

Contamination of Heavy metals in Surface water of Ib River, Jashpur District, Chhattisgarh, India.

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ABSTRACT -

This paper deals with the physico-chemical parameters and metals analysis in Ib river of Jashpur district in Chhattisgarh. Monthly changes in physical, chemical parameters and metals analysis such as Temperature, pH, Turbidity, Alkalinity, Total Dissolved solids (TDS), Dissolved oxygen (DO), Chlorides, Phosphate, Nitrates, Lead (Pb), Zinc (Zn), and Cobalt (Co) analyzed for a periods of winter season from Nov 2012 to Feb 2013. All parameters were within the permissible limit. The results indicate that the Ib river is non-polluted and can be used for domestic, irrigation and fisheries.

Keywords – Physico-chemical parameters, monthly variation, DO.

INTRODUCTION

River water is one of the oldest and significant sources of irrigation in India and is particularly in Chhattisgarh (Palanisamy, 1998). River water occupy vital role in the irrigation as well as local ecosystem in the semi-arid and regions of Chhattisgarh. River water provides multiple uses like source of drinking water for uncountable rural and urban communities and livestock, fish culture recharge of river water, control of floods etc. (Gurunathan, 2006). As water is one of the most important compounds of the ecosystem, but due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to pollute water quality and depletion of aquatic biota. It is therefore necessary that the quality of river water should be checked at regular time of interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. It is difficult to understand the biological phenomena fully because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro-biological relationship.

The Ib river located at Jashpur district of Chhattisgarh. The present communication report result of physico-chemical parameter and analysis of Lead (Pb), Zinc (Zn), and Cobalt (Co) from two sampling station viz., station 1 Haldimunda and station 2 Narayanpur on monthly basis over a period of four month Nov 2012 to Feb 2013. The residing people used the water of these river for multipurpose like drinking, bathing, washing and irrigation.

MATERIALS AND METHODS – The water samples from Ib river were collected from two different stations in the morning hours between 10 to 12 am in polythene bottle regularly for four month. The water samples were immediately brought in to laboratory for the estimation of various physico-chemical parameters like Temperature and pH were recorded at the time of sample collection by using Thermometer and pocket digital pH meter. While other parameters such as Turbidity, Alkalinity, Total dissolved solids, DO., Chlorides, Phosphate, Nitrates were estimated in the laboratory by using Indian standard procedures. Lead (Pb), Zinc (Zn), and Cobalt (Co) metals were analysed by using atomic absorption spectrophotometer (AAS). (Trivedy and Goel, 1986, APHA 1985).

RESULT AND DISSCUSSION

Station - 1- Dhondidand

Month & Year	Temperature	pH	Turbidity	Alkalinity	TDS	DO	Chlorides	Phosphate	Nitrates	Lead	Zinc	Cobalt
	⁰ C	-	NTU	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l
Nov 2012	21.3	7.67	5	9	32	4.1	7.20	5.60	0.11	<0.01	<0.01	<0.01
Dec 2012	18.2	7.82	8	8	35	4.9	6.21	4.7	0.62	<0.01	<0.01	<0.01
Jan 2013	19.2	7.47	7	6	31	4.5	5.60	5.2	0.47	<0.01	<0.01	<0.01
Feb 2013	16.8	7.52	3	5	45	4.8	4.32	4.85	0.21	<0.01	<0.01	<0.01

Station – 2 - Dhondibahar

Month & Year	Temperature	pH	Turbidity	Alkalinity	TDS	DO	Chlorides	Phosphate	Nitrates	Lead	Zinc	Cobalt
	⁰ C	-	NTU	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l
Nov 2012	17.3	7.35	11	7	40	4.3	4.30	5.22	0.91	<0.01	<0.01	<0.01
Dec 2012	22.3	7.41	6	6	38	4.4	6.21	5.60	0.23	<0.01	<0.01	<0.01
Jan 2013	21.4	7.56	5	9	30	4.9	7.20	4.7	0.47	<0.01	<0.01	<0.01
Feb 2013	22.4	7.86	3	5	32	4.7	4.50	3.8	0.76	<0.01	<0.01	<0.01

Temperature – Generally the weather in study area is quite cool, however the water temperature plays an important factor which influences the chemical bio-chemical characteristics of water body. The minimum temperature recorded 16.8°C and maximum 22.4°C . Water temperature in winter was low due to higher water level. (Salve and Hiware 2008).

pH – pH values range from minimum 7.35 to maximum 7.86. Most of biochemical and chemical reactions are influenced by the pH. The reduced rate of photosynthetic activities reduces the assimilation of carbon dioxide and bicarbonates which are ultimately responsible for increase in pH, (Kamble, S.M. et al.,). The factors like air, Temperature bring about changes in the pH of water. The higher pH values observed suggest that carbon dioxide, carbonate – bicarbonate equilibrium is affected more due to change in physico-chemical condition (Karanth. 1987, Tiwari et al., 2009).

Turbidity – Turbidity values range from minimum 3 NTU and maximum 11 NTU. In winter season presence of suspended particulate matter is very low, affecting the lower turbidity.

Alkalinity – Total ranges from minimum 5 mg/l and maximum 9 mg/l. The alkalinity was maximum due to increase in bicarbonates in water and minimum due to high photosynthetic rate. (Hujare, M.S. 2008).

Total Dissolved Solids – Total found range from minimum 30 mg/l to maximum 45 mg/l.

Dissolved oxygen – The value of DO is remarkable in determining the water quality criteria of an aquatic system. In the system where the rates of respiration and organic decomposition are high, the DO values usually remain lower than those of the system, where the rate of photosynthesis is high. During the study period DO was found to be ranging between minimum 4.1 mg/l to maximum 4.9 mg/l. (Krishnamurthy R., et al, 1990).

Chlorides – The values of chlorides range from minimum 4.30 mg/l to maximum 7.20 mg/l. Chlorides occur naturally in all types of water. Low concentration of chloride is considered to be the indicators of no pollution due to any industrial origin.

Phosphate - The value of phosphate fluctuates from minimum 3.8 mg/l to maximum 5.60 mg/l.

Nitrate – The values of nitrate ranges minimum 0.11 mg/l to maximum 0.91 mg/l.

Lead (Pb) – The values of Lead range from minimum <0.01 mg/l to maximum <0.01 mg/l.

Zinc (Zn) – The values of zinc range from minimum <0.01 mg/l to maximum <0.01 mg/l.

Cobalt (Co) – The values of cobalt range from minimum <0.01 mg/l to maximum <0.01 mg/l.

The concentrations for lead, zinc and cobalt reflect that these metals fall within the acceptable range for a river water as guided by WHO. Lead (Pb), Zinc (Zn), and Cobalt (Co) metals in Ib river was very low in concentration and no harmful for human being.

CONCLUSION

The findings of the study can be said that the observed physico-chemical properties and the levels of concentrations of lead, zinc and cobalt metals in the river water did not constitute any pollution threat presently. This in because all the parameters are within the permissible limits of WHO and still acceptable and conducive to both human and aquatic bodies. No factories or plants are present around this river so the river is not polluted by industrial wastes and thus this river may be very useful to people living near by it and to others also. This research work will be helpful in knowing the importance of the river.

REFERENCE

- APHA (1985): Standard Methods for Examination of Water and Wastewater, 20th Edition, American Public Health Association, Washington D. C.
- Gurunathan, A. Shanmugam, C.R, (2006): Customary Rights and their Relevance in Modern Tank Management: Select Cases in Tamil Nadu, Paper prepared for the workshop entitled 'Water, Law and the Commons' organized in Delhi from 8 to 10 December 2006 by the International Environmental Law Research Centre (ILERC).
- Hujare, M. S. (2008): Seasonal variation of physico-chemical parameters in the perennial tank of Talsande, Maharashtra. *Ecotoxicol. Environ. Monitor.* 18(3): 233-242.
- Karanth, K.R (1987): Groundwater Assessment Development and Management Tata McGraw Hill publishing company Ltd., New Delhi, 725p.

- Krishnamurthy R.(1990): Hydro-biological studies of Wohar reservoir Aurangabad (Maharashtra State) India. J. Environ. Biol.11(3), 335-343.
- Palanisamy, K. and R. Balasubramaniyan (1998) : Common Property and Private Prosperity: Tank vs. Private Wells in Tamil Nadu, Indian Journal of Agricultural Economics,vol.53, No.4, Oct - December.
- Salve, V. B. and Hiware C. J. (2008): Study on water quality of Wanparakalpa reservoir Nagpur, Near Parli Vaijnath, District Beed. Marathwada region, J. Aqua. Biol., 21(2): 113-117.
- Swaranlatha, S. and A. Narsingrao (1998): Ecological studies of Banjara lake with reference to water pollution. J. Envi. Biol. 19(2): 179-186. 13. Arvindkumar, (1995): Some Immunological Aspects of the Fresh water Tropical Wetland of Santhal. Pargana (Bihar) India, J. Envi. Poll.2 (3): 137-141
- Trivedi, R.N. Dubey D.P and Bharti, S.L.(2009) : Hydro-geochemistry and groundwater quality in Beehar River Basin, Rewa District, Madhya Prakesh, India, Proc. International conference on Hydrology and Watershed, JN & T Hyderabad, pp.49-59
- Trivedy, R. K. and Goel P. K. (1986): Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra.