ISSN: 2347-5129
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.352
IJFAS 2015; 3(1): 15-18

www.fisheriesjournal.com
Received: 08-06-2015
Accepted: 10-07-2015

Seemashri Bora
Department of Life Sciences,
Dibrugarh University,
Dibrugarh, Assam, 786004,
India.

SP Biswas
Department of Life Sciences,
Dibrugarh University,
Dibrugarh, Assam, 786004,
India.

Correspondence
Seemashri Bora
Department of Life Sciences,
Dibrugarh University,
Dibrugarh, Assam, 786004,
India.

Water quality and ichthyofaunal diversity of an oxbow lake in upper Assam

Seemashri Bora, SP Biswas

Abstract
Water quality and ichthyofaunal diversity of an oxbow lake, Moridikhow in Sivasagar District (Assam) was reported. 40 species, belonging to 13 families are recorded of which Cyprinidae was the most dominant (14). Certain physico-chemical parameters such as dissolved oxygen, free CO_2, and alkalinity were studied to know the aquatic health of the oxbow lake.

Keywords: Ichthyofauna, oxbow lake, physico-chemical parameter, Assam.

1. Introduction
Assam is naturally endowed with large number of rivers, lakes and *beels* (wetlands). These water bodies act as a major habitat for large variety of aquatic flora and fauna. Weed infested *beels* are especially rich in ichthyofauna (Biswas and Choudhury, 2008) [2]. However, like other natural water bodies in Assam, fish diversity has been steadily declining from the *beels* mainly due to habitat destruction and anthropogenic activities. The growth, distribution and abundance of aquatic animals mainly depend on the quality of water. Therefore, regular monitoring of water is important for better production of the fishery resources. Water quality of any water body mainly fluctuates due to its physical, chemical and biological parameter. Few studies have been made on the diversity of fish and physico chemical parameter of different water bodies of Assam (Chakravartty *et al*., 2012; Deka and Dutta, 2013; Das and Bordoloi, 2012; Goswami and Kalita, 2012; Saud *et al.*, 2012) [3, 5, 4, 5, 6, 10]. The present report deals with the ichthyofaunal diversity and certain physico chemical parameter of Moridikhow, a weed infested oxbow lake in Sivasagar District of Assam.

2. Materials and Method
2.1. About the study area
Moridikhow is an oxbow lake which was originally a part of the river Dikhow, a tributary of the Brahmaputra. This lake is situated in the Dikhowmukh area (26.98// N and $94^0$46/ E), about 25 km away from Sivasagar town in upper Assam. It is a perennial water body, mostly choked with aquatic macrophyte especially during dry months. Entire bank of the lake is occupied by local villagers and they use water and other aquatic resources for their livelihood.

2.2. Collection of sample and chemical analysis
Five different stations were selected in the lake for sampling of water. Water samples were collected at monthly basis during morning hours from these sampling stations. Analyses of different physico chemical parameters were done as per standard method (APHA, 1998; Trivedy *et.al*, 1987) [1, 12]. A mercury thermometer was used to record both air and water temperature. pH was recorded with a digital portable pH meter.
Fish samples were collected every month during the study period from different local fishermen. Fishermen used different indigenous methods to catch fishes. They generally used gill nets, cast nets, drag nets of different mesh sizes for collecting different types of fishes. Collected specimens are preserved in 10% formalin and identified following Talwar and Jhingran (1991) [11].

3. Result and discussion
3.1. Physico chemical parameter of the lake
The studied physico chemical parameters include air and water temperature, pH of water,

dissolved oxygen (DO), free CO_2 and alkalinity of water. During the study period, air temperature was recorded maximum in June and minimum in January. Similarly water temperature was noted high in summer and low in winter. As water temperature is dependent on air temperature, therefore, air and water temperature show similar fluctuation during the year.

The Hydrogen ion concentration or pH of water did not show much fluctuation throughout the year. pH of water show that water of the studied lake is near neutral (6.9-7.1) to slightly alkaline (7.3). pH range between 6.5-7.5 is an indicative of productive water.

Dissolved oxygen (DO) is an important parameter as most of the aquatic organisms can breathe only that oxygen that is dissolved in water. DO was recorded maximum in February (5.98± 2.82mg/l) and minimum in December (2.63±1.58mg/l) in the studied area. The value of DO was highly variable. After a high value in February, a sudden drop in DO value was observed in March (Table 1). This may be due to profuse vegetation growth in the surface of the water body.

The free CO_2 was ranged between 1.75- 5.81mg/l. The lowest value was recorded in March and the highest value was recorded in February. From March onwards, Free CO_2 value increases. High aquatic vegetation may be the reason for such a high CO_2 value as most part of the water surface is covered with water hyacinth. The value of free CO_2 is also dependant on time and site of water. As sampling was done during morning hours, photosynthetic activities were reduced at that time and hence high value of free CO_2 is recorded. Near periphery also, free CO_2 is found to be more than centre.

