Indian J. Applied & Pure Bio. Special Volume 127-134 (2021).
Environment & Sustainable Development : Problems, Prospects & Mitigation Date : 25th-27th November, 2021
ISSN: 0970-2091
A web of Science Journal

Fresh water fish diversity with their conservation status in Kolkata fish markets

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Abstract

A market-based survey was carried out in few selected fish markets of Kolkata to assess the fresh water fish diversity and threatened category of fishes. The study was conducted for a year from January-2020 to December-2020 in fish markets located at Barasat, Patipukur, Sealdah, Newtown and Howrah. A total of 47 freshwater species belonging to 9 orders were recorded of which Cypriniformes was most dominant on the basis of species richness. Of the 47 fish species available, according to IUCN status 1 is endangered, 4 are Vulnerable and 4 are Near Threatened. The aim of this study was to know the diversity of fresh water fishes along with their conservation status and to build awareness among the people along with providing insights to policy makers for taking definite measures for conservation.

West Bengal lies between the Himalayas and Bay of Bengal and is blessed with a diverse variety of natural water resources in the form of estuaries, backwaters, rivers, streams, mangroves, wetlands, reservoirs and ponds. According to the report of the Fisheries Department, Government of West Bengal[5], West Bengal is enriched with 6.08 lakh ha of freshwater fisheries resources in the form of Ponds and Tanks (2.88 lakh ha), Beels (0.41 lakh ha), Reservoirs (0.27lakh ha), 22 river drainage basins (1.72 lakh ha) and Canals (0.80 lakh ha) Fish is an integral part of the aquatic ecosystem and Bengal is known for fish market as most of the Bengalese are fond of fish eating and the livelihoods of many people depend on fish catching from rivers, pools, beels, lakes or streams and sell them in the local as well as to earn money. It is also related to socio-economic development of the region. Therefore, fish market can be a good place to study fish diversity along with other socio-economic prospects[8].

Many studies have been carried out from time to time to study the diversity of fishes of different region including Bengal. A recent study reported a total of 267 species of fresh water fishes across whole West Bengal[11] whereas Gopal and Chauhan[4], reported 250 fish species from Sundarban only. Another recent market-based study of Burdwan District reported 37 no. of fresh water fishes[12], whereas 61 species of fishes were reported from Purba Midnapore District of West Bengal[7]. The knowledge of species diversity

is very much necessary for management of the ecosystem and taking specific measures for conservation.

The fish diversity in Kolkata has not yet been studied recently as such. Increase in the population of urban area has led to decline in water bodies and overfishing. Along with that increased water pollution and many other factors have led to decline in fish population and variety[9]. Therefore, this study was planned to know the diversity of freshwater fish species of Kolkata and nearby markets in West Bengal; and their conservation status.

Study area :

The study was conducted by personal survey for a year from January-2020 to December-2020, with a minimum of 1 (one) visit per month to each market; barring the complete lockdown period due to Covid19. The fish markets chosen were Barasat fish market, Patipukur fish market, Sealdah fish market, Newtown NKDA fish market and Howrah fish market, located in different regions of Kolkata. Barasat fish market & Newtown fish market comes under North 24 Parganas district, Howrah fish market under Howrah district whereas the rest of them under the Kolkata district. Fish species were observed and their abundance were noted in each fish market on each visit; and they were photographed for identification and record.

Collection and identification of fishes :

Maximum number of fish come to the market in the morning, therefore, the survey was carried out in the morning (6.00-9.00 am). Besides taking photographs of the varieties of fishes available in the market, the fishermen and sellers were questioned to know the different diversity and abundance of fish species that come to the markets. Identification and classification of fishes were done with the help of literatures[6,13].

Fish Diversity and Abundance :

In the present study, 47 species of fish belonging to 9 orders and 17 families were documented. It was found that the fish variety available in the markets were less in the months of January, February and March; whereas in the months of June, July and August it was noted increase in fish variety, which may be due to Monsoon period. The complete record of fish species found in the above mentioned five fish markets of Kolkata is provided in Table I. Information about the conservation status of the fishes are also provided based on the International Union for Conservation of Nature and Natural Resources (IUCN) Red List Categories and criteria[11].

