

## Ichthyofaunal Diversity of Mridangabhanga River

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### ABSTRACT

The ichthyofaunal diversity of Mridangabhanga River was studied at three sites fortnightly from 2019 August to 2021 August. The sites Bolerhat, Purbo Dwarakapur, Kedarpur was chosen for sampling. The local fish landing stations were also surveyed. Hydrology study was done in the sampling stations during each day of fish collection. The river was highly influenced by tidal effect, which had great influence on the fish diversity also. The present study reveals that ichthyofaunal diversity of Mridangabhanga River was a combination of good number of fresh water, estuarine and marine fishes. The statistical analysis indicates that fish diversity of the three study sites were more or less same in case of occurrence. Altogether 90 fish species belonging to 33 families and 63 genera were collected from three sampling sites. Cypriniformes was the most dominant order consisting 29% of total fish population followed by the Siluriformes (14%), Clupeiformes (9%), Anaban-

tiformes (8%), Gobiliformes (7%), Perciformes (6%), Synbranchiformes, Pleuronectiformes (3%). Others Anabantiformes, Rhinopristiformes, Osteoglossiformes, Anguilliformes represents 2% and Beloniformes, Carcharhiniformes, Aulopiformes Myliobatiformes, Kurtiformes, Tetraodontiformes represents 1% of the total diversity of fish fauna. Among these fishes 7 species Nearly Threatened 5 species Vulnerable category, 1 Endangered category species, 69 were least concerned Not Evaluated Category 5 species, 3 species Data Deficient Category. Few additional data was collected from local fish market survey. The study also reveals that this river along with is a safer place for fish spawns to survive.

**Keywords** Distributaries, Tidal effect, Estuarine fishes, Fish seeds, Breeding ground.

### INTRODUCTION

The biodiversity loss and species extinctions are crucial problem at global level. The anthropogenic activity has drastically changed the ecosystem of rivers, which affected all the aquatic flora and fauna. Specially, fresh water fishes are vulnerable as they could not with stand wide hydrological changes, as a result many of them reached at the verge of extinction. Laffaillae *et al.* (2005), Sarkar *et al.* (2008), Kang *et al.* (2009) has opined that fresh water fishes are most threatened taxonomic groups as they have sensitivity to the qualitative changes of the aquatic body.

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The great genetic delta, The Sunderban area is endowed with rich biodiversity. The aquatic resources especially the fish species are highly diverse. The distributaries of River Ganga in South 24 Parganas has created a mesh work of rivers and rivulets and created the world's largest delta with highest diversified fauna, the Sunderban. The Mridangabhangha River is one of the distributary of River Ganga, it joins Mathurapur and Pathorprotima block of South 24 Pargana West Bengal. The river is fed by sea tides twice daily, which is an important factor that influences the aquatic population of this river. The Mridangabhangha River valley adjoins with agriculture fields and bheries where extensive fish culture were done, lowland area, marshy lands, canals and water bodies and the Kakmara River (local name). During flood the river water rises and covers lowland, marshy area and other water bodies in the valley, at the end of flood, river water retrieves and brings good number of fish species from nearby water bodies along with flood water. Moreover, during high tide many estuarine and marine fishes enters into river flow, which may have increased diversity of fish population. The Mridangabhangha River conserves a major part of commercial fisheries which is the sole livelihood of the local people. Major portions of fish captured from this river are supplied to the Kolkata based fish markets. During the present survey it was observed that, many of the fish farmers as well as common fishermen were engaged in fish seeds collection and commercially selling it. It was a lucrative business to the local people.

Extensive studies were done on the fish diversity of Sunderban area by several authors and results indicated that the deltaic region of Indian Sunderban houses a rich diversity of ichthyofauna (Chakraborty *et al.* 2021, Paul *et al.* 2021, Md Sen and Mandal 2019, Saha *et al.* 2018, Md Islam *et al.* 2017, Mishra and Gopi 2017, Chakraborty and Adhikary 2014, Rahaman *et al.* 2012, Sarkar and Banerjee 2012, Dhara and Paul 2016, Mitra *et al.* 2006, Chakraborty 1991).

