

## LIMNOCHEMISTRY OF GADADHAR RIVER AT COOCH BEHAR DISTRICT, WEST BENGAL, INDIA.

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### ABSTRACT

A study was carried out during January 2016 to December 2016 to recorded the limnochemistry in different sites of river Gadadhar at Cooch Behar District, West Bengal, India. Various Physico-chemical parameters such as temperature, turbidity (TSS), TDS, pH, total alkalinity, chloride, dissolved oxygen, BOD, were evaluated at selected

four sites of Gadadhar river. The study reveals that most of the physicochemical parameters of river water of four selected sites show moderate variation in their concentration for all seasons. The physical, chemical and biological characteristics of the river water are gradually changing and producing the harmful effect on Aquatic biota and there by human beings.

**KEYWORDS:** Limnochemistry, Gadadhar River, Cooch Behar, seasonal variation.

### INTRODUCTION

The physicochemical factors of the medium exert profound influence on the number, abundance, distribution and diversity of its inhabitants. Physical and chemical analysis of water has attained great importance and has been well accepted in recent years for the ecological studies of aquatic habits. The total riverine net work of cooch behar include some major rover like Torsa, Ghargharia, Kaljani, Gadadhar etc. Which are the potential source of huge indigenus fish diversity along with a considerable number of ornamental fish population. There is practically not much information available in literature regarding the Physicochemical characteristics of the Gadadhar river at Coochbehar. Gadadhar river is a part of Brahmaputra-Meghna riverine system, originated in Pamsechura of Buxaduar. It meet Torsha at Balabhut area, after flowing through the Alipurduar and Cooch Behar District of

west Bengal. A study was carried out during January 2016 to December 2016 to record the various physicochemical parameters such as temperature, transparency, TDS, pH, total alkalinity, chloride, DO, and BOD in river Gadadaha at cooch behar district. Water sampling was conducted at four selected locations in the river Gadadhar namely chat Genduguri, Bilsa, Naokhuli, Ghogarkuthi paratham khanda. Indian agriculture receives most of its water from surface source like river, reservoir, dam etc.<sup>[1]</sup> However, nowadays the river water is largely influenced by discharge of industrial as well as domestic waste while flowing through big towns and increases the water pollution in rivers.<sup>[2]</sup> Water pollution is a major problem in all the major river of India.<sup>[3]</sup>

## MATERIALS AND METHOD

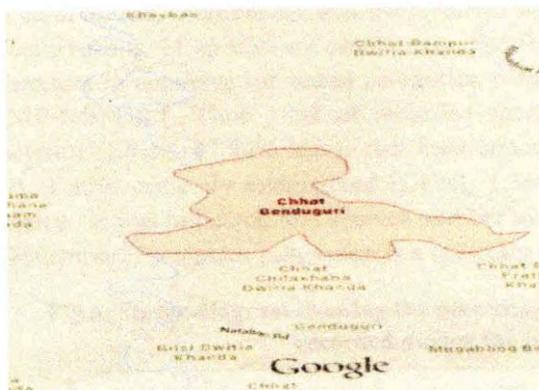
The present study was carried out in the river Gadadhar in Cooch Behar district covering mostly rural areas, monthly sampling was carried out (from January 2016 to December 2016) in the river At four sampling sites.

