

## Study of indigenous freshwater fish diversity of Bankura (West Bengal), India with special reference to *Clarias batrachus*

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### Abstract

A study was conducted to determine the ichthyofaunal diversity in Bankura district of West Bengal. The area is traversed by major and minor rivers, feeder channels, numerous ponds, bills, reservoirs which have made this drought-trodden district as the highest producer of aquatic products within the state. Field survey was conducted in randomly selected local markets covering twenty-two blocks of Bankura. Fish sampling was carried out using various conventional fishing gears. The entire region harbours a wide variety of aquatic fishes. A total number of 92 indigenous fish species belonging to 30 families were identified during this study. The Cyprinidae family dominated the population with its 36 varieties followed by Channidae, Siluridae and Bagridae. Sonamukhi block situated in Shali basin; Sarenga and Raipur of Kangsabati basin; Dwarkeshwar and seven bundhs-enriched Bishnupur were the major habitats of small indigenous fishes. This paper also denotes presence of 12 globally endemic freshwater fish species viz. *Hypophthalmichthys molitrix*, *Cyprinus carpio*, *Labeo nandina*, *Tor khudree*, *Chitala chitala*, *Bagarius bagarius*, *Wallago attu*, *Ompok pabda*, *Ailia coila*, *Anguilla bengalensis*, *Parambassis lala*, *Oreochromis mossambicus*. The substitution of native *Clarias batrachus* with invasive African catfish *C. gariepinus* was observed in various local markets. Some traders even promote illicit farming of this banned species for their own profit. As a consequence, the indigenous, nutritionally-enriched *C. batrachus* is becoming more endangered.

**Keywords:** *Clarias batrachus*, Fish diversity, Small indigenous fish

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## INTRODUCTION

The district of Bankura (22°38' to 23°38' N and 86°36' to 87°46' E), over a massive geographical area of 6,882 km<sup>2</sup>, enjoys lush green views combined with uneven plateau which links plains of Bengal to the peninsular mass of Chota Nagpur. The area is beset with intermittent dense forest, red ferruginous laterite soil and Damodhar-Dwarkeshwar-Shilabati-Kangsabati riverine network. The rivers of the district get a lease of life with monsoon rains. The same can be attributed to the reservoirs and ponds of the region. The

aquaculture farms (14400 ha) are thus mainly dependent upon the supply of groundwater along with rain water throughout the year. The climate is tropical dry sub-humid with an annual rainfall of 1100 to 1400 mm. This combination of seasonal streams, rain-soaked natural ponds, aquaculture farms, rivers and their feeder channels are the rich sources (52341 Ha) of freshwater indigenous fishes (Anonymous, 2016).

Small indigenous fishes (which attain a maximum length of 25-30 cm in mature stage) comprise a large portion of fish biomass and a major contributor of nutritional security to the rural people. Fish

circulates essential nutrients between the littoral, limnetic, profundal and benthic zones. Mohanty et al. (2013) reported that these indigenous fishes are the source of vital proteins (*Xenentodon canchila*, *Ailia coila*) and micro-nutrients such as Calcium (*Puntius sophore*, *Gudusia chapra*, *Chanda nama*), Zinc (*Mystus tengra*, *Chela bacaila*), iron (*Osteobrama cotio*, *Mystus vittatus*), as well as vitamins (*Esomus danricus*, *Parambassis ranga*) and fatty acids (*Amblypharyngodon mola*, *Channa punctata*). Thus, they play a major role in community nutrition in a district like Bankura where about 41.52% families are thriving under poverty (Anonymous, 2016).

*Clarias batrachus* (Linn.) is a widely recognized small indigenous fish by virtue of its nutritional richness. It is presently thriving in Southern Asia at a merely vulnerable state despite its high demand among consumers. Siltation of natural breeding grounds, intermittent periods of drought, indiscriminate use of pesticides in paddy fields, industrial effluents and illicit fishing of juveniles has made the situation more hostile (Dhara and Saha, 2013). Some traders often substitute *C. batrachus* with invasive alien catfish *C. gariepinus* in the local name of 'Dēśī Māgur' due to their morphological resemblance (Khedkar et al., 2015). The biological invasion of *C. gariepinus* in natural water bodies can be a potential threat to biodiversity due to its frenzied feeding behavior (Radhakrishnan et al., 2011). It has become a burning issue in South China, Brazil and India to protect endemic and endangered small indigenous fishes from prolific predatory nature of *C. gariepinus* (Khedkar et al., 2015).

To create conservation strategy as a whole, knowledge of the occurrence of the species, present status and distribution range is essential. Mapping of fish diversity area is also important in view of conservation of those fish species in natural habitats. The present investigation aims to study the ichthyofaunal diversity of Bankura district along with a search of threatened, endemic and vulnerable species. Special emphasis on *C. batrachus* was also given to verify biological invasion of African catfish *C. gariepinus* in local water bodies.

