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AVIFAUNAL DIVERSITY OF TAWA RESERVOIR AND ITS SURROUNDING AREAS OF HOSHANGABAD DISTIRCT (MADHYA PRADESH)

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ABSTRACT : The avian diversity of Tawa reservoir, at Hoshangabad district of Madhya Pradesh, was studied during the period of January 2009 to December 2009. The diversity was carried out at five different stations to determine different bird species in three different seasons in Tawa reservoir and its surrounding areas by adopting the line transect methodology. The total 64 bird species belonging to 13 orders were listed in study areas. Diversity was determined by using Shannon-Weinner Index and ANOVA (single factor) to compare the bird diversity in different stations in different seasons. The result indicates that the value of Shannon –Weiner Index *(H')* of bird diversity throughout the three seasons of the year 2009 were high at these stations i.e. Chicha –Pipariya *H'*=1.337664 with the species richness (S=56) and in Belawada *H '*=1.335499 with the species richness (S=58) during winter season in comparison to summer and rainy seasons. However, overall, no much significant differences ($p>0.05$) were noticed in diversity of birds at five study stations during all the three seasons throughout the year. It shows that the habitats, that are required for avian fauna are almost equally available at all five study stations.
Key words: Avian diversity, ANOVA, Line transect, Shannon-Weinner Index, Species richness.

INTRODUCTION

Birds are one of the most populous life forms on the planet, and its diversity leads to a richness of life and beauty. Apart from this, birds have always fascinated mankind with their intrinsically beautiful plumage, melodious songs and artistic behaviour, Shrestha [1] .There are around 9000 species of birds living in the world today, with a tremendous diversity of life style. Besides this, birds are valuable for many aspects *i.e.* sensitive indicator of pollution and also play great role in pest control. Avian species richness and diversity along with the densities of some common bird species in relation to habitat features on farmland were studied by Mark [2]. Ali and Ripley [3] and Shrestha [1, 4] were used to study the feeding behaviour of birds and its role in pest control. Density of breeding weaverbirds *Ploceus* spcies have been made in Andhra Pradesh, India by Mathew [5] and Punjab Dhindsa [6].

In the present study, the avian fauna is studied at Tawa Reservoir and its surroundings in Hoshangabad District of Madhya Pradesh. The vegetation around the Tawa Reservoir is very rich with biological diversity. The area is traditionally rich in wild life due to their rich vegetation and the surrounding environment is very favorable for wild life. A large variety of birds and insects (butterflies and moths) are present in the surrounding area of the reservoir. The study about the status and diversity of birds of Tawa Reservoir and its surrounding area are less study, so this study has been undertaken to observe avian diversity of Tawa reservoir and its surrounding areas at Hoshangabad district.

MATERIALS AND METHODS

Study area: Tawa Reservoir is situated at Hoshangaad 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 22033'44" North latitude and $77^0$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 degree Celsius and 19 degree Celsius respectively. Overall, the climate of the district is pleasant throughout the year which fascinating to avian fauna habitat.

Reconnaissance survey:

During the preliminary survey of the study period, five stations were choosen 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 doing fishing.

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, view the reservoir from the garden area.

Station -D. Ranipur Village-Which is near river (Down stream) 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 it is situated on the right side of LBMC (Left Bank Main Canal) at a distance of 6 Km.

Study design: The study was carried out throughout the year during all the three season *i.e.*, Rainy (July to October), winter (November to February) and summer (March to June) seasons by regular visits at the interval of two to five days. The line transect method was opted for birds survey and censes by Burnham *et al.,* [7]. The number of transects lay was based on the relative extents of the habitats. Separate transects were established in each habitat and data was collected and analyzed separately and length of transect ranged upto 3 Km. The appropriate transect width (approximately 100 meter) depended on the species, was counted. Different transect widths (W) were used for different bird species even in the same survey.

Data Collection Techniques: Field data of birds of the reservoir and surrounding areas were observed during winter season at morning hours between 6.30 am and 9.00 am, 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, 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 using DCR-DVD 610E Digital Video Camera Recorder (Sony Handy cam, 40x Zoom), were used for observations and recorded census data. The Identification of birds was done by using the field guide "The book of Indian birds (Thirteenth Edition)" by Ali [8] and with the help of Forest Department of Itarsi and Hoshangabad.

Data Analysis : The bird species diversity was determined by using Shannon-Weinner Index [9] and ANOVA (single factor) were used to compared diversity between seasons and different station at (α =0.05). The statistical data was processed using Microsoft Excel 2007.

RESULT AND DISCUSSION

In our study there were 64 bird species belonging to 13 orders were recorded. In the study areas eight species winter common (WC), forty four species resident common (RC), one species resident migratory (RM), two species winter uncommon (WU), one species resident uncommon (RU), four species migratory common (MC) and four species migratory uncommon (MU) were observed. Apart from this, *Saxicoloides fulicata* (Indian Robin), *Passer domesticus* (House Sparrow) *Nectarinia asiatica* (Purple Sunbird), *Bubulcus ibis* (Cattle Egret) *Acridotheres tristis* (Common Mayna), *Turdoides Striatus* (Jungle Babbler) and Small Bee-eater (*Merops orientalis*) some common species were seen high in number throughout the years **(Table No-1).** Kulkarni *et al.,*[10] reported fifteen species, namely, Cattle Egret, Red- wattled Lapwing, Blue Rock Pigeon, Eurasian collared-Dove, Rufous collared-Dove, Rose-ringed Parakeet, Greater Coucal, Brainfever Bird, House Swift, Small Bee-eater, Common Swallow, Black Drango, Common Myna, Red-vented Bulbul, White- throated Munia, were common at Nanded city, Maharashtra. Occurrences of these birds are due to local environmental conditions and impacts of seasons.

Seasonal variations in diversity of birds during the study period are shown in **Table No-2**. The value of Shannon –Weiner Index (*H'*) of avian diversity throughout the three seasons of the year 2009 were high at Chicha –Pipariya *H'*=1.337664 with the species richness (S=56) and in Belawada *H'*=1.335499 with the species richness (S=58) during winter season .While in summer, it was high value in only Chicha-Pipariya *H* '=1.114487 (S=48) and in Belawada *H'*=1.088982 (S=49) areas. Apart from this, in the rainy season *H'*=1.105013 with (S=41) was found in Belawada and Chicha–Pipariya *H'*=1.070391 (S=38) in comparison to the other than three stations.

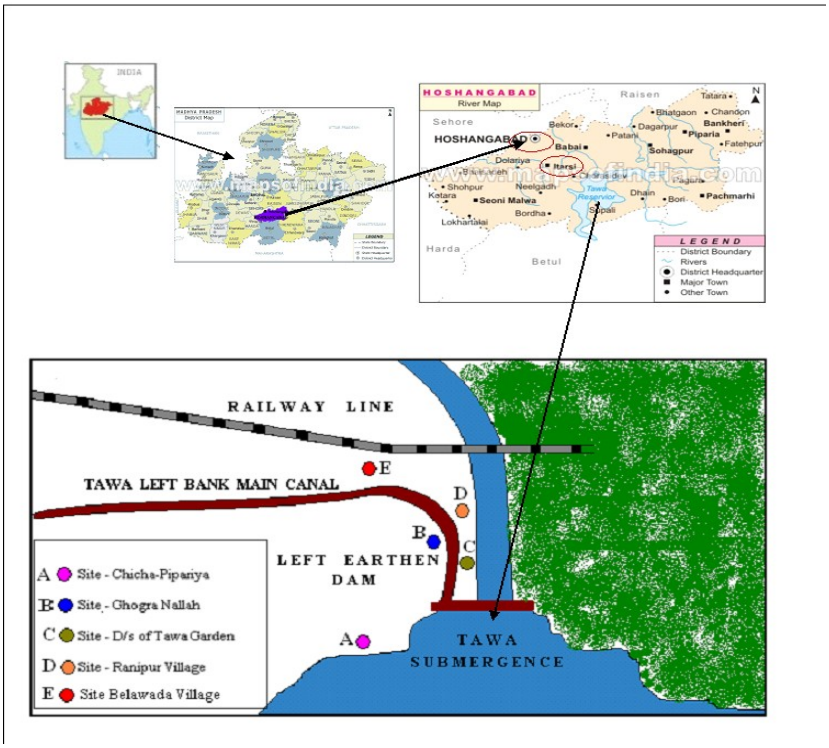

Figure 1:- Location of Tawa Reservoir and study sites.

