



**Full Length Research Article**

**STUDY OF PHYSICO-CHEMICAL PARAMETERS OF WATER OF IB RIVER, JASHPUR,  
CHHATTISGARH, INDIA**

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**ABSTRACT**

Ib is an important river of Jashpur district (C.G.). Two sampling station viz., station 1 Dhondidand and station 2 Dhondibahar, were established for the collection of water samples during July 2012 to Oct 2012. Monitoring of water of river Ib includes physico-chemical parameters and analysis of iron and copper metal. The temperature was 18.2<sup>o</sup>C to 24.6<sup>o</sup>C, pH of river water ranges from 7.12 to 7.85, Turbidity ranging between 11 NTU to 14 NTU, Conductivity ranged from 50  $\mu$ s/sec to 55  $\mu$ s/sec, Alkalinity was 7mg/l to 11 mg/l. TDS ranged from 32 mg/l to 44mg/l. TSS was 18 mg/l to 38 mg/l, DO ranged from 4.1 mg/l to 4.7mg/l, BOD was 9 mg/l to 17 mg/l, COD was 27 mg/l to 44 mg/l, Iron ranging between 0.03mg/l to 0.9mg/l and copper was <0.01 mg/l to <0.01 mg/l. In the paper the result of 4 month study are presented.

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**INTRODUCTION**

River play on important role in the development of nation and sustenance of life, which are being polluted due to rapid industrialization, urbanization and other developmental activities. Indian agriculture receivers most of its water from surface sources like river, reservoir, dam etc. Ib is an important river in Chhattisgarh, it originator in hills near pandrapat at an elevation of 762 m. Today the main concern with environmental pollution is with its impact on the health of the present generation and the future ones. Our culture is completely river oriented and most of our important towns and urban areas are located on the bank of major rivers. Untreated domestic waste way into the rivers through sewage outfalls drains etc. and increases the water pollution in rivers. The interactions of both the physical and chemical properties of water play a significant role in composition, distribution and abundance of aquatic organisms. The degree of pollution is generally assessed by studying physical and chemical characteristics of the water bodies. The present study was

aimed to monitor the changes in physico-chemical parameters and iron and copper metals of river Ib in Jashpur district Chhattisgarh.

**Experimental Section**

Water samples were collected for physico-chemical analysis from two sampling station namely Dhondidand and Dhondibahar, respectively. As per the norms of the APHA, wide mouthed plastic bottles of one liter size was used for collecting the samples. These are analysed using standard methods for physico-chemical examination of water.

Samples were collected monthly in a routing manner from the river bank. Samples were analysed for following physico-chemical and biological parameter viz temperature, pH, Turbidity, Conductivity, Total, Alkalinity (by simple titration method), TDS, TSS ( by filtration method), Dissolved oxygen (Winkler method), Biochemical, Oxygen Demand (5 days incubation method), Chemical oxygen demand (by dichromate titration method, Iron was analysed (by Phenanthroline method) and copper was analysed (by Atomic absorption spectrophotometer (AAS)) method because of it relatively low cost. All the experiment was done with in 24 hr sampling.

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## Station 1. Dhondidand

Month & Year	Temperature °C	pH	Turbidity NTU	Conductivity µs/sec	Total Alkalinity Mg/l	TDS Mg/l	TSS Mg/l	DO Mg/l	BOD Mg/l	COD Mg/l	Iron Mg/l	Copper Mg/l
July 2012	21.6	7.17	13	51	8	42	38	4.3	16	44	0.03	<0.01
Aug 2012	23.2	7.85	14	54	10	32	34	4.2	13	42	0.58	<0.01
Sept 2012	24.6	7.12	12	55	11	44	36	4.4	14	30	0.9	<0.01
Oct 2012	24.1	7.36	11	50	7	40	32	4.1	9	27	0.71	<0.01

## Station 2. Dhondibahar

Month & Year	Temperature °C	pH	Turbidity NTU	Conductivity µs/sec	Total Alkalinity Mg/l	TDS Mg/l	TSS Mg/l	DO Mg/l	BOD Mg/l	COD Mg/l	Iron Mg/l	Copper Mg/l
July 2012	21.7	7.23	14	52	9	43	37	4.5	15	43	0.03	<0.01
Aug 2012	24.1	7.36	11	53	8	42	35	4.7	17	44	0.9	<0.01
Sept 2012	20.2	7.05	12	55	11	34	36	4.2	14	42	0.58	<0.01
Oct 2012	18.2	7.22	13	54	7	44	18	4.3	13	28	0.03	<0.01

## RESULTS AND DISCUSSION

**Temperature** – Temperature is mainly depending on the atmosphere and weather condition. It is basically important for the effect on certain chemical and biological reaction taking place in water and aquatic organisms. Temperature of the river water was recorded average in rainy season Temperature found to range from minimum 18.2°C to maximum 24.6°C.

**pH** – pH of the aquatic system is an important indicator of the water quality and the extent pollution in the watershed areas. pH found to range from minimum 7.12 to maximum 7.85.

**Turbidity** – Turbidity values ranges from minimum 11 NTU and to maximum 14 NTU. The increased turbidity during rainy months was attributed to soil erosion in the nearby catchment and massive contribution of suspended solids from sewage surface run offs and domestic wastes mainly contribute to the increased turbidity.