The nine orders with number of species includes- Cypriniformes- 14 species, Decapoda- 4 species, Perciformes- 11 species, Siluriformes- 10 species, Cyprinodontiformes- 1 species, Mugiliformes- 1 species, Osteoglossiformes- 2species, Synbranchiformes- 3 species, and Characiformes- 1. In terms of fish abundance, Cypriniformes is the most abundant order, constituting 30.37% of the total fish fauna of the all five markets. Perciformes comes second containing 24.22% of total fish fauna. The details of order and number of species and % of abundance is shown in Table-2. The relationship of the fish order with species abundance is depicted in Figure 1.

Table-1. Taxonomic position and conservation status of different fresh water fishes in Kolkata fish markets

Order	Family	Sl No	Scientific name	Local name	IUCN Status	Availability status				
						A	B	C	D	E
Cypriniformes	Cyprinidae	01	*Amblypharyngodon mola*	Morala	LC	+	+	+	-	+
		02	*Catla catla*	Katla	LC	+	+	+	+	+
		03	*Cyprinus carpio*	Cyprinus	VU	+	+	-	-	+
		04	*Cirrhinus mrigala*	Mrigal	LC	+	+	+	+	+
		05	*Ctenopharyngodon idellus*	Grass Carp	NE	+	+	+	+	+
		06	*Hypophthalmichthys molitrix*	Silver Carp	NT	+	+	+	+	+
		07	*Hypophthalmichthys nobilis*	Silver Carp	DD	+	+	+	+	+
		08	*Labeo boga*	Bata	LC	+	+	+	+	+
		09	*Labeo bata*	Bata	LC	+	+	+	+	+
		10	*Labeo calbasu*	Kalbose	LC	+	+	+	+	+
		11	*Labeo rohita*	Rui	LC	+	+	+	+	+
		12	*Pethia ticto*	Titpunti	LC	+	+	+	+	+
		13	*Puntius sophore*	Punti	LC	+	+	+	+	+
		14	*Puntius javanicus*	JapaniPunti	LC	+	+	+	-	+
Osteoglossiformes	Notopteridae	15	*Chitala chitala*	Chital	NT	+	+	+	+	+
		16	*Notopterus notopterus*	Falui	LC	+	+	+	+	+
Perciformes	Ambassidae	17	*Parambassis ranga*	Chada	LC	+	+	+	+	+
	Anabantidae	18	*Anabas testudineus*	Koi	LC	+	+	+	+	+
	Channidae	19	*Channa gachua*	Cheng	LC	+	+	+	+	+
		20	*Channa punctata*	Lata	LC	+	+	+	+	+
		21	*Channa striata*	Shol	LC	+	+	+	+	+
		22	*Channa marulius*	Shal	LC	+	+	+	+	+
	Chichlidae	23	*Oreochromis mossambicus*	Tilapia	VU	+	+	+	+	+
		24	*Oreochromis niloticus*	Nilontica	LC	+	+	+	+	+
	Osphronemidae	25	*Trichogaster fasciata*	Kholse	LC	+	+	-	-	+
		26	*Trichogaster lalius*	Kholse	LC	+	+	-	-	+
	Gobiidae	27	*Glossogobius giuris*	Bele	LC	+	+	+	+	+
Siluriformes	Bagridae	28	*Mystus tengara*	Tangra	LC	+	+	+	+	+
		29	*Sperata aor*	Tangra	LC	+	+	+	+	+
	Clariidae	30	*Clarias batrachus*	DesiMagur	LC	+	+	+	+	+
		31	*Clarias gariepinus*	Hybrid Magur	LC	+	+	+	+	+
	Heteropneustidae	32	*Heteropneustes fossilis*	Singhi	LC	+	+	+	+	+
	Pangasidae	33	*Pangasius hypophthalmus*	Pangus	EN	+	+	+	+	+

