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Ecology and Diversity of Small Indigenous Fishes in Four Fishing Sites of Upper Brahmaputra Basin, Assam, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Small Indigenous fishes constitute important fishery resource of Assam, but doesn't finds its place in capture fishery. Collection of these species is chiefly from their wild habitat and thus the study of these habitats become very important. The four sites selected for study namely Bogibeel, Madhupur, Maguri Beel and Sessa are well known fishing sites of Upper Assam known to record higher fish catch. These sites harbour variety of small indigenous fishes for both food and ornamental value. In our study we have recorded 41 different species of fishes of which 13

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belonged to Family Cyprinidae. Channa bleheri and Ailia coila were the two Near Threatened (NT) fish found during the study. Systematic studies of the habitat directly or indirectly like studying the gut content of fishes will give significant information.

Keywords: Small Indigenous Fishes; Upper Assam; Cyprinidae; gut content.

1. INTRODUCTION

Water resource in Assam is largely contributed by Brahmaputra River, tributaries of Brahmaputra and the channels that connect the tributaries or directly fall in Brahmaputra [1]. However, the river channels and wetlands of Assam constitute the major repository of variety of small indigenous fishes [2]. 90 percent of population in Assam are fish consumers and largely depend on these water bodies to meet the demand [3]. Culture fishery is progressing very slowly in Upper Assam and is limited to only a few intensive fish culturists. Besides importance is given solely to commercial carp fishes like *Labeo rohita, Cirrhinus mrigala, Catla catla* etc. and very less important is given to the small indigenous fishes of the state. The only thing that is protecting these fishes is their natural habitat. Owing to their characteristic's interaction with land and water, these habitats are most productive ecosystem [4]. Information on the influence of hydrobiology and fisheries of these water bodies is scanty till date [5]. Biotic community requires definite conditions of their own for survival which differs from species to species. Available scientific information on the hydrobiology and fisheries of the river Brahmaputra in the region is scanty and fragmented [6,7,8]. Apart from that due to large interpretation of human and overexploitation have large impact on the destructing the habitat grounds of the fishes. [9,10].

Bogibeel, Madhupur, Maguri beel and Sessa are important fishing habitat for many small indigenous fishes of Upper Assam. These water bodies harbour diverse species of small indigenous fishes which are given least importance on its conservation (Jhingran, 1991), [11]. As collection of these fishes is done mainly from the wild, the conservation of the ecological habitat becomes very essential. There is very less information on the tributaries and wetlands of Upper Assam. Therefore, a systematic study on the ecology becomes very important. The aim of the current work is to study the importance and conditions required for survival of some of the small important fishes of Assam.

2. MATERIALS AND METHODS

Four different sites with reports of higher fish catch of small fishes were selected for study namely Bogibeel, Madhupur, Maguri Beel and Sessa. Of the four sites Bogibeel, Madhupur and Sessa were located in Dibrugarh district, while Maguri Beel is in Tinsukia district. The geographic locations of the different sites visited were 27º22´34.38´´N Lat. 94º47´31.22´´E Long. (Bogibeel), 27º19´32.87´´ N Lat. 94º46´9.68´´E Long. (Madhupur), 27º36´5´´N Lat. 95º25´13´´ E Long. (Maguri Beel), 27º20´19.62´´ N Lat. 94º51´51.03´´ E Long. (Sessa). Each site was visited four times of the year. The survey period was from January 2019 to December 2020. Detail studies on the sites were conducted, while the water parameters were calculated following APHA [12]. The water sample collected was brought to Department of Life Sciences, Dibrugarh University for all the necessary analysis. An interrogation was done with the local fisherman about the presence of some important small fishes found in the region which was confirmed by market survey conducted in the nearby fish landing centres. The fishes were photographed and brought to Freshwater Biology Laboratory, Department of Life Sciences, Dibrugarh University and identification was done following Talwar and Jhingran [13] and Jayaram [14,15].

3. RESULTS AND DISCUSSION

The four different sites selected for study were peculiar in it that it had a mainstream lotic water body while lentic water bodies like wetlands lies beside it. The survey was conducted on both the lentic and lotic system. The color of the water appeared light green in all the water bodies. In majority of ecosystem light green of a water body is due to presence of the group of green algae Chlorella [16], which is necessary for the growth of zooplanktons upon which the small fishes feed. Diet selection varies from in carnivore, omnivore and herbivore fishes and the habitat in which they live must support the fishes with their preferred diet [17]. Thus, study on the feeding biology of fishes reflects significant information on the ecology of the fishes [18]. Few studies

