A STUDY ON THE FRESH WATER FISH DIVERSITY OF MORA DHANSIRI RIVER, ASSAM, INDIA

Abstract:

The Mora Dhansiri River, situated in Darrang District, Assam, India, harbors a diverse array of freshwater fish species, contributing significantly to the region's biodiversity. Through comprehensive sampling efforts, this study identified a total of 29 fish species across 05 orders and 12 families. Cypriniformes dominated the catch list with 17 species, followed by Perciformes with 04 species, Siluriformes with 05 species, Synbranchiformes with 02 species, and one species from Gobiiformes. The most abundant family was Cyprinidae, comprising 22 species, followed by Bagridae and Cobitidae with four species each. The study revealed prominent genera such as *Labeo, Puntius, Mystus, and Channa,* with multiple species representing each genus. Notably, the presence of exotic species such as *Cyprinus carpio, Ctenopharyngodon idella*, and *Hypophthalmichthys molitrix* underscores the influence of adjacent private ponds on the river's fish diversity. Of the recorded species, 19 were deemed edible and suitable for aquarium trade, with three species also possessing medicinal value. Furthermore, the study assessed the conservation status of the fish species, revealing that 2.19% were endangered, 4.54% vulnerable, and 6.81% near-threatened, while 77.2% were categorized as least concern. Additionally, 2.27% of species were classified as data deficient, and 9.09% were not accessed. The presence of near-threatened species like *Hypophthalmichthys molitrix* highlights the conservation significance of the Mora Dhansiri River. However, anthropogenic pressures such as industrial effluents, pesticide use, overexploitation, and habitat destruction pose significant threats to the river's aquatic biodiversity. Urgent conservation measures are needed to safeguard these valuable resources and ensure their sustainable management for future generations.

Keywords: Freshwater fish diversity, Mora Dhansiri River, Assam, Northeast India, Conservation, anthropogenic pressures, sustainable management.

Introduction:

The northeastern region of India is renowned as a global hotspot for freshwater fish diversity, boasting a rich array of physiography and ecoclimatic conditions (Kottelat and Whitten, 1996; Ramanujam *et. al.,* 2010). With its abundance of various water resources such as rivers, reservoirs, wetlands, ponds, and paddy cum fish culture systems, this region harbors a remarkable diversity of fish species. Approximately 33.13% of India's freshwater fish species are found here, encompassing 267 species across 114 genera, 38 families, and 10 orders (Sen, 1985; Mahanta *et. al.,* 2003). The ichthyofauna of the North East shares a strong affinity with Indo-Gangetic fauna, with lesser connections to Burmese and South Chinese fish fauna (Yadav and Chandra, 1994). This rich diversity highlights the vital regional significance of the fishery sector, both economically and for local communities (Allen and Flecker, 1993).

The significance of these fish resources transcends mere biodiversity, as they play crucial roles in nutrition, economic generation, and livelihood sustenance for local communities (Chakravarty *et. al.,* 2012). Fish serves as valuable tools for ecological assessments across various levels of biological organization, with assessment methodologies existing for ecosystems, populations, individuals, and even at cellular and molecular levels. In Assam, the Brahmaputra and Barak drainage systems profoundly influence the aquatic biodiversity of the region, with Brahmaputra and its tributaries shaping the northern part, Barak dominating the southern part, and the eastern section partially influenced by the Chindwin drainage (Mahanta *et. al.,* 2003).

The detailed documentation of fish diversity within individual tributaries of the River Brahmaputra remains incomplete, despite sporadic reports periodically surfacing. Mora Dhansiri, a vital water body in Assam's Darrang district, has historically sustained communities along its banks, facilitating the development of small cities. Despite the growing awareness of declining biodiversity in rivers nationwide, little attention has been directed towards understanding the current status of biodiversity of this river. Therefore, this study aims to fill this gap by conducting a comprehensive assessment of aquatic fauna along different sampling sites of the river. The findings from this investigation will not only inform conservation strategies for the Mora Dhansiri river's aquatic biodiversity but also contribute to the preservation of fish germplasm. By shedding light on the current state of aquatic biodiversity in this river system, the research endeavours to provide valuable insights for conservation efforts and sustainable management practices.