		34	*Pangasius pangasius*	Pangus	LC	+	+	+	+	+
	Siluridae	35	*Ompok pabda*	Pabda	NT	+	+	+	+	+
		36	*Ompok pabo*	Pabda	NT	+	+	+	+	+
		37	*Wallago attu*	Boal	VU	+	+	+	+	+
Decapoda	Palaemonidae	38	*Macrobrachium rosenbergii*	Golda Chingri	LC	+	+	+	+	+
		39	*Macrobrachium assamense*	Chingri	LC	+	+	+	+	+
		40	*Macrobrachium americanum*	Chingri	LC	+	+	+	+	+
		41	*Macrobrachium idea*	Chingri	LC	+	+	+	+	+
Cyprinodontiformes	Aplocheilidae	42	*Aplocheilus panchax*	Kanpona	LC	+	+	+	+	+
Mugili Forms	Mugilidae	43	*Rhinomugil corsula*	Kharsula	VU	+	+	-	-	+
Charci forms	Serrasalmidae	44	*Colossoma macropomum*	Rupchanda	NE	+	+	+	+	+
Synbranchi Formes	Mastacembelidae	45	*Macrognathus aculeatus*	Pankal	LC	+	+	+	+	+
		46	*Macrognathus aral*	Pankal	LC	+	+	+	+	+
	Synbranchidae	47	*Monopterus cuchia*	Kuchia	LC	+	+	+	+	-

** IUCN (International Union for Conservation of Nature and Natural Resources) Red list: LC: Least Concern, NT: Near Threatened, VU: Vulnerable, NE: Not Evaluated, EN: Endangered, DD: Data Deficient. A= Barasat fish market, B= Patipukur fish market, C= Sealdah fish market, D= Howrah fish market, E= NKDA fish market, (+) denotes = Found, (-) denotes = Not Found.

Table-2. Name of the order and number of species and % of abundance

Sl. No	Name of the order	Number of species	MEAN	SD
1	Cypriniformes	14	30.37	0.97
2	Decapoda	04	8.40	0.76
3	Perciformes	11	24.22	1.81
4	Siluriformes	10	21.31	1.34
5	Cyprinodontiformes	01	2.25	0.14
6	Mugiliformes	01	2.25	0.14
7	Osteoglossiformes	02	3.90	0.98
8	Synbranchiformes	03	5.04	0.92
9	Characiformes	01	2.25	0.14

In terms of families of fishes, 19 families were found of which Cyprinidae family of Cypriniformes was the most abundant contributing 29.22% of fish fauna & Palaemonidae is the second richest family with 8.40 % of recorded fish fauna. The details of family and number of species and % of abundance is shown in Table-3. The relationship of the fish family with species abundance is depicted in Figure 2.

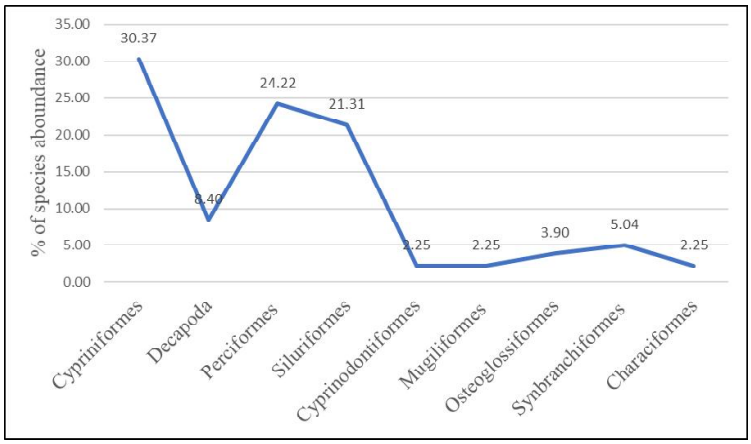

Fig 1: Relationship of fish order with species abundance.

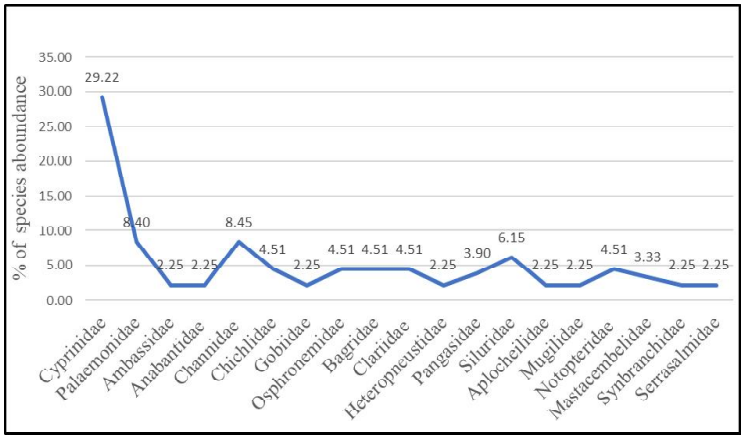

Fig 2: Relationship of fish family with species abundance.

Conservation Status of Fishes :

The population of Kolkata metro area in 2020 was 14,850,000, a 0.64% increase from 2019 and in 2021 it further increased to 14,974,000, *i.e.*, 0.84% increase from 2020 (https://worldpopulationreview.com). With increase in population, the demand of fishes increases in the different markets of Kolkata. This has led to overfishing which in turn has led to different species of fishes becoming threatened[1]. Along with this a CIS survey conducted by South Asian Forum of Environment (SAFE) over a period of eight months showed that Kolkata had lost 46 % of its water bodies since 2006. The number of ponds, lakes and canals has declined from 3,874 to 1,670 in last 10 years[10]. The water bodies have been filled up for construction of different buildings. Along with this rapid industrialization and increased cultivation has led to increase in water pollution and high pesticide levels. A combination of all these- decline of water bodies, water pollution and

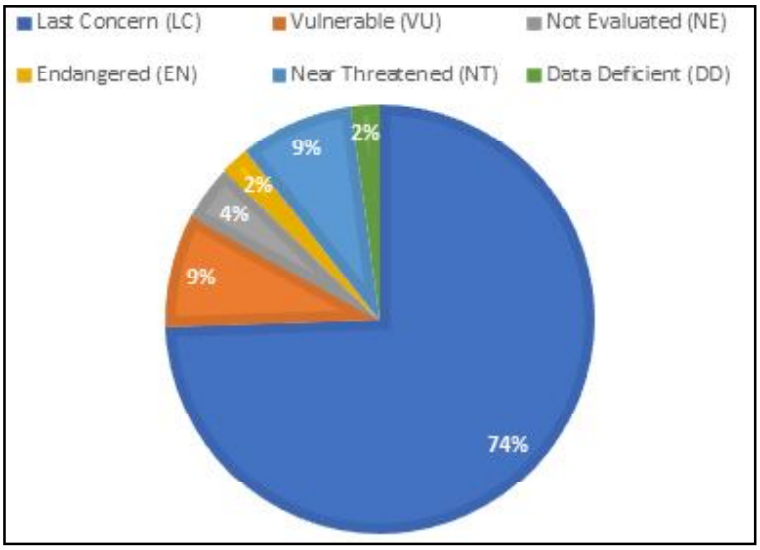

Fig 3: % of species under different threatened category as per IUCN.

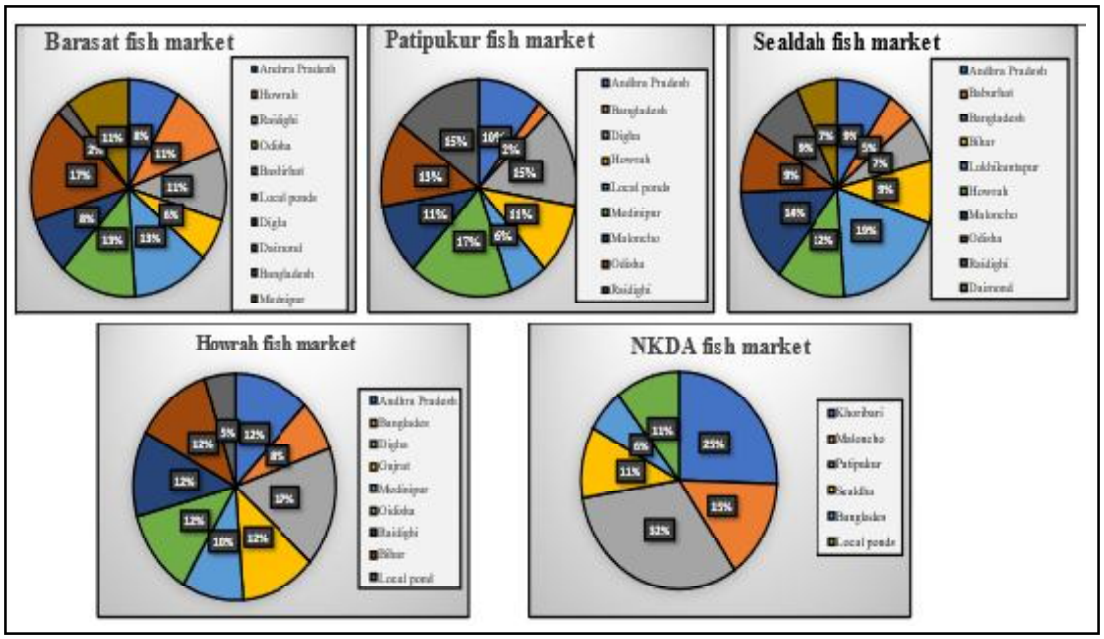

Fig 4: Sources of fish supply to the fish markets

overfishing, has led to habitat loss and worsening of the conservation status of different species of fishes[2].

The present study also supports the above observation. Among the 47 species of different fishes found in the markets of Kolkata; 35 species can be counted as Least concern (LC), 4 species are Vulnerable (VU)-

Table-3. Name of family and number of species and % abundance.

Sl.no	Name of the Family	Number of species	Mean	SD
1	Cyprinidae	14	29.22	0.67
2	Palaemonidae	04	8.40	0.76
3	Ambassidae	01	2.25	0.14
4	Anabantidae	01	2.25	0.14
5	Channidae	04	8.45	1.22
6	Chichlidae	02	4.51	0.28
7	Gobiidae	01	2.25	0.14
8	Osphronemidae	02	4.51	0.28
9	Bagridae	02	4.51	0.28
10	Clariidae	02	4.51	0.28
11	Heteropneustidae	01	2.25	0.14
12	Pangasidae	02	3.90	0.98
13	Siluridae	03	6.15	0.87
14	Aplocheilidae	01	2.25	0.14
15	Mugilidae	01	2.25	0.14
16	Notopteridae	02	4.51	0.28
17	Mastacembelidae	02	3.33	1.13
18	Synbranchidae	01	2.25	0.14
19	Serrasalmidae	01	2.25	0.14

Cyprinus carpio, Oreochromis mossambicus, Wallago attu and Rhinomugil corsula; 4 species are Near Threatened (NT)-*Hypophthalmichthys molitrix, Chitala chitala, Ompok pabda* and *Ompok pabo*. 1 species is Endangered (EN)-*Pangasius hypophthalmus*. Whereas 2 species are found to be Not Evaluated (NE) and 1 species is Data Deficient (DD). The detailed percentage of conservation status is shown in the form of Pie chart in Figure 3.

Source of Fish :

The inflow of fishes into the different fish markets of Kolkata comes from mainly Andhra Pradesh, Bihar and Bangladesh along with local supply. From the state of Andhra Pradesh, fish supply is about 8% in Barasat fish market, 10% in Patipukur fish market, 9% in Sealdah fish market, and 12% in Howrah fish market. Likewise, Bihar has 8% supply in Sealdah fish market and 12% in Howrah fish market. More or less 8% fishes came from the Bangladesh. Rest amount of fishes comes from local water bodies. There is a different source pattern shown by the NKDA fish market where 25% came from Khoribari and 25% from Malancho local water body located in the North 24 parganas and 32% from the Patipukur fish market.

The market-based survey of Kolkata shows the different varieties of fishes available for consumption along with their conservation status. It is clear that in spite of many greater number of fresh water fish species being reported, a lesser number are available for consumption. Moreover, water pollution, unregulated use of pesticides, decline in number of water bodies and over fishing has led to worsening of the conservation status of many fishes. A few appropriate conservation measures like ban on fishing during breeding period, regulation in fishing, etc need to be taken for conservation of the threatened fishes in their natural environment. Raising awareness among consumers as well as fishermen communities about threatened fishes can also help in the conservation of fishes.

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