Bulletin of Arunachal Forest Research, Vol. 33(2), 45-49: 2018 ISSN 0970-9487

PHYSIO-CHEMICAL PARAMETERS AND FISH FAUNA OF SESA RIVER- A CASE STUDY

Rajesh Kumar Shah[1*], Brojen Phukan[1], Santoshkumar Abujam[2], Asham Borang[3]
[1]Department of Zoology, DHSK College, Dibrugarh- 786001, Assam
[2]Deaprtment of Zoology, Rajiv Gandhi University- 791112, Arunachal Pradesh
[3]State Forest Research Institute, Itanagar- 791111, Arunachal Pradesh
*Email: rajeshkumarshah39@yahoo.com

Abstract

Sesa is one of the important sub-tributaries of the River Brahmaputra. It is a rain fed River flowing through Tinsukia and Dibrugarh districts and meets the River Brahmaputra in upper Assam. Since the last several decades the growing activity of small to heavy industries is eminent in both of the districts. Ecology of the River Brahmaputra basin invites scientific interest in hydrology and fish fauna. Though considerable work has been done on this aspect of the Brahmaputra River system, an exhaustive scientific understanding on such aspects of Sesa River is almost neglected. The present paper is a result of a case study highlighting the physio-chemical parameters of Sesa River reporting 36 species of fish belonging to 28 genera, 20 families and 6 orders.

Keywords: Sesa River; Physio-chemical parameters; Fish fauna; Assam

INTRODUCTION

The river is vital source for earning livelihood of fisher folk and other inhabiting in the vicinity (Deori et al., 2015). The flood affected water bodies are supporting a lucrative fishery in India, especially the North Eastern states which are considered as the second most important inland fishery resources of the country (Bhaumik et al., 2003). The Brahmaputra River system is the main source of fishery resources in the North East India.

Sesa River, a rain fed is a second order tributary in the Brahmaputra River system. Before meeting the River Brahmaputra it flows through Tinsukia and Dibrugarh districts in upper Assam and joins Burhi Dihang River at Lezai which further meets the River Brahmaputra at Dihingmukh. In both of the districts the activity of small to heavy industries like natural gas, petrochemicals, colliery, tea, thermal power, bricks, etc. are growing fast since last several decades. As the Sesa River passes through such areas with small to heavy industries, there are many possibilities of pollution effecting aquatic organism such as fishes. Fishes are one of the most important biotic components of aquatic ecosystem. Thus, indeed, there was a need of study on the physio-chemical characteristics and fish fauna occur in Sesa River. Evident from Biswas and Sugunan (2008); Das and Sharma (2012); Sharma et al., (2012) and Deori et al., (2015) it is seen that a considerable work has been done on the physio-chemical characteristics and fish fauna of the Brahmaputra River system many of its sub-tributaries are almost neglected. This is more so for Sesa River. An exhaustive study on such aspects on the Sesa River is an imperative. Therefore, a case study of physio-chemical characteristics and fish fauna occurred in Sesa River was thought important and the present study is a case in the direction.

MATERIALS AND METHODS

The present paper is based on the study carried out during the period from the December 2016 to May 2017. The accomplished methods are given as under:

Water Quality Analysis: Water samples from Sesa River were collected from two sites namely the Bolai Tea Estate at Barbaruah (27°21'09" N & 94°58'37" E) and the Lezai area (27°17'40" N & 94°48'42" E). The physical parameters such as colour and transparency as well as temperature were determined by visual comparison and 'Thermometer Secchi Disc method' respectively. The chemical parameters namely pH value, dissolved oxygen, free carbon dioxide and alkalinity were estimated by following the scheme of Trivedy and Goel (1986) and Anonymous (1998).

Fish Survey and Identification: Fish survey was undertaken along and nearby the Sesa river randomly. The local folk catch fishes from Sesa river and feeding streams as well as nearby flooded marsh areas (Beel as locally called). During last part of second week of January a ceremony like traditional fishing is organized by local community for feast during Magh Bihu, a local festival of Assamese community. Such areas were also surveyed and meeting the fisher folk was rewarding for gathering data and fish enumeration. Sometimes they sell the catches in the village market. The data gathering and identification were also accomplished during the survey of such folk-market. Taxonomic work and identification of fishes was done using the scheme of Darshan et al., (2018).

