



Research Paper

Hydrophytes and Ichthyofaunal Diversity of Chhattarpur Pond Jabalpur

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Abstract: The present was undertaken to know diversity of hydrophyte species of the Chhattarpur pond of Jabalpur. The research was conducted for the period of six months from September, 2023 to February 2024, during the study period, samples were collected twice a month. A total of 07 hydrophyte species belonging to 07 families and a total Eight fish species belonging to two orders were recorded. The diversity was measured by the Shannon-wiener and Simpson's species diversity index. Mean and Standard deviations of the hydrophyte diversity indices were recorded 1.5466 ± 0.1108 and 0.2589 ± 0.0383 , respectively. On the other hand, cypriniformes and ophiocephaliformes orders were recorded with *cirrhinus mrigala* dominancy.

Keywords: Chhattarpur pond, Hydrophyte, Ichthyofaunal Diversity

Introduction:

Hydrophytes can be used as a tool in the determination of pollution and nutrient levels water quality and lake condition (Melzer, 1999). Hydrophytes are plants adapted to aquatic environments and can only grow in

water. The hydrophytes are submerged, free-floating, marshy and amphibious in nature (Khaparde and Harney, 2018). Hydrophytes play a major role in the primary productivity of the aquatic ecosystem. They use nutrients and thus influence water quality and control water quality by Exuding various organic and mineral components. Aquatic communities reflect anthropogenic influence and are very useful to detect and assess human impacts (Solak et al., 2012). Pond water is considered one of the major sources of fish production. Ponds are common features of many landscapes and often contribute to the bulk of regional freshwater biodiversity (Williams et al., 2004). The rich biodiversity of any ecosystem is essential to maintain its stability for the proper function of its food chains (Siddiqui et al., 2014). The fish constitute an economically important group of animals. Ichthyofaunal documentation is important to analyze the status of fish species and also helps us in future planning to improve and conserve the biodiversity (Bose et al., 2013). The study of the biodiversity of fish fauna and their identification is one of the interesting fields of biological research, which gives us an idea about the morphological variations and population

diversity of fauna in polluted and non-polluted sites of any particular habitat (Napit, 2013). The adverse effects of the environment, climatic changes, increment in water temperature, declining water level, pesticide, xenobiotic compounds and embellish in the aquatic bodies affected the fisheries productivity, hence decreasing the number of aquatic organisms especially fish species, in the aquatic ecosystem (Parihar

and Dubey, 1995).

Materials and Methods:

The research was conducted in Chhattarpur pond of Jabalpur District, (Madhya Pradesh), India. The Chhattarpur pond fig 01 is located in Jabalpur in city at altitude 23°17'02.5" N and longitude 80°02'12.7" E having a catchment area of 210437 km².



Fig 01: Map showing the location of Chhattarpur pond, Jabalpur

Collection and identification of Hydrophytes were done from four corners and the middle of the pond, by hand-picking method. Collected samples of hydrophytes were identified as per the identification guides of Santhanam et al., 1989 and Gupta et al., 2007. Collection and Identification of Fish Species were done with the help of local fishermen by using different types of nets namely gill net (mesh size of 2-3 inches), cast net (mesh size of 2.5 cm) and drag net (mesh size of 5 cm) as per the method (Narway et. al., 2019). Fish sample were collected at fortnightly intervals (15 days). Fishes were identified by using the identification keys of Jayaram 2010 and Talwar and Jhingran, 1991.

Results and Discussion:

The diversity indices were calculated using the field data and laboratory analysis was carried out at Department of Fishery Science, Jabalpur. The result obtained in the present

investigation have been summarized below.

Assessment of hydrophytes diversity of Chhattarpur pond, Jabalpur

A total of 07 hydrophyte species of the pond belonging to 04 ecological groups viz., Submerged, Rooted-floating, Free-floating and Emergent were recorded. In the Submerged ecological group, 02 species were identified comprising the families of Ceratophyllaceae and Hydrocharitaceae the species were *Ceratophyllum demersum* and *Hydrilla verticillata* which were 36% and 15% of the total families. Out of the two species, *C. demersum* was the most dominant species followed by *H. verticillata*. In the rooted -floating leaved two species were identified comprising the families of Trapaceae and Pontederiaceae, the species were *Trapa natans* and *Eichhornia crassipes* which were 30% and 05%. In the free-floating ecological group, two species were identified comprising the families of

Lemnaceae and Salviniaceae, the species were *Lemna minor* and *Azolla pinnata*, which were 07% and 04% of total families. In addition, 01 Emergent species i.e. *Ipomea carnea* comprising the family Convolvaceae which was 03% of the total family.

Measurement of Diversity

Diversity of hydrophytes of Chhattarpur pond, Jabalpur

The species diversity of hydrophytes was estimated based on the Shannon-wiener diversity index (H). The range was recorded between 1.392 to 1.704 from the Chhattarpur pond. The maximum value 1.704 was observed in the month of December, 2023 and the minimum value (1.392) was recorded in the month of January, 2024. The result of the present study showed that the hydrophyte diversity which includes species richness and species evenness, does not remain the same throughout the year. Which is shown in Fig. 03.

The Simpsons diversity index of the Chhattarpur pond site varied in the ranges between 0.20576 to 0.31590 Simpsons species diversity was the maximum (0.20576) during December, 2023. While it was minimum (0.31590) during January, 2024 shown in Fig 04.

The fish species density, abundance and distribution recorded from the Chhattarpur pond are shown in Fig. 01.

In present study total of 08 fish species were recorded belonging from 02 orders viz., Cypriniformes and Ophiocephaliformes. In the Cypriniformes order, a total of six fish species were identified comprising the family of Cyprinidae, the species were *Cirrhinus mrigala*, *Labeo rohita*, *Labeo catla*, *Cyprinus carpio*, *Hypophthalmichthys nobilis* and *Ctenopharyngodon Idella*, which were 91%. Out of the six species, *C. mrigala* was the most dominant species followed by *L. rohita* and *L. catla*. In Ophiocephaliformes order only two fish species were identified from the Ophiocephalidae family the species were *Channa striata* and *Channa marulius* which was 09% from this order.

Diversity of fish species

The species diversity of fish was estimated based on the Shannon-wiener diversity index (H). The range was recorded between 1.719 to 1.924 from Chhattarpur pond. The maximum value (1.924) was observed in the month of January, 2024. The result of the present study showed that the fish diversity which includes species richness and species evenness, does not remain the same throughout the year. In addition, the fish diversity was higher in Chhattarpur pond, however, the diversity of the pond was high which is showed in Fig 03.

Simpson's (Dominance) species diversity index (D) of fish species of Chhattarpur pond

The Simpson's diversity index of the fish species varied in the range between 0.156 to 0.198 Simpson's species diversity was the maximum (0.156) during the month of November, 2023. While it was minimum (0.198) during the month of January, 2024.

Result of the present study correlated with the other Researchers such as Jain, 2017 studied on fish species of 09 different water bodies of Western, Uttar Pradesh and recorded the presence of 61 species of 09 different orders viz., Cypriniformes, Siluriformes, Perciformis, Clupeiformes, Ophiocephaliformes, Beloniformes, Mastacembaliformes, Tetrodontiformes and Mugiliformes in the different water bodies. The orders Cypriniformes composed of 38%, Siluriformes 23%, Perciformes 13%, Clupeiformes 06%, Ophiocephaliformes 07%, Beloniformes 03%, Mastacembaliformes 05%, Tetrodontiformes 03% and Mugiliformes 02%, each of the total fish species.

The result of the present study also correlated with other Researchers Jesintha et al., 2020. They recorded fish species from Somasila reservoir in Andhra Pradesh. A total of 19 species of 06 different orders viz., Cypriniformes, Perciformes, Siluriformes,

Osteoglossiformes, Anguilliformes and Gobiiformes in the reservoir. The order Cypriniformes 37% Perciformes 26%, Siluriformes 21%, Osteoglossiformes 05%, Anguilliformes 05% and Gobiiformes 06% each of the total fish species.

Conclusions:

The present study gives an idea of existing fish species which revealed that, a total of 08 fish species, 02 orders, 02 families and 08 genus were recorded in Chhattarpur pond. A total of 07 hydrophyte species belonging to 07 families and a total Eight fish species belonging to two orders were recorded. It was found that Shannon-wiener diversity index (H) and Simpson's (Dominance) species diversity index (D) of fish species was recorded higher level in the Chhattarpur pond.

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Table 1. Percentage contribution of fish species from two orders collected from Chhattarpur pond

S. No.	Order	Family	Genus	Species	Common name
1.	Cypriniformes	Cyprinidae	I. <i>Cirrhinus</i>	<i>mrigala</i>	Naraini
			II. <i>Labeo</i>	<i>rohita</i>	Rohu
			III. <i>Labeo</i>	<i>catla</i>	Catla
			IV. <i>Cyprinus</i>	<i>carpio</i>	Common carp
			V. <i>Hypophthalmichthys</i>	<i>molitrix</i>	Bighead carp
			VI. <i>Ctenopharyngodon</i>	<i>idella</i>	Grass carp
			I. <i>Channa</i>	<i>striatus</i>	Bhunda
2.	Ophiocephaliformes	Ophiocephalidae	II. <i>Channa</i>	<i>marulius</i>	Saur