had been conducted on the feeding biology of the fishes of Assam till date and thus we lack the key inputs that can be made on their habitat ecology. Apart from diet hiding grounds is another essential factor for survival of the fishes. The hiding habitat helps the fishes to escape them not only from their predators, but also provide them a suitable habitat as they control the temperature, turbidity, gas solubility etc. The sites taken under study were hugely occupied with aquatic plants like *Eichorrnia crasipes* (Mart.) Solms*, Pistia stratiotes* L., *Hydrilla verticillata* (L.f.) Royle, *Lemna minor* L., etc. Aquatic plants are also very essential during the breeding operation as it helps eggs to get attached to its bushy roots so it doesn't get dispersed far away. In all the sites studied the bottom of the river appeared loamy with maximum depth between 8-8.5 m during monsoon and minimum depth of 3-4.5 m in the middle during winter. Annual flood is another important aspect of Assam which has certain advantages and disadvantages. On one hand it introduces fresh nutrients to the river while on another hand it also introduces seasonal predatory species to these channels. The turbidity was recorded more during the summer, while it was less during the winter. Photosynthetic oxygen had a great impact on all the sites due to presence of aquatic plants in different forms from phytoplankton to aquatic plants. Other parameters like hardness and alkalinity recorded normal to support biotic flora and fauna [19-21].

The different aquatic habitats studied along with their habitat parameters are listed in Table 1.

Table 1. Water parameters recorded in different sampling sites

Sampling Stations	pH	Air Temperature Range(^{0}C)	Water Temperature Range (^{0}C)	Dissolved Oxygen (mgL^{-1})	Hardness	Alkalinity (mgL^{-1})	Free CO_2
Bogibeel	6.9±1.2	18.8-36.8	17.7-30.8	7.22±2.1	49.01±27	55±6.37	3.02±0.11
Madhupur	7.1±0.72	17.8-28.2	17.2-30.45	8.83±1.7	53.90±8.89	17±4.34	4.27±2.66
Maguri Beel	7.2±1.3	18.9-34.3	17.89-28.9	8.02±2.2	55.34±9.01	35±5.34	3.96±0.23
Sessa	6.85±2.1	17.7-36.7	17.3-28.23	7.5±1.78	41.61±85	21±.55	1.22±0.67

Important small indigenous fish species that is known to harbour in the water bodies that were surveyed are as follows:

Table 2. Species recorded in different sites

SL No.	Family	Scientific name	IUCN status
1.	Cyprinidae	*Pethia gelius*	LC
2.	Cyprinidae	*Pethia ticto*	LC
3.	Cyprinidae	*Puntius conchonius*	LC
4.	Cyprinidae	*Puntius sophore*	LC
5.	Cyprinidae	*Puntius sarana*	LC
6.	Cyprinidae	*Danio rerio*	LC
7.	Cyprinidae	*Barilius barila*	LC
8.	Cyprinidae	*Devario aequipinnatus*	LC
9.	Cyprinidae	*Danio rerio*	LC
10.	Cyprinidae	*Danio dangila*	LC
11.	Cyprinidae	*Devario devario*	LC
12.	Cyprinidae	*Esomus danricus*	LC
13.	Cyprinidae	*Rasbora daniconius*	LC
14.	Botiidae	*Botia rostrata*	VU
15.	Cobitidae	*Canthophrys gongota*	LC
16.	Cobitidae	*Lepidocephalichthys guntea*	LC
17.	Sisoridae	*Glyptothorax telchitta*	LC
18.	Sisoridae	*Glyptothorax indicus*	LC
19.	Sisoridae	*Sisor rabdophorus*	LC
20.	Sisoridae	*Sisor rabdophorus*	LC
21.	Mastacembelidae	*Macrognathus pancalus*	LC
22.	Mastacembelidae	*Macrognathus aral*	LC
23.	Mastacembelidae	*Mastacembelus armatus*	LC

SL No.	Family	Scientific name	IUCN status
24.	Erethistidae	*Erethistes pussilus*	LC
25.	Erethistidae	*Hara horai*	LC
26.	Erethistidae	*Hara jerdoni*	LC
27.	Osphronemidae	*Trichogaster fasciata*	LC
28.	Osphronemidae	*Trichogaster lalia*	LC
29.	Belonidae	*Xenentodon cancilla*	LC
30.	Chacidae	*Chaca chaca*	LC
31.	Channidae	*Channa gachua*	LC
32.	Channidae	*Channa bleheri*	NT
33.	Ailiidae	*Ailia coila*	NT
34.	Schilbeidae	*Pachypterus atherinoides*	LC
35.	Ambassidae	*Parambassis ranga*	LC
36.	Gobiidae	*Glossogobius giuris*	LC
37.	Badidae	*Badis singenensis*	NE
38.	Tetraodontinae	*Leiodon cutcutia*	LC
39.	Ambassidae	*Parambassis ranga*	LC
40.	Bagridae	*Mystus vittatus*	LC
41.	Bagridae	*Mystus cavasius*	LC

Among these 39 important species that were found to inhabit these, which have both food as well as ornamental value 13 species belonged to the family Cyprinidae. Of the 39 species 2 species i.e. *Channa bleheri* and *Ailia coila* are listed as Near Threatened (NT) species (IUCN ver. 3.1), while *Botia rostrata* is classified as Vulnerable (VU), while majority as Least Concern (LC) species.