Alkalinity is the capacity of water to neutralise acids and an ability to absorb hydroxyl ion without significant pH change (Koliyar and Rokade, 2008) [9]. The range of alkalinity 40-90 mg/l is considered as highly productive. The calculated alkalinity is ranged between 46-106 mg/l of the studied lake. Alkalinity is maximum in December and minimum in August. Similar observation about alkalinity was made by Saud *et al.* (2012) [10].

Table 1: Monthly variation in the physico chemical parameter of the oxbow lake

Month	Air Temp ^{0}C	Water Temp ^{0}C	pH	DO (mg/l)	Free CO_2 (mg/l)	Alkalinity (mg/l)
January	21.35±1.63	17.7±0.42	7.3±0.23	4.42±1.06	4.78±1.32	100±12.91
February	23.9±1.56	20.75±2.47	7.32±0.12	5.98±1.82	5.81±1.53	89.5±7.98
March	29.75±1.06	23.75±1.06	7.14±0.35	2.91±0.14	1.75±0.39	69.5±7.62
April	30.65±0.49	25.9±1.55	7.16±0.42	3.64±1.62	2.31±1.27	71.5±17.3
May	32.5±2.12	30±1.41	7.1±0.23	5.22±3.76	2.02±1.31	77±12.95
June	33.1±1.56	30.5±0.71	6.9±0.34	4.48±1.74	2.95±1.39	62±2.82
July	31±1.41	30.25±1.77	7.13±0.67	5.33±3.72	3.02±1.53	46±6.99
August	32.5±0.71	31.15±0.21	7.2±0.78	5.47±2.63	3.85±1.44	58±8.56
September	29.5±0.71	28.75±0.35	6.9±0.41	4.52±2.21	5.17±2.28	52±9.78
October	26.25±0.35	24.5±0.71	7.15±0.56	3.42±1.73	5.27±2.26	64±5.16
November	25.35±0.92	24.4±0.57	7.23±0.63	2.93±1.49	4.80±1.04	85±6.67
December	23.5±0.70	22.75±2.47	7.26±0.26	2.63±1.58	5.63±0.95	106.5±14.35

3.2. Ichthyofaunal diversity

During the study, a total of 40 fish species belonging to 13 families were identified. List of fishes with common names, conservation status based on the report of Conservation Assessment and Management Plan (CAMP) for freshwater fishes of India by Molur and Walker and IUCN Red List of Threatened Species are given in Table 1. Of these, Cyprinidae family with 14 fish species dominating the lake followed by Channidae family with 5 species. Bagridae, Belontiidae, Chandidae and Siluridae family are represented by 3 species each. Notopteridae and Mastacembelidae family are reported from the lake each with 2 species.

Among the reported fishes, *Labeo rohita* is a very common fish for the fishermen. They are usually caught by hook and line and it is a popular fishing gear for the villagers. Other commonly found fishes are *Amblypharyngodon mola* and *Notopterus notopterus.* They are abundant species. Fourteen species are commonly found and twenty one are occasionally found from the lake. *Mastacembelus armatus, M. pancalus* and *Nandus nandus* are generally not common for the fishermen. Villagers also use cast net, gill net, bamboo made traps etc. for fishing. Fishing is continuous throughout the year. However, peak fishing season is winter (Dec-Feb). Local villagers employed *Phasi jal* in night and in early morning they collect their catch from the net. Different nets are used to catch different sized fishes.

During monsoon, fishes like *Wallago attu, Channa sp, Puntius sp* breed in the beel. But carps like *Catla catla, Labeo rohita, Labeo gonius* etc. breed in running water of main river Dikhow. They migrate from the lake to river through the connecting channel.

Forty fishes recorded in the studied beel indicate rich diversity of fishes in the lake. According to IUCN status, major fishes of this lake are of least concern (LC) category. Four species are nearly threatened (NT) and categories of five species are not evaluated (NE). According to CAMP status, a major part of the fishes are lower risk near threatened (LRlc) type. Six species are vulnerable and three are endangered species.