## MATERIALS AND METHODS

The recent study was conducted on the River Mridangabhangha the distributaries of River Ganga. The study sites Bolerhat, Purbo Dwarakapur, Kedarpur were chosen at proper intervals. The sampling sites along with the river bank, the adjoining lowland area and fish culture ponds. Sampling was done by engaging fishermen and also collected from local fish landing stations. Fish was caught by various gears (Cast net, Lift net, Gill net) and traps were used for Cat fishes and mud species collection. All collected fishes were assorted into two groups adult and fries. Identification was done according to the standard taxonomic procedure following (Day 1875-1878, Talwar and Jhingran 1991, Jayaram 1999, Kang *et al.* 2009, Sarkar and Banerjee 2012, Laffaille *et al.* 2005). The fish diversity of Mridangabhangha River is enlisted in the Tables 1-3.

**Table 1.** Hydrology of in three study sites of Mridangabhangha River.

Month	Temperature of water		pH		Salinity (PSU)		DO (mg/l)		Transparency		Alkalinity (%)	
	Min	Max	Min	Mix	Min	Max	Min	Max	Min	Max	Min	Max
August	29.8	29.94	8	8.1	18.9	18.96	7.12	7.16	12	12.2	24.8	24.88
September	23.2	24.68	7.5	7.6	15.2	15.4	7.4	7.5	18	18.6	26	26.2
October	19.8	19.96	7	7	14.5	14.76	8.20	8.9	14	14.6	25.10	25.2
November	13.64	17	7.5	7.8	12	12.5	7.56	7.58	18	18.4	13.9	14
December	13	13.94	7.9	8	12.01	12.5	7.23	8	18.8	18.82	18.2	18.6
January	10.2	10.66	7	7.2	16.8	16.92	8	8.2	16	16.2	14.8	14.88
February	11.4	11.88	7.8	7.9	24.3	24.56	6.5	7	16.8	16.82	21	21.5
March	14.64	14.08	6.9	7	24.0	24.02	8	8.5	14	14.2	18.2	18.6
April	17.9	18.56	7	7.2	24.8	24.88	6.3	7	17	17.2	17	17.8
May	38.28	39.58	7.8	8	20.6	20.82	5.9	6	14.9	14.6	21.88	21.88
June	37.70	38.12	7.9	8.2	24.5	24.8	8	8.4	8	8.01	14.8	18.6
July	33.62	33.67	7.5	7.6	23.8	25.9	4.9	5	4.6	5	24	24.8

**Table 2.** Shows the fish species diversity of Mridangabhanga at S1. Bolerhat, S2. Purbo Dwarakapur, S3. Kedarpur during the study period.

		August 2019-August 2020	September2020- August 2021
S1	Species richness	89	45
	Margalef index	11.15254	5.601416
	Shannon wiener index	4.085332	4.087129
S2	Species richness	89	89
	Margalef index	11.01297	11.30274
	Shannon wiener index	4.065523	4.069573
S3	Species richness	89	87
	Margalef index	11.06163	10.89804
	Shannon wiener index	4.010821	4.122512

## RESULTS AND DISCUSSION

River Mridangabhanga is important because it is a productive breeding ground of fishes in the Southern deltaic region. The mangrove habitat with huge primary productivity and high organic and inorganic nutrients has enriched this river ecosystem which in turn provides good nurturing ground for fishes. Chakraborty (1991), Mitra *et al.* (2006), Sen and Mandal (2019) indicated that the pelagic region of the coastal area are highly productive due to high nutrients derived from mangrove plants, surface runoff and anthropogenic origin. The monsoon storm and heavy rainfall damages embankment of the river and inundation increases salinity of river water which act as threat to the natural breeding grounds.

The study of fishes of Mridangabhanga reveals a rich diversified list of freshwater, estuarine and marine fishes. A total of 90 total fish species were identified during the study, belonging to 18 Orders, 33 families and 63 Genera (Table 1). Cypriniformes was the most dominant order consisting 29% of total fish population followed by the Siluriformes (16%), Clupeiformes and Anabantiformes (9%), Gobiliformes (7%), Perciformes (6%), Synbranchiformes and Pleuronectiformes (3%). Others Rhinopristiformes, Osteoglossiformes, Anguilliformes represents 2% and Beloniformes Carcharhiniformes Aulopiformes Myliobatiformes, Kurtiformes Tetraodontiformes represents 1% of the diversity of fish fauna.

Order Cypriniformes represents 2 families, among them the family Cyprinidae was the most dominant family having a total number of 14 Genus and

26 Species and Family Danionidae represents 1 Genus and 1 Species. Order Siluriformes represents 5 Families among them family Bagridae 4 Genus 8 Species, Siluridae 2 Genus 3 Species, Order Clupeiformes represents 3 Families, among them Family Clupeidae represents 5 Genus 5 Species, Family Pristigasteridae 1 Genus 1 Species, Family Engraulidae represents 1 Genus 2 Species, Order Anabantiformes represents 4 families, Badidae with one Genus and one Species, Nandidae representing 1 Genus 1 Species, Osphronemidae 1 Genus 3 Species and Channidae with 1 Genus 3 Species. Order Gobiliformes represents only Family Oxudercidae with 6 Genus 6 Species, Order Kurtiformes represents 1 Family Kurtidae with 1 Genus 1 Species, Order Pleuronectiformes represents 2 Families among them Family Cynoglossidae represents 1 Genus 3 Species and Family Soleidae 1 Genus 1 Species. Order Tetraodontiformes represents the only Family Triacanthidae with 1 Genus 1 Species. Order Mugiliformes represents the only family Mugilidae with 4 Genus 4 Species. Order Aulopiformes also represents the only family Synodontidae with 1 Genus 1 Species. Order Carcharhiniformes represents Family Carcharhinidae with 1 Genus 1 Species. Order Rhinopristiformes represents two families and both the Families Rhinobatidae and Pristidae represents 1 Genus and 1 Species. Order Osteoglossiformes represents the Family Notopteridae representing 2 Genus and 2 Species. Order Myliobatiformes represents Family Gymnuridae with 1 Genus and 1 Species, Order Synbranchiformes represents two Families, Mastacembelidae with 2 Genus and 2 Species and Family Synbranchidae with 1 Genus and 1 species. Order Perciformes represents two families family Latidae with 1 Genus 1 Species, and Family Ambes-

**Table 3.** List of fishes of Mridangabhanga River. LC:Least concerned category; NT: Nearly threatened; NE: Not evaluated; VC: Vulnerable category; DD: Data deficit ; ED: Endangered species.