**Table 1: Details of study sites at Gadadhar river, Cooch Behar.**

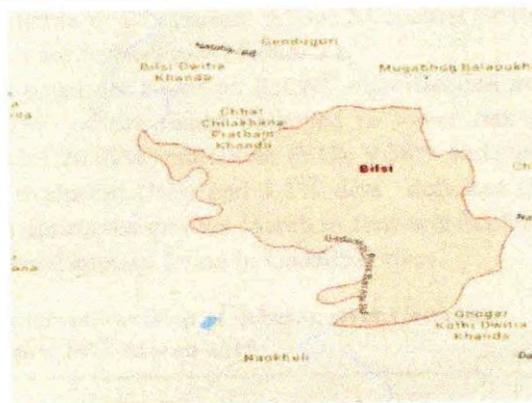
Sl. No.	Name of the Sampling station	Latitude and Longitude of the sampling station	Distance (k.m)
1.	Chhat Genduguri, W.B	26 <sup>0</sup> .36' N Latitude 89 <sup>0</sup> .61' E Longitude	Starting Point
2	Bilsa, W.B	26 <sup>0</sup> .34' N Latitude 89 <sup>0</sup> .61' E Longitude	4 km. From Chhat Genduguri
3.	Nao khuli, W.B	26 <sup>0</sup> .32' N Latitude 89 <sup>0</sup> .62' E Longitude	4.km. from Bilsa
4.	Ghogarkuthi, Pratham Khanda, W.B	26 <sup>0</sup> .30' N Latitude 89 <sup>0</sup> .63' E Longitude	4 km. From naokhuli

Diagram 1

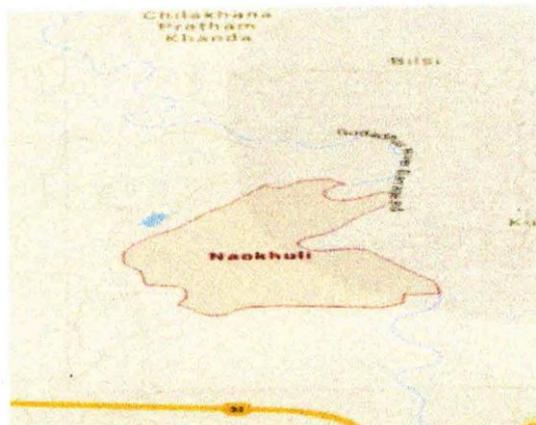
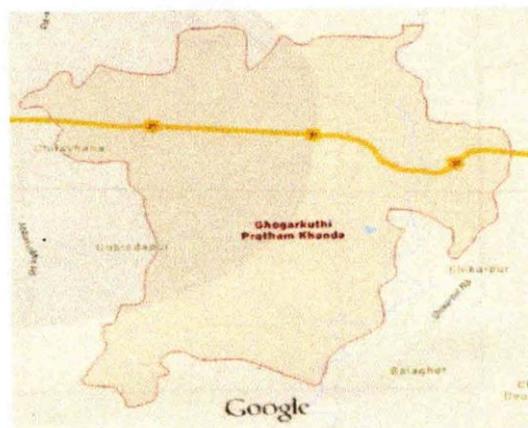
**Four sampling sites at river Gadadhar**



**Fig.1: Sampling site 1**



**Fig.2: Sampling site 2**

**Fig.3: Sampling site 3****Fig.4: Sampling site 4**

### Sample collection

To analyze the water quality, a 1000ml of water was collected by plastic bottles with double stoppers from each sampling station. Samples were collected month wise between 9:30 and 11:30 and from the surface of the river. Before sampling, the bottles were cleaned and washed with detergent solution and treated with 5% nitric acid over night. The bottles were finally with deionized water and dried. After sampling the bottles were screwed carefully and marked with the respective identification number. Some of the Parameters like water temperature,  $P^H$ , TDS, water Turbidity, DO, etc. were calculated on the spot by thermometer, digital pH meter, and digital TDS meter, whereas rest parameters were tested in laboratory according to standard method (APHA 1999; Welch 1975).

### RESULT AND DISCUSSION

The average result of the physicochemical parameters for water samples are presented in Table-2

#### pH

pH is the scale of intensity of acidity and alkalinity of water and Measure the concentration of hydrogen ions. The pH of water samples ranged between 6.8 to 8.5 pH was estimated with the help of Hanna portable pH meter by dipping it into the water sample after calibration. A during monsoon, the rain water is responsible for neutralization and finally makes It to alkaline.

