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Current Status and Diversity of Ichthyofauna in the River Rupnarayan

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Abstract

The current study was done on river Rupnarayan from September 2019 to August 2021 at four sampling stations namely, Chaulia, Kolaghat, Chitnan, and Jagatpur. The study assists in assessing the dispensation and plenty of fish demography in the river Rupnarayan. In the study, 34 ichthyospecies were recorded in river Rupnarayan during the study period. Among the 34 species, 12 species belonged to the order Siluriformes, 5 species belonged to the order Cypriniformes, 8 species belonged to the order Perciformes, 3 species belonged to Clupeiformes, 1 species belongs to Polinemiformes, 2 species belong to Synbranchiformes, 1 species belongs to order Beloniformes, 1 species belongs to order Pleuronectiformes, 1 species belongs to order Mugiliformes. The study also revealed that excessive ichthyodiversity was observed at the Jagatpur sampling station, followed by the Chaulia sampling station, the Kolaghat sampling station, and the Chitnan sampling station.

***Key words*:** Concomitant, Decisive, Biodiversity, Prosperity, Sustainable, Toxicity

Fishes are the cardinal underwater species which is straightly concomitant to human prosperity. A discrete category of river in West Bengal bestows ichthyospecies. Conservation of ichthyospecies is a foremost contrivance for sustainable development. The systemizing of ichthyofauna plays a decisive role in the repute of aquatic biodiversity. Rupnarayan River is crucial for the fishing potential and irrigation purposes of local fishermen. Research has been done on disparate rivers of West Bengal and listed distinct types of ichthyospecies. Sarkar and Pal [1] recorded 119 ichthyospecies in the Jaldhaka river and showed their conservation status. In the Torsa river, 107 ichthyospecies were documented by Dey and Sarkar [2]. In the river Rupnarayan, 38 ichthyospecies were documented by Ghorai [3]. Ichthyo diversity in the Siyom river was studied by Bagra and Das [4] who identified 44 species during the 2002-2004 study period. Several researchers like, Hayati *et al*. [5], Shahnawaz *et al*. [6], and Shrestha *et al*. [7] studied ichthyodiversity in the Brantas river, Bhadra river and Tamor river. Ichthyodiversity in all south Bengal rivers dwindled due to unselective fishing and pollution. The purpose of the study is to evaluate the diversity and distribution of ichthyofauna in the river Rupnarayan. This study considers sustainable management for fish conservation in the river Rupnarayan.

MATERIALS AND METHODS

Sampling stations

Four sampling stations were selected, namely sampling station I at Chaulia (latitude and longitude 22.3821ºN, 87.9592 ºE), sampling station 2 at Kolaghat (latitude and longitude 22.4352ºN, 87.8607 ºE), sampling station 3 at Chitnan (latitude and longitude 22.5373ºN, 87.8722 ºE), sampling station 4 (latitude and longitude 22.6230 ºN, 87.8206 ºE).

Collection of fish fauna

Ichthyospecies were collected from September 2019 to August 2021 at four sampling stations by cast net, hand net, drag net, etc. Collected ichthyofauna were fetched to the laboratory and identified by Talwar and Jhingran [8], www.fishbase.org, Jayaram [9].

Data analysis

Shannon and Simpson diversity index were used for the ichthyodiversity n the river Rupnarayan. The formula for Shannon and Simpson index is as follows:

Shannon diversity index

$$H = -\sum_{i=1}^{s} P_i \ln P_i$$

Where;
S = Species number
P_i = Probability of particular (n_i / N) species.
ln = Natural log

Simpson index of diversity

$$\text{Simpson' index (D)} = [\{\sum n(n-1)\} / \{N(N-1)\}]$$
$$\text{Simpson's diversity index} = (1-D)$$

Where;
n = Entire number of each species
N= Overall number of all species

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RESULTS AND DISCUSSION

A total of 34 ichthyospecies (Table 1) were recorded from river Rupnarayan. Order wise ordination of ichthyofauna were delineated in (Fig 1). Recorded fishe fishes in river Rupnarayan were *Ompok pabda, Mystus vittatus, Clarias batrachus, Puntius ticto, Amblypharyngodon mola, Silonia silonida, Heteropneustes fossilis, Puntius sarana, Colisa chuna, Chanda nama, Channa punctata, Gudusia chapra, Puntius vittatus, Channa striata, Mystus tengara, Polynemus paradiseus, Tenualosa ilisha, Monopterus cuchia, Glossogobius giuris, Mystus cavasius, Wallago attu, Chela cachius, Setipinna phasa, Oreochromis mossambicus, Pangasius pangasius, Mystus seenghala, Macrognathus pancalus, Xenentodon cancila, Johnius coitor, Cynoglossus cynoglossus, Ompok bimaculatus, Mugil parsia, Lates calcarifer, Arius maculatus*.