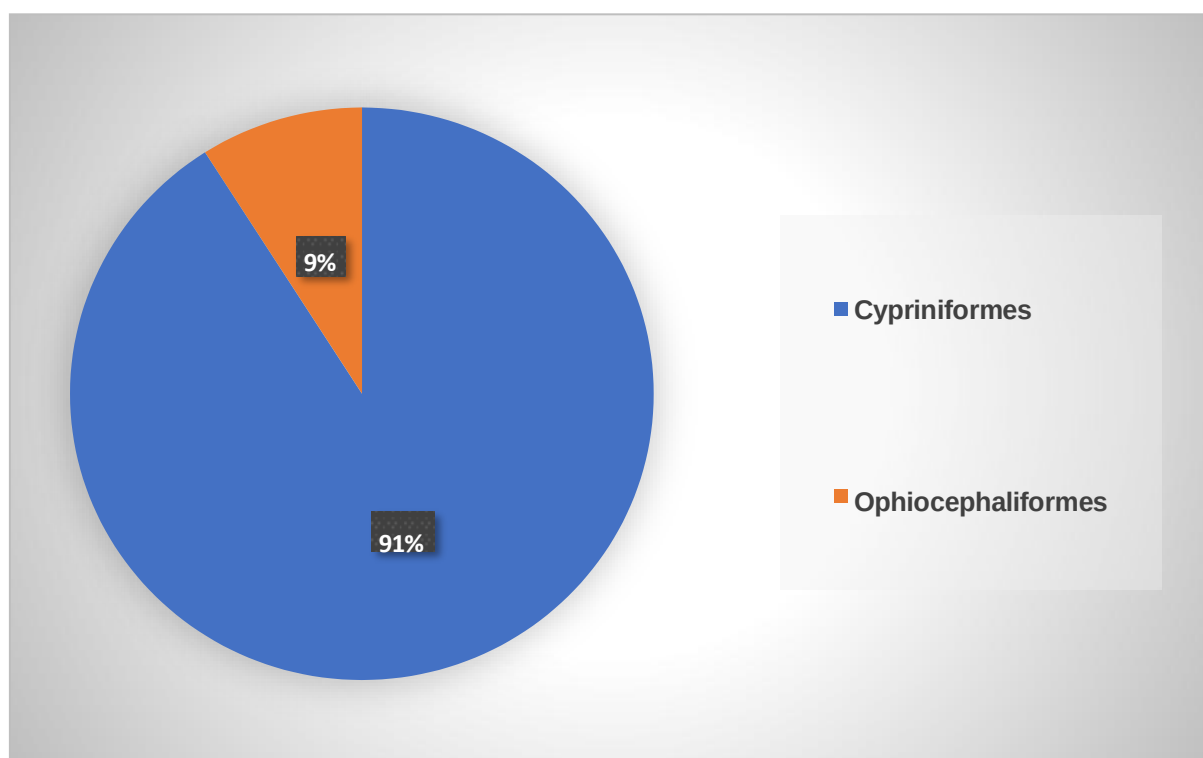


Fig 02: Fish species of the Chhatarpur pond

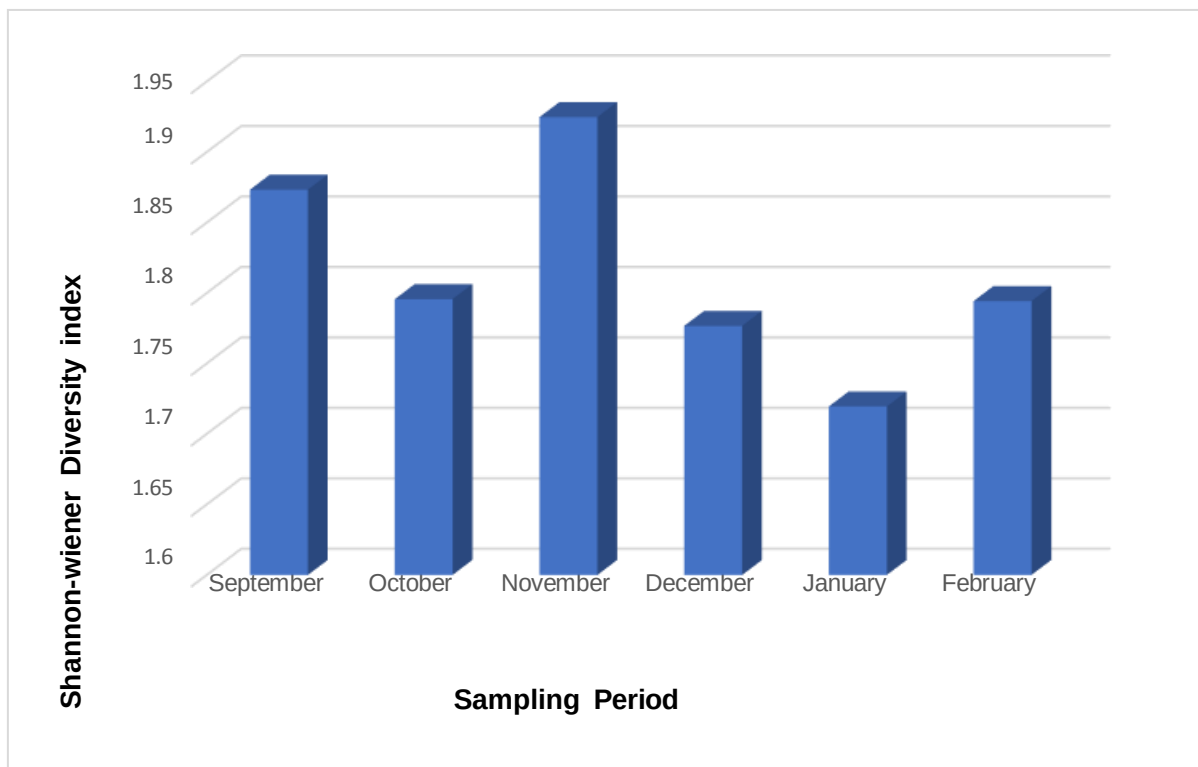


Fig 03: Shannon -wiener diversity index