

Status of ornamental fish diversity and Anthropogenic hazards in Nitai *beel* of Kamrup district of Assam, India

Makibur Rahman

Department of Zoology, Pragjyotish College, Guwahati -781009, Assam, India

ABSTRACT

India is endowed with vast expanse of freshwater resources which can be broadly put under two categories depending on basic ecological consideration. They are ponds and lakes and streams and rivers. In Assam alone nearly one lakh hectare of water spread area is covered under beels. Assam is recognized as one of the hotspots of freshwater fish diversity. A survey was conducted on the Nitai beel of Kamrup district since April-2018 till March -2019. The present investigation reveals an ornamental fish diversity of 43 fish species belonging to 18 families has been recorded. Out of which 16 species belongs to cyprinidae family, 4 species from bagridae, 2 species from cobitidae, 2 species from ambassidae, 2 from nandidae, 2 species from osphronemidae, 2 species from Channidae, 3 species from mastacembelidae family. 38 species enlisted as least concern (LC), 2 species as near threatened (NT), 3 species as not evaluated (NE) and 2 species as data deficient (DD). *Mystus vittatus*, *Nandus nandus*, *Anabas testidunius*, *T. fasciatus*, *Botia derio*, *Notopterus notopterus*, *Monopterusuchia* etc. for having high overseas demand have potential value as food and ornamental. Moreover different anthropogenic stress have been recorded from the beel. So in this study an attempt has been made to know the actual status of ornamental resources of the Nitai beel and its anthropogenic stress.

INTRODUCTION

Fishes make up most of the abundant class of vertebrates, both in terms of number of species and of individuals. They exhibit enormous diversity of size, shape and biology, and in the habitats they occupy. Researchers have arrived at different estimates, most of which range between 17,000 and 30,000 for the numbers of currently recognized fish species. The eventual number of living fish species may be close to 28,000 in the world. Jayaram (1981) listed 742 freshwater species of

fishes under 233 genera, 64 families and 16 orders from the Indian region. Talwar and Jhingran (1991) estimated 2,546 species of fish belonging to 969 genera, 254 families and 40 orders. The Indian fish population represents 11.72 per cent of species, 23.96 per cent of genera, 57 per cent of families and 80 per cent of the global fishes. Goswami (2007), Vishwanath *et al.* (2007) studied Natural and Anthropogenic Hazards of fish fauna of North-east India. Malakar *et al.* (2017) studied diversity and present status of three flood plain wetland of central Assam.

Wetlands since time immemorial have been perceived as life sustaining units of the world. They are considered as future food and fodder resources for human population and its related allies. Ecologically, wetlands are of great significance as they support varied food chains and food webs, regulate hydrological cycle, recharge ground water and maintain its quality by acting as filters, provide refuge to a large number of endangered flora and fauna help in trapping of energy and carbon-dioxide and in nutrient cycling treatment of waste water and provide natural check to floods. Wetlands also have great recreational and aesthetic values. As a part of the non-traditional agriculture the wetlands also support agricultural economy. Around 6.4% of the earth's surface is covered with wetlands. They are continuum of rivers and are locally known as *beels* and are biologically sensitive ecosystems which play a vital role in the inland fish production of the eastern and northeastern part of the country. The *beels* are unique water bodies which need in depth scientific study before undertaking any management measure.

Ornamental fishes are attractive and colourful species of fishes with peaceful nature of various characteristics, which are kept as pets in confined space of an aquarium or a garden pool for fun and fancy. Ornamental fishes are also known as living jewels and are kept in house as pets. In the recent years the ornamental fishes has become one of the major income sources for the small scale farmers and unemployment people of the world. In India the North Eastern Region is one of the major hotspot for ornamental fish diversity in the world (Kottelat and Whitten, 1996). Including 82 ornamental fish species are available in the upper Assam districts like Tinsukia, Dibrugarh, Sibsagar and Jorhat (Pandey *et al.*, 1998). Total 87 potential ornamental fish species are available in the state of Assam (Bhattacharjya *et al.*, 2000). Out of 217 fish species recorded in Assam 150 fish species have good ornamental value (Bhattacharjya *et al.*, 2003). So far, in the North Eastern Region a total of 274 species has been recorded, of which 250 fish species have ornamental value, out of 250 species 187 recorded from the state of Assam (Mahapatra *et al.*, 2004).