In Chaulia sampling station, 14 numbers of *Ompok pabda*; 8 numbers of *Mystus vittatus*; 4 numbers of *Clarias batrachus*; 12 numbers of *Puntius ticto*; 23 numbers of *Amblypharyngodon mola*, 9 numbers of *Silonia silonida*; 32 numbers of *Puntius sarana*; 20 numbers of *Colisa chuna*; 13 numbers of *Chanda nama*; 11 numbers of *Channa punctata;* 26 numbers of *Gudusia chapra*; 7 numbers of *Puntius vittatus*; 8 numbers of *Channa striata*; 25 numbers of *Mystus tengara*; 28 numbers of *Polynemus paradiseu s*; 12 numbers of *Tenualosa Ilisha*; 9 numbers of *Monopterus cuchia*; 5 numbers of *Glossogobius giuris*; 4 numbers of *Mystus cavasius*; 11 numbers of *Chela cachius*; 31 numbers of *Setipinna phasa*; 5 numbers of *Oreochromis mossambicus*; 3 numbers of *Pangasius pangasius*; 9 numbers of *Mystus seenghala*; 3 numbers of *Macrognathus pancalus*; 2 numbers of *Xenentodon cancila*; 3 numbers of *Johnius coitor*; 3 numbers of *Cynoglossus cynoglossus*; 8 numbers of *Ompok bimaculatus*; 11 numbers of *Mugil parsia*; 10 numbers of *Latis calcarifer*; 12 numbers of *Arius maculatus*, were recorded during the study period.

Table 1 Fish species recorded from river Rupnarayan during September 2019 to August 2021

S. No.	Scientific name	Order	No. of fish species in Chaulia	No. of fish species in Kolaghat	No. of fish species in Chitnan	No. of fish species in Jagatpur
1	*Ompok pabda*	Siluriformes	14	12	3	9
2	*Mystus vittatus*	Siluriformes	8	9	12	7
3	*Clarias batrachus*	Siluformes	4	8	6	5
4	*Puntius ticto*	Cypriniformes	12	15	21	16
5	*Amblypharyngodon mola*	Cypriniformes	23	29	19	31
6	*Silonia silonida*	Siluriformes	9	10	11	12
7	*Heteropneustes fossilis*	Siluriformes	0	0	2	4
8	*Puntius sarana*	Cypriniformes	32	8	11	19
9	*Colisa chuna*	Perciformes	20	14	28	40
10	*Chanda nama*	Perciformes	13	9	8	15
11	*Channa punctata*	Perciformes	11	9	0	18
12	*Gudusia chapra*	Clupeiformes	26	11	7	29
13	*Puntius vittatus*	Cypriniformes	7	13	5	11
14	*Channa striata*	Perciformes	8	10	6	0
15	*Mystus tengara*	Siluriformes	25	42	24	24
16	*Polynemus paradiseus*	Polinemiformes	28	13	6	22
17	*Tenualosa ilisha*	Clupeiformes	12	14	8	4
18	*Monopterus cuchia*	Synbranchiformes	9	10	0	5
19	*Glossogobius giuris*	Perciformes	5	5	9	4
20	*Mystus cavasius*	Siluriformes	4	0	9	3
21	*Wallago attu*	Siluriformes	0	6	0	4
22	*Chela cachius*	Cypriniformes	11	3	8	11
23	*Setipinna phasa*	Clupeiformes	31	26	18	16
24	*Oreochromis mossambicus*	Perciformes	5	8	16	8
25	*Pangasius pangasius*	Siluriformes	3	2	0	9
26	*Mystus seenghala*	Siluriformes	9	13	1	14
27	*Macrognathus pancalus*	Synbranchiformes	3	5	4	12
28	*Xenentodon cancila*	Beloniformes	2	0	0	1
29	*Johnius coitor*	Perciformes	3	0	1	1
30	*Cynoglossus cynoglossus*	Pleuronectiformes	3	8	2	2
31	*Ompok bimaculatus*	Siluriformes	8	5	19	13
32	*Mugil parsia*	Mugiliformes	11	8	27	9
33	*Latis calcarifer*	Perciformes	10	2	2	11
34	*Arius maculatus*	Siluriformes	12	8	5	19

