta intermedia*) and Cattle Egret (*Bubucus ibis*) tend to use only rice paddy field for foraging. The researchers pointed out that there was a decrease in the number of passage birds depending on the increase in the variety and quantity of pesticides used for agricultural activities ([Yyldyrym and Ozcan, 2007](#)). Many pesticides are toxic to insects, birds, mammals, amphibians, or fish. In Europe, the population decline among farmland birds was far greater in countries with more intensive agriculture, and in a statistical analysis 'cereal yield' explained over 30% of the trend in population change. Herbicides can change habitats by altering vegetation structure, ultimately leading to population decline. Fungicide use has also allowed farmers to stop growing 'break crops' like grass or roots. This has led to the decline of some arable weeds ([Boatman, 2007](#)). Lower availability of key invertebrates and seed food for farmland birds in northern Europe was likely due to insecticides and herbicides, intensification and specialization of farmland, loss of field margins, and ploughing ([Wilson, 1999](#)). Bird species at risk from indirect effects caused by pesticides in the UK include grey partridge, corn bunting, yellowhammer, red-backed shrike, skylark, tree sparrow, and yellow wagtail ([CSL, 2005](#)). Farmers' pest management practices such as the amount and timing of insecticide use significantly affect ladybeetle densities ([Zhou and Huang, 2014](#)).

In the study area local people cut down the trees for their house hold purposes (Figure 3). Besides, they let loose animals to graze in the vicinity. Therefore animals are found grazing nearby area and they also damage the surrounding vegetation. Along this, it was also observed that, there was illegal cutting of trees in the area. Illegal wood cutting has caused nuisance and cutting short to the habitat of the forest dwellers and animals.



Figure 3: Logging

Various birds also live, build their nests and derive their food from the trees. Industrial timber harvesting has altered the natural state of forested landscapes at an increasing rate ([Frankli and Forman, 1987](#)). The extensive implementation of clear cutting has caused high degrees of forest fragmentation ([Bergeron, 2000](#)). Avifaunal communities are highly sensitive to changes in habitat caused by human disturbance ([Watson et al., 2004](#); [Pidgeon et al., 2007](#)) hence they have been used effectively as bio-indicators in many ecosystems ([Gottschalk et al., 2005](#)).

CONCLUSION

It is concluded that at Tawa Reservoir and its surrounding areas is the environment of the study areas being suitable for avian fauna. But the anthropogenic activities such as use of chemicals in agriculture land, and logging will affect adversely the bio-diversity of birds at this region in future. Hence effective steps should be taken for environmental protection, conservation of birds and vegetation to protect the avian diversity so that this area can prove to be a blessing to the threatened bird species of India.

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