### Temperature

The air temperature was measured with the help of ordinary mercury thermometer at 2ft above the surface water and water temperature was measured with the same thermometer by placing it inside the water on the sampling stations. Temperature is one of the most importance physical parameters that control the physiological activities. The water temperature range between 12.1 to 29.1<sup>0</sup>C. The air temperature range between 11.2 to 27.2<sup>0</sup>C. It was observed that the water temperature was slightly higher than air temperature.

### Dissolved Oxygen

Dissolved oxygen in water is an indicator for water quality and diversity of living thing. The concentration ranged from 4.3 to 6.9 ppm (Table 2) the highest values of D.O were observed from the End of pre monsoon to the mid monsoon. The reason is the turbulence and oxygenation resulting from rain falls. The values recorded in the pre monsoon, monsoon, post monsoon was irreversibly correlated Biological oxygen Demand (BOD).<sup>[4,5]</sup>

BOD indicates the quality of biodegradable organic matter present in an aquatic system that is subjected to aerobic decomposition by microbes which provides a direct indication of the states of pollution. The BOD ranged from 0.7 to 1.3 PPM table2. It may concluded that the water is not much polluted.

When BOD level in high, do level decrease because the O<sub>2</sub> available in the water is being consumed by the bacteria.<sup>[6]</sup> Adequate do is necessary for good water quality. Survival of aquatic organism.<sup>[7]</sup>

**Table 2: Mean Values (Month wise) of different physic-chemical Parameters recorded in four different sampling stations of River Gadadhar.**

Month	Water Temp. (°c)	Ambient Temp (°C)	TDS (ppm)	Turbidity TSS (NTU)	pH	D.O. (ppm)	B.O.D (mg/L)	Total Alkalinity (mg/L)	Chloride
January	12.1	11.2	203	18	8.2	5.1	1.2	60	6
February	13.5	12.3	284	19.4	8.3	5.3	1.1	58.4	5.4
March	21.1	20.2	301	25.7	8.5	5.6	1	68.3	4.8
April	25.5	24	250	29.2	8	6.1	1.3	92.1	4.9
May	29.1	26.5	264	31.8	7.5	6.7	0.9	97.3	5
June	28	27.1	256	45.2	6.8	6.9	1.1	118.2	5.8
July	27.5	27.2	190	47	6.9	6.2	0.7	109.8	7.2
August	26.3	25.9	185	40.2	7.2	5.7	0.9	101.2	8.1
September	21.5	20.1	220	22.1	7.8	4.8	1.1	103.5	8.9
October	18.4	17.5	271	8.6	7.9	4.3	1.2	89.7	8.2

November	17.5	16.4	279	17.5	8.3	4.9	1.2	82.5	7.1
December	13.2	11.1	287	18.6	8.2	5	1	64.6	7.3

### Alkalinity

The alkalinity of water is its capacity to neutralize acids. In this study the highest concentration of alkalinity 118.2 it was recorded in the month of December and Lowest concentration 58.4 was recorded in the month of August. Increase dilution of river water may be responsible for lower values of alkalinity in rainy season.<sup>(8)</sup>

### TDS & TSS

The solid substance present in the water stay either in dissolved or suspended forms. The dissolved forms are smaller and lighter than the suspended ones. TDS values of the collected water samples was estimated by using HM digital Aqua pro digital water (Model AP-1).

Turbidity or TSS of the water was estimated by using the turbidity meter made by Eutech. The TSS values of water ranged from 8.6 to 47 NTU and the TDS values ranged from 185 to 301 ppm. The highest value of TDS was recorded in the month of March and lowest value was recorded in the month of August.

### CHLORIDE

Chloride may occur in fresh water as a result of salt deposits in the soil being dissolved. High chloride content in inland waters may be an indication of pollution.<sup>(9)</sup> High chloride content has been correlated with high degree of organic pollution and eutrophication. The chloride concentration values of water from 4.8 to 8.9 mg (Table2). It is due to the organic waste load particularly sewage pollution.

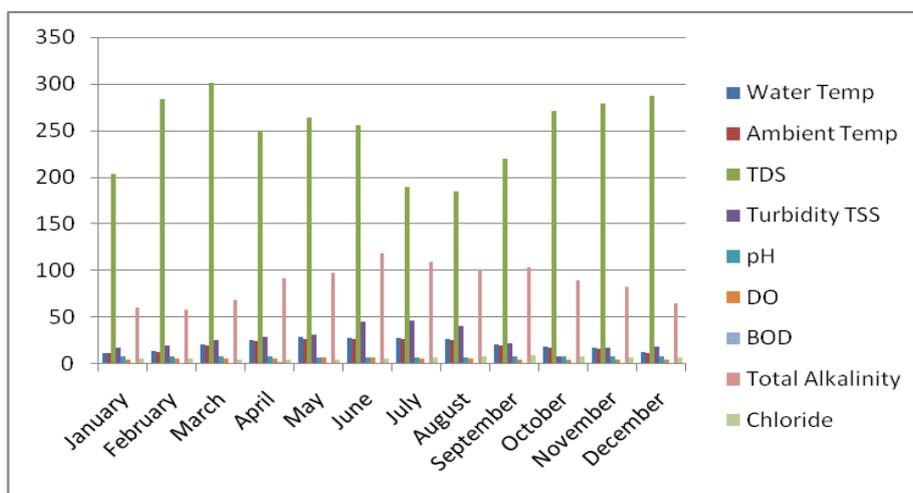


Diagram 2 showing Mean Values (Month wise) of different physic-chemical Parameters recorded in four different sampling stations of River Gadadhar.

## CONCLUSION

This study assessed the physicochemical properties of Gadadhar river water from four different location of Coochbehar city during January 2016 to December 2016. The analysis was carried out by taking certain important parameters. From the discussion and result analysis in different aspects it may be conducted that Gadadhar river water quality is more or less good, but the parameters also stipulates the Gradual deterioration of water of Gadadhar river at cooch behar district of West Bengal. The increasing industrialization, urbanization etc., has made water bodies full of chemicals.<sup>[10,11]</sup>

## REFERENCES

1. S.N thitame and G.M. Pondhe, *J.Chem Pharma. Res*, 2010; 2(2): 316-320.
2. B.Padmanabha and S.L. Belagali, *Jr. of Env. Sci., and Engg*, 2007; 49(1): 48-50.
3. Bhargav, D.S. *Nature and the Ganga, Environmental Conservation*, 1987; 14(4): 307-318.
4. Barat, S. and Jha, P. changes in the water quality and total coliformbacterial load in a stretch of River Mahanande at siliguri city, West Bengal, India. *Asian J. Microbiol. Biotech, Ex. Stience*, 2002; 4(4): 571-575.
5. Ray, P.and David, A. Effect of industrial wastes and sewage upon the chemical and biological composition and Fisheries of the river Ganga at Kanpur, *Environ. Hlth.*, 1966; 8: 307-339.
6. Sawyer, C.N., P.L.Mc.Carty and Parkin, G.F. 2003. *Chemistry for environment Engineering and Science*, 5<sup>th</sup> edition. McGraw-Till, New York.
7. Islam, M.S.,N.T Megla and Suravi. 2012 status of water quality in the Dhalesdwari river and its effect on aquatic organization, Bangladesh, *J.Environ. Sci*, 23 in press.
8. Bhangava, D.S.1982 usefulness of Ganga, *Journal India water works Assoc*, 14(3): 239-234.
9. Muna war, M. 1970. A limnological study of fresh water ponds of Hyderabad, India. 1- The biotope. *Hydrobiologia*, 35: 127-162.
10. Kumar, P., Pandey A. And Upadhyay H.C., 2014. Seasonal variation in physic-chemical of Kali River in Pithoragarh district of Uttarakhand, India. *J environ Res Develop*. 8(3A): 600-606.

11. Alam, M. And Pathak, J,K, 2010. Rapid assessment of Water quality index of Ranganga river, western uttar Pradesh (India) using a computer programme. *Nat. Sci*, 8(II): 1-8.