In Kolaghat sampling station, 12 numbers of *Ompok pabda* ; 9 numbers of *Mystus vittatus*; 8 numbers of *Clarias batrachus*; 15 numbers of *Puntius ticto*; 29 numbers of *Amblypharyngodon mola*, 10 numbers of *Silonia silonida*; 8 numbers of *Puntius sarana*; 14 numbers of *Colisa chuna*; 9 numbers of *Chanda nama*; 9 numbers of *Channa punctata*; 11 numbers of *Gudusia chapra*; 13 numbers of *Puntius vittatus*; 10 numbers of *Channa striata*; 42 numbers of *Mystus tengara*; 13 numbers of *Polynemus paradiseus*; 14 numbers of *Tenualosa Ilisha*; 10 numbers of *Monopterus cuchia*; 5 numbers of *Glossogobius giuris*; 6 numbers of *Wallago attu*; 3 numbers of *Chela cachius*; 26 numbers of *Setipinna phasa*; 8 number of *Oreochromis mossambicus*; 2 numbers of *Pangasius pangasius*; 13 numbers of *Mystus seenghala*; 5 numbers of

Macrognathus pancalus; 8 numbers of *Cynoglossus cynoglossus*; 5 numbers of *Ompok bimaculatus*; 8 numbers of *Mugil parsia*; 2 numbers of *Latis calcarifer*; 8 numbers of *Arius maculatus*, were recorded during the study period.

In Chitnan, 3 numbers of *Ompok pabda*; 12 numbers of *Mystus vittatus*; 6 numbers of *Clarias batrachus*; 21 numbers of *Puntius ticto*; 19 numbers of *Amblypharyngodon mola*, 11 numbers of *Silonia silonida*; 2 numbers of *Heteropneustes fossilis*; 11 numbers of *Puntius sarana*; 28 numbers of *Colisa chuna*; 8 numbers of *Chanda nama*; 7 numbers of *Gudusia chapra*; 5 numbers of *Puntius vittatus*; 6 numbers of *Channa striata*; 24 numbers of *Mystus tengara*; 6 numbers of *Polynemus paradiseus*; 8 numbers of *Tenualosa Ilisha*; 9 numbers of *Glossogobius giuris*; 9 numbers of *Mystus cavasius*; 8 numbers of *Chela cachius*; 18 numbers of *Setipinna phasa*; 16 numbers of *Oreochromis mossambicus*; 1 numbers of *Mystus seenghala*; 4 numbers of *Macrognathus pancalus*; 1 numbers of *Johnius coitor*; 2 numbers of *Cynoglossus cynoglossus*; 19 numbers of *Ompok bimaculatus*; 27 numbers of *Mugil parsia*; 2 numbers of *Latis calcarifer*; 5 numbers of *Arius maculatus*, were recorded from September 2019 to August 2021.

In Jagatpur, 9 number of *Ompok pabda*; 7 numbers of *Mystus vittatus*; 5 numbers of *Clarias batrachus*; 16 numbers of *Puntius ticto*; 31 numbers of *Amblypharyngodon mola*, 12 numbers of *Silonia silonida*; 4 numbers of *Heteropneustes fossilis*; 19 numbers of *Puntius sarana*; 40 numbers of *Colisa chuna*; 15 numbers of *Chanda nama*; 18 numbers of *Channa punctata*; 29 numbers of *Gudusia chapra*; 11 numbers of *Puntius vittatus*; 24 numbers of *Mystus tengara*; 22 numbers of *Polynemus paradiseus*; 4 numbers of *Tenualosa Ilisha*; 5 numbers of *Monopterus cuchia*; 4 numbers of *Glossogobius giuris*; 3 numbers of *Mystus cavasius*; 4 numbers of *Wallago attu*; 11 numbers of *Chela cachius*; 16 numbers of *Setipinna phasa*; 8 numbers of *Oreochromis mossambicus*; 9 numbers of *Pangasius pangasius*; 14 numbers of *Mystus seenghala*; 12 numbers of *Macrognathus pancalus*; 1 numbers of *Xenentodon cancila*; 1 numbers of *Johnius coitor*; 2 numbers of *Cynoglossus cynoglossus*; 13 numbers of *Ompok bimaculatus*; 9 numbers of *Mugil parsia*; 11 numbers of *Latis calcarifer*; 19 numbers of *Arius maculatus*, were recorded from September 2019 to August 2021.

Ichthyodiversity in the river Rupnarayan was done by Shannon index and Simpson index. Graphical delegation of ichthyodiversity (Shannon and Simpson) were depicted in (Fig 2). Shannon index at Chaulia sampling station was 3.158; Kolaghat sampling station was 3.09; Chitnan sampling station was 3.04; Jagatpur sampling station was 3.172. The highest Shannon index was observed at Jagatpur sampling station and the lowest Shannon index was observed at Chitnan sampling station. Simpson index at Chaulia was 0.95521; Kolaghat was 0.95182; Chitnan was 0.94893; Jagatpur was 0.95581 (Table 2).

Table 2 Fish diversity in river Rupnarayan (Shannon index and Simpson index)

Name of the sampling stations	Shannon index	Simpson index
Chaulia	3.158	0.95521
Kolaghat	3.09	0.95182
Chitnan	3.04	0.94893
Jagatpur	3.172	0.95581

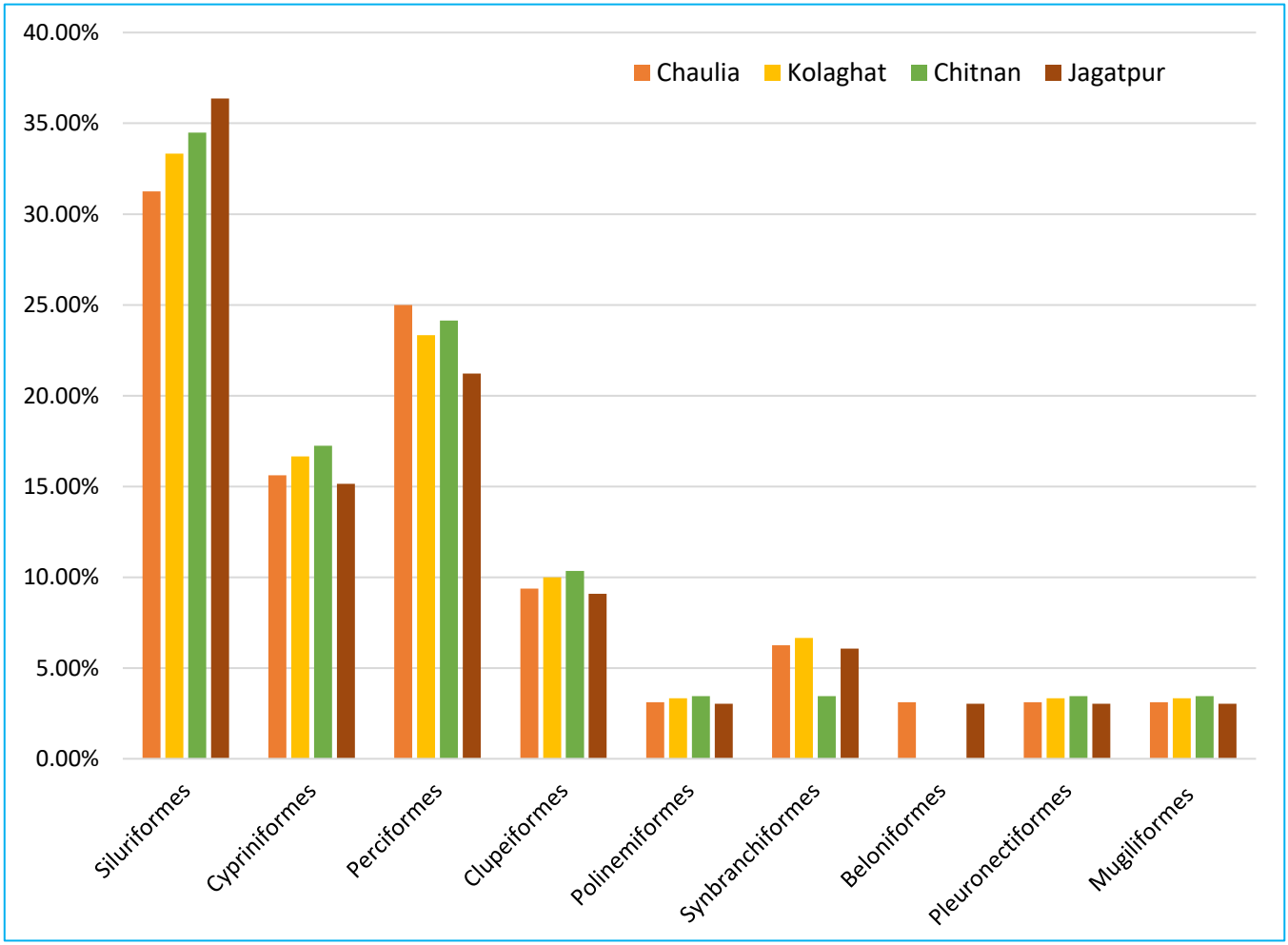

Fig 1 Order wise distribution of fish species in river Rupnarayan at four sampling stations