## MATERIALS AND METHODS

**Field survey:** Field sampling and survey were conducted during 2017-2018 in randomly chosen waterbodies and local fish markets of twenty-two community development blocks of bankura district (Fig. 1). Primary data was collected from the fishermen and fish-sellers whereas secondary data was obtained from the concerned authorities, Govt. agencies and research publications. The graphical representation and statistical analysis of data was carried out using Microsoft Office Excel software. Garmin eTrex Vista Hcx Global Position-

ing system device has been utilized to obtain specific location status. The Geographic information system (GIS) based spatial distribution of fish diversity was analyzed through Inverse-distance weighting (IDW) spatial interpolation method by using ArcGIS 10.2 (<http://www.esri.com>) software.

**Collection of samples:** Various conventional fishing gears (Fig. 2) were employed to collect specimen with the help of fish farmers from the study area.

It included Ghunī (Used to catch bottom dwelling fishes like *Trichogaster chuna*, *Anabas testudineus* etc.), Palu'i (Used to catch fishes in slime), Dughārē (Used to catch small indigenous fishes in shallow river), Barāśī (Used to catch small and medium sized fishes), Cāp Jāl (Used to catch small fishes), Drag net (Used to catch carps, small indigenous fishes of a pond), Ghun Jāl, Phāñđi, Wheel chip, Jhim chip, Tōgi, Jaṭā (Used to catch *C. orientalis*, *Monopterus cuchia*, *Clarias batrachus* etc.), Larkā (Used to catch *C. striata*), Kēñcā (Used to catch fishes like *C. striata*) etc. The samples were immediately preserved in 4-6% formalin and brought to laboratory for further identification (Roy et al., 2013). Specimens were precisely recorded by photography. Identification and subsequent taxonomic classification of those samples were done according to Talwar and Jhingran (1991) and FishBase (2016). The International Union for Conservation of Nature (IUCN, 2018) red list of threatened species was followed to evaluate the present conservation status of the species.

## RESULTS

A total number of 92 indigenous freshwater fish species belonging to 30 families under 10 orders were identified in the study area. The GIS-based fish diversity map showed 11 different regions (by



Fig. 1. Geographical map of the study area.