Table 2: Checklist of fishes found in the oxbow lake with occurrence, IUCN and CAMP status

Family	Scientific Name	Common Name	IUCN status	CAMP Status	Occurrence
Family: Cyprinidae	*1. Amblypharyngodon mola* (Ham.-Buch.)	Brass fish	LC	LRlc	A
	2. Aspidoparia jaya (Ham.-Buch.)	Aspidoparia	LC	VU	C
	3. A. morar (Ham.-Buch.)	Aspidoparia	LC	LRnt	C
	4. Catla catla (Ham.-Buch.)	Common carp	NE	VU	O
	5. Cirrhinus mrigala (Ham.-Buch.)	Mrigal	LC	LRnt	O
	6. Esomus danricus (Ham.-Buch.)	Flying barb	LC	LRlc	C
	7. Labeo bata (Ham.-Buch.)	Minor carp	LC	LRnt	O

	8. L. gonius (Ham.-Buch.)	Kuria labeo	LC	LRnt	O
	9. L. rohita (Ham.-Buch.)	Rohu	LC	LRnt	C
	10. Puntius conchonius (Ham.-Buch.)	Rosy barb	LC	LRlc	C
	11. P. sophore (Ham.-Buch.)	Spot fin swamp barb	LC	LRnt	C
	12. P. ticto (Ham.-Buch.)	Two spot barb	LC	LRnt	C
	13. Rasbora daniconius (Ham.-Buch.)	Black line rasbora	NE	LRnt	C
	14. R. rasbora (Ham.-Buch.)	Yellow tail black tip	LC	LRnt	O
Family: Notopteridae	*15. Chitala chitala* (Ham.-Buch.)	Feather back	NT	EN	O
	16. Notopterus notopterus (Pallas)	Bronze feather back	LC	LRnt	A
Family: Channidae	*17. Channa barca* (Ham.-Buch.)	Violet snakehead	DD	NE	O
	18. C.gachua (Schneider)	Dwarf snakehead	LC	VU	O
	19. C. marulius (Ham.-Buch.)	Peacock snakehead	LC	LRnt	O
	20. C. punctatus (Bloch)	Spotted snakehead	LC	LRnt	C
	21. C. striata (Bloch)	Striped snakehead	LC	LRlc	O
Family: Siluridae	*22. Ompok pabda* (Ham.-Buch.)	Gulper catfish	NT	EN	O
	23. O. pabo (Ham.-Buch.)	Pabo catfish	NT	NE	O
	24. Wallago attu (Bloch & Schneider)	Helicopter catfish	NT	LRnt	C
Family: Bagridae	*25. Mystus bleekeri* (Day)	Day's mystus	LC	LRlc	O
	26. M. cavasius (Ham.-Buch.)	Gangetic mystus	LC	LRnt	O
	27. M. tengara (Ham.-Buch.)	Tengara mystus	LC	NE	C
Family: Claridae	*28. Clarias batrachus* (Linn.)	Magur	LC	VU	O
Family: Belontidae	*29. Trichogaster fasciatus* (Schneider)	Banded gourami	LC	LRnt	C
	30. T. lalia (Ham.-Buch.)	Dwarf gourami	LC	NE	C
	31. T. sota (Ham.-Buch.)	Honey gourami	LC	NE	O
Family: Anabantidae	*32. Anabas testudineus* (Bloch)	Climbing perch	DD	VU	O
Family: Chandidae	*33. Chanda nama* (Ham.-Buch.)	Elongate glass perchlet	LC	NE	C
	34. Pseudoambasis baculis (Ham.-Buch.)	Himalayan glassy perchlet	LC	NE	O
	35. P. ranga (Ham.-Buch.)	Indian glassy fish	LC	NE	O
Family: Mastacembelidae	*36. Mastacembelus armatus* (Ham.-Buch.)	Zig-zag spiny eel	NE	NE	R
	37. M. pancalus (Ham.-Buch.)	Striped spiny green eel	NE	LRnt	R
Family: Heteropneustidae	*38. Heteropneustes fossilis* (Bloch)	Stinging catfish	LC	VU	O
Family: Nandidae	*39. Nandus nandus* (Ham.-Buch.)	Leaf fish	LC	LRnt	R
Family: Schilbeidae	*40. Pseudotropus atherinoides* (Bloch)	Indian potashi	NE	EN	O

IUCN status:
LC-Least concern, NE- Near threatened, DD-Data deficient
NE-Not evaluated
CAMP status:
LR-nt = Lower Risk near threatened, LR-lc = Lower Risk least concerned,
EN= Endangered, NE = Not evaluated Vu= Vulnerable.
Occurence:
A-Abundant C- Common O-Ocassional, R-Rare