Sl. No.	Class	Order	Family	Sub family	Name of the Fish	Status
1	Actinopterii	Tetraodontiformes	Triacanthidae		<i>Triacanthus biaculeatus</i>	NE
2	Actinopterii	Kurtiformes	Kurtidae		<i>Kurtus indicus</i>	NE
3	Actinopterii	Perciformes	Latidae		<i>Lates calcarifer</i>	LC
4	Actinopterii	Perciformes	Ambessidae		<i>Ambassis kopsii</i>	NE
5	Actinopterii	Perciformes	Ambessidae		<i>Chanda nama</i>	LC
6	Actinopterii	Perciformes	Ambessidae		<i>Parambassis baculis</i>	LC
7	Actinopterii	Perciformes	Ambessidae		<i>Parambassis ranga</i>	LC
8	Actinopterii	Anabantiformes	Badidae		<i>Badis badis</i>	LC
9	Actinopterii	Anabantiformes	Nandidae		<i>Nandus nandus</i>	LC
10	Actinopterii	Anabantiformes	Osphronemidae		<i>Trichogaster fasciata</i>	LC
11	Actinopterii	Anabantiformes	Osphronemidae		<i>Trichogaster lalius</i>	LC
12	Actinopterii	Anabantiformes	Osphronemidae		<i>Trichogaster chuna</i>	LC
13	Actinopterii	Anabantiformes	Channidae		<i>Channa orientalis</i>	VU
14	Actinopterii	Anabantiformes	Channidae		<i>Channa punctate</i>	LC
15	Actinopterii	Anabantiformes	Channidae		<i>Channa striata</i>	LC
16	Actinopterii	Beloniformes	Belonidae		<i>Xenentodon cancila</i>	LC
17	Actinopterii	Anguilliformes	Anguillidae		<i>Anguilla bengalensis</i>	LC
18	Actinopterii	Anguilliformes	Anguillidae		<i>Anguilla bicolor</i>	NT
19	Cohondrichthyes	Carcharhiniformes	Carcharhinidae		<i>Carcharhinus limbatus</i>	VU
20	Cohondrichthyes	Rhinopristiformes	Pristidae		<i>Pristis clavate</i>	EN
21	Cohondrichthyes	Rhinopristiformes	Rhinobatidae		<i>Rhinobatos annadalei</i>	DD
22	Cohondrichthyes	Myliobatiformes	Gymnuridae		<i>Gymnura japonica</i>	VU
23	Actinopterygii	Clupeiformes	Clupeidae		<i>Corica soborna</i>	LC
24	Actinopterii	Clupeiformes	Clupeidae		<i>Gonialosa manmina</i>	LC
25	Actinopterii	Clupeiformes	Clupeidae		<i>Gudusia chapra</i>	LC
26	Actinopterii	Clupeiformes	Clupeidae		<i>Nematalosa galathea</i>	LC
27	Actinopterii	Clupeiformes	Clupeidae		<i>Tenualosa ilisha</i>	LC
28	Actinopterii	Clupeiformes	Pristigasteridae		<i>Llisha elongate</i>	LC
29	Actinopterii	Clupeiformes	Engraulidae		<i>Setipinna phasa</i>	LC
30	Actinopterii	Clupeiformes	Engraulidae		<i>Setipinna tenuifilis</i>	DD
31	Actinopterii	Cypriniformes	Danionidae		<i>Parluciosoma daniconius</i>	LC
32	Actinopterii	Cypriniformes	Cyprinidae		<i>Amblypharyngodon mola</i>	LC
33	Actinopterii	Cypriniformes	Cyprinidae		<i>Aspidoporia jaya</i>	LC
34	Actinopterii	Cypriniformes	Cyprinidae		<i>Chagunius chagunio</i>	LC
35	Actinopterii	Cypriniformes	Cyprinidae		<i>Cirrhinus reba</i>	LC
36	Actinopterii	Cypriniformes	Cyprinidae		<i>Esumus danricus</i>	LC
37	Actinopterii	Cypriniformes	Cyprinidae		<i>Laubuka laubuca</i>	NT
38	Actinopterii	Cypriniformes	Cyprinidae		<i>Labeo pangusia</i>	LC
39	Actinopterii	Cypriniformes	Cyprinidae		<i>Labeo angara</i>	LC
40	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius chola</i>	LC
41	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius conchonus</i>	LC
42	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius amphibious</i>	DD
43	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius binotatus</i>	LC
44	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius puntio</i>	NE
45	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius phutunio</i>	LC
46	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius sophore</i>	LC
47	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius terio</i>	LC
48	Actinopterii	Cypriniformes	Cyprinidae		<i>Puntius ticto</i>	LC
49	Actinopterii	Cypriniformes	Cyprinidae	Danionidae	<i>Salmostoma bacaila</i>	LC
50	Actinopterii	Cypriniformes	Cyprinidae	Danionidae	<i>Salmostoma phulo</i>	LC
51	Actinopterii	Cypriniformes	Cyprinidae	Danionidae	<i>Securicula gora</i>	LC
52	Actinopterii	Cypriniformes	Cyprinidae	Danionidae	<i>Rasbora daniconius</i>	LC
53	Actinopterii	Cypriniformes	Cyprinidae	Danionidae	<i>Danio rerio</i>	LC
54	Actinopterii	Cypriniformes	Cyprinidae	Danionidae	<i>Danio aequipinnatus</i>	LC
55	Actinopterii	Cypriniformes	Cobitidae		<i>Lepidocephalichthys guntea</i>	LC

Table 3. Continued.