Study Area

The present study was done in Nitai *beel*, located on the flood plain of Kolajal River, at a distance of 05 km from Sualkuchi and 35 km. from Guwahati with a total area of 50.68 hectare. It lies between $91^{\circ} 31'06''$ E longitude & $26^{\circ}11'52''$ N latitude (Figure 1a & 1b). The climate of the studied area remains mild throughout the year. It falls under tropical monsoon climate. The annual average recorded temperature is 22.67°C , annual average rainfall is 159.7 cm, and annual average humidity is 81.01%. The Nitai *beel* is endowed with rich floral and faunal diversity.



Figure 1. a. Map showing the study area



Figure 1. b. Nitai *Beel*

MATERIALS AND METHODS

Data collection was carried out in consistent manner from April-2018 till March -2019. Data analysis were done by visiting the *beel* itself on monthly basis and through questionnaire to the fishermen of the wetland having years of experience. Fishes were collected from the water body using locally available fishing gears from pre-selected sampling sites. Fishing gears and devices used during fishing operation were moving nets (*Dhekijal*, *Khewali jal* etc and *Drag nets* of various mesh sizes), Different traps namely *Jakoi*, *Polo*, *Sepa* and *Bamboo bana*. The moving nets were used throughout the year while, Gill net is extensively used during the monsoon period. Fishes were sorted out species wise using taxonomic keys (Talwar *et al.*, 1999), (Jayaram, 1999), (Nath *et al.*, 2000), (Vishwanath *et al.*, 2007). The latest scientific names of the fish species were used following Calacademy reports (2015). Fishes were photographed and preserved few individuals in 4% formalin for species representation. Further sorting of fish species were carried out into major group, intermediate group and minor group fishes. Fishes are categorized into threatened species based on IUCN Red List, CAMP (1998). Fishermen and native people were interviewed for information on species diversity. Fish catch statistics of commercially important species have been collected covering all the months of the year. Landing sites were visited once a week and data collected have been supplemented by direct enquiries from fishermen and fish traders.

RESULTS AND DISCUSSION

I. Ornamental fish fauna

In the present study a total of 43 fish species belonging to 18 families has been recorded. Out of which 16 species belongs to cyprinidae family, 4 species from bagridae, 2 species from cobitidae, 2

species from ambassidae, 2 from nandidae, 2 species from osphronemidae, 2 species from Channidae, 3 species from mastacembelidae family. Other families such as anabantidae, synbranchidae, schilbeidae, belonidae, heteropneustidae, claridae, notopteridae, clupeidae, siluridae and tetradontidae each contains 1 species. All the species has been recorded are listed in (Table 1 and Figure 2). It has been observed that cyprinidae family having 37% abundance, 9% from bagridae, 7% from mastacembelidae family, 5% abundance from cobitidae, ambassidae, nandidae, osphronemidae and Channidae family. Again 2% abundance from anabantidae, synbranchidae, schilbeidae, belonidae, heteropneustidae, claridae, notopteridae, clupeidae, siluridae and tetradontidae families (Figure 3). Out of 43 species recorded during the study period, 38 species enlisted as least concern (LC), 2 species as near threatened (NT), 3 species as not evaluated (NE) and 2 species as data deficient (DD). It has been observed that, almost all the fish species bear food value. However, *Badis badis* is considered here as weed fish and does not bear any demand as fish food. But this species is an excellent ornamental fish because of its small size and beautiful colour patterns. Notwithstanding, *Badis badis* has not received any attention in this region for ornamental fish culture and most of the time discarded improperly during sorting of commercially important species. *Amblypharyngodon mola*, *Labeo calbasu*, *Puntius chola*, *Puntius conchoni*, *Puntius sophore*, *Lepidocephalichthys guntea*, *Chanda nama*, *Anabas testudineus*, *Channa stewarti* and *Channa punctatus* are found abundant in the *beel*. Whereas *Chela cachius*, *Danio aequipinnatus*, *Danio devario*, *Botia Dario*, *Mystus cavasius*, *Mystus vittatus*, *Eutropiichthys vacha*, *Clarias batrachus* etc. are found to be moderate. Apart from this *Notopterus notopterus*, *Barilius bendelisis*, *Danio rerio*, *Esomus danricus*, *Rasbora daniconius*, *Rita rita*, *Xenentodon cancilla*, *Monopterusuchia*, and *Leiodon cutcutia* are found low occur-