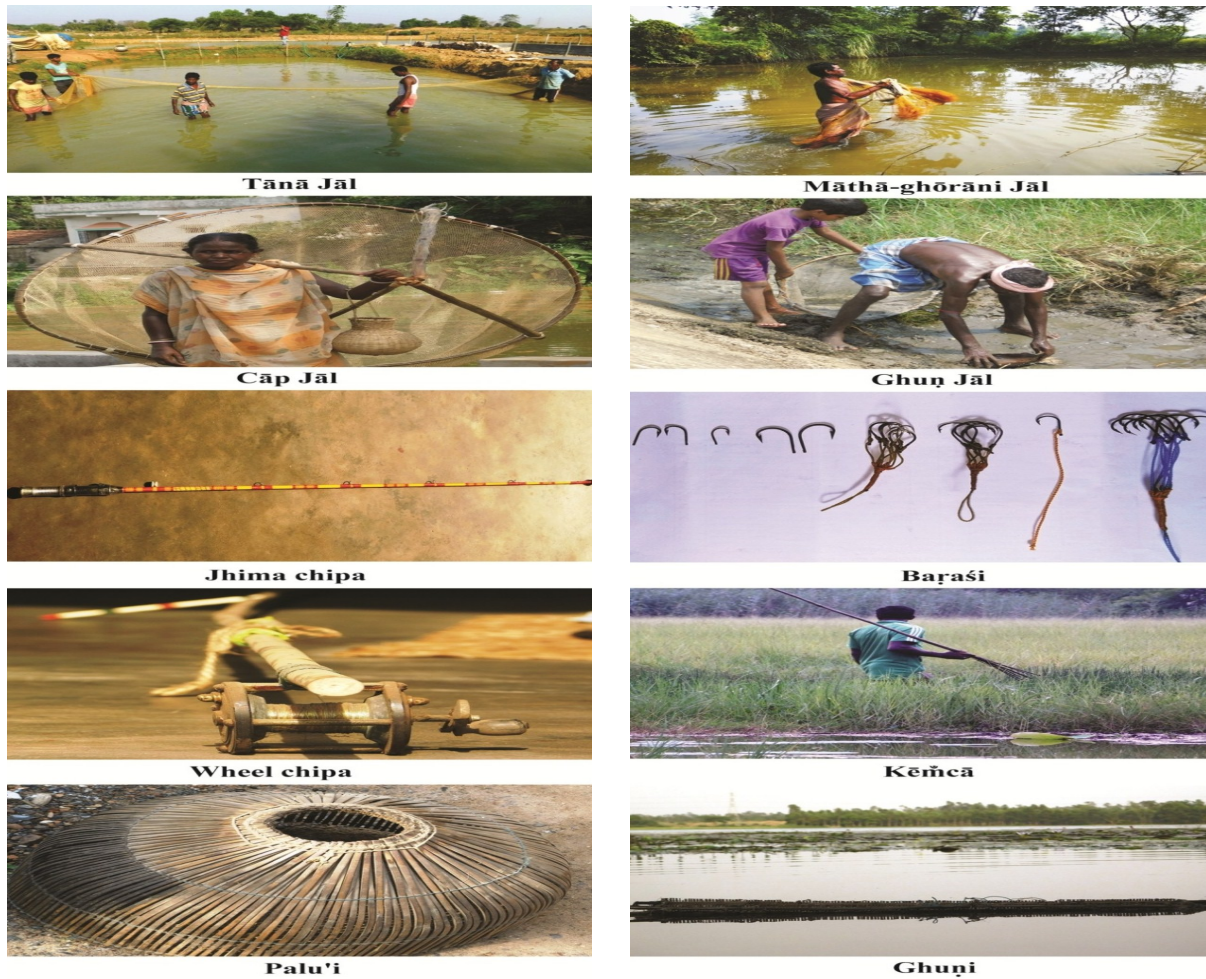


Fig. 2. Fishing gears used to collect fish during the study.

using equal interval method) of species richness. Bishnupur, Bankura-II, Raipur, Barjora, Hirbandh and Saltora blocks were very rich in the context of species availability of fish (Fig. 3).

The entire northern and southern part of Bankura District is also significantly rich where more than 50 species are available in general. Due to rugged topography and impermeable soil layer, a greater portion of Indus, Chhatna, and Taldangra blocks have only a few water bodies and subsequently lower fish diversity. The order-wise fish diversity has illustrated predominance of Cypriniformes (42.39%), Siluriformes (20.65%) and Perciformes (21.74%) over the area (Fig. 4). Anguilliformes and Tetraodontiformes were least observed with only single species under each of them. Sarenga and Raipur blocks of Kangsabati basin were the major habitats of small indigenous fishes. Ramsagar of Onda block was identified as a potential breeding centre of major carps being the destination of several hatcheries for qualitative spawns.

The Cyprinidae family dominated the population with 36 varieties throughout the district followed by

Channidae (6), Siluridae (4) and Bagridae (4). Block wise distribution (Table 1) showed maximum diversity in the blocks Bankura-I (69), Raipur (67), Barjora (66), Saltora (65) and Sarenga (65) ranging from economically significant species such as Dēṣī Māgur (*Clarias batrachus*), Śiṅgī (*Heteropneustes fossilis*), Dēṣī kō'i (*Anabas testudineus*) to rare or near threatened Maulā (*Anguilla bengalensis*), Kānāghōghōr (*Bagarius bagarius*) or Bōyāla (*Wallago attu*).

A large number of species has newly been revealed in this area through this study. The distribution pattern indicated presence of several threatened, endemic and vulnerable species in rural waterbodies (Table 2). The result was slightly different from earlier reports of maximum diversity at Onda, Hirbunth and Raipur region. Roy et al. (2013) reported rapid declining of *C. chitala* and *O. pabda* in Bankura district whereas the present study indicated considerable recovery and more availability of those species in that region. Additionally, the presence of endangered species *Tor khudree* in Bankura district was not previously reported.

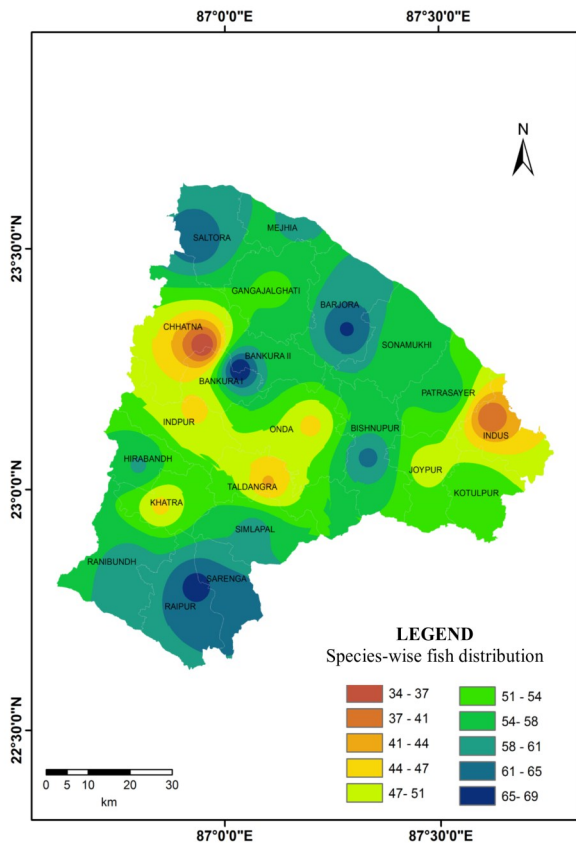


Fig. 3. Spatial distribution of fish diversity of Bankura district.

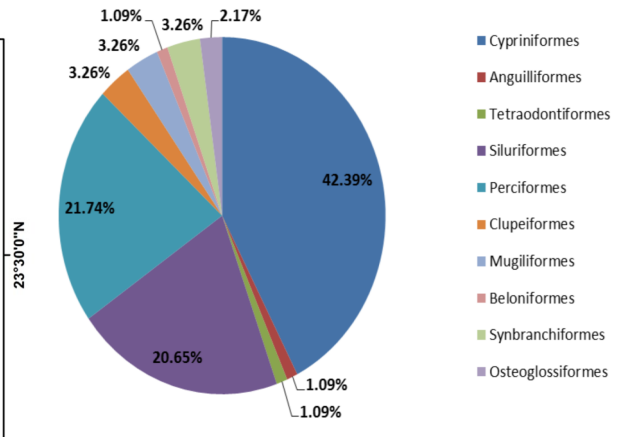


Fig. 4. Order wise fish distribution of Bankura, West Bengal.

A large diversity of small indigenous fishes (Table 3) was observed in local markets (Bankura-I, Rairpur, Barjora, Saltora, Hirbandh and Sarenga blocks) of Bankura district near rivers basin. *Amblypharyngodon mola*, *Esomus danricus*, *Salmostoma bacaila*, *Heteropneustes fossilis*, *Clarias batrachus*, *Mystus tengra*, *Chanda nama*, *Channa orientalis* and *Channa punctata* were mostly consumed. These species (Fig. 5) are either obtained by fishing from nearby water bodies or caught from natural ponds predominantly in monsoon. *C. batrachus* has a high demand throughout the Bankura district. It is majorly been found once or

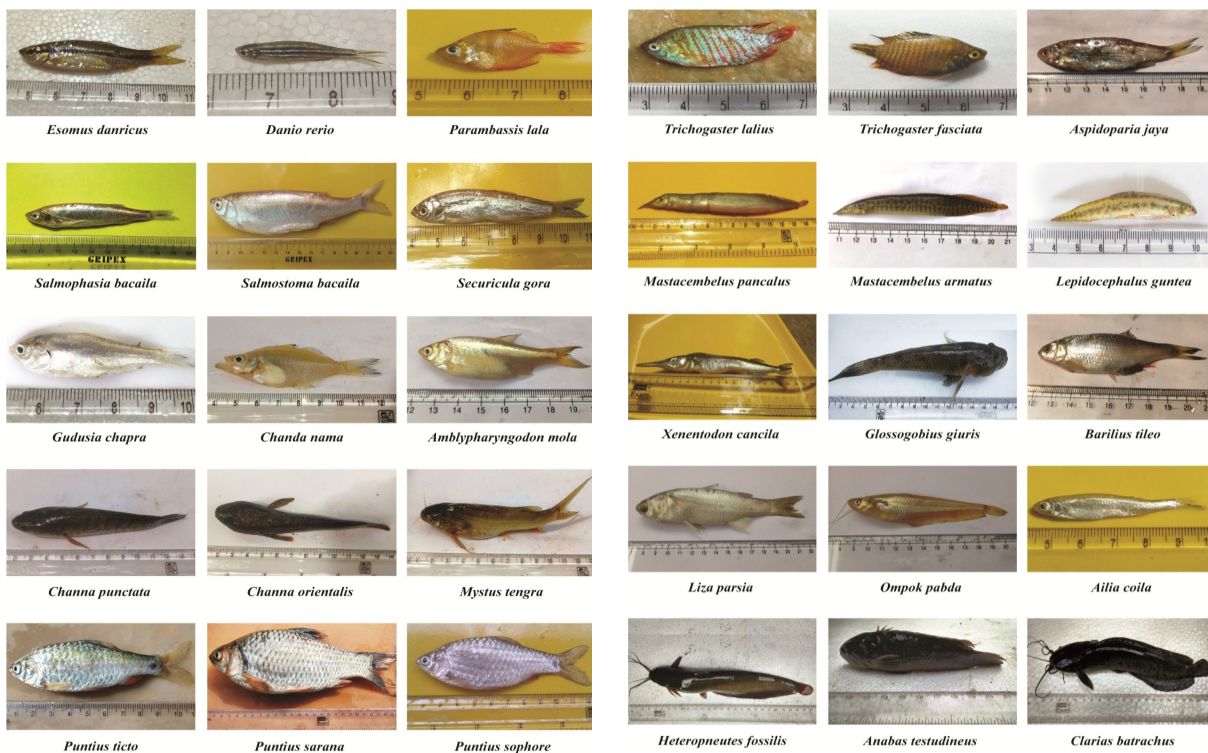


Fig. 5. Some freshwater small indigenous fishes of Bankura district.

Table 1. Fish diversity of Bankura district, West Bengal.