of fish species of Chhattarpur pond

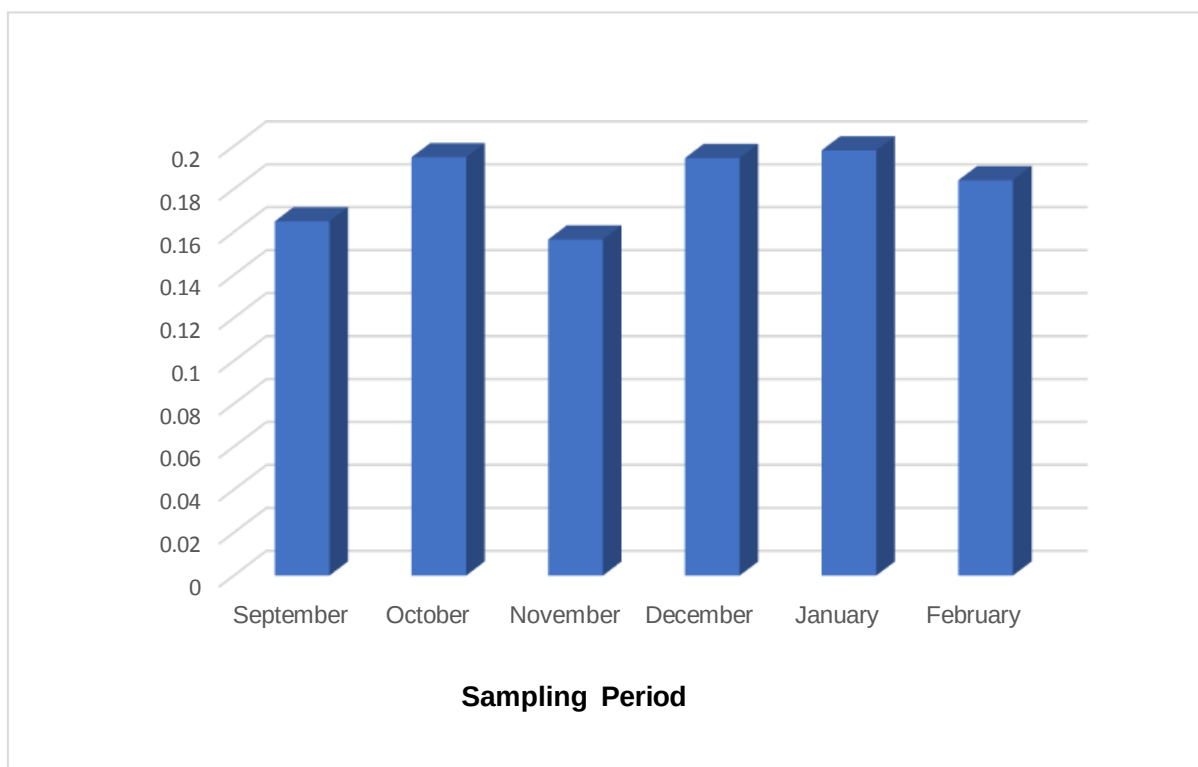


Fig 04: Simpson's (Dominance) species diversity index of fish species of Chhattarpur pond