rence in the *beel*. *Ompak pabo* and *Barilius barna* species are found to be Near threatened species. Fishes like *Trichogaster lalius*, *T.fasciatus*, *Badis badis*, etc were the larvicidal fish found. Air breathing fishes such as *Clarias magur*, *Heteropneustes fossilis*, *Channa spp.* and *Mastcembelus armatus* fetch having high market value as live fish. Moreover the rate of fish catch is increasing over years due to presence of many commercially

important species like *Mystus vittatus*, *Nandus nandus*, *Anabas testudineus*, *T. fasciatus*, *Botia derio*, *Notopterus notopterus*, *Monopterus cuchia* etc. for having high overseas demand have potential value as food and ornamental. It has been found that different anthropogenic stress going on in the *beel* such as total fishing, festival fishing, use of mosquito net for catching fish, use of pesticides in the agricultural land near the *beel*, fish disease etc.

Table 1. Ornamental fish diversity of Nitai *Beel*.

Family	Species name	Occurrence	IUCN Status
Notopteridae	<i>Notopterus notopterus</i> (Pallas,1769)	Low	LC
Clupeidae	<i>Gudusia chapra</i> (Ham. 1822)	Low	LC
	<i>Amblypharyngodon mola</i> (Ham-Buch, 1822)	Abundant	LC
	<i>Barilius barna</i> (Ham-Buch, 1822)	Low	NT
	<i>Barilius bendelisis</i> (Ham-Buch, 1807)	Low	NE
	<i>Chela cachius</i> (Ham-Buch,1822)	Moderate	LC
	<i>Danio aequipinnatus</i> (McClelland,1839)	Moderate	LC
	<i>Danio devario</i> (Ham-Buch,1822)	Moderate	LC
Cyprinidae	<i>Danio rerio</i> (Ham-Buch,1822)	Low	DD
	<i>Esomus danricus</i> (Ham-Buch,1822)	Low	LC
	<i>Labeo calbasu</i> (Ham-Buch,1822)	Abundant	LC
	<i>Osteobrama cotio</i> (Ham-Buch,1822)	Moderate	LC
	<i>Puntius conchoniuis</i> (Ham-Buch,1822)	Abundant	LC
	<i>Puntius chola</i> (Ham-Buch,1822)	Abundant	LC
	<i>Puntius sophore</i> (Ham-Buch,1822)	Abundant	LC
	<i>Pethia ticto</i> (Ham-Buch,1822)	Moderate	LC
	<i>Rasbora daniconius</i> (Ham-Buch,1822)	Low	NE
	<i>Salmostoma bacaila</i> (Ham-Buch,1822)	Moderate	LC
Cobitidae	<i>Botia dario</i> (Ham-Buch, 1822)	Moderate	LC
	<i>Lepidocephalichthys guntea</i> (Ham-Buch,1822)	Abundant	NE
Bagridae	<i>Mystus cavasius</i> (Ham-Buch,1822)	Moderate	LC
	<i>Mystus tengara</i> (Ham. 1822)	Moderate	LC
	<i>Mystus vittatus</i> (Bl. 1794)	Moderate	LC
	<i>Rita rita</i> (Ham. 1822)	Low	LC
Siluridae	<i>Ompak pabo</i> (Ham. 1822)	Low	NT
Schilbeidae	<i>Eutropiichthys vacha</i> (Ham. 1822)	Moderate	LC
Claridae	<i>Clarias batrachus</i> (Linn. 1758)	Moderate	LC
Heteropneustidae	<i>Heteropneustes fossilis</i> (Bl. 1794)	Moderate	LC
Belonidae	<i>Xenentodon cancilla</i> (Ham. 1822)	Low	LC
Mastacembelidae	<i>Macrognathus aral</i> (Bl.&Schn. 1801)	Low	LC
	<i>Macrognathus pancalus</i> (Ham. 1822)	Moderate	LC
	<i>Mastacembelus armatus</i> (Lecepede,1800)	Moderate	LC
Synbranchidae	<i>Monopterus cuchia</i> (Ham-Buch,1822)	Low	LC

