RELATIVE ABUNDANCE OF FISHES IN *Chandakhal* WETLAND OF DHUBRI DISTRICT, ASSAM (INDIA) AND THEIR CONSERVATION STATUS

ABSTRACT

The Inland fisheries and aquaculture play an important role in providing cheap animal protein to the human dietary composition of the rural Assam in India. Fish groups like carps, clupeids, perches, murrels, catfishes, minnows etc. comprise a good number of species in the region. Apart from the riverine fisheries different wetland fisheries associated with the two major rivers, namely the *Brahmaputra* and *Barak* in Assam have contributed a major part in fish production. The aim of the present study is to enquire about the numerical relative abundance of fishes in *Chandakhal* wetland located in Dhubri district, in the state of Assam, India. This is an investigative study based on the data collected from fish catch at the designated landing stations. It finds that the numerical relative abundance of most of the valued food fishes falling under Major Fish Group is less than 1.00% and the total numerical relative abundance of the Major Group fishes constitutes only 4.05%. Among the Major Group fishes *Labeo calbasu* has the highest relative abundance of 0.74%. Under the Intermediate fish group, the most abundant species is *Macrognathus pancalus* having the numerical relative abundance 5.58%. Again, among the Minor Group, *Lepidocephalichthys guntea* is the most relatively abundant fish species whose numerical relative abundance is 7.92%. The 'near threatened' species like *Wallago attu* and *Chitala chitala* are having relative abundances of 0.23% and 0.09% respectively and the 'endangered' species *Clarias magur* is found to have the relative abundance as low as 0.08% in the present study.

Add some key environmental features of the wetland and types of anthropogenic pressure to impact on fish diversity and population density.

Keywords: Chandakhal; relative abundance; fish; wetland.

1. INTRODUCTION

In India, floodplain lakes support a lucrative fishery, particularly in the eastern and north – eastern states and are considered as the second most important inland fisheries resources of the country [1]. The wetland ecosystems are used by fishes as a refuge for breeding, feeding and nesting purposes at one or the other stage of their life cycle [2] that has led the wetlands to become potent inland fishery resources as well as breeding grounds for many important riverine fishes. Apart from playing an immense role in raising cheap nutritious protein supply in human dietary composition in the rural areas in the state of Assam, they have the potentiality to contribute in the development of the local rural economy as well as macro economy of the country.

India is bestowed with a large inland fish habitat comprising a numbers of major and minor rivers with their innumerable tributaries, streams and the floodplain wetlands. These ideal habitats are found harbouring high fish biodiversity that play a pivotal role in sustaining the nutritional security and the livelihoods to a large local populace in addition to the contribution in the National economy. There are 2,500 species of fishes found in India; of it 930 species are freshwater belonging to 326 genera, 99 families and 20 orders [3]. Again a record of total 2182 fish species is found from different water bodies in India [4].

The North Eastern India being considered as one of the global 'hot spots' of freshwater fish diversity in the world [5] shares its fish fauna predominantly with that of the Indo – Gangetic fauna and to a small extent with the Burmese and South China fish fauna [6]. There is the record of 187 species of fishes reported from Assam and its neighbouring states [7]. Again after more than a decade, altogether 183 fish species are reported from Assam and the neighbouring North Eastern India [8]. The state of Assam has been reported with the data of 202 fish species in the drainage of two major river systems: the *Brahmaputra* and *Barak* rivers [9]. And of late, 311 fish species are found occurring in the state of Assam that comprises 131 food fish species and 180 ornamental fish species [10].

There are reports of carps, clupeids, perches, murrels, catfishes, minnows etc. in different wetlands of Assam. The wetland fishes can be categorized into three distinctive groups on the basis of their size in adult stage of life, namely, Major group, Intermediate group and Minor group [11]. Again, in Assam, the floodplain wetlands and the tectonic wetlands constitute the major fishery resources and presently only about 25% - 30% of total wetland area is being utilized for fishery with an average production of 0.4 ton ha^{-1} yr^{-1} against their production potential of 1 ton ha^{-1} yr^{-1} [9]. There is still a huge gap between the state's fish production and its potentiality. Filling in the gap would enable the state to address the problems of unemployment and malnutrition simultaneously. The present study is aimed to identify the status of numerical relative abundance of the fish species available in *Chandakhal* wetland in the state of Assam, India.