Sl. No.	Class	Order	Family	Sub family	Name of the Fish	Status
56	Actinopterii	Cypriniformes	Cyprinidae	Barbinae	<i>Pethia conchoniis</i>	LC
57	Actinopterii	Siluriformes	Siluridae		<i>Wallago attu</i>	VU
58	Actinopterii	Siluriformes	Siluridae		<i>Ompok pabda</i>	NT
59	Actinopterii	Siluriformes	Siluridae		<i>Ompok bimaculatus</i>	NT
60	Actinopterii	Siluriformes	Bagridae		<i>Batasio batasio</i>	LC
61	Actinopterii	Siluriformes	Bagridae		<i>Mystus bleekeri</i>	LC
62	Actinopterii	Siluriformes	Bagridae		<i>Mystus cavasius</i>	LC
63	Actinopterii	Siluriformes	Bagridae		<i>Mystus gulio</i>	LC
64	Actinopterii	Siluriformes	Bagridae		<i>Mystus tengra</i>	LC
65	Actinopterii	Siluriformes	Bagridae		<i>Mystus vittatus</i>	LC
66	Actinopterii	Siluriformes	Bagridae		<i>Ailia coila</i>	NT
67	Actinopterii	Siluriformes	Bagridae		<i>Silonia silondia</i>	LC
68	Actinopterii	Siluriformes	Pangasilidae		<i>Pangasius pangasius</i>	LC
69	Actinopterii	Siluriformes	Clariidae		<i>Clarias batrachus</i>	LC
70	Actinopterii	Siluriformes	Heteropneustidae		<i>Heteropneustes fossilis</i>	LC
71	Actinopterii	Aulopiformes	Synodontidae		<i>Harpadon nehereus</i>	NT
72	Actinopterii	Mugiliformes	Mugilidae		<i>Planiliza macrolepis</i>	LC
73	Actinopterii	Mugiliformes	Mugilidae		<i>Chelon parsia</i>	LC
74	Actinopterii	Mugiliformes	Mugilidae		<i>Rhinomugil corsula</i>	LC
75	Actinopterii	Mugiliformes	Mugilidae		<i>Valamugil buchanani</i>	LC
76	Actinopterii	Gobiliformes	Oxudercidae	Oxudercinae	<i>Apocryptes bato</i>	LC
77	Actinopterii	Gobiliformes	Oxudercidae		<i>Apocryptodon madurensis</i>	LC
78	Actinopterii	Gobiliformes	Oxudercidae		<i>Glossogobius giuris</i>	LC
79	Actinopterii	Gobiliformes	Oxudercidae		<i>Parapocryptes serperaster</i>	LC
80	Actinopterii	Gobiliformes	Oxudercidae		<i>Parapocryptes batooides</i>	LC
81	Actinopterii	Gobiliformes	Oxudercidae		<i>Periophthalmus kalolo</i>	LC
82	Actinopterii	Synbranchiformes	Mastacembelidae		<i>Macragnathus pancalus</i>	LC
83	Actinopterii	Synbranchiformes	Mastacembelidae		<i>Mastacembelus armatus</i>	LC
84	Actinopterii	Synbranchiformes	Synbranchidae		<i>Monopterusuchia</i>	LC
85	Actinopterii	Osteoglossiformes	Notopteridae		<i>Notopterus notopterus</i>	LC
86	Actinopterii	Osteoglossiformes	Notopteridae		<i>Chitala chitala</i>	NT
87	Actinopterii	Pleuronectiformes	Soleidae		<i>Synaptura albomaculata</i>	NE
88	Actinopterii	Pleuronectiformes	Cynoglossidae	Cynoglossinae	<i>Cynoglossus macrostomus</i>	VU
89	Actinopterii	Pleuronectiformes	Cynoglossidae	Cynoglossinae	<i>Cynoglossus lingua</i>	LC
90	Actinopterii	Pleuronectiformes	Cynoglossidae	Cynoglossinae	<i>Cynoglossus arel</i>	LC

sidae with 3 Genus 4 Species, Order Beloniformes represents Family Belonidae with 1 Genus 1 Species.

During the present study, 90 fish species were recorded from Mridangabhanga River (Table 3). Among these fishes 7 species Nearly Threatened Category, 5 species Vulnerable category, 1 Endangered category species, 69 were least concerned category species, Not Evaluated Category 5 species, 3 species Data Deficient Category, according to "The IUCN RedList of Threatened Species" 2021.