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

S. No.	Order	Family	*Scientific Name*	Common Name	Status
1	Pelecaniformes	Phalacocoracidae	*Phalacocorax niger*	Little Cormorant	WC
		Phalacocoracidae	*Phalacocorax carbo*	Indian Shang	WC
		Phalacocoracidae	*Phalacocorax fuscicollis*	Indian Cormorant	WC
2	Ciconiformes	Ardeidae	*Bubulcus ibis*	Cattle Egret	RC
		Ardeidae	*Egretta garzeta*	Little Egret	RC
		Ardeidae	*Ardeola grayii*	Indian pond Heron	RC
		Ardeidae	*Ardea alba*	Great egret	MU
		Ardeidae	*Mesophoyx intermedia*	Intermediate egret	MU
		Threskiornithidae	*Psudibis papillosa*	Black ibis	MU
3	Anseriformes	Anatidae	*Dendrocygna bicolor*	Large whistling Duck	RM
4	Falconiformes	Accipiteidae	*Elanus cacerules*	Black shoulder Kite	RC
5	Galliformes	Phasianidae	*Pavo cristatus*	India Peafowl	RC
		Phasianidae	*Gallinula chloropus*	Common Moorhen	RC
		Phasianidae	*Gallus gallus*	Red jungle Fowl	RC
		Phasianidae	*Gallus sonneratii*	Grey jungle Fowl	RC
6	Charadiiformes	Recurvirostridae	*Himantopus himantopus*	Black winged Stilt	RC
		Charadriidae	*Vanellus indicus*	Red wattled Lapwing	RC
		Charadriidae	*Vanellus malabaricus*	Yellow wattled Lapwing	RC
		Charadriidae	*Tringa nebularia*	Common green Shank	WC
		Charadriidae	*Tringa totanus*	Common red Shank	WU
		Jacanidae	*Metropidius indicus*	Bronze winged Jacana	WC
7	Columbiformes	Columbidae	*Columba livia*	Blue rock Pigeon	RC
		Columbidae	*Streptopelia senegalensis*	Laughing Dove	RC
		Columbidae	*Streptopelia chinensis*	Spotted Dove	RC
		Columbidae	*Streptopelia decaoto*	Euratian collared Dove	RC
8	Psittaformes	Pisstacidae	*Psittecula eupatria*	Alexandrine Parakeet	RC
		Pisstacidae	*Psittecula krameri*	Rose ringed Parakeet	RC
9	Cuculiformes	Cuculidae	*Eudynamys scolopacea*	Asian Koel	RC
		Centropodidae	*Centropus sinensis*	Greater Coucal	RC
10	Coraciiformes	Alcedinidae	*Ceryle rudis*	Lesser pied Kingfisher	RC
		Alcedinidae	*Halcyon smyrnesis*	White breasted Kingfisher	RC
		Alcedinidae	*Alcedo atthis*	Common Kingfisher	RC
		Meropidae	*Merops orientalis*	Small Bee eater	RC
11	Bucerotiformes	Bucertodae	*Ocyceros birostris*	Indian grey Hornbill	RC
		Bucertodae	*Anthracoceros coronatus*	Malabar pied Hornbill	MU
12	Upupiformes	Upupidae	*Upaupa epops*	Common Hoopoe	RC
13	Passeriformes	Motacillidae	*Motailla flava*	Yellow Wagtail	WC
		Motacillidae	*Motailla alba*	White Wagtail	WC
		Motacillidae	*Motacilla Maderraspatensis*	Large pied Wagtail	WC
		Muscicapidae	*Copsychus saularis*	Oriental magpie Robin	RC
		Muscicapidae	*Saxicoloides fulicata*	Indian Robin	RC
		Muscicapidae	*Turdoides Striatus*	Jungle Babbler	RC
		Muscicapidae	*Prnia inornata*	Plain Prinia	RC
		Muscicapidae	*Ceromela fusea*	Indian Chat	RC
		Muscicapidae	*Terpsiphone paradisi*	Asian paradise Flycathcher	RC
		Corvidae	*Corvus splendens*	House Crow	RC
		Corvidae	*Corvus macrorhynchos*	Jungle Crow	RC
		Corvidae	*Passer domesticus*	House Sparrow	RC
		Sturnidae	*Acridotheres tristis*	Common Mayna	RC
		Sturnidae	*Acridotheres fuscus*	Jungle Mayna	RU
		Sturnidae	*Sturnus pagodaram*	Brahminy Starling	MC
		Sturnidae	*Sturnus contra*	Asian pied Starling	RC
		Nectrainidae	*Nectarinia asiatica*	Purple Sunbird	RC
		Pycnonifidae	*Pynonotus cafer*	Red vented Bulbul	RC
		Aludidae	*Ammomanes phenicurus*	Rufus tailed Finch Lark	MC
		Aludidae	*Eremopteris grisea*	Ashy crowned Sparrow Lark	MC
		Oriolidae	*Oriolus oriolus*	Euration golden Oriole	RC
		Lanidae	*Lanics schach*	Rufous backed Shrink	WU
		Hirundinidae	*Hirundo rustica*	Barn Swallow	MC
		Hirundinidae	*Hirundo tahitica*	House Swallow	RC
		Campephagidae	*Tephrodornis gularis*	Large wood Shrink	RC
		Dicruridae	*Dicrurus leucophaeus*	Ashy Drongo	RC
		Dicruridae	*Dicrurus macrocerus*	Blank Drongo	RC
		Irenidae	*Aegithina tipia*	Iora	RC