Materials and Methods:

Study area:

The stretch of the Mora Dhansiri River which was surveyed for the study lies in the latitude 26.643984°N and longitude 92.200449°E and covers a size of 5 km. Mora Dhansiri originates from Jia Dhansiri and flows through Udalguri District which is a tributary of the Jia Dhansiri River. Jia Dhansiri River is a tributary of the river Brahmaputra. The Mora Dhansiri River is entirely flowing through the floodplain of the Jia Dhansiri River in northwest to southeast direction. Almost one half of the basin falls in the piedmont zone while the second half occupies small part of the young floodplains of the northern Brahmaputra valley. It is basically fed by rainwater during monsoon season. The study area, Mora Dhansiri river is situated in between Darrang district and Udalguri district. Dhansiri river, having total catchment area 1220 km has

varied water level that depends on the season. Locations including areas of maximum and minimum human activities were selected besides; also, some fishing site was selected randomly for the study. Sampling was done during the pre-monsoon and post monsoon period.

Sampling and Collection of fishes from Mora Dhansiri river:

The fish samples were periodically collected from River Mora Dhansiri. Regular fish catch surveys were carried out from February 2022 to April 2023 in Mora Dhansiri river basin. Some catchment sites were selected on the basis of the possibility of getting more specimens. Five sites were chosen for the survey area based on habitat types, water quality and depth. Fish samples were also collected from the catch of fishermen. Status of fish diversity was recorded with the help of local fishermen from the study area; the data was collected in all seasons. The study was conducted every day morning between 6.00 am to 9.00 am and afternoon between 3pm to 5.30 pm. Samplings were conducted fortnightly from commercial catches landed at different fish landing centers.

Fish were usually caught by means of the traditional fishing gears such as seine net (Sutar jal), cast net (jhakijal), square lift net (tar jal), conical trap (dughair), fish angles (Borsi), monofilament fixed gill net (Current jal) and fish barrier (Thaga). The fishing effort was done by using gill nets with the same length (100 m to 20 m) and height (1.6 m), but with mesh size 1.5 inches and more. Waheranets were also (Altaf *et. al.,* 2011) used during the study for fish collection.

Primary data on the concerned species was collected from the fishermen, fish traders and local people. Relevant data such as local name of the collected fish samples, source, distribution and availability of the species were collected from the study sites. Fish markets were monitored

regularly for commercial fish collection. Fish species available at the local market and caught by local fishermen from the lakes and chars were also purchased.

Secondary data was also collected from the District Fisheries Offices, Department of Fisheries (DoF). Along with these data, published relevant documents were also collected from various government agencies, autonomous bodies and NGOs. Research papers on the freshwater fish fauna of International, National and Regional were also consulted towards compiling the past data of abundance and availability for assessing biodiversity status.

Identification of the collected samples:

The collected fish samples were identified by evaluating their morphometric and meristic characteristics as well as the color of the specimens referring the books and data base (www.fishbase.org). The taxonomic analysis by Rahman (1989) and Inland Fishes of India and neighboring countries by Talwar and Jhingran (1991) was also used for identification.

Preservation:

All the identified and unidentified fish samples were preserved with 10% formalin in the plastic jars.

Results and Discussion

Fish diversity studied in Mora Dhansiri River:

The present survey of river Mora Dhansiri in between Nadirkash village (Darrang district) and Madhavguhai village (Udalguri district) reveals the presence of twenty nine (29) species of fishes belonging to five (05) orders and twelve (12) families.

Order Cypriniformes dominates the catch list with seventeen (17) species followed by four (04) species of Perciformes, five (05) species of Siluriformes, two (02) species of Synbranchiformes and one (01) species from Gobiiformes. The observation reveals as many as 16 fish species falling under family Cyprinidae followed by family Bagridae, Channidae and Mastacembelidae with 02 numbers of species each; family Claridae, Cobitidae, Schilbeidae, Heteropneustidae, Osphronemidae, Anabantidae *and* Gobiidae 01 number of species each.

The genera wise species composition in the present fish diversity study reveals that the genera *viz*., *Labeo* having 7 number of species, *Puntius* having 5 number of species, *Mystus* having 4 number of species, and *Channa* comprises 3 numbers of species *Botia* having 3 numbers of species; the genera *Trichogaster* and *Chanda* having 2 number of species each. *Cyprinus, Ctenopharyngodon, Cirrhinus, Amblypharyngodon, Salmophasia, Salmostoma, Heteropneustes, Wallago, Anabas, Glossogobius, Chitala, Lepidocephalichthys, Esomus, Devario, Clupisoma* are having single representative species each.

