Inventum Biologicum: *An International Journal of Biological Research*
2025, Vol. 5, Issue 3, pp. 1-5

Inventum Biologicum

Journal homepage: www.journals.worldbiologica.com/ib

Research paper

Study of Fish Diversity in the Lotic Environment of Sunderbani, District Rajouri, Jammu (J&K)

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ARTICLE INFO

Keywords

Conservation
Cyprinidae
Diversity
Fish
Rajouri
Streams

DOI
10.5281/ib-2002025

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ABSTRACT

The present study was carried out in different streams of Sunderbani in District Rajouri(J&K) to figure out its fish diversity from December 2021 to February 2022. The study was carried out two study stations. The study station I was near the Thandapani highway. The study station II at Doukhade was located at a distance of 3-4 kilometers from the study station II. A total of four species belonging to family Cyprinidae and order Cypriniformes i.e *Tor putitora, Labeo rohita, Garra gotyla* and *Pethia conchonius* were reported. The relative abundance was also calculated. *Tor putitora* contributing about 42.6% then *Garra gotyla* by 37.3%*Pethia conchonius* by 13.3% and *Labeo rohita* by 6.6%. Fishing methods commonly employed included rod and hook, cast net, basket etc. Decline in fish diversity and conservation measures in the area have also been discussed.

1. Introduction

Our earth is the territory of numerous species as aquatic and land life. Every species is significant for adjusting the environment and has its influence on biodiversity. It is manifested at all levels of bio-organization that is from cell to ecosystem which is essential for stabilization of ecosystem, protection of overall environment quality for understanding intrinsic worth of all species on the earth (Ehrlich and Wilson 1991). The Indian National Biological Diversity Act,2002 defines biological diversity as the variability among living organisms from all localities. The diversity is attributed toseveral factors like habitat diversity, existence of different drainage basins, geological history thus playing an important role in the speciation and evolution of groups inhabiting mountain streams (Kottelat 1989). Biodiversity is normally treated in terms of genes, species and ecosystem. Of various diversities, the Ichthyofaunal diversity includes variety of fish species inrespect of the context and scale, to alleles or genotypes within fish population, percent to species of life forms within a fish community and to species or life forms across aqua regimes (Burtonet al 1992).

India is one of the mega biodiversity nations known from the world, and occupies the ninth position in terms of freshwater mega biodiversity. In

India, there are 2,500 species of fishes of which 930 live in freshwater (Jayaram 1999). Fishes are of immense value to human beings since they have long been a staple item in the diet of many people; form an important element in the economy of many nations and give incalculable recreational and psychological value to the naturalist, sports enthusiast, and home aquarist.

The Union Territory of Jammu and Kashmir is rich in aquatic resources ranging from pools, ponds, streams and lakes. The important river which flows through J&K is Indus, Jhelum, Chenab and Ravi. Rivers of Jammu province arise from middle and outer Himalayas and traverse long routes before entering into plans of this region. Thus, the riverine system of this area has great longitudinal stratification, thereby providing a variety of habitats for habiting fish fauna (Das and Nath, 1971; Malhotra and Jyoti, 1971; Baba, 2004. The variations in altitude and topography have led to different sequence of succession of water bodies in different areas of the state, which has ultimately resulted in the colonization of these waters by different types of fishes. The state is bestowed with many natural water resources.

Thandapani stream is located in Sunderbani Tehsil of Rajouri district in Jammu &Kashmir, India. This stream acts as a recipient of various effluent from villages located on its sides. Besides this, stream water is also used for washing clothes by local inhabitants and cattle bathing purposes. All the effluents entering the stream are liable to deteriorate its water quality thereby making it unfit for drinking and other purposes. Within the river system the number and types of fish species fluctuate with variability of the habitats. The dependence of man on the biological wealth of rivers, lakes, oceans, etc, could not be over emphasized. But the rapid growth of human population and increased demand for water and its bio-resources had been resulting in further loss of stream habitat which leads to aquatic organisms becoming less abundant. Ever increasing anthropogenic activities are severely affecting and degrading river habitats which in turn disturbing fish fauna. Thus, the information on Ichthyofaunal diversity will serve as information tool for differentiating habitats, diagnosing the temporal changes in the ecosystem and formulating various conservation strategies.