Legend-R=Resident U=Uncommon , O=Occassional, W=Winter Migrant , C=Commom, M=Migratory

Table 2 -Bird diversity 2009 (Shannon- weiner index *H'*)

SITES → SEASONS ↓	Belawada	Ranipur	Ghogra Nallah	Chicha-Pipariya	Garden Area
WINTER	1.335499	1.243649	1.124203	1.337664	1.245038
SUMMER	1.088982	0.920223	0.83239	1.114487	1.037792
RAINY	1.105013	0.874143	0.789178	1.070391	0.938935

Minor difference was noted in diversity and species richness among Belawada and Chicha-Pipariya. Diversity and species richness were high than other three stations (Ghogra Nallah, Ranipur and Garden area) because both the stations (Belawada and Chicha-Pipariya) are having approximately same vegetation type, cultivated land and water availability). In winter season availability of abundant food, water supply through canal and increased vegetation, attract migratory and residents birds in this area. The wetland area provides food and breeding ground to the migrants and residents. Some authors have also found change in community patterns of birds during different seasons (Bilcke [11], Morrison *et al*., [12], Poulin *et al.,* [13], López [14] and Moro). Bhat *et al.,* [15] also reported that the bird density or the number of individuals were more in winter season during December –Feb and less in May-July.

The data for diversity and species richness throughout the three seasons of the year 2009 were assessed using ANOVA (single factor). Overall, there was no significant difference ($p>0.05$) in diversity of birds at five study stations during all three seasons throughout the year. It shows that the habitats, that are required for birds are almost equally available at all five study stations. This also indicates that the study stations are equally important for bird watching and conservation of birds.

CONCLUSION

This study includes avian diversity of Tawa reservoir of Hoshangabad district during different seasons of the year 2009. It had been observed that the avian diversity during winter season was more in comparison to rainy and summer seasons. Whereas, the diversity of birds in the agricultural area of Belawada and Chicha-Pipariya was more during all three seasons as compared to the rest of the three stations of the study area. Apart from this, no much significant ($p>0.05$) were noticed overall all the five stations when ANOVA (single factor) were applied. This suggest that the habitat i.e. availability of food, water, climatic conditions and surrounding vegetation of all five stations are equally favorable for avian fauna.

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