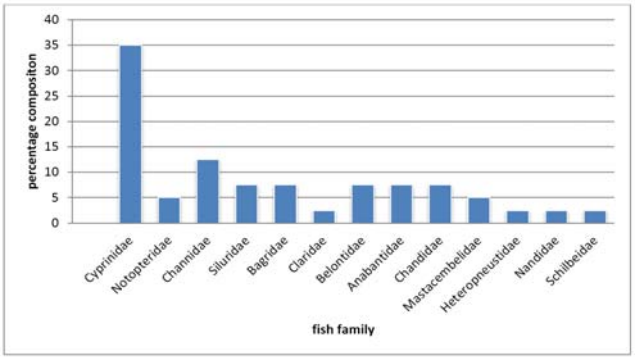
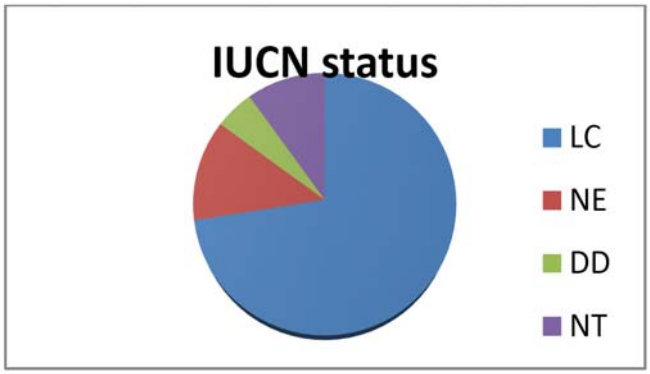


Fig 1: percentage composition of fish family recorded from the oxbow lake



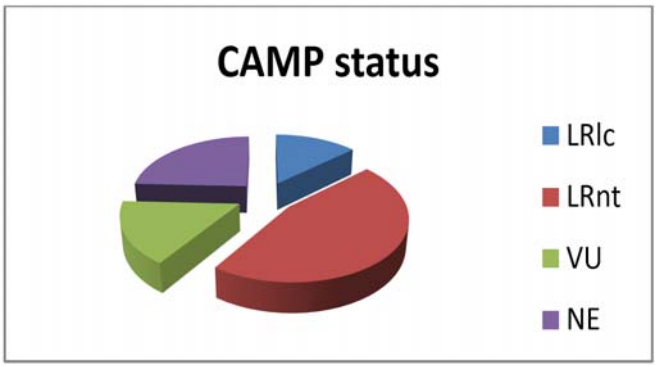


Fig 2: Conservation status of fishes recorded from Moridikhow oxbow lake

4. Conclusion

The rich ichthyofauna of the lake indicates the high productivity of the lake. However, fish diversity is declining due to anthropogenic stress on water such as washing clothes, washing different containers etc. by the local people. Fishing nets with small mesh size is also responsible for degradation of fish diversity. To conserve diversity, people awareness is must and they will learn to use resources without causing any damage to those resources. Along with the capture fishery, culture fishery can also be adopted for higher production from the lake. Proper regulation of fishing gears and their mesh size and their fishing intensity should also be monitored. Weed management is another important matter for consideration.

5. Reference

1. APHA. Standard methods for examination of water and wastewater. 20th edition. American Public Health Association, Washington, DC, USA, 1998.
2. Biswas SP, Choudhury M. Ecology and Ichthyofaunal diversity of wetlands in Upper Assam. *Management of freshwater ecosystem*, Agrotech Publishig Academy, Udaipur, 2008, 73-82
3. Chakravartty P, Chakravartty M, Sharma S. A Survey on the Fish Diversity with Special Reference to the Classified Ornamental Fishes and their Prospects in the Kapla Beel of Barpeta District, The Science Probe 2012; 1(2):12-21.
4. Das MK, Bordoloi S. Diversity of ornamental fishes in the river island Majuli, Assam, Global Journal of Bio-Science and Biotechnology. 2012; 1(1):81-84.
5. Deka K, Dutta A. Ichthyo-faunal diversity and status in Barbila *Beel*, Nalbari, Assam, The Clarion 2013; 2(2):32-37.
6. Goswami C, Kalita MP. Ichthayofaunal Diversity & Anthropogenic Stress on Deepor Beel: the only Ramsar site in Assam, IOSR Journal of Environmental Science, Toxicology and Food Technology. 2012; 2(1):54-59.
7. IUCN. IUCN Red List of Threatened Species. Version <www.iucnredlist.org>, Downloaded on, 19, May, 2013.
8. Molur S, Walker S. Report of the Conservation Assessment and Management Plan. Workshop on freshwater fishes of India, Zoo outreach Organization/CBSG, Coimbatore, India, 1998, 156.
9. Koliyar JG, Rokade NS. Water quality in Powai lake: Mumbai, Maharashtra, Proceedings of Taal 2007: The 12th World Lake Conference, 2008, 1655-1659
10. Saud BJ, Chetia M, Verma VK, Kumar D. Eco-hydrobiology with special amphasis on ichthyofaunal diversity of urpod wetland of Goalpara, Assam, India, International journal of plant, animal and environmental sciences. 2012; 2(3):103-109.
11. Talwar PK, Jhingran AG. Inland Fisheries of India and Adjacent Countries. Oxford & IBH Publ. Com., New Delhi, 1991, 1-2.
12. Trivedy RK, Goel PK, Trisal CL. Practical methods in Ecology and Environmental Science. Enviro Media Publication, Karad (India), 1987.