Recent study estimations have suggested that aquatic ecosystems are particularly concerned by the loss of biodiversity especially due to human activity. The fauna of Rajouri has been on continuous decline possibly due to habitat loss, pollution and extensive use of insecticides and pesticides. There is scanty literature available regarding the current fish fauna, their distribution, and the threats in district Rajouri of Jammu division. Further no attempt seems to have been made so far to study the fish diversity in this district. The fish diversity of the most lotic water bodies of district Rajouri still appears to be unmapped and not properly documented.Keeping these facts in mind, the preliminary research work was carried with aimto know the taxonomic status of diversity of fishes from Thandapaninallah and to assess various anthropogenic pressure on the streams in the area.

2. Material and Methods

2.1 Physiography of the study area

The study was carried out during 2021-2022 in Sunderbani. It is the town in district Rajouri of Jammu and Kashmir, India. Sunderbani is located at 33.04.N and 74.49.E. It has an average elevation of 633 metres (2,004 feet). The official languages are Poonchi, Dogri. It is the hilly area with the cool and charming environment. It is about 79 km far from Jammu. Total area of Sunderbani is 333.43 sq.km. There are about 43 villages in Sunderbani block of Rajouri District (Fig. 1). The river system of J&K depicted in map (Fig. 2).

2.2 Collection

Fishes were collected from various water bodies of Sunderbani with the help of local fisher men. A casting net, also called a throw net, is a circular net with small weights distributed around its edge. A feature of the cast net used was that it consisted of solid iron or lead sinkers, the cast net after casting settled rapidly on the bottom, thus, preventing the net from being carried downstream by the current. After casting, the fisherman upturned the stones of the river bed in the area blanketed by the net and the fishes hiding underneath got caught in the peripheral pockets of the net. The collected fishes were placed in separate buckets containing enough water and brought to the laboratory for identification. The fishes on the basis of their morphometric, meristic and diagnostic characters (Malhotra et al1975 and Talwar and Jhingran, 1991)) were identified as *Tor putitora, Labeorohita, Garragotyla*and *Pethiaconchonius*. Two collection sites were studied during present study (Fig. 5, 6).

***Study Station I*:** The study station I is located near the main highway of Thandapani, commonly known as Thandapaninallah. It was surrounded by various agricultural fields. *Tor putitora, Labeo rohita* and *Garra gotyla* were commonly found in this stream (Fig.3).

***Study Station II*:** It is located in Doukhade area of Sunderbani. Three fishes were identified which includes *Garra gotyla, Tor putitora* and *Pethia conchonius* (Fig. 4).

2.3 Preservation and Identification

Collected fish samples were preserved in 10 % formalin for identification. The collected specimens were sorted at species level and all the species obtained were counted. The fishes on the basis of their morphometric, meristic and diagnostic characters (Malhotra et al., 1975) were identified as *Tor putitora, Labeo rohita, Garra gotyla* and *Pethia conchonius.*

