International Journal of Ecology and Environmental Sciences
www.ecologyjournal.in
Online ISSN: 2664-7133; Print ISSN: 2664-7125; Impact Factor: RJIF 5.28
Received: 14-12-2020; Accepted: 29-12-2020; Published: 14-01-2021
Volume 3; Issue 1; 2021; Page No. 102-105

Study of ichthyofaunal diversity of amarpura dam district Dungarpur (Raj.)

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Abstract
This study involves the study of the diversity of fish fauna in the dam of Amarpura. An ichthyofaunal survey was conducted between January 2019 and January 2020 to determine the diversity and distribution of freshwater fishes in the Amarpura dam. 26 species (9 families) belonging to 6 orders were collected in this study. The Cyprinidae, Heteropneustidae, Ambassidae, and Channidae were the three abundant families. The index of Shannon-Weiner diversity was 1.302. This study has produced baseline data on ichthyofunal diversity that can now be regularly monitored and form the basis for future plans of fisheries and conservation.

Keywords: amarpura dam, Spices richness, ichthyofaunal diversity

Introduction

Rajasthan, India's largest state, is well known for its multifaceted topography. Rajasthan is well known for the Thar Desert, the north western region. The eastern area Rajasthan is renowned for the hills of Aravalli, while the southern section of this state provides typical sites of water supplies. Human-made reservoirs are commonly found here. Fishes from the Indian subcontinent's inland water bodies have been researched long ago [1, 2, 3, 4, 5, 6]. India is one of the world's mega biodiversity countries and ranks ninth in freshwater biodiversity [7].

Water is most essential for life and plays a vital role in the ecosystem which provides habitats for migratory birds, aquaculture, plants, animals & microbes [8]. The reservoirs are a crucial part of inland aquatic resources of India, which known for their rich biogenic production potential, and diversity of fish-food organisms [9]. In each habitat, the distribution and composition of the fish species were closely connected with many factors like the availability of food, breeding sites, topography, water current, depth, and physico-chemical properties of water [10].

Fishes are important indicators of ecological health and maintain a balance in the food chain by consuming plankton and small animals. This balance in the food chain may be affected by pollution in the aquatic system [11]. Fish is an excellent food for humans. It provides protein, fat, and vitamin A and D, essential for human health. Fish is also providing vitamin B and essential amino acids such as lysine and methionine abundantly required to form phospholecithine in the gray matter of the brain [12]. Fishes are a crucial and cheapest source of animal protein and minerals. This planet hosts a large diversity of ichthyofauna [13]. From a social-economic perspective, India's reservoir fisheries are also important as they can employ about 2 million people [14]. There are about 2500 fish species in India, of which about 930 live in freshwater, and about 1570 are marine [15]. Indian reservoirs preserve a wide variety of fish species. Fisheries in Rajasthan state is primarily the type of catch in which the exploitation of fishing is carried out through an open bid method. However, water bodies have been auctioned on long leases in recent years, and therefore fish seeds are also stocked for better returns. Water bodies were classified into water groups A, B, C, and D based on annual revenue [16].

Around 2500 species are represented by the Indian inland fish fauna [17, 18]. Hora *et al*. [19], Datta *et al*. [20], Johal *et al*. [21], Johal *et al*. [22] and Mohan *et al*. [23] carried out extensive and remarkable studies on Rajasthan's fish fauna. A total of 27 species belonging to 7 orders, 14 families, and 21 genera were reported in the Dilawara reservoir of Dhar Tehsil, Madhya Pradesh [24]. 74 species of fish belonging to nine (9) orders, 26 families, and 58 genera from the river Jinari in Goalpara, Assam [25]. This study was to discover the diversity and conservation status of ichthyofauna. 19 families and 9 orders of 46 species belonging to 30 genera were identified in Rapti River at Shravasti and Balrampur districts [26]. 9 orders were reported from 29 genera and 43 species belonging to 13 different families. With 24 species, Cypriniformes was found to be a dominant order and has a contribution of 56 per cent in Kharung River, Chhattisgarh [27].

Materials and methods

Study site

Amarpura dam is constructed on the Bhadar River. This river is a tributary of river Mahi originated from hills near village Kangrua. The study area is 13 km. from Simalwara and 53 km. from Dungarpur and it is situated on latitude 23º29'23"N, and longitude73º48'48"E. Amarpura dam is an earthen dam, the maximum length of the dam is 228 m, maximum height is 20.0 m. The catchment area is 67 sq. miles. The gross capacity of the dam is 15.20 Mcum. This reservoir is useful for irrigation, drinking, and fishing purposes.

Sample collection

The fish samples were taken from commercial catches at the Amarpura reservoir during the 2019 fishing year. In the field

itself, fish have been identified by using standard handbooks [28, 5, 17, 29]. Species that could not be identified in the field were preserved in 4% formalin and were brought beside the laboratory. Taxonomic keys were used for identification up to genus and spices level.

The relative abundance was calculated by the following formula.

Relative abundance = (ai/A) 100%

Where, ai = number of individuals collected in the species and A= total number of species collected in one sampling period.

The diversity index was determined from the Shannon-Weiner (1949) diversity index (H):

$$\mathbf{H = -\sum P_i (lnP_i)}$$

Where, P_i is the proportion of each species in the sample.

Evenness (J) was determined by diversity index of Shannon:

$$\mathbf{J = H/In(S)}$$

Where, S is the total number of species.

The samples were carried out every last week of each month. The fish samples were obtained at three preselected sampling sites with the assistance of local professional fishermen. All fish species have been preserved in 10 percent formaldehyde solution.