4. CONCLUSION

From the above discussion it is clear that river channels and wetlands are great potential habitat for the small indigenous fishes of Assam. Apart from that indirect estimation through feeding biology can be a tool in determining habitat of any fish. As each fishes requires specific diet and environment, it is very essential that we conserve the present habitat of these fishes.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Bhattacharjya BK, Bhaumik U, Sharma AP. Fish habitat and fisheries of Brahmaputra River in Assam, India. Aquatic Ecosystem Health and Management. 2017;20:102-115. DOI:10.1080/14634988.2017.1297171.
2. Acharjee B, Das AN, Dutta A. Fish diversity and fisheries potential of some wetlands in Assam. Remarking An Analisation. 2017;1(12):6-21.
3. Bhuyan PC, Goswami C, Kakati BK. Study of fish consumption patterns in Assam for Development of Market-Driven Strategies. Reserach Journal of Chemistry Environmental Sciences. 2017;5(6):42-52.
4. Chandra G. Management regimes and institutional arrangement in floodplain wetlands fisheries of Assam: An Evaluation. Indian Journal of Extension Education. 2011;47(1&2):27-33.
5. Sugunan VV, Bhattacharjya BK. Ecology and fisheries of beels in Assam. Bull. No. 104, Central Inland Fisheries Research Institute, Barrackpore. 2000;81.
6. Motwani MP, Jayaram KC, Sehegal KL. Fish and fisheries of the Brahmaputra river system, Assam. I. Fish fauna with observations on their zoo-geographical distribution. Tropical Ecology. 1962;3:17–43.
7. Singh SP, Mehrotra SN, Yadava YS, Choudhury M, Biswas BK, Biswas DK. Investigation on factors relating to decline of fishery in the river Brahmaputra and its tributaries. Annual Report, Central Inland Fisheries Research Institute, Barrackpore, Kolkata. 1988;243.
8. Biswas SP, Baruah S. Ecology of the river dolphin (*Platanista gangetica*) in the upper Brahmaputra. Hydrobiologia. 2000;430: 97–111.
9. Yadava YS, Chandra R. Some threatened Carps and catfishes of Brahmaputra river system. In: P. V. Dehadrai, P. Das and S. R. Verma (Eds.), Threatened fishes of India. 1994;4:45–55.
10. Sinha M. Fish genetic resources of the North-eastern region of India. Journal of

Inland Fisheries Society of India. 1994;26(1):1–19.
11. Biswas SP, Borbora SH, Dutta BC. Present status of capture fisheries in the upper stretches of the Brahmaputra. Bulletin of Life Sciences. 1995;5:31–40.
12. APHA. American water works association and water pollution control federation. standard methods for the examination of water and waste water. American Public Health Association. 2004;20:1134–1135.
13. Talwar PK, Jhingran AG. Inland fishes of India and adjacent countries, Vol. 1&2. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi. 1991;1158.
14. Jayaram KC. The Freshwater Fishes of India, Pakistan, Bangladesh, Burma, Sri Lanka: A Handbook. Zoological Survey of India, Calcutta. 1981;475.
15. Jayaram KC. The Freshwater Fishes of the Indian Region. Narendra Publishing House, Delhi. 1999;551.
16. Mane AM, Pattanaik SS, Jadhav R, Jena AK. Pond Coloration, Interpretation and Possible Measures of Rectification for sustainable Aquaculture practice. Aquaculture Times. 2017;3(3)-6-9.
17. Ribble DO, Smith MH. Relative intestine length and feeding ecology of freshwater fishes. Growth. 1983;47:292-300.
18. Odum WE. Utilization of the direct grazing and plant detritus food chains by the striped mullet, *Mugil cephalus*, Marine Food Chains. Encyclopedia of Ocean Sciences. 1970;222-240.
19. Chutia SJ, Yashwanth BS, Baruah AK, Kashyap A, Chetia BR, Nath BB, Choudhury A, Rathlavath S, Borah S, Chrispin LC. Trends in fish production of Assam: An Analysis. International Journal of Current Microbiology Applied Science. 2018;7(11):3417-3422. DOI:doi.org/10.20546/ijcmas.2018.711.392
20. Das P, Borah S, Yadav AK, Bhattacharjya BK, Das BK. Openwater Fisheries of Assam and Strategies for its Development. Fishing Chimes. 2018;38(1&2):17-28.
21. Phukon H, Biswas SP Study on habitat ecology and fish diversity of a wetland in upper Assam. Geobios. 2011;38:45-48.