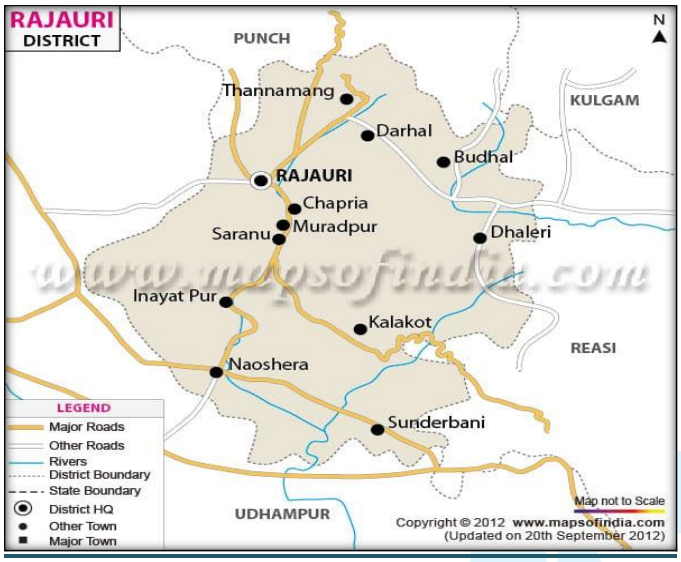

Fig. 1 Map of Rajouri

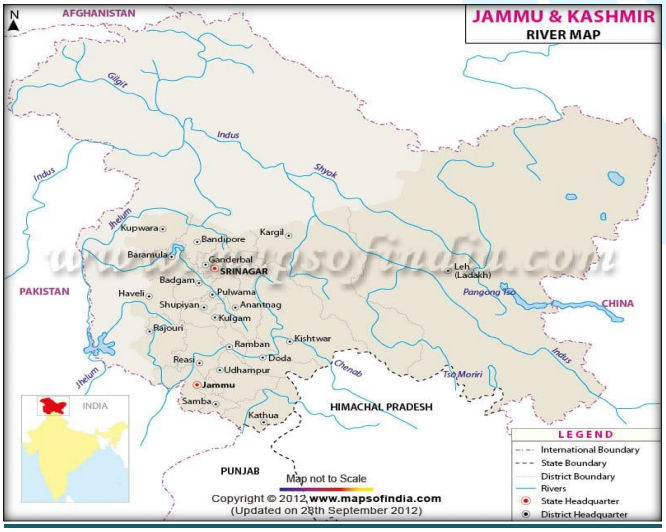

Fig. 2 Map showing the river system of Jammu and Kashmir

Fig. 3 Study Station-I (Thandapaninallah)

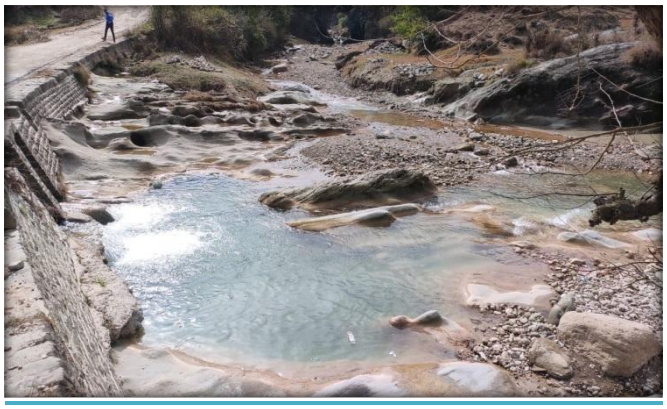

Fig. 4 Study Station-II (Doukhade)

Fig. 5 Fisherman collecting fish by using net

Fig. 6 Collected fishes

3. Results and Discussion

During the present study, extending from December 2021 to February 2022 a total four species were successfully collected from the different geographical locations in the Study Station I (Thandapani)and Study Station II (Doukhade). The fishes collected (Fig. 6) found were namely *Tor putitora, Labeorohita, Garragotyla,* and *Pethiaconchonius*. They were collected with the help oflocal fisherman. After the taxonomic classification of the collected fishes, they

were found to belong to order Cypriniformes and family Cyprinidae. The total abundance and percentage abundance in the two streams depicted in Table 1 and Fig. 7.

Table 1 Table showing fish abundance and percentage in the study streams

Species	Number of individuals in Study Station-I (Thandapani)	Number of individuals in Study Station-II (Doukhade)	Total Abundance	Percentage Abundance (%)
Tor putitora	18	14	32	42.6%
Labeo rohita	5	0	5	6.6%
Garra gotyla	16	12	28	37.3%
Pethia conchonius	0	10	10	13.3%
Total	39	36	75	

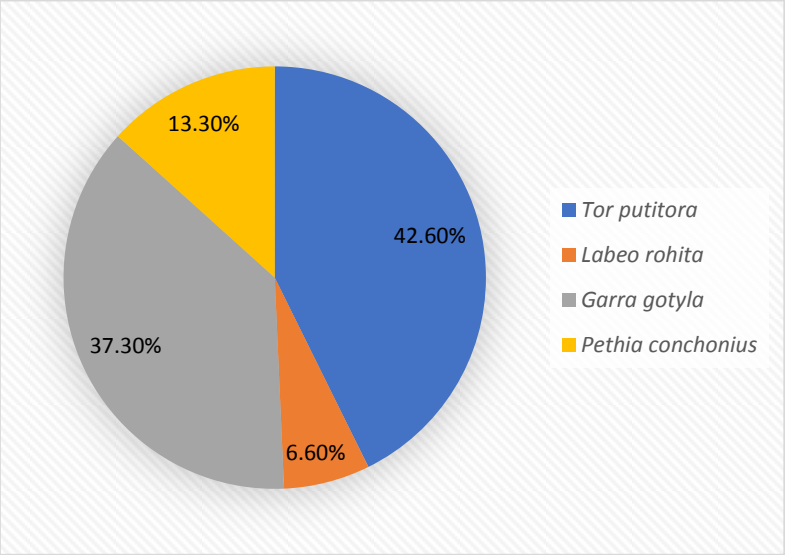

Fig. 7 Graph showing percentage of various fish species found in both study stations