2. MATERIALS AND METHODS

This is an investigative study based on the data collected through observation of fish catch at six designated landing sites of *Chandakhal* wetland (Latitude 26^0 00′ 00″ – 26^0 02′ 30″ N and Longitude 89^0 51′ 30″ – 89^0 55′ 30″ E) located in the western most extremity of the state of Assam, India near the Indo – Bangla international border (Fig. 1).

The fishes were categorized into three groups: Major group, Intermediate group and Minor group [11] and the data were collected in terms of each such group. The specimens of small and moderate fishes falling under minor and intermediate groups were collected and preserved in 10% Formaldehyde solution following the standard preserving technique. For large growing fishes falling under major group, on the spot identification was done and photographs were taken using 12.1 Mega Pixel Sony Cyber Shot Camera.

The identification and confirmation of the species were done consulting taxonomic literatures [12,13,14,15].

The species nomenclature was followed by consulting the California Academy of Sciences (http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp).

The data was collected from the fish landing at the landing sites and the numerical relative abundance (RA) of fish species was calculated after Lakra et al. [16] with the help of the following formula:

$$RA = \frac{\text{Numbr of Specimens of particular species} \times 100}{\text{Total Number of specimens of all species}}$$

The conservational statuses of the recorded species are ascertained with the help of The IUCN Red List of Threatened Species 2022-1 (www.iucnredlist.org/search) and C.A.M.P. Report [17].

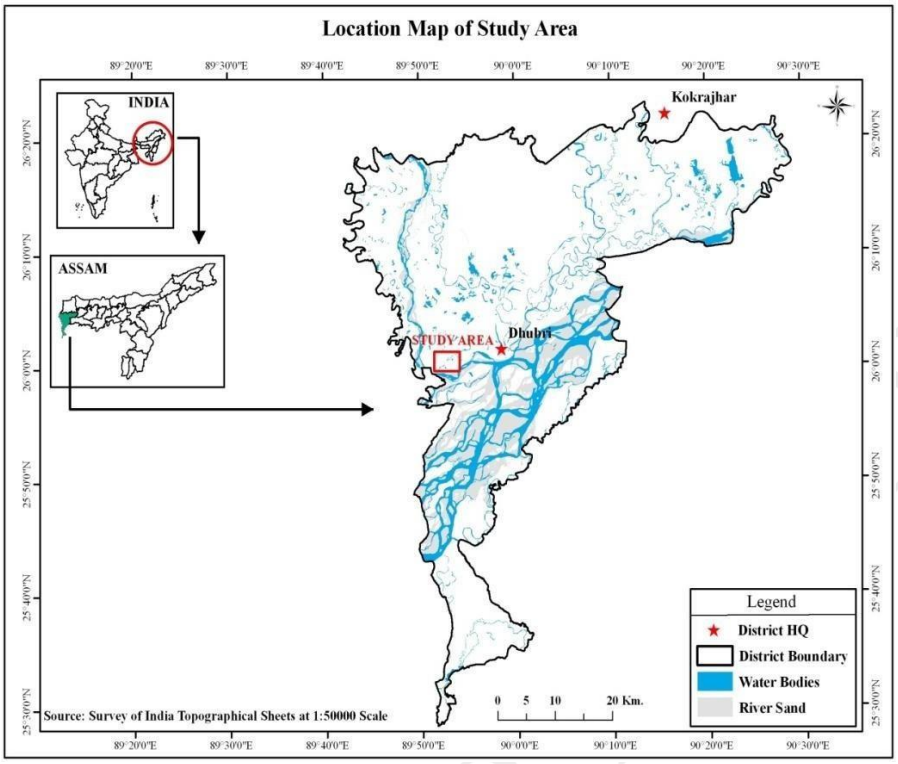

Fig. 1. Location map of the study area

3. RESULTS

The relative abundance is estimated and accordingly on the basis of the species wise results of different fish groups viz., the Major group, Intermediate group and Minor group, the fishes are ranked in ascending order.

Among the Major group fishes as shown in Table 1, *Labeo calbasu* occupies the top most place showing the relative abundance 0.74 in the sample followed by *Sperata aor* (0.60%), *Labeo rohita* (0.46%), *Cyprinus carpio* (0.45%), *Sperata seenghala* (0.30%), *Cirrhinus mrigala* (0.24%), *Wallago attu* (0.23%), *Gibelion catla* (0.21%), *Hypopthalmichthys molitrix* (0.20%), *Labeo gonius* (0.20%), *Channa striata* (0.18%), *Ctenopharyngodon idella* (0.12%), *Chitala chitala* (0.09%) and *Channa marulia* (0.03%).

Thus the relative abundance of most of the valued food fishes falling under major fish group is found to be < 1.00% and the total Relative Abundance of the Major Group fishes constitutes only 4.05%.

Table 1. Relative Abundance (RA) of major group fishes

Sl. No.	Species	RA (%)
1	*Labeo calbasu*	0.74
2	*Sperata aor*	0.60
3	*Labeo rohita*	0.46
4	*Cyprinus carpio*	0.45
5	*Sperata seenghala*	0.30
6	*Cirrhinus mrigala*	0.24
7	*Wallago attu*	0.23
8	*Gibelion catla*	0.21
9	*Hypophthalmichthys molitrix*	0.20
10	*Labeo gonius*	0.20
11	*Channa striata*	0.18
12	*Ctenopharyngodon idella*	0.12
13	*Chitala chitala*	0.09
14	*Channa marulia*	0.03

The relative abundance of the species considered under the Intermediate fish group, as shown in Table 2, states that among all intermediate fishes, the top most abundant species is *Macrognathus pancalus* (5.58%) followed by *Nandus nandus* (4.59%), *Mystus cavasius* (4.31%), *Macrognathus aral* (3.32%), *Mystus bleekeri* (2.98%), *Channa punctata* (2.81%), *Salmophasia phulo* (2.24%), *Glossogobius giuris* (1.09%), *Notopterus notopterus* (0.91%), *Gudusia chapra* (0.80%), *Anabas testudineus* (0.74%), *Labeo bata* (0.64%), *Cirrhinus reba* (0.62%), *Ompok pabda* (0.51%), *Heteropneustes fossilis* (0.45%), *Systomus sarana* (0.40%), *Xenontodon cancila* (0.40%), *Mastacembelus armatus* (0.34%), *Ompok bimaculatus* (0.32%), *Hemibagrus menoda* (0.22%) and *Monopterus cuchia* (0.08%). The result shows very low relative abundance for most of the priced food fish of Intermediate group like *Gudusia chapra* (0.79%), *Anabas testudineus* (0.74%), *Ompok pabda* (0.51%), *Heteropneustes fossilis* (0.46%), *Ompok bimaculatus* (0.32%) and *Clarias magur* (0.08%). The total Relative Abundance for the Intermediate Fishes accounts to 33.44%.

Out of the total 58 fish species recorded in the study area, 22 numbers of species (37.9%) fall within the Minor group. The result in Table 3, shows that *Lepidocephalichthys guntea* is the most relatively abundant fish species (7.92%); followed by *Chanda nama* (7.16%), *Mystus carcio* (6.85%), *Parambassis ranga* (6.82%), *Trichogaster fasciatus* (5.74%), *Puntius sophore* (5.59%), *Rasbora daniconius* (4.22%), *Mystus tengera* (2.57%), *Laubuca laubuca* (2.39%), *Esomus danricus* (2.22%), *Botia Dario* (2.16%), *Badis badis* (1.66%), *Amblypharyngodon mola* (1.47%), *Pachypterus atherinoides* (1.14%), *Pethia gelius* (0.95%), *Pethia conchonius* (0.80%), *Channa gachua* (0.72%), *Pseudambassis baculis* (0.66%), *Puntius guganio* (0.57%), *Canthophrys gongota* (0.44%), *Leiodon cutcutia* (0.41%) and *Chaca chaca* (0.11%). The total Relative Abundance of the Minor group fishes accounts to 62.51%.

The study of relative abundance of the threatened species of different levels (as per CAMP, 1998 and IUCN, 2022) finds that the CAMP reported 'Vulnerable (VU)' species, *Mystus bleekeri* has the relative abundance of 2.98% followed by *Pethia conchonius* (0.80%), *Anabas testudineus* (0.74%), *Cirrhinus reba* (0.62%), *Systomus sarana* (0.40%), *Gibelion catla* (0.21%) and *Clarias magur* (0.08%).

On the other hand the 'Least Concern' (assessed latest by 2009) species like *Pachypterus atherinoides* has the relative abundance 1.14%. At the same time *Ompok pabda*, *Ompok bimaculatus* and *Chitala chitala* being 'Endangered' as per CAMP (1998) are also reported to be 'Near Threatened (NT)' assessed latest by IUCN 2009 and 2010 (Accessed on 9th Aug 2022) bear the relative abundances amounting 0.51%, 0.32% and 0.09% respectively. Again

Table 2. Relative Abundance (RA) of intermediate group fishes

Sl. No.	Species	RA (%)
1	*Macrognathus pancalus*	5.58
2	*Nandus nandus*	4.60
3	*Mystus cavasius*	4.31
4	*Macrognathus aral*	3.32
5	*Mystus bleekeri*	2.98
6	*Channa punctata*	2.81
7	*Salmophasia phulo*	2.24
8	*Glossogobius giuris*	1.09
9	*Notopterus notopterus*	0.91
10	*Gudusia chapra*	0.80
11	*Anabas testudineus*	0.74
12	*Labeo bata*	0.64
13	*Cirrhinus reba*	0.62
14	*Ompok pabda*	0.51
15	*Heteropneustes fossilis*	0.45
16	*Systomus sarana*	0.40
17	*Xenontodon cancila*	0.40
18	*Mastacembelus armatus*	0.34
19	*Ompok bimaculatus*	0.32
20	*Hemibagrus menoda*	0.22
21	*Monopterus cuchia*	0.08
22	*Clarias magur*	0.08

Table 3. Relative Abundance (RA) of minor group fishes

Sl. No.	Species	RA (%)
1	*Lepidocephalichthys guntea*	7.92
2	*Chanda nama*	7.16
3	*Mystus carcio*	6.85
4	*Parambassis ranga*	6.82
5	*Trichogaster fasciatus*	5.74
6	*Puntius sophore*	5.59
7	*Rasbora daniconius*	4.22
8	*Mystus tengera*	2.57
9	*Laubuca laubuca*	2.39
10	*Esomus danricus*	2.22
11	*Botia Dario*	2.16
12	*Badis badis*	1.66
13	*Amblypharyngodon mola*	1.47
14	*Pachypterus atherinoides*	1.14
15	*Pethia gelius*	0.95
16	*Pethia conchonius*	0.80
17	*Channa gachua*	0.72
18	*Pseudembassis baculis*	0.66
19	*Puntius guganio*	0.57
20	*Canthophrys gongota*	0.44
21	*Leiodon cutcutia*	0.41
22	*Chaca chaca*	0.11

Cyprinus carpio, being a 'vulnerable' species as per IUCN (2008) is found having the relative abundance of 0.45% in the present study. Moreover, the relative abundance of *Wallago attu* being a 'Lower Risk Near Threatened' species as conferred by CAMP (1998) and 'Vulnerable' by IUCN (2019) is found to be 0.23%. Again *Cirrhinus mrigala* being declared as 'Least Concern' by IUCN (2010) and 'Lower Risk Near Threatened' by CAMP (1998) has the relative abundance 0.24%. *Clarias magur* having relative abundance 0.08% has been conferred Endangered Species status by IUCN - 2010 (Accessed on 9th August 2022).

Some physical characteristics of Chandakhal wetland like water level, weed infestation pattern, culture management, netting type, effluent discharge if any, may be considered to assess the anthropogenic perturbations on fish diversity, population density as well as fishery economics of the area.

4. DISCUSSION

It can be interpreted from the result in Table 1 that among the major group fishes most of which are with high commercial value, *Labeo calbasu* occupies the top most place showing the relative abundance of 0.74% in the study sample followed by *Sperata aor* (0.60%), *Labeo rohita* (0.46%), *Cyprinus carpio* (0.45%), *Sperata seenghala* (0.30%), *Cirrhinus mrigala* (0.24%), *Wallago attu* (0.23%), *Gibelion catla* (0.21%), *Hypopthalmichthys molitrix* (0.20%), *Labeo gonius* (0.20%), *Channa striata* (0.18%), *Ctenopharyngodon idella* (0.12%), *Chitala chitala* (0.09%) and *Channa marulia* (0.03%). Thus the relative abundance of most of the valued food fishes falling under major fish group is found to be < 1.00%. The condition is pitiable concerning the production as well as the dependency of the stakeholders. Among the stake holders, particularly the fisher community whose fate of livelihood directly relies on the wetland production, the lower catch of such fish species due to their poor relative abundance makes the fisher redundant. The present scenario of the relative abundance in the studied wetland is not in conformity with the abundance observed in some other wetlands of Assam a couple of decades ago [18,19]. Thus, the poor relative abundance of Major fish group estimated in the present study unfurls the miserable yield of the prized food fish species that has certainly effect on the fishers' economy.

Again from the result in Table 2, it can be said that among the relative abundance of the species considered under the Intermediate fish group, the top most abundant species is *Macrognathus pancalus* (5.58%) followed by *Nandus nandus* (4.59%), *Mystus cavasius* (4.31%), *Macrognathus aral* (3.32%), *Mystus bleekeri* (2.98%), *Channa punctata* (2.81%), *Salmophasia phulo* (2.24%) and so on. The result shows very low relative abundance for most of the priced food fish falling under this group like *Gudusia chapra* (0.79%), *Anabas testudineus* (0.74%), *Ompok pabda* (0.51%), *Heteropneustes fossilis* (0.46%), *Mastcembelus armatus* (0.34%), *Ompok bimaculatus*

(0.32%) and *Clarias magur* (0.08%).

The Minor fish group comprises the small indigenous species that constitutes the lions share in the sample

fish composition comprising about 38% of the total fish species recorded in the study area and most of these species are fishes of good food value as well as potent ornamental value. From the result in Table 3, it can be interpreted that *Lepidocephalichthys guntea* is the most relatively abundant fish species whose relative abundance amounts to 7.92%; followed by *Chanda nama* (7.16%), *Mystus carcio* (6.85%), *Parambassis ranga* (6.82%), *Trichogaster fasciata* (5.74%), *Puntius sophore* (5.59%), *Rasbora daniconius* (4.22%), *Mystus tengera* (2.57%), *Laubuca laubuca* (2.39%), *Esomus danricus* (2.22%), *Botia Dario* (2.16%) and so on.

Therefore, from the result of the relative abundance of species in the present wetland, it can be interpreted that the wetland has a relatively high abundance of fishes of Intermediate and Minor groups. It signifies their identity as resident species of the present wetland. The study of abundance of small indigenous fish species in Bangladesh [20] reveals that *Mystus vittatus*, *Mystus tengera*, *Puntius sophore*, *P. ticto*, *Channa punctata* and *Mastacembelus pancalus* to be the most abundant species. However, in the present study, fish species like *Gudusia chapra*, *Ompok pabda*, *Ompok bimaculatus*, *Hemibagrus menoda*, *Systomus sarana* and *Mastacembelus armatus* etc. are although not frequently found but their presence establishes the potamodromous migration of those species in the present wetland.

The present study of relative abundance of 'vulnerable' species (as per CAMP, 1998), *Mystus bleekeri* has the highest relative abundance of 2.98% among the other species under 'vulnerable' status viz., *Pethia conchonius* (0.80%), *Anabas testudineus* (0.74%), *Cirrhinus reba* (0.62%), *Heteropneustes fossilis* (0.45%), *Systomus sarana* (0.40%), *Gibelion catla* (0.21%) and *Clarias magur* (0.08%). On the other hand the 'endangered' species like *Pachypterus atherinoides* has the relative abundance 1.14%, *Ompok pabda* (0.51%) and *Ompok bimaculatus* (0.32%) and *Chitala chitala* (0.09%).

Apart from this, the consultation with the IUCN red list data (Version 2022-1) reveals that the fish community of the present study area has 'vulnerable' species like *Cyprinus carpio* and *Cirrhinus mrigala* which have relative abundances calculated to be 0.45% and 0.24%. The 'near threatened' species like *Wallago attu* and *Chitala chitala* are having relative abundances of 0.23% and 0.09% respectively and the 'endangered' species *Clarias magur* is found to have the relative abundance as low as 0.08% in the present study.

As the freshwater fishes are highly sensitive to the quantitative and qualitative alterations of their aquatic habitats [21,22,23], hence are often employed as active bio indicators [24] and since in Asian countries, some of the main causes of diminishing fish diversity are environmental degradation, increased sedimentation, flow alteration and introduced species [5], the poor relative abundance of different fish species in the present study draws attention of the scientific fraternity to identify the cause of such result. Similar kind of observation is found in marine fisheries also where various factors have significant bearings with the relative abundance of fishes [25].

5. CONCLUSION

From the result and discussion of the present study it can be said that the relative abundance of most of the threatened and valued food fish species of the study area is poor. The present finding leads to open a potential area of study to find out the cause of dwindling fish abundance and formulate solution to the problem.

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