Result and discussion

The percentage of individuals in each order and family was based on species. The dominant order was Cypriniformes which shows 58.0 percent of the total fish population, followed by Siluriformes was 15.0 percent, Perciformes was 12.0 percent, Anabantiformes was 8.0 percent, Beloniformes was 4.0 percent, Osteoglossiformes was 4.0 percent.

The results were focused on statistical analysis to establish and compare fish species' diversity in the different sampling sites. In the present study Dominance was 0.3787, Simpson index was0.6213, Shannon index was 1.302 and evenness was 0.613.

Second, the species richness was evaluated (Figure-1 and Table-1&2). Results of this study show similarities with earlier work of [30, 31, 32, 33, 34, 35, 36].

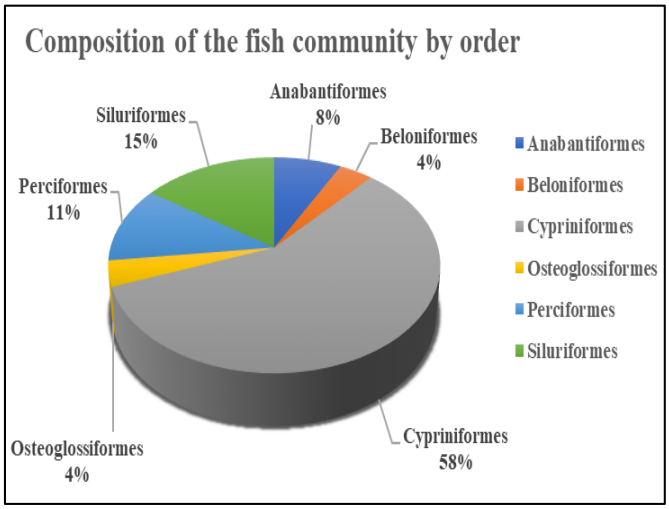

Fig 1: Composition of the fish community by order.

Table 1: Composition of the fish richness by family.

Sl. number	Families	Number of species	Percentage (%)
1.	Cyprinidae	15	57.69
2.	Heteropneustidae	2	7.69
3.	Siluridae	1	3.84
4.	Bagridae	1	3.84
5.	Notopteridae	1	3.84
6.	Ambassidae	2	7.69
7.	Cichlidae	1	3.84
8.	Channidae	2	7.69
9.	Belonidae	1	3.84
		26	

Table 2: Systematic list of fish species.

Sl. No.	Order	Family	Scientific name	Common name	Iucn status	Seasonal abundance	Economic value
1.	Cypriniformes	Cyprinidae	*Catla catla* (Ham.)	Catla Catla	LC	TY	Food fish
2.			*Labeo rohita* (Ham.)	Rohu	LC	TY	Food fish
3.			*Labeo calbasu* (Ham.)	Black rohu	LC	TY	Food fish
4.			*Labeo bata* (Ham.)	minor carp	LC	SM	Food fish
5.			*Labeo gonius*	*Kuria labeo*	LC	TY	Food fish
6.			*Amblypharyngodon mola* (Ham.)	Mola carplet	LC	SM	Ornamental
7.			*Puntius ticto* (Ham.)	Ticto barb	LC	SM	Ornamental, food fish
8.			*Puntius sophore* (Ham.)	Pool barb	LC	SM	Ornamental
9.			*Punitis sarana* (Ham.)	Olive Barb	LC	SM	Ornamental
10.			*Rasbora daniconius* (Ham.)	Slender rasbora	LC	TY	Ornamental
11.			*Cirrhinus mrigala* (Ham.)	Mrigal	LC	RS	Food fish
12.			*Cirrhinus reba* (Ham.)	Reba carp	LC	SM	Food fish
13.			*Cyprinus carpio* (Linn.)	Wild common carp	VU	TY	Ornamental/food fish
14.			*Hypophthalmichthys molitrix* (Val.)	Silver carp	NT	TY	Food fish
15.			*Ctenopharyngodon idella* (Val.)	Grass carp	NE	TY	Food fish
16.	Siluriformes	Heteropneustidae Siluridae Bagridae	*Heteropneustes fossilis* (Bloch)	Stinging catfish	LC	SM	Ornamental/food fish
17.			*Ompok bimaculatus* (Bloch)	Butter catfish	NT	SM	Food fish
18.			*Wallago attu* (Bl. & Schn.)	Fresh water shark	NT	WN	Food fish/ornamental
19.			*Mystus seenghala*	Cat fish	LC	TY	Food fish/ornamental fish
20.	Osteoglossiformes	Notopteridae	*Notopterus notopterus* (Pallas)	Bronze featherback	LC	WN	Ornamental/food fish

21.	Perciformes	Ambassidae Cichlidae	*Chanda nama* (Ham.)	Elongate glass-perchlet	LC	TY	Ornamental
22.			*Channa punctatus* (Bloch)	Spotted snakehead	LC	TY	Food fish/ornamental fish
23.			*Oreochromis mossambicus* (Peters)	Tilapia	NT	TY	Food fish
24.			*Channa striata* (Ham.)	Snakehead murrel	LC	TY	food fish
25.	Anabantiformes	Channidae	*Channa marulius* (Ham.)	Bullseye snakehead	LC	TY	food fish
26.	Beloniformes	Belonidae	*Xenentodon cancila* (Ham.)	Needlefish	LC	TY	Ornamental Fish

Conclusion

A total number of 26 species belonging to 6 order and 9 families are reported in Amarpura dam of Dungarpur district southern Rajasthan. Shannon diversity index of this study was 1.302.

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