Ambassidae	<i>Chanda nama</i> (Ham-Buch,1822)	Abundant	LC
	<i>Parambassis ranga</i> (Ham-Buch,1822)	Moderate	LC
Nandidae	<i>Badis badis</i> (Ham-Buch,1822)	Moderate	LC
	<i>Nandus nandus</i> (Ham-Buch,1822)	Moderate	LC
Anabantidae	<i>Anabas testudineus</i> (Bloch,1792)	Abundant	DD
Osphronemidae	<i>Trichogaster fasciatus</i> (Bl.-Schn,1801)	Abundant	LC
	<i>Trichogaster lalius</i> (Ham. 1822)	Moderate	LC
Channidae	<i>Channa punctatus</i> (Bl. 1793)	Abundant	LC
	<i>Channa stewarti</i> (Playfair,1867)	Abundant	LC
Tetradontidae	<i>Leiodon cutcutia</i> (Ham-Buch,1822)	Low	LC

LC – Least Concern, DD – Data Deficient, NE – Not Evaluated, NT – Near Threatened

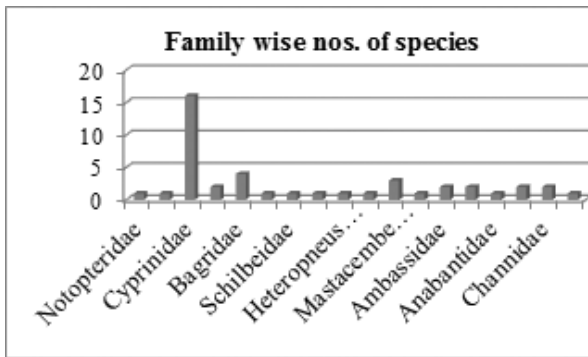


Figure 2. Graphical representation of number of fish species in families

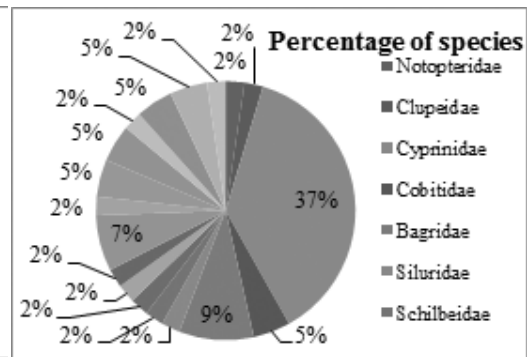


Figure 3. Graphical representation of fish population in percentage

II. Anthropogenic stress in Nitai *beel*

Different anthropogenic stress has been observed in the *beel*. Some of the observations discussed below.

➤ **Lack of the sprit for implementation of fishery acts**

Different fish and fisheries acts or legislatios are not being implemented in the true spirit, regarding matters such as the use of gears, regulation of mesh size of nets and fishing of fries, fingerlings and gravid fishes. An awareness on the implementation of all such acts would definitely depict drastic changes on the

conservation and propagation of fishery resources in the *beel*.

➤ **Total fishing**

This is practice where water from wetlands are pumped out or physically removed totally and the fishes are also fished out. In this process not only the fish, but other associated non-piscian or amphibians species are also totally filtered. This is termed as total filtration. It is a detrimental process where a all categories fishes will be totally destroyed.

➤ **Festival fishing :** In some special time of the year specially in festival time, people used to catch fish fauna as a whole. This practice de-

stroy the fish abundance as well as fish habitat.

- **Pollution** : Agricultural sewage creates pollution to the wetland. Use of pesticides and fertilizers affect the fish populations. Acts should deal with environmental clearance issues for any such establishments.
- **Fish disease** : There are several diseases of protozoan, fungal, viral, and helminthic origin that have been occurring in all species of fish.
- **Turbidity** : Due to soil erosion the water of the *beel* in a turbid condition for several months, and more so during the monsoon and post monsoon periods. The turbidity of the water hinders the condition conducive for laying eggs by which fish fail to reproduce. This is a most disadvantageous environmental condition during the breeding season for most of the fishes dwelling in such environment.

CONCLUSION

Wetlands are socio-culturally associated with the native people. Wetlands are the sources of water for agriculture, food in the form of fish, edible aquatic flora and molluscs. It harbours a wide variety of indigenous ornamental fishes. But, now a day, the production of the fish species is declined according to the fishermen communities living in and around *beel* due to over exploitation and human interference or economic benefit. The Nitai *beel* supports other biological resources such as invertebrates and aquatic flora. The ornamental fish diversity of Nitai *beel* is dominated by indigenous small sized fishes. *Amblypharyngodon mola* and *Puntius sophore* are the most abundant fish species during winter and post monsoon fishing respectively. Fish diversity comprises of both lentic and lotic water species due to seasonal river connection.

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