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A Comparative Study on the Water-Bodies near Industrial Area: Dagori and Raigarh

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Abstract: *An investigation was undertaken on the areas like Dagori and Raigarh to see the effects of rapid industrialization on the water bodies of these two areas i.e shivnath river at Dagori and kelo river at Raigarh respectively. A Comparative study has been made by taking parameters like P^H, Hardness , alkalinity, Total Dissolved Solid (TDS) , Dissolved Oxygen (DO) , Biological Oxygen demand (BOD) and Chemical Oxygen demand (COD) of these two rivers .The Potability of water was checked directly by collecting samples from the water bodies of these two areas. In the present investigation it was found that the maximum parameters of Shivnath river at Dagori were not at the level of pollution, but maximum parameters of Kello river at Raigarh shows that they are somewhat polluted and not potable. So, it is the need of the hour to take necessary steps for making the water potable for the survival of the living organisms on these water bodies.*

Keywords: *Physico-chemical parameters, water sample, Bilaspur, Raigarh.*

1. INTRODUCTION

Water is called matrix of life because it is an essential part of all living systems and is the medium from which life evolved and in which life exists. It is well known that human health and survival depends upon use of uncontaminated and clean water for drinking and other purposes. About 75% of the world's surface area is covered with water. Out of which 97% of the earth's water is in the ocean, not fit for human use due to its high salt content. Remaining 2% is locked in polar ice caps and only 1% is available as fresh water in rivers, lakes, streams reservoirs and ground water, suitable for human consumption. Now-a-day, water quality issues have become a significant concern due to the growth of population, urban expansion and technological development. Industrial Effluents entering the water bodies is one of major sources of environmental toxicity. It not only affects the quality of drinking water but also has deleterious impact on the soil microflora and aquatic ecosystems. Apart from availability, continuous water pollution due to disposal of sewage, industrial and mining wastes also threatens to reduce the available quantity of usable water and more and more of our ground and surface water resources including lakes, ponds and rivers are being categorized as polluted (Subramanian *et al*. 2000; Mohan *et al* 2000; Kumaresan *et al*. 2006; Singh *et al*. 2007; Singh *et al*. 2013).

The rivers Shivnath and Kelo are the major sources of water supply in Bilaspur and Raigarh district respectively, but industrilization adds alot of pollutants which needs to be controlled is today's need of the hour. Some natural and anthropogenic substances may cause turbidity (cloudiness) which blocks light and disrupts plant growth and clogs the gills of some fishes. The most common environmental concerns in the industry are water consumption and wastewater discharge, chemicals used in processing and cleaning, packaging reduction and disposal, and food scraps and refuse (Mc Kinney and Schoch 2003). Water from most sources is therefore unfit for immediate consumption without some sort of treatment (Raymond, 1992). The consequences of waterborne bacteria and virus infection; polio, hepatitis, cholera, typhoid, diarrhea, stomach cramps, etc, have been well established but nitrate contamination is just as deadly. Consequent to the realization of the potential health

hazards that may result from contaminated drinking water, contamination of drinking water from any source is therefore of primary importance because of the danger and risk of water borne diseases (Edema et al., 2001; Fapetu, 2000). Thus, regular physico-chemical analysis of water at source must be carried out to determine or check the effectiveness of treatment process (Okonko et al., 2008).

2. MATERIAL & METHOD

2.1. Study Area

Nova industrial area is a part of Dagori Dist. Bilaspur situated at 21.893 latitude and 82.066 longitude, and Anjani industrial area is a part of Raigarh dist . The river water is the only source of water for these industrial areas and they are continuously degrading due to industrial activities. Therefore, we have decided to analyze its effluents so that some remedies for the improvement could be possible.

2.2. Sample Collection

Effluent samples were collected from three different locations in shivnath river in triplicates near Nova plant in dagori and similarly from kelo river near Anjani plant in raigarh. The water samples were collected and stored in 1 liter capacity clean plastic bottles. Prior to collecting the samples, the containers were rinsed by the water to be sampled and analyzed in laboratory for their physic-chemical parameters. Samples collected from study sites were properly labelled. Samples for analysis with standard procedure in accordance with standard method of American Public Health Association APHA (1988) and National Env. Engineering Research Instt. (NEERI) (1986) Nagpur. Values of pH were measured by a portable digital water analyses kit with electrodes. The instrument was calibrated with buffer solutions having pH values of 4 and 9. Total dissolved solids (TDS) were calculated by summing up the concentrations of all the major actions and anions. The values of electrical conductivity (EC) were measured by portable kit with electrodes. D.O. by Winkler's method, Total alkalinity has determined by titrimetric methods using phenophthalein and methyl orange indicators. The total hardness of the water samples was determined by titration with EDTA using Erichromeblack-T as an indicator. Flouride of the water samples were estimated by UV-Visible spectrophotometer.

Table1. *Methods used for estimation of various physico-chemical parameters.*

Parameters	Method
Ph	pH meter
Total Alkalinity	Titration with H_2SO_4
Total Hardness	EDTA Titration
Turbidity	Nephalo turbidity
Silica	Spectrophotometer
Flouride	Spectrophotometer
Chloride	Silver Nitrate method
Total Dissolved Solