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Current status of fish diversity of Subarnarekha river in Paschim Medinipur district, West Bengal

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Abstract
The river is one of the major sources of the wide variety of fish species. Fishes are an important source of human protein. Fish plays a crucial role in the economic development of different countries. The current investigation deals with the fish diversity of the Subarnarekha river of Paschim Medinipur district, West Bengal from November 2020 to January 2022. Total of 50 fish species under 13 orders, 21 families, and 35 genera have been recorded during the investigation period. The order Cypriniformes (46.40%) was dominant followed by Anabantiformes (20.92%), Siluriformes (16.47%) and Perciformes (5.49%). The Cyprinidae family represented the highest number of fish species (46.40%), followed by the family Channidae (10.98%) and Siluridae (4.44%). Out of 50 fish species, 43 species Least Concern, 4 species Near Threatened, and 3 species vulnerable category.

Keywords: Fish diversity, Subarnarekha river, conservation status, threat

1. Introduction
Fish species are an important part of the aquatic environment that exhibits enormous diversity in their morphology, habitat, and biology. Fish is a cheap source of protein and an important cash crop in many countries of the world and water is the basic physical support in which they perform their life activities namely feeding, swimming, breeding, digestion, and excretion (Bronmark and Hansson, 2005) [3]. As an indicator of a balanced aquatic ecosystem, fishes are included or near the top of the food chain. 28,500 species of fish have been recorded to date Worldwide, of these 22 hundred species of fish are known to occur in the different aquatic environments of India. The Subarnarekha is an important river in India. It originates near Nagri village in the Ranchi district of Jharkhand at an elevation of 600 meters and joins the Bay of Bengal near Kirtania Port in Odisha. The river is about 395 km long. It flows in Jharkhand, West Bengal, and the Odisha states of India. In West Bengal, it flows through Paschim Medinipur district, namely Sonakania, Nekramara, Sripur, Chuapal, Kuliana, and Simulia etc villages. The present investigation is to determine the abundance, current fish diversity, and conservation status of river Subarnarekha. The Subarnarekha river is the major source of freshwater fish species. Over the past few decades, the riverine ecosystem has come under several anthropogenic stress, pollution, and domestic effluents leading to its destruction and loss of fish habitat. For this reason, many fish species have become extremely endangered.

2. Materials and Methods
2.1 Study site
The present investigation was conducted in three sampling stations such as Sonakania, Kuliana, and Chuapal of river Subarnarekha, for study and collection of fish species.

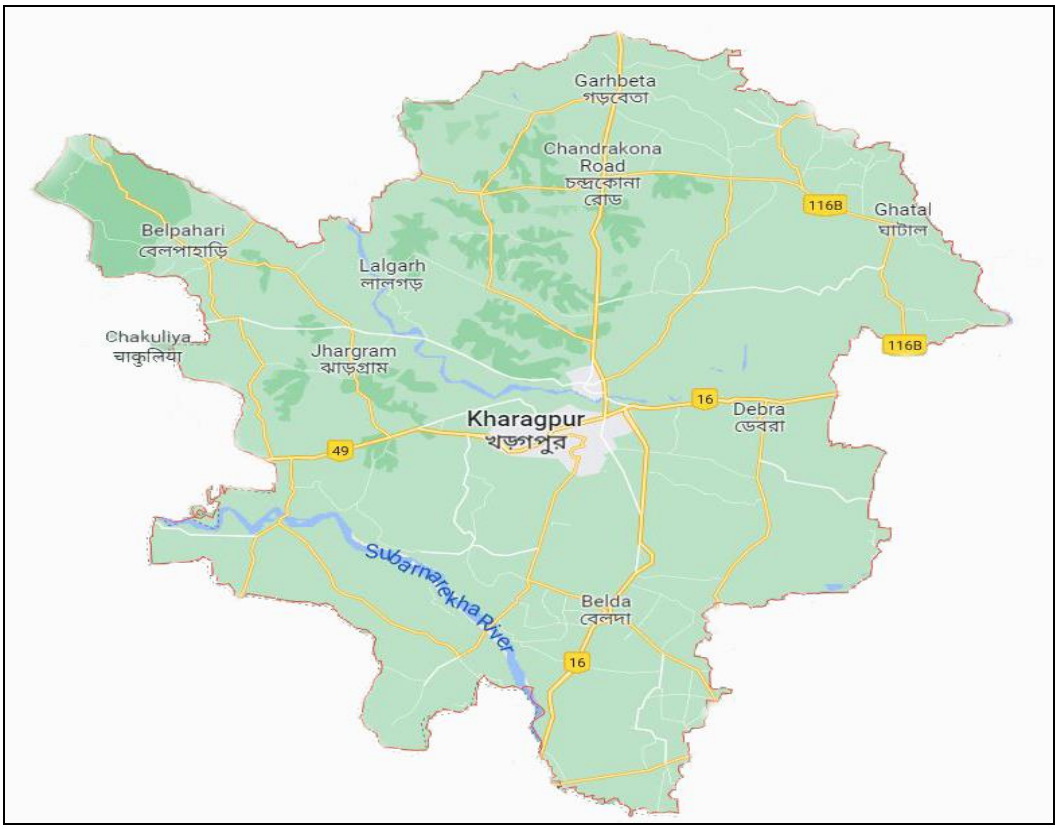

Fig 1: Location of Subarnarekha river in Paschim Medinipur district, West Bengal

Table 1: Study site of Subarnarekha river

Sl. No.	Name of the sampling station	Latitude and Longitude of the sampling station
Site-1	Sonakania	21°51'44.80"N 87°15'20.21"E
Site-2	Kuliana	22°13'27.43"N 86°55'11.42"E
Site-3	Chuapal	22°09'35.44"N 87°03'31.25"E

Fig 2: Satellite image of the study sites

2.2 Specimen collection and preservation

The fish samples were captured with the help of fishermen using a gill net, cast net, drag net, and scoop net. The fish specimens were collected monthly from November 2020 to January 2022 during the early morning (6 am to 9 am). The collected fish species were preserved in a 10% formalin solution.

2.3 Identification of species

The species were identified following Jayaram (2002) [10], Talwar, and Jhingran (1991) [21].

3. Results and Discussion

The study revealed that the river Subarnarekha of Paschim Medinipur district has a rich fish diversity. In total, 50 species

belonging to 13 orders, 21 families, and 35 genera were recorded in the river Subarnarekha. The Cypriniformes was the dominant order group comprising of 46.40% followed by Siluriformes 16.47%, Anabantiformes 20.92%, Perciformes 5.49%, Gobiiformes 1.67%, Synbranchiformes 1.96%, Cyprinodontiformes 0.65%, Tetraodontiformes 0.39%, Mugiliformes 0.78%, Beloniformes 0.65% and Anguilliformes, Osteoglossiformes, and Cichliformes contributed 2.09% respectively. *Puntius ticto, Puntius sarana, Labeo rohita, Catla catla, Labeo bata, Labeo calbasu, Clarias batrachus, Channa marulius, Channa gachua* and *Cyprinus carpio* were dominant species in this river. The maximum number of species belonging to family Cyprinidae 46.40% followed by the family Channidae 10.98%, Osphronemidae 6.53%, Siluridae 4.4%, Ambassidae 3.14%, Nandidae 2.35%, Bagridae 3.66%, Pangasiidae 2.48%, Heteropneustidae 2.22%, Clariidae 3.00%, Anabantidae 1.67%, Mugilidae 0.78%, Sisoridae 0.65%, Tetraodontidae 0.39%, Aplocheilidae 0.65%, Mastacembelidae 1.96%, Gobiidae 1.67%, Belonidae 0.65%, and Notopteridae, Anguillidae, and Cichlidae 2.09% each. The highest value of the Shannon diversity index (H') was observed at Site-1(3.798) and the lowest value was at Site-2(3.710). The high Evenness index (e) was found at Site-1(0.976) and low at the Site -3(0.963). This study records the presence of 3 vulnerable species, 4 Near Threatened species, and 43 species are under the Least Concern category as per IUCN (2022).

Table 2: Fish diversity of Subarnarekha river

Sl. No.	Order	Family	Scientific name	Local name	Conservation status	Site-1	Site-2	Site-3
1.	Cypriniformes	Cyprinidae	*Labeo rohita*	Rui	Least Concern	12	10	14
2.			*Catla catla*	Catla	Least Concern	12	9	11
3.			*Cirrhinus mrigala*	Mrigal	Least Concern	7	6	9
4.			*Amblypharyngodon mola*	Mourola	Least Concern	5	8	6
5.			*Esomus danricus*	Daria	Least Concern	7	5	4
6.			*Labeo calbasu*	Kalbose	Least Concern	8	9	8
7.			*Labeo bata*	Bata	Least Concern	9	8	8
8.			*Puntius ticto*	Puti	Least Concern	11	9	7
9.			*Puntius sarana*	Sar puti	Least Concern	8	10	7
10.			*Puntius sophore*	Puti	Least Concern	7	5	6
11.			*Puntius chola*	Puti	Least Concern	5	7	3
12.			*Puntius terio*	Puti	Least Concern	4	2	1
13.			*Puntius conchonius*	Puti	Least Concern	3	2	5
14.			*Puntius phutunio*	Puti	Least Concern	7	5	4
15.			*Salmostoma phulo*	Chela	Least Concern	4	3	4
16.			*Salmostoma bacaila*	Chela	Least Concern	2	5	1
17.			*Osteobrama cotio*	Keti	Least Concern	5	4	6
18.			*Garra gotyla*	Klagachhi	Least Concern	3	0	2
19.			*Cyprinus carpio*	Cyprinus	Vulnerable	8	9	6
20.	Perciformes	Ambassidae	*Chanda nama*	Chanda	Least Concern	4	3	2
21.			*Parambassis ranga*	Chanda	Least Concern	6	5	4
22.		Nandidae	*Nandus nandus*	Veda	Least Concern	7	5	6
23.	Siluriformes	Siluridae	*Wallago attu*	Boal	Vulnerable	8	5	4
24.		Bagridae	*Mystus cavasius*	Tengra	Least Concern	3	0	2
25.			*Mysus tengara*	Tengra	Least Concern	5	3	2
26.			*Mystus vittatus*	Tengra	Least Concern	4	1	3
27.			*Sperata aor*	Aar	Least Concern	0	1	4
28.		Siluridae	*Ompok pabda*	Pabda	Near Threatened	6	5	6
29.		Heteropneustidae	*Heteropneustes fossilis*	Singi	Least Concern	7	6	4
30.		Clariidae	*Clarias batrachus*	Magur	Least Concern	9	8	6
31.		Pangasiidae	*Pangasius pangasius*	Pangus	Least Concern	6	8	5
32.		Sisoridae	*Bagarius bagarius*	Bhagha aor	Near Threatened	2	2	1
33.	Osteoglossiformes	Notopteridae	*Chitala chitala*	Chital	Near Threatened	3	2	5
34.			*Notopterus notopterus*	Pholui	Least Concern	2	1	3
35.	Synbranchiformes	Mastacembelidae	*Macrognathus pancalus*	Pankal	Least Concern	5	7	3
36.	Tetraodontiformes	Tetraodontidae	*Leiodon cutcutia*	Tepa	Least Concern	2	1	0
37.	Cyprinodontiformes	Aplocheilidae	*Aplocheilus panchax*	Techoukka	Least Concern	3	2	0
38.	Beloniformes	Belonidae	*Xenentodon cancila*	Kakia	Least Concern	3	0	2
39.	Anabantiformes	Channidae	*Channa punctata*	Lata	Least Concern	8	7	6
40.			*Channa marulius*	Sal	Least Concern	5	9	9
41.			*Channa gachua*	Chang	Least Concern	9	6	8
42.			*Channa striatus*	Shol	Least Concern	7	5	5
43.		Osphronemidae	*Trichogaster fasciata*	Kholisa	Least Concern	4	6	8
44.			*Trichogaster lalius*	Kholisa	Least Concern	5	8	3
45.			*Trichogaster chuna*	Kholisa	Least Concern	6	6	4
46.		Anabantidae	*Anabas testudineus*	Koi	Least Concern	5	5	3
47.	Gobiiformes	Gobiidae	*Glossogobius giuris*	Bele	Least Concern	5	5	3
48.	Anguilliformes	Anguillidae	*Anguilla bengalensis*	Bam	Near Threatened	6	4	6
49.	Cichliformes	Cichlidae	*Oreochromis mossambicus*	Tilapia	Vulnerable	5	7	4
50.	Mugiliformes	Mugilidae	*Rhinomugil corsula*	Khsola	Least Concern	3	1	2

Table 3: Species abundance, Species richness, and biodiversity index in three sampling stations of river Subarnarekha

Study site	Abundance	Species richness	Shannon index (H')	Evenness index (e)
Site-1	280	49	3.798	0.976
Site-2	250	47	3.710	0.964
Site-3	235	48	3.728	0.963