RESULTS AND DISCUSSION

Physical Parameters

The monthly average values of water colour, temperature and transparency of Sesa River are presented in Table 1. The water colour was recorded as colourless during December 2016 to February 2017; slightly greenish during March 2017; clear during April and dirty during May 2017. Water temperature ranges from 18 ºC in December to 23 ºC in May. The water temperature shows continuous increasing from December to May. Transparency was recorded highest in April (24.38) and lowest in May (17.65). The water transparency was found fluctuated up and down during the study period. The transparency values indicate that the Sesa River is a productive in nature which reciprocates Sharma and Darve (1991). All the physical parameters showed different degrees of variations during the study period.

Table 1: Monthly changes of water colour, temperature and transparency

Period	Colour	Temperature (ºC)	Transparency (cm)
December, 2016	Colourless	18	23.75
January, 2017	Colourless	18.32	21.22
February, 2017	Colourless	19.04	22.37
March, 2017	Slightly greenish	21	19.25
April, 2017	Clear	21.5	24.38
May, 2017	Dirty	23	17.65

Chemical Parameters

The monthly average values of pH, dissolved oxygen, free carbon dioxide and alkalinity of Sesa River are presented in Table 2. pH value ranges from 7.0 during March-May to 9.0 during January-February. The increase in pH value of the water may due to increase in alkaline substances like ammonia. Lowest alkalinity was measured in the month of May (50 mg/l) and highest in

December (106 mg/l). This may be due to increase in carbonates and bicarbonates during December.

Increase in alkalinity of the River water leads to damage of gills, eyes and skin which may lead to death of the fishes resulting inability to dispose the metabolic wastes.

Dissolved oxygen ranges from 10.0 mg/l during December to 6.39 mg/l during May. The lowest amount of dissolved oxygen was found in the month of May and the highest was found in the month of December. Dissolved oxygen content was found very high as compared to WHO limits. This indicates a highly oxidized environment in the river. Free carbon dioxide ranges from 3.2 mg/l during May to 5.0 mg/l during February. The amounts of free carbon dioxide were recorded highest during February and lowest during May.

Table 2: Monthly changes of pH, DO, FCO_2 and alkalinity of Sesa River

Period	pH Value	Dissolved Oxygen (mg/l)	Free Carbon dioxide (mg/l)	Amount of Alkalinity (mg/l)
December, 2016	8.0	10.0	4.0	106
January, 2017	9.0	7.45	3.5	90
February, 2017	9.0	8.77	5.0	70
March, 2017	7.0	7.31	3.7	65
April, 2017	7.0	7.24	3.5	60
May, 2017	7.0	6.9	3.2	50

Fish Enumeration

The list of fish fauna recorded from River Sesa is given in a tabular form (Table 3). The list covers 26 species belonging to 6 orders, 20 families and 28 genera. During study 4 famlies, 13 species and 8 genera in order Cypriniformes; 6 families, 8 species and 6 genera in order Perciformes; 6 families, 10 species and 9 genera in order Siluriformes; 2 families, 3 species and 3 genera in order Synbranchiformes; 1 family, 1 species and 1 genus each in order Osteoglossiformes and Beloniformes was recorded. On categorization (IUCN, 2018-3) 32 speciss are under 'List Concern' 2 species under 'Near Threatened' both belonging to family Siluridae and 2 species belonging to family Cyrinidae and Erethistidae are under 'Not Assessed' category.

Table 3: List of fish available in the Sesa River

Sl	Zoological Name	Local Name	Order	Family	IUCN Status
1.	*Amblypharyngodon mola*	Moa	Cypriniformes	Cyprinidae	LC
2.	*Anabas testudineus*	Kawai	Perciformes	Anabantidae	LC
3.	*Botia dario*	Gethu	Cypriniformes	Botiidae	LC
4.	*Channa marulius*	Sal	Perciformes	Channidae	LC
5.	*Channa punctata*	Goroi	Perciformes	Channidae	LC
6.	*Channa striata*	Shol	Perciformes	Channidae	LC
7.	*Cirrhinus reba*	Lachim	Cypriniformes	Cyprinidae	NA

8.	*Clarias magur*	Magur	Siluriformes	Clariidae	LC
9.	*Clupisoma garua*	Neria	Siluriformes	Ailiidae	LC
10.	*Erethistes hara*	Hilgaruah	Siluriformes	Erethistidae	NA
11.	*Glossogobius giuris*	Patimutura	Perciformes	Gobiidae	LC
12.	*Heteropneustes fossilis*	Singi	Siluriformes	Heteropneustidae	LC
13.	*Labeo bata*	Bhangone	Cypriniformes	Cyprinidae	LC
14.	*Labeo calbasu*	Mali	Cypriniformes	Cyprinidae	LC
15.	*Labeo catla*	Bahu	Cypriniformes	Cyprinidae	LC
16.	*Labeo gonius*	Kurhi	Cypriniformes	Cyprinidae	LC
17.	*Labeo rohita*	Row	Cypriniformes	Cyprinidae	LC
18.	*Laubuka laubuca*	Laubuka	Cypriniformes	Danionidae	LC
19.	*Macrognathus aral*	Tura	Synbranchiformes	Mastacembelidae	LC
20.	*Mastacembelus armatus*	Bami	Synbranchiformes	Mastacembelidae	LC
21.	*Monopterus cuchia*	Cuchia	Synbranchiformes	Synbranchidae	LC
22.	*Mystus bleekeri*	Singorah	Siluriformes	Bagridae	LC
23.	*Mystus cavasius*	Bar singorah	Siluriformes	Bagridae	LC
24.	*Nandus nandus*	Gedgedi	Perciformes	Nandidae	LC
25.	*Notopterus notopterus*	Kandhuli	Osteoglossiformes	Notopteridae	LC
26.	*Ompok bimaculatus*	Pabhoh	Siluriformes	Siluridae	NT
27.	*Paracanthocobitis botia*	Bali botia	Cypriniformes	Nemacheilidae	LC
28.	*Parambassis ranga*	Chanda	Perciformes	Ambassidae	LC
29.	*Pethia gelius*	Kaniputhi	Cypriniformes	Cyprinidae	LC
30.	*Rita rita*	Litha	Siluriformes	Bagridae	LC
31.	*Salmostoma bacaila*	Selkona	Cypriniformes	Danionidae	LC
32.	*Sperata aor*	Arii	Siluriformes	Bagridae	LC
33.	*Systomus sarana*	Cheniputhi	Cypriniformes	Cyprinidae	LC
34.	*Trichogaster fasciata*	Kholihana	Perciformes	Osphronemidae	LC
35.	*Wallago attu*	Barali	Siluriformes	Siluridae	NT
36.	*Xenentodon cancila*	Kokila	Beloniformes	Belonidae	LC

CONCLUSION

From the above discussion, it is clear that a feasible variation was observed in certain physio-chemical parameters of Sesa River. However, the recorded values are within permissible range given in Anonymous (1982). It was observed that the pollution level is not in an alarming condition but likely to be go up in future. The river also harbours a good number of ornamental and edible fish species seasonally.

ACKNOWLEDGEMENT

The authors are thankful to the Principal, D.H.S.K. College, Dibrugarh for help and support.

REFERENCES

Anonymous, 1998. Standard Methods for Examination of Water and Wastewater. 20th Eds., APHA Public Health Association,Washington, D.C., pp. 11-93.

Anonymous, 1982. Tolerance limit for inland surface waters subject to pollution (2296). Bureau of Indian Standards.

Bhaumik, U., Jha, B.C., Mitra, K., Vinci, G.K., 2003. Fish yield optimization in beels: Some case studies from West Bengal. Bulletin of Central Inland Fisheries Research Institute, Barrackpore, 125, 43-54.

Biswas, B.K., Sugunan, V.V., 2008. Fish diversity of Brahmaputra River system in Assam, India. Journal of Inland Fishery Society of India. 40(1), 23-31.

Darshan, A., Abujam, S.K., Das, D.N., 2018. Biodiversity of Fishes in Arunachal Himalaya. Academic Press, Elsevier, pp. 284.

Das, B., Sharma, S. 2012. A comparison of fish diversity of Kopili and Jamuna Rivers of Karbi Anglong district, Assam. The Science Probe. 1(1), 21-29.

Deori, D. J., Abujam, S.K., Biswas, S.P., 2015. Fish diversity and habitat ecology of Dihing River- A tributary of Brahmaputra River. International Journal of Fisheries and Aquatic Studies. 2(4), 190-197.

Sarma, D., Das, J., Bhattacharyya, R.C., Dutta, A., 2012. Ichthyofaunal diversity of lower reaches of the Brahmaputra River, Assam. International Journal of Applied Biology and Pharmaceutical Technology. 3(2), 126-130.

Sharma, L.L., Darve, V.S., 1991. Water quality of 26 waters of Rajasthan in relation to phytoplankton. In : Proceeding of The Second Asian Fisheries Forum. Asian Fisheries Society Manila, Philippines, pp. 915-918.

Trivedy, R.K., Goel, P.K., 1986. Chemical and Biological Methods of Water Pollution Studies. Env. Publ., Karad, India, pp. 25.