Thus, it has been observed from the record of the fish account in respect of the present study that there is a total of 44 numbers of species that represents 23 genera.

The observation records three exotic species *viz*., *Cyprinus carpio, Ctenopharyngodon idella* and *Hypopthalmichthys molitrix falling* under family Cyprinidae. *Glossogobius giuris*, the tank goby, is a species of goby native to fresh, marine and brackish waters.

The existence of these exotic species is due to their accidental entry from the adjacent private ponds where culture of exotic fishes is carried out in composite fish farming with other Indian carps. The photographs of the fish species recorded in the present study area, Mora Dhansiri river, Nadirkash village are shown in Plate-1

The details of fish species recorded from the present study site are given below-

Table 1: Species recorded in Mora Dhansiri River

SL No.	Species	Order	Family	Local Name	Economic value	Conservation (IUCN) Status, 2011
1	*Labeo rohita*	Cypriniformes	Cyprinidae	Row/Rohu	Edible	LC
2	*Labeo bata*	Cypriniformes	Cyprinidae	Bata/Bhangan	Edible	LC
3	*Cyprinus carpio*	Cypriniformes	Cyprinidae	Common carp	Edible	LC
4	*Cirrhinus mrigala*	Cypriniformes	Cyprinidae	Mirika	Edible	VU
5	*Puntius chola*	Cypriniformes	Cyprinidae	Cholaputi	Edible, aquarium species	LC
6	*Puntius phutonio*	Cypriniformes	Cyprinidae	Phutputhi	Edible, aquarium species	LC
7	*Puntius sophore*	Cypriniformes	Cyprinidae	Puthi	Edible, Aquarium species	LC
8	*Puntius terio*	Cypriniformes	Cyprinidae	Puthi	Edible aquarium species	LC
9	*Labeo catla*	Cypriniformes	Cyprinidae	Bhokua	Edible	LC
10	*Labeo calbasu*	Cypriniformes	Cyprinidae	Kalbaus	Edible	LC
11	*Ctenopharyngodon idella*	Cypriniformes	Cyprinidae	Grass carp	Edible	Not accessed
12	*Amblypharyngodon mola*	Cypriniformes	Cyprinidae	Moa/mola	Edible, aquarium species	LC
13	*Hypophthalmichthys molitrix*	Cypriniformes	Cyprinidae	Silver carp	Edible	NT
14	*Salmostomas bacaila*	Cypriniformes	Cyprinidae	Chalo	Edible	LC
15	*Salmophasia phulo*	Cypriniformes	Cyprinidae	Saruselkona	Edible	LC
16	*Esomus danricus*	Cypriniformes	Cyprinidae	Darikana	Edible, Aquarium species	LC
17	*Lepidocephalus guntia*	Cypriniformes	Cobitidae	Botia	Edible, aquarium species	LC
18	*Mystus vittatus*	Siluriformes	Bagridae	Tengra	Edible,	LC

					Aquarium species	
19	*Mystus carcio*	Siluriformes	Bagridae	Singorah	Edible, Aquarium species	LC
20	*Clarias magur*	Siluriformes	Claridae	Magur	Edible, aquarium species, medicinal value	LC
21	*Clupisoma garua*	Siluriformes	Schilbidae	Neria	Aquarium species	LC
22	*Heteropneustes fossilis*	Siluriformes	Heteropneustidae	Singhi	Edible, aquarium species, medicinal value	LC
23	*Channa punctatus*	Perciformes	Channidae	Taki	Edible, aquarium species	Not accessed
24	*Channa striatus*	Perciformes	Channidae	Goroi	Edible, aquarium species	Not accessed
25	*Trichogaster lalius*	Perciformes	Osphronemidae	Kholihona	Edible, aquarium species	LC
26	*Anabus testudenius*	Perciformes	Anabantidae	Kawoi	Edible, aquarium species, medicinal value	LC
27	*Glossogobius giuris*	Gobiiformes	Gobiidae	Patimutura	Aquarium, Medicinal value	LC
28	*Macrognathus aral*	Synbranchiformes	Mastacembelidae	Tura	Edible aquarium species	LC
29	*Macrognathus pancalus*	Synbranchiformes	Mastacembelidae	Pancatura	Edible aquarium species	LC

Northeastern India, one of the ichthyofaunal hotspot areas of our country, is marked by the presence of varied freshwater fishes, a few adapted to torrential waterflow out of which only 29 number of fish species recorded from the present study (Table: 1)