A total seventy-five individuals belong to family Cyprinidae were observed from both study stations that is Thandapani and Doukhade. Highest number of individuals were observed on site I followed by site II. Study station I (Thandapani) provides all the types of habitats also the site possesses small pebbles, rocks, beds and plenty of vegetation which suits for the most of the species for their survival and reproduction. On the other hand, site II is affected with pollution. Various species collected from the two streams are depicted in Table 2. The difference in the number of individuals is due to the difference of habitat that is the depth and rate of flow and also due the presence of availability of food**.**

Table 2 Different fish species found at different study stations during present study

Fish species	Study Station I	Study Station II
Tor putitora	+	+
Labeo rohita	+	-
Garra gotyla	+	+
Pethia conchonius	-	+

The results revealed a distinction in fish diversity and fish assemblages across II study station.

At Station I (mid-stream), Three fishes were collected which were *Tor putitora, Garra gotlya, Labeo rohita.*

At Station II (up-stream), Three fishes were collected which were *Tor putitora, Garragotyla, Pethia*conchonius*.* Cyprinids dominance in the assemblage structure as seen during the present study is in the accordance with the observations of Dass and Nath, (1966); Malhotra and Dutta (1975).

The percentage of dominant species at respective stations is depicted in Fig. 8.

The cyprinids have been found dominant at all sites. In the present study, the cyprinids dominate at all sites due to great adaptive variability to inhabit different habitats available to them.Gandotra and Sharma (2015) also found Cyprinidae to be dominant in the streams of Sunderbani. It is due to their adaptive variability to occupy all possible habitats and presence of appropriate environment, stream bottom, depth, water current and food abundance for them. They recorded twelve fishes belonging to family Cyprinidae and Sisordae as the season was favourable for fish catching. During this present study only four species belonging to family Cyprinidae were recorded due to peak winters. As in winter season fish tend to slow down and generally need less food to support them.

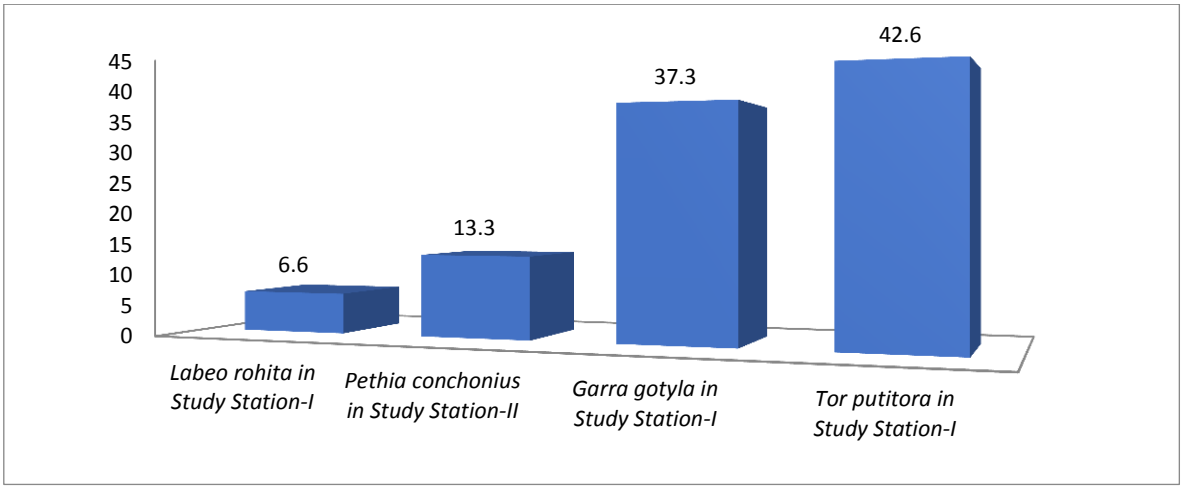

Fig. 8 Graph showing percentage of dominant fishes at respective stations

4. Conclusion

This study provides a comprehensive data on diversity of fishes in Sunderbani, district Rajouri (J&K) which clearly reveals that fish abundance is directly correlated with stream gradient and environment conditions. Also, the stream is dominated by Cyprinids and majority of species are food fishes along with their ornamental values. Moreover, the water quality of this area is conducive for aquaculture. Therefore, the government must start some schemes in this area with the help of farmers to raise fish farms for mass productive which will not only increase the economy to the rural folk.

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