The cluster analysis is represented by Dendrogram Figs.1-3. The X axis indicates the Fish species and Y axis indicates distance. The fishes of

Mridangabhanga River during 2019 and 2020 were heterogenous with respect to occurrence in three study sites Figs. 2A and B. Shows fish species composition differed significantly among three study sites with respect to two studied years according to the analysis.

Some of the fish species of this area are sporadic visitors to this river usually shows higher population during the monsoon season. The freshwater fish species are also observed in higher population during heavy flow of monsoon. The channels at Purbadwarakapur houses a large numbers of oozing females during monsoon catch and fingerlings were found in the shallow back water area there during post monsoon. The backwater at Purbadwarakapur area gives

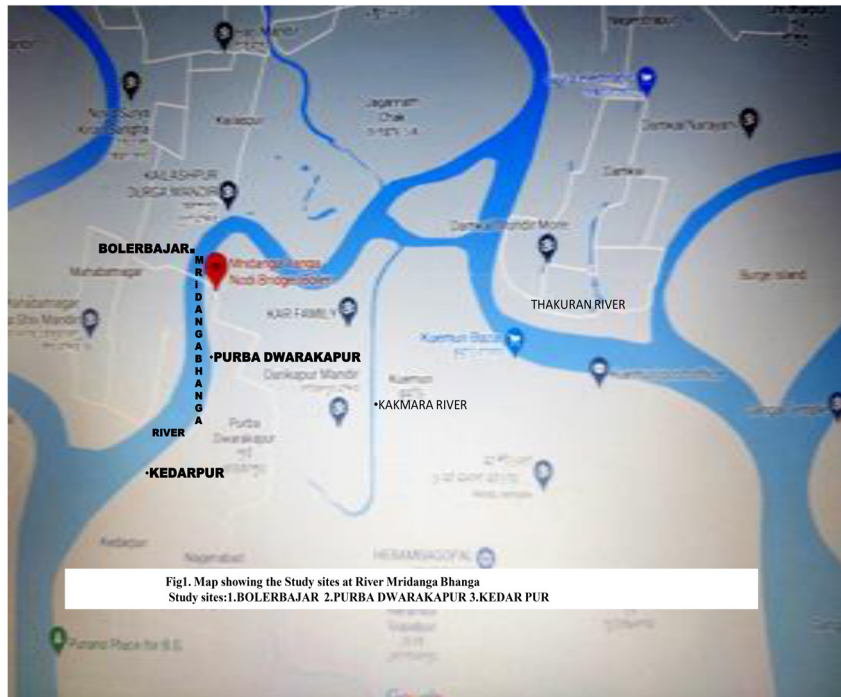
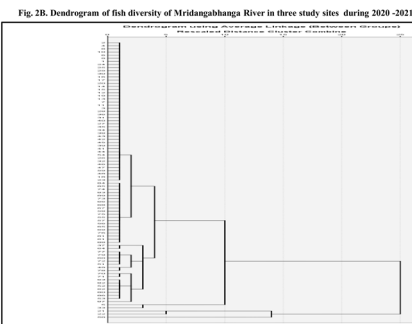
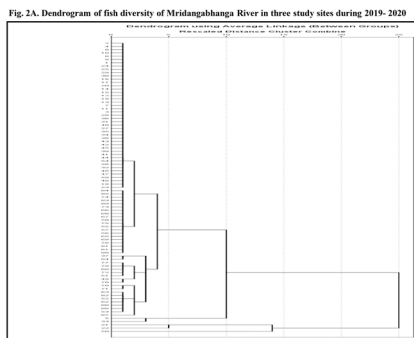


Fig. 1. Map showing the study sites of Mridangabhanga River.

shelter to the freshwater as well as brackish water fishes where spawns of *Chanda nama*, *Xenentodon cancila*, *Badis badis*, *Anguilla bengalensis*, *Gudusia chapra*, *Setipinna phasa*, *Aspidoparia jaya*, *Labuca labuca*, *Esomus danricus*, *Puntius ticto*, *P. phutunio*, *Danio rario*, *Mystus tengara*, *Heteropneustes foss-*