Species	Blocks of Bankura district																Total						
	Ban kura -I	Ban kura -II	Bar- jora	Bis- hnu pur	Ch ha tna	Gan- gajag hati	Hir- bun dh	In- dus	Ind- pur	Joy- pur	Kh- atra	Kot- ulpur	Mej- hia	On- da	Pa- trasay er	Rai- pur		Rani- bun dh	Sa- lita ra	Sa- reng a	Si- mla pal	So- namu khi	Tal- dan gra
<i>Labeo rohita</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22
<i>Labeo bata</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22
<i>Labeo dero</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01
<i>Catla catla</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22
<i>Cirrhinus mirgala</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21
<i>Securicula gora</i>	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	04
<i>Esomus danricus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	19
<i>Danio rerio</i>	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	02
<i>Labeo fimbriatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	04
<i>Labeo ariza</i>	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	03
<i>Labeo calbasu</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21
<i>Labeo gonius</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	07
<i>Puntius sophore</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22
<i>Puntius sarana</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	19
<i>Puntius ticto</i>	+	+	+	+	-	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	13
<i>Barbonymus gonionotus</i>	+	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	08
<i>Cirrhinus reba</i>	-	+	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	03
<i>Amblypharyngodon mola</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22
<i>Ctenopharyngodon idella</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21
<i>Hypophthalmichthys molitrix</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21
<i>Aristichthys nobilis</i>	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	20
<i>Cyprinus carpio</i>	-	+	+	+	-	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15
<i>Bariilus tileo</i>	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	09
<i>Paruciosoma daniconius</i>	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Bariilus vagra</i>	-	+	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	08
<i>Colossoma macropomum</i>	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22
<i>Osteobrama cotio</i>	+	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	06
<i>Salmostoma bacalla</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	20
<i>Aplocheilichthys chax</i>	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	06
<i>Aspidothorax morar</i>	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	08
<i>Aspidoparia jaya</i>	+	-	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
<i>Crossocheilus latius</i>	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01
<i>Labeo nandina</i>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	03

Contd.....



	21
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	59
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	47
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	47
	38
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	54
	34
	63
	66
	57
	69
Oreochromis niloticus	
Amblyceps mangoni	
Nandus nandus	
Trichogaster chuna	
Trichogaster lalius	
Trichogaster fasciata	
Pangasius pangasius	
Ailia coila	
Clupisoma garua	
Eutropichthys vachra	
Liza parsia	
Mugil cephalus	
Rhinomugil corsula	
Lates calcarifer	
Lepidocephalus guntea	
Botia birdi	
Pterygoplichthys multiradiatus	
Leiodon cutcutia	
Total	

twice in a week (Table 4) in the local markets. It attains an average weight of 100-250 g and been sold at a steep price (INR 500-600/ Kg). This irregular availability provoked some traders to substitute *C. batrachus* with *C. gariepinus* at the same price even in rural villages where the local people have a good idea on minute differences between small indigenous fishes.

### DISCUSSION

The study area contained 12 globally endemic freshwater fish species (*Near Threatened*= 10; *Vulnerable*= 1; *Endangered*= 1). Some of the species like *Labeo dero*, *Gagata cenia*, *Nandus nandus*, *Batasio batasio*, *Crossocheilus latius*, *Hara hara*, *Cirrhinus reba* are extremely rare and were only obtained in narrow ranges. The endangered fish *Tor khudree* was obtained only in Bankura-I and Sonamukhi outskirts.

The study found a large species variety in Bankura-I, Raipur, Barjora, Saltora and Sarenga blocks. These areas showed better fish variety compared to previous reports. The present status of a number of fishes (*Rhinomugil corsula*, *Puntius sarana*, *Pangasius pangasius*, *Heteropneustes fossilis*, *Anabas testudeneus* etc.) has shown positive acceleration from vulnerable to least concern category indicating large scale cultivation of those species throughout the region. On the contrary, the habitat ranges of *Barilius barna*, *Clupisoma garua*, *Bagarius bagarius* have shrunk drastically.

Small indigenous fishes play an important role by providing nutritional security to rural people who can't afford to purchase major carps and other costly fishes. Those fishes are generally been caught and sold by women and thus contribute to livelihood of rural sector.

*C. batrachus* is a high value commodity throughout the district. The demand is generally so high that the traders can sale their entire stock within a short time span. However, the supply is extremely meager compared to the demand. During Monsoon, the supply of *C. batrachus* was found to be better though it remains very low as far as the major carps are concerned. The traders also promote farming of banned *C. gariepinus* which was found more prevalent in Bankura-I, Bishnupur, Chhatna, Raipur and Sarenga blocks. Khedkar et al., (2015) reported this type of substitution in local fish markets of Maharashtra, Andhra Pradesh, Tamil Nadu, Gujarat, Utter Pradesh, Madhya Pradesh and West Bengal. This biological invasion of African variant in natural water bodies in Bankura is a serious concern as it reflects the real scenario of the nation. Restoration of natural breeding grounds, semi-intensive cultivation and social awareness has to be adopted for the conservation of *C. batrachus*, before it becomes totally extinct (Ganguly et al., 2017). Probiotic organisms like *Lysinibacillus sphaericus* PKA17 can also be ap-