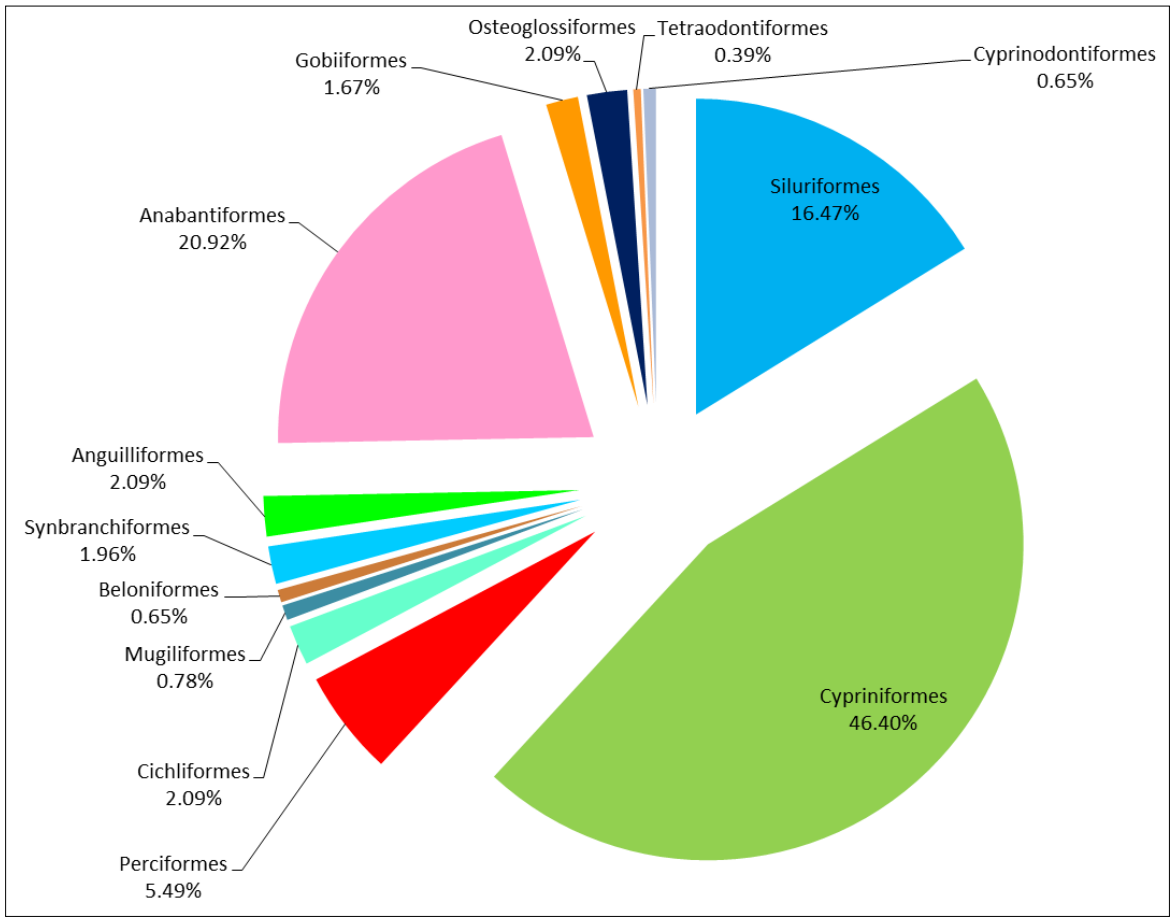

Fig 3: Order wise representation of fish species in Subarnarekha river

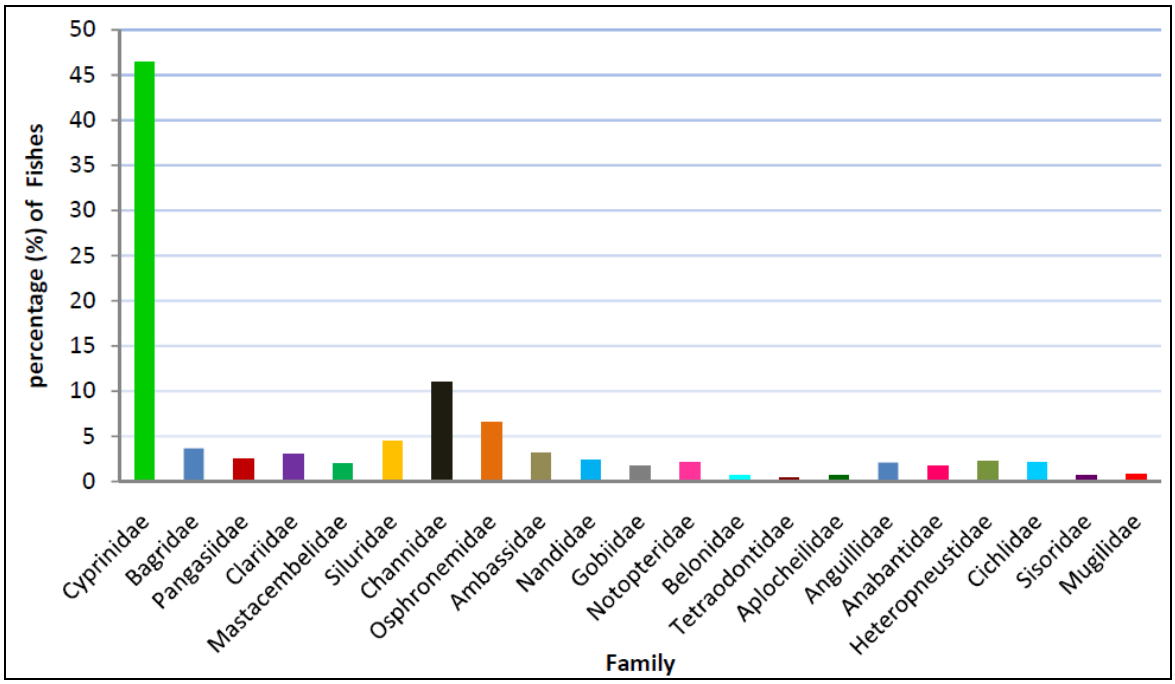

Fig 4: Family wise distribution of fishes in river Subarnarekha

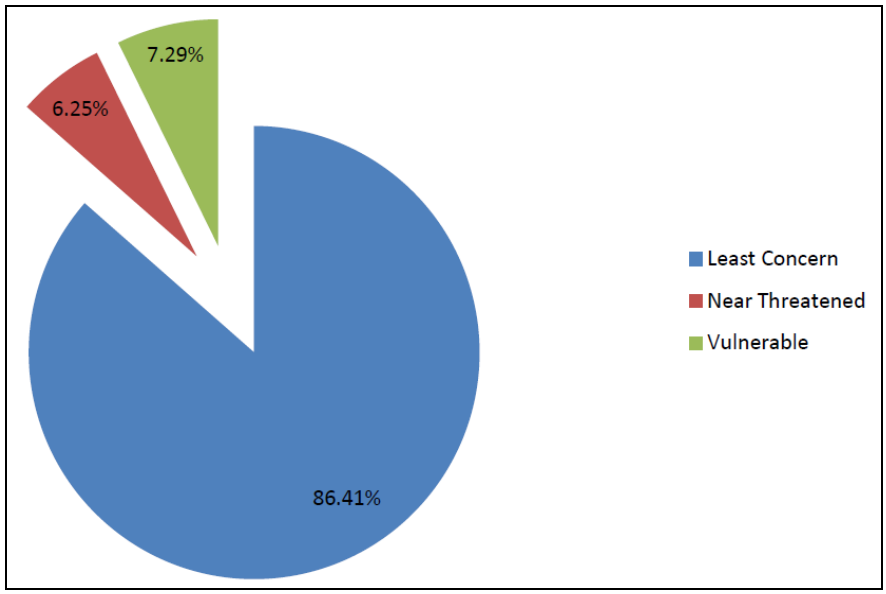

Fig 5: Conservation status of species in Subarnarekha river

Fish diversity in numerous river systems of West Bengal has been carried out by many studies. Jana *et al*. (2021) [8] recorded a total of 56 species belonging to 8 orders, 22 families, and 37 genera from the Kapaleswari river in Paschim Medinipur district, West Bengal. Pahari *et al*. (2017) [17] reported 55 species under 48 genera, 9 orders, and 21 families from the river Keleghai of West Bengal. Ghorai (2018) was observed a total of 38 fish species belonging to 10 orders, 24 families, and 29 genera from the Rupnarayan river of Purba Medinipur district of West Bengal. Kar *et al*. (2017) [12] reported a total of 45 fish species belonging to 29 genera, 17 families, and 8 orders from Kangsabati river in Paschim Medinipur district, West Bengal. The fish fauna of the Subarnarekha River is under threat due to over and indiscriminate fishing, pollution, domestic effluents, and different anthropogenic threat such as the flow of pesticides used in the agricultural fields to the river and the setting of brick industries on the river bank, etc. Pesticides used in the riverbank area paddy fields can adversely affect the population of fish species (Acharjer *et al*., 2012) [1].

4. Conclusion

The present investigation revealed that the Subarnarekha river has a wide variety of freshwater fish. The river is very much rich in food fishes than ornamental fishes. To understand the fish diversity in the Subarnarekha river, this present investigation is quite helpful. The fish diversity of this river is declining due to over and indiscriminate fishing, organic and inorganic pollution, domestic effluents, habitat destruction, and several anthropogenic activities. It is suggested that the avoid illegal fishing, the riverine natural habitat should not be destructed, and increasing large scale public awareness to conserve the fish diversity in Subarnarekha river. This fish diversity may have a significant impact on the livelihood of local people who can get their food source, especially protein diet, from this river system.

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