*ilis*, *Rhinomugil corsula*, *Cynoglossus cynoglossus* were found during low tide at post monsoon. The creeks and waterlogged area behind the river bank shows a rich diversity of fishes and they showed a heterogeneous composition of freshwater and marine fishes. The fish spawns were collected from these



Figs. 2A, B. The cluster analysis is represented by Dendrogram Figs. 2A, B. The X axis indicates the Fish species and Y axis indicates distance. The fishes of Mridangabhanga River during 2019 and 2020 was heterogenous with respect to occurrence in three study sites Figs. 2A, B. Shows fish species composition differed significantly among three study sites with respect to two studied years according to the analysis.

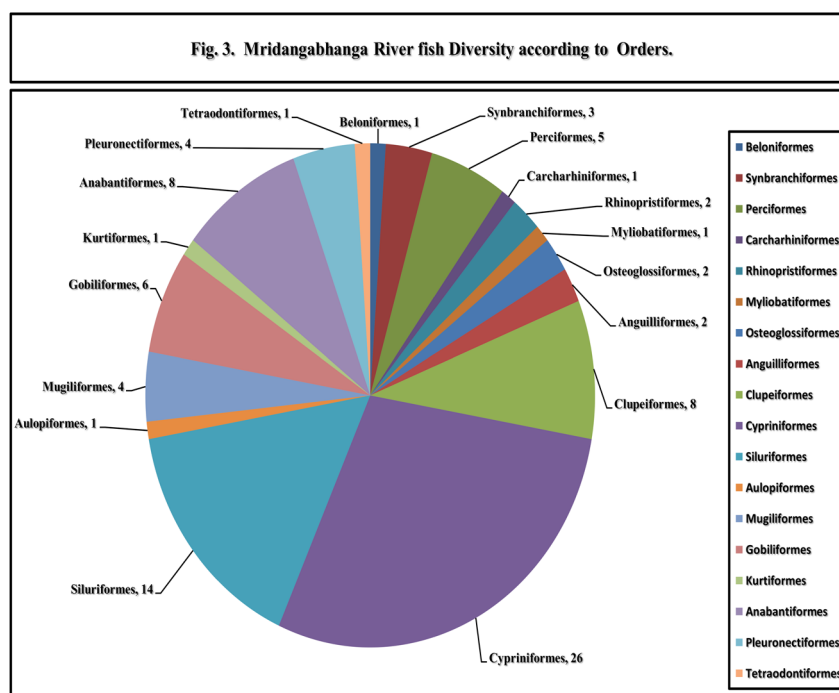


Fig. 3. Mridangabhanga River fish diversity according to orders.

waterlogged areas in large scale. The local villagers were trying to rare those spawns in their own culture ponds which will not only be a source of livelihood on the other hand it will increase fish population also. The fishery at Purbadwarakapur is administered by the Gram Panchayat and it aims to conserve those spawns and increase production in large scale. The local villagers were always concerned and take care of the fishery. The statistical analysis of fish species biodiversity of Mridangabhanga River shows that, the species richness value was lowest during 2021 at Bolerhat and the Margalef index value was also lowest at Bolerhat in the same year. Species richness value at Kedarpur during 2021 was lower than the value studied during 2020. The statistical analysis of fish species biodiversity in Mridangabhanga River at three study sites reveals that the distribution of the fish population are more or less even in all the three study sites.

## CONCLUSION

The study of ichthyofaunal diversity of River Mridangabhanga indicates that this river is a good source

of freshwater and estuarine food fishes and also a healthy habitat of fish seeds. The food fishes, ornamental fishes and fish spawns serves the livelihood of the local village people. Though this river has to face erosion almost every year due to flood moreover also high rainfall damages crude mud embankments in every monsoon. As a result it affects aquatic ecosystem which has adverse impact on aquatic fauna. In addition to it, the Mridangabhanga River fishes are directly influenced by urban sewage, agricultural runoff and saline water inflow during high tide. The river shows a steady productivity throughout the year thus may be conserved as a good nurturing ground. An effective conservation measure is earnestly needed to save the natural breeding grounds and to protect the diversity of the fishes.

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