"The fish nomenclature is based on Fishbase.org and fish status was checked in IUCN red list" (IUCN 2011). "The status of the fishes are based on the IUCN (2011), IUCN (2014) data base as it was prevalent and followed during the samples collection time but the status of some of the species mentioned may have got changed in recent times". [13]

"The present survey of River Mora Dhansiri in between Nadirkash village (Darrang district) and Madhavguhai village (Udalguri district) reveals the presence of twenty nine (29) species of fishes belonging to five (5) orders and ten (10) families. Cypriniformes dominates the catch list with seventeen (17) species followed by four (4) species of Perciformes and 5 species of Siluriformes and Synbranchiformes (2) and Gobiiformes were represented by one (1) species". [13]

"Mora Dhansiri river has freshwater, semi torrent, hill stream and ornamental fish species as it camouflaged with freshwater river like Brahmaputra and Dhansiri while coming through hilly terrain. Present survey record the presence of one near threatened species namely *Hypophthalmichthys molitrix*, which is one of the important findings. Presence of species is significant as these are placed in endangered and near threatened category in IUCN (2011) check list. Although IUCN check, review of literature shows *Puntius chola, Puntius conchonius, Catla catla, Mystus vittatus* and *Clarias batrachus* are prominent vulnerable species". [13]

The study of IUCN conservation status of the fish species revealed that 2.19% of the fishes were endangered species, 4.54% vulnerable species, 6.81% near threatened and 77.2% least concern. 2.27% of the fish species of the river are data deficient and 9.09% of fish species not accessed. (Table: 1)

Identification, categorization of endangered, threatened and vulnerable species and their studies on their biology and habitat in order to conserve them had become inevitable . “Some economically important Indian major carp fingerlings of *Labeo rohita*, *Catla catla* and *Cirrhinus mrigala* were found in much abundance whereas few species of hill adapted fishes were found during net trapping. Setting of small scale factories near the river bank and flow of effluents into the stream is one of the major factors that may affect the present fish diversity. Survey reveals that pesticides (especially organophosphates) are randomly used in the bank side paddy fields which can also affect the fish population. Reports suggest a drastic reduction in abundance of the freshwater fishes in the northeastern region due to destruction of the habitat, overexploitation, over fishing, and other anthropogenic effects”. [13]

As the economy of the area is dominated by agriculture, the inhabitants have naturally developed a close linkage with the local water resources- the river and the Wetlands. The floodplains of the river and the wetland fringes provide suitable lands for agriculture and livestock rearing. Most of these lands are, however, regularly inundated and sometimes crops are badly damaged. Moreover, bank erosion and shifting of river courses also assume serious dimension in places. Inspite of all these, the people generally have a tendency to settle down near the river as it provides necessary facilities for washing, bathing etc. and some scope for economic activities like fishing, collecting logs, boating etc. Thus the people have their own response to the riverine environment and perceptions on the river in particular and the environment in general. It had been observed that the economic status of the people was fairly poor as they were not fully engaged in particular work specially in the business of fish, because of declining fish population in the river due to anthropogenic pressure, floods and siltation.

A total of 21 fishing gears and accessories were recorded in the river to catch the fishes. Fishermen use various conventional methods to catch fishes mainly for their domestic consumption from this river. Some of these conventional methods are ecofriendly but many of them are destructive too. Fishermen apply these methods according to the behavior, abundance in different seasons and habitat of the fishes. Local fishermen use these methods for commercial fishing. These methods are usually confined near the fish markets. However, fishermen often practice these methods in remote areas and the fish are transported to the fish markets. Although most fish farmers try to over exploit the fishing resources, these methods will not cause any threat to the fishes if practiced with limitations. With the advancement in technology and population increase, efforts are made to over exploit the aquatic resources that will yield more fishes in less time and with a little effort. In the process, various destructive techniques are introduced for the fishing activities. The destructive methods are indiscriminate killers of the entire aquatic organism including the entire life stages of fishes. These include the use of dynamite, pesticides and other chemicals.

Conclusion

The present survey is done within two to three kilometer stretch of the River Mora Dhansiri at some selected point and the findings are encouraging. This survey was probably first of its kind in the study site and therefore further studies have to be carried out to know the exact fish diversity in this heartline river of Darrang and Udalguri district.

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Plate 1: Fish species found in Mora Dhansiri river.