**Conductivity** – Conductivity values ranges from minimum 50 µs/sec and maximum 55 µs/sec. conductivity of the river water was recorded average in rainy season.

**Alkalinity** – Alkalinity values ranges from minimum 7 mg/l and maximum 11 mg/l. Alkalinity is influenced with carbonate and bicarbonate and other ions. Alkalinity is directly related to the abundance of phytoplankton which dissociates bicarbonate into carbonates and carbon dioxide. The carbon dioxide thus, released is used in photosynthesis. The low concentration of sewage and no industrial waste may be the cause of lower alkalinity.

**Total Dissolved Solids** – Total dissolved solids ranges from minimum 32 mg/l and maximum 44 mg/l.

**Total Suspended solids** – Total suspended solids ranges from minimum 18 mg/l and maximum 38 mg/l.

**Dissolved oxygen** – Dissolved oxygen is a factor which determines whether the biological changes are brought about by aerobic or anaerobic organism. It reflects the physical and biological processes prevailing in the water. The oxygen present in water can be dissolved from air or produced by photosynthetic organisms. Oxygen is generally reduced in the

water due to respiration of biota, decomposition of organic matter, rise in temperature, oxygen demanding wastes and inorganic reductant such as hydrogen sulphide, ammonia, nitrites, ferrous iron etc. Do vary from 4.1 mg/l to 4.7 mg/l. There values indicate no organic pollution in Ib river.

**Biological Oxygen Demand** - BOD is the measure of degradable organic matter present in a water sample and it can be defined as the amount of oxygen required by microorganisms in stabilizing the bio degradable organic matter under aerobic condition. The aim of BOD test is to determine the amount of biochemically oxidisable carbonaceous matter. The BOD observation was recorded minimum 9 mg/l to maximum 17 mg/l.

**Chemical oxygen Demand** – COD is the amount of oxygen consumed during the chemical oxidation of organic matter. COD give us reliable parameter for judging the extent of pollution in water. The COD observations was recorded minimum 27 mg/l to maximum 44 mg/l.

**Iron (Fe)** – Iron ranges minimum 0.03 mg/l to maximum 0.9 mg/l.

**Copper (Cu)** – Cooper ranges minimum <0.01 mg/l to maximum <0.01 mg/l.

The concentration of iron and copper metals fall within he acceptable range for river water as guided by WHO. Concentration of iron and copper metals in the river water did not constitute any pollution threat presently.

## Conclusion

On the basis of various parameters studied it was concluded that the water quality of river Ib is good. Due to low alkalinity the river water was suitable for agricultural purposes lower D.O. indicates that no pollution in Ib river in the study zone, because no industrial discharge in river.

## REFERENCES

- [1] M Alam; JK Pathak. *Nature and Science*, 2010, 8(11), 1-8.

- [2] HS Mandal; Amrita Das. *J. Chem. Pharm. Res.*, 2011, 3(6), 265-270.
- [3] SN Thitame; GM Pondhe. *J. Chem. Pharm. Res.*, 2010, 2(2): 316-320
- [4] R Chandra; M Gupta; A Pandey. *Rec. Res. in Sci. and Tech.*, 2011, 3(6), 16-18.
- [5] MK Mustapha; JS Omotosho. *African J. of App. Zoo. and Envntl. Bio.*, 2005, 7, 3-77.
- [6] Nidhi Saxena; SN Misra; RN Shukla. *J. Chem. Pharm. Res.*, 2011, 3(2): 162-167.
- [7] Duran; Mustafa; M Suicmez. *J. Environ. Biol.*, 2007, 28, 231-236.
- [8] RR Sangpal; UD Kulkarn; YM Nandurkar. *ARPJ. J. of Agri. and Biol. Sci.*, 2011, 6(3), 34-38.
- [9] BK Sahu; RJ Rao; SK Behara; RK Pandit. Effect of pollutants on the dissolved oxygen concentration of the river Ganga at Kanpur. In: Pollution and biomonitoring of Indian rivers (Ed.: R.K. Trivedy), ABD Publication, Jaipur, India, 2000; 168-170.
- [10] MA Rafeeq; AM Khan. *J. Aqua. Biol.*, 2002, 17, 33-35.
- [11] DN Saksena; RK Garg; RJ Rao. *J. of Environ. Biol.*, 2008, 29(5), 701-710.
- [12] Anand; Chetna; Pratima Akolkar; R Chakrabarti. *J. Environ. Biol.*, 2006, 27, 97-101.
- [13] APHA, A WW A and WPCF. "Standard methods for. Examination of water and waste water" 20<sup>th</sup> Edition 1998.
- [14] VS Shrivastava; PR Patil. *Nat. Environ. Pollut. Tech.*, 2002, 1, 279-283.
- [15] Y Bahadur; R Chandra. *Poll Res.*, 1996, 15(1), 31-33.
- [16] KO Adebowale; FO Agunbiade; BI Olu Owolabi. *EJEAFChe.*, 2008, 7(4), 2797-2811.
- [17] A Kumar; Y Bahadur. *W.J. of Agri. Sci.*, 2009, 5(1), 1-4.
- [18] AK Agarwal; GS Rajwar. *J. of American Sci.*, 2010, 6(6), 65-71.

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