**Table 2.** Taxonomic position and conservation status of different fishes of Bankura district, West Bengal.

Sl. No.	Order	Family	Scientific name	Local name	IUCN Status
1			<i>Labeo rohita</i>	Ru'i	LC
2			<i>Labeo bata</i>	Bāṭā	LC
3			<i>Labeo dero</i>	Khursā	LC
4			<i>Catla catla</i>	Kātlā	NE
5			<i>Cirrhinus mrigala</i>	Mrgēla	LC
6			<i>Esomus danricus</i>	Dārkē	LC
7			<i>Danio rerio</i>	Zebra fish	LC
8			<i>Labeo fimbriatus</i>	Ṭuṅgur barā	LC
9			<i>Labeo ariza</i>	Bhāgnā/Rēbā	LC
10			<i>Labeo calbasu</i>	Kālabōs	LC
11			<i>Labeo gonius</i>	Khursā	LC
12			<i>Puntius sophore</i>	Puṅṭi	LC
13			<i>Puntius sarana</i>	Sarapuṅṭi	LC
14			<i>Puntius ticto</i>	Ciṭpuṅṭi	LC
15			<i>Barbonymus gonionotus</i>	Jābhā puṅṭi	LC
16			<i>Cirrhinus reba</i>	Rēbā	LC
17			<i>Amblypharyngodon mola</i>	Mauralā	LC
18		Cyprinidae	<i>Ctenopharyngodon idella</i>	Grass carp	NE
19			<i>Hypophthalmichthys molitrix</i>	Silver Carp	NT
20	Cypriniformes		<i>Aristichthys nobilis</i>	Bighead carp	NE
21			<i>Cyprinus carpio</i>	Common carp	VU
22			<i>Barilius tileo</i>	Pērā	LC
23			<i>Paruciosoma daniconius</i>	Dārkē	LC
24			<i>Barilius vagra</i>	Hōidē pērā	LC
25			<i>Colossoma macropomum</i>	Rūpacāṅṅ	NE
26			<i>Osteobrama cotio</i>	Dēlā/ kaṭi	LC
27			<i>Salmostoma bacaila</i>	Chuyā	LC
28			<i>Aplocheilus panchax</i>	Tēcōkhā	LC
29			<i>Aspidoparia morar</i>	Cirā	LC
30			<i>Aspidoparia jaya</i>	Chuyā	LC
31			<i>Crossocheilus latius</i>	Simsuṅṭi	LC
32			<i>Labeo nandina</i>	Nāndin	NT
33			<i>Salmophasia bacaila</i>	Cēlā	LC
34			<i>Barilius barna</i>	Bhōlā	LC
35			<i>Securicula gora</i>	Ghōrācēlā	LC
36			<i>Tor khudree</i>	Pātharchōṭā	EN
37		Balitoridae	<i>Schistura corica</i>	Sālgēṭō	LC
38			<i>Lepidocephalus guntea</i>	Guṭē	LC
39		Cobitidae	<i>Botia birdi</i>	Bāgyāgēṭō	NE
40	Osteoglossiformes	Notopteridae	<i>Chitala chitala</i>	Citala	NT
41			<i>Notopterus notopterus</i>	Phōlu'i	LC
42			<i>Bagarius bagarius</i>	Kānāghōgar	NT
43		Sisoridae	<i>Glyptothorax dorsalis</i>	Tēlsuṅṭi	LC
44			<i>Gagata cenia</i>	Juṅgalā	LC
45		Erethistidae	<i>Hara hara</i>	Kōsihārā	LC
46		Heteropneustidae	<i>Heteropneustes fossilis</i>	Śiṅgī	LC
47			<i>Wallago attu</i>	Bōyāla	NT
48			<i>Ompok pabda</i>	Pābdā	NT
49		Siluridae	<i>Clarias batrachus</i>	Dēśī Māgur	LC
50	Siluriformes		<i>Clarias gariepinus</i>	African Māgur	LC
51			<i>Mystus tengra</i>	tyānrā	NE
52			<i>Rita rita</i>	Riṭhā	LC
53		Bagridae	<i>Aorichthys aor</i>	Āṛ	LC
54			<i>Batasio batasio</i>	Bātāsī	LC
55		Amblycipitidae	<i>Amblyceps mangois</i>	Jiyā /Chitkā	LC
56		Pangasiidae	<i>Pangasius pangasius</i>	Pānāśa	LC
57			<i>Ailia coila</i>	Bāṅśapātā	NT
58		Schilbeidae	<i>Clupisoma garua</i>	Gērō/Kacā	LC
59			<i>Eutropiichthys vacha</i>	Bāchā	LC
60		Loricariidae	<i>Pterygoplichthys multiradiatus</i>	Kēnō	NE
61	Anguilliformes	Anguillidae	<i>Anguilla bengalensis</i>	Maulā	NT
62	Tetraodontiformes	Tetraodontidae	<i>Leiodon cutcutia</i>	Pufferfish	NE

Contd.....