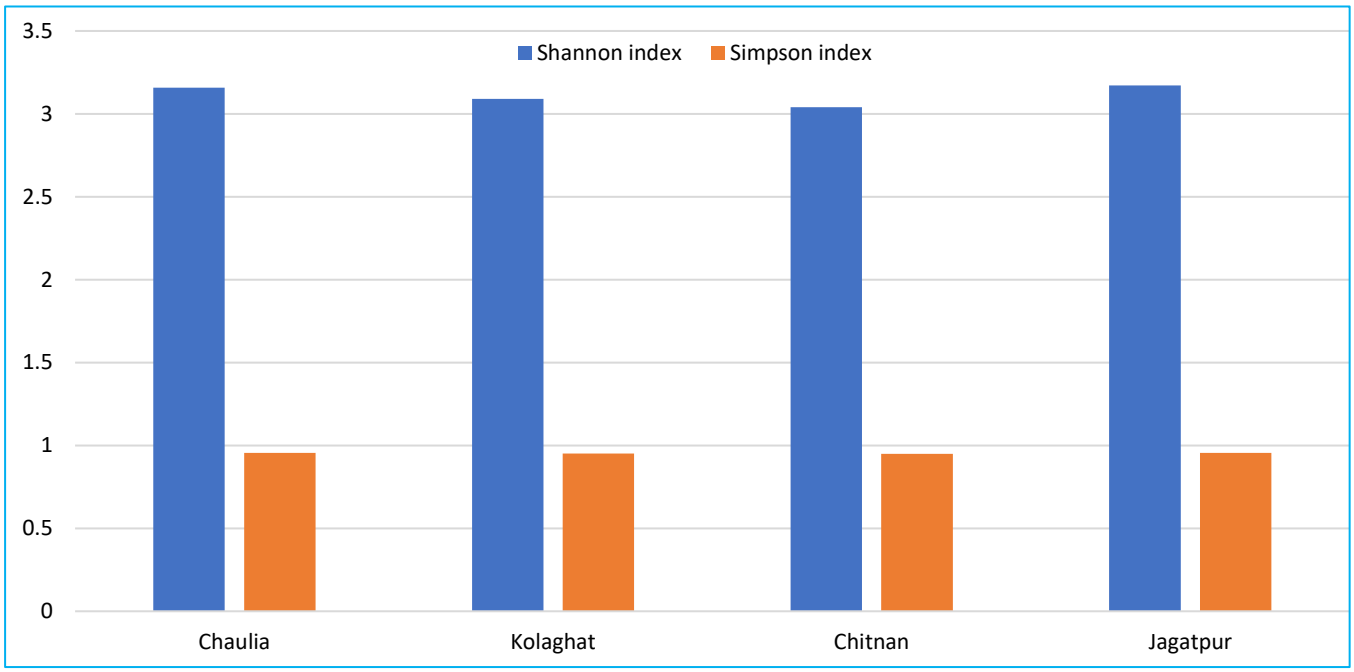

Fig 2 Shannon and Simpson index of fish diversity in river Rupnarayan

CONCLUSION

The current study assists in evaluating ichthyodiversity in river Rupnarayan. Fish species recorded from river Rupnarayan were *Ompak pabda, Mystus vittatus, Clarius batrachus, Puntius ticto, Amblypharyngodon mola, Silonia silonida, Heteropneustes fossilis, Puntius sarana, Colisa chuna, Chanda nama, Chana punctatus, Gudusia chapra, Puntius vittatus, Channa striata, Mystus tengara, Polynemus paradiseus, Ptenualosa ilisha, Monopterus cuchia, Glossogobius giuris, Mystus cavasius, Wallago attu, Chela cachius, Setipinna phasa, Oreochromis mossambicus, Pangasius pangasius, Mystus seenghala, Macrognathus pancalus, Xenentodon cancila, Johnius coitor, Cynoglossus cynoglossus, Ompok bimaculatus, Mugil parsia, Latis calcarifer, Arius maculates*. In the Chaulia sampling station, 32 fish species were recorded while in the Kolaghat sampling station, 30 fish species were recorded. In the Chitnan sampling station, 29 fish species were recorded and in the Jagatpur sampling station, 33 fish species were recorded. Our study will accelerate policymakers for the conservation of ichthyospecies in the river Rupnarayan. However illicit fishing, avoiding toxicity in riverine areas, and fisherfolk community awareness can assist in conserving ichthyodiverity in the river Rupnarayan.

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Conflict of Interest:

The authors do not have any conflict of interest.

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