63		Gobiidae	<i>Glossogobius giuris</i>	Bhalkōrā/ Bēlē	LC
64		Anabantidae	<i>Anabas testudineus</i>	Dēśī kō'i	DD
65			<i>Channa orientalis</i>	Cyām	NE
66			<i>Channa gachua</i>	Śīsīrcyām	LC
67			<i>Channa striata</i>	Śōl	LC
68		Channidae	<i>Channa stewartii</i>	Tēlcyām	LC
69			<i>Channa punctata</i>	Lyāṭā	LC
70			<i>Channa marulius</i>	Śāl	LC
71			<i>Chanda nama</i>	Cāṁḍakōṁṛā	LC
72		Ambassidae	<i>Parambassis ranga</i>	Cāṁḍakōṁṛā	LC
73	Perciformes		<i>Parambassis lala</i>	Lāl Cāṁḍakōṁṛā	NT
74			<i>Badis badis</i>	Kalōpurṁṭi	LC
75		Badidae	<i>Dario dario</i>	Lālapurṁṭi	DD
76			<i>Oreochromis mossambicus</i>	Tēlāpiyā	NT
77		Cichlidae	<i>Oreochromis niloticus</i>	Nilantīkā	NE
78		Nandidae	<i>Nandus nandus</i>	N'yādōs	LC
79			<i>Trichogaster chuna</i>	Cūnā	LC
80		Osphronemidae	<i>Trichogaster lalius</i>	Khōlsē	LC
81			<i>Trichogaster fasciata</i>	Khōlsē	LC
82		Latidae	<i>Lates calcarifer</i>	Bhēṭki	NE
83			<i>Tenualosa ilisha</i>	Ilīs	LC
84	Clupeiformes	Clupeidae	<i>Gudusia chapra</i>	Khayārā	LC
85		Engraulidae	<i>Setipinna phasa</i>	Phāsā	LC
86			<i>Liza parsia</i>	Pārsē	NE
87	Mugiliformes	Mugilidae	<i>Mugil cephalus</i>	Pārsē	LC
88			<i>Rhinomugil corsula</i>	Kyaklās	LC
89	Beloniformes	Belonidae	<i>Xenentodon cancila</i>	Gāntārā	LC
90		Synbranchidae	<i>Monopterusuchia</i>	Kucē	LC
91	Synbranchiformes		<i>Mastacembelus armatus</i>	Pyaṁkāl	LC
92		Mastacembelidae	<i>Mastacembelus pancalus</i>	Pyaṁkāl	NE

NE= Not Evaluated; DD= Data Deficient; LC= Least Concern; NT= Near Threatened; VU= Vulnerable; EN=Endangered

**Table 3.** Small indigenous fishes of Bankura district, West Bengal.

Sl. No.	Scientific name	Local name
1	<i>Esomus danricus</i> (Hamilton, 1822)	Dārkē
2	<i>Danio rerio</i> (Hamilton, 1822)	Zebra fish
3	<i>Puntius sophore</i> (Hamilton, 1822)	Puṁṭi
4	<i>Puntius ticto</i> (Hamilton, 1822)	Cīṭpurṁṭi
5	<i>Amblypharyngodon mola</i> (Hamilton, 1822)	Mauralā
6	<i>Barilius tileo</i> (Hamilton, 1822)	Pērā
7	<i>Parluciosoma daniconius</i> (Hamilton, 1822)	Dārkē
8	<i>Barilius vagra</i> (Hamilton, 1822)	Hōldē pērā
9	<i>Osteobrama cotio</i> (Hamilton, 1822)	Dēlā/ kaṭi
10	<i>Salmostoma bacaila</i> (Hamilton, 1822)	Chuyā
11	<i>Aplocheilus panchax</i> (Hamilton, 1822)	Tēcōkhā
12	<i>Aspidoparia morar</i> (Hamilton, 1822)	Cīrā
13	<i>Aspidoparia jaya</i> (Hamilton, 1822)	Chuyā
14	<i>Crossocheilus latius</i> (Hamilton, 1822)	Simsuṁṭi
15	<i>Salmophasia bacaila</i> (Hamilton, 1822)	Cēlā
16	<i>Barilius barna</i> (Hamilton, 1822)	Bhōlā
17	<i>Securicula gora</i> (Hamilton, 1822)	Ghōṛācēlā
18	<i>Glyptothorax dorsalis</i> (Vinciguerra, 1890)	Tēlsuṁṭi
19	<i>Hara hara</i> (Hamilton, 1822)	Kōsihārā
20	<i>Gagata cenia</i> (Hamilton, 1822)	Juṅgalā
21	<i>Glossogobius giuris</i> (Hamilton, 1822)	Bhalkōrā/Bēlē
22	<i>Schistura corica</i> (Hamilton, 1822)	Sālgēṭō
23	<i>Botia birdi</i> (Chaudhuri, 1909)	Bāgyāgēṭō/Birdi Loach
24	<i>Anabas testudineus</i> (Bloch, 1792)	Dēśī kō'i
25	<i>Gudusia chapra</i> (Hamilton, 1822)	Khayārā
26	<i>Mastacembelus pancalus</i> (Hamilton, 1822)	Pyaṁkāl
27	<i>Channa orientalis</i> (Bloch and Schneider, 1801)	Cyām
28	<i>Channa gachua</i> (Hamilton, 1822)	Śīsīrcyām
30	<i>Channa stewartii</i> (Playfair, 1867)	Tēlcyām
31	<i>Channa punctata</i> (Bloch, 1793)	Lyāṭā
32	<i>Setipinna phasa</i> (Hamilton, 1822)	Phāsā
33	<i>Eutropiichthys vacha</i> (Hamilton, 1822)	Bāchā

Contd.....

34	<i>Heteropneustes fossilis</i> (Bloch, 1794)	Śiṅgī
35	<i>Ompok pabda</i> (Hamilton, 1822)	Pābdā
36	<i>Clarias batrachus</i> (Linnaeus, 1758)	Dēśī Māgur
37	<i>Mystus tengra</i> (Hamilton, 1822)	ṭyānrā
38	<i>Batasio batasio</i> (Hamilton, 1822)	Bātāsī
39	<i>Chanda nama</i> (Hamilton, 1822)	Cāṁdakōṁṛā
40	<i>Parambassis ranga</i> (Hamilton, 1822)	Cāṁdakōṁṛā
41	<i>Parambassis lala</i> (Hamilton, 1822)	Lāl Cāṁdakōṁṛā
42	<i>Badis badis</i> (Hamilton, 1822)	Kalōpuṁṭi
43	<i>Dario dario</i> (Hamilton, 1822)	Lālapuṁṭi
44	<i>Amblyceps mangois</i> (Hamilton, 1822)	Jiyā /Chitkā
45	<i>Nandus nandus</i> (Hamilton, 1822)	N'yādōs
46	<i>Trichogaster chuna</i> (Hamilton, 1822)	Cūnā
47	<i>Trichogaster lalius</i> (Hamilton, 1822)	Khōlsē
48	<i>Trichogaster fasciata</i> (Bloch and Schneider, 1801)	Khōlsē
49	<i>Ailia coila</i> (Hamilton, 1822)	Bāṁśapātā
50	<i>Liza parsia</i> (Hamilton, 1822)	Pārsē
51	<i>Mugil cephalus</i> (Hamilton, 1822)	Pārsē
52	<i>Lepidocephalus guntea</i> (Hamilton, 1822)	Guṭē
53	<i>Xenentodon cancila</i> (Hamilton, 1822)	Gāntārā

**Table 4.** Survey on *Clarias batrachus* of Bankura district, West Bengal.

Sl. No.	Blocks	Frequency	Price (INR/Kg)	Average Weight (g)
1	Bankura-I	Seasonal	550-600	200-250
2	Bankura-II	Seasonal	600-650	130-150
3	Barjora	Once or twice in a week	600	100-120
4	Bishnupur	Once in a week	550-600	100-150
5	Chhatna	Rare	600	230-250
6	Gangajalghati	Weekly	500	230-250
7	Hirbunth	Available	400-500	200-250
8	Indus	Seasonal	650-700	200-250
9	Indpur	Weekly	400-450	250-300
10	Joypur	Seasonal	500-550	150-200
11	Khatra	Infrequent	500-550	250-300
12	Kotulpur	Infrequent	550	150-200
13	Mejhia	Once in a month	600-800	200-250
14	Onda	Weekly	400-450	150-180
15	Patrasayer	Regular	400-450	150-180
16	Raipur	Seasonal	500-600	250-300
17	Ranibunth	Regular	400	150-250
18	Saltora	Infrequent	500	100-150
19	Sarenga	Infrequent	600	250-300
20	Simlapal	Seasonal	450	200-250
21	Sonamukhi	Rare	300-400	100-150
22	Taldangra	Seasonal	500	200-250

INR= Indian Rupee

plied at proper dose level to enhance the growth and disease-resistance of *C. batrachus* as suggested earlier (Ganguly et al., 2018).

### Conclusion

The study provided a new perspective of ichthyofaunal diversity of Bankura district in West Bengal in India. It revealed a wide variety of species which constitutes a significant portion (53.80%) of freshwater indigenous fishes of the state. The area is predominated by the order Cypriniformes (42.39%) which includes the family Cyprinidae, Balitoridae and Cobitidae. The Siluriformes and Perciformes also majorly contribute towards biodiversity. The riverine civilization, suitable climate, soil profile and edge effects have enriched the

ichthyofaunal diversity of the district. The inland fish and fisheries are making substantial contribution towards rural economy and women empowerment. A major portion of rural-backward people rely upon inland fisheries as a source of nutritional and economic security. However, the restoration of indigenous fishes has often grossly been underestimated. Rapid industrialization, indiscriminate use of chemical fertilizers and pesticides in adjacent agricultural fields more worsen the situation. There are a good number of globally threatened fishes still thriving in this geopolitical area that demand our utmost attention right now. Intensive study equipped with advance technologies needs to be carried out. The threatened and endangered species must be exclusively cultivated in their nat-

ural habitats free of any industrial and agricultural pollutants for the conservation of the species. The nutritional value of all freshwater indigenous fishes should also be assessed. The restoration of indigenous *C. batrachus* must be prioritized through semi-intensive cultivation. Social awareness among common people and fish-farmers has to be intricate. The Government and other stakeholders must also step up to restore the fish diversity and rejuvenate old waterways. Serious involvement of all concerned authorities is highly needed to develop an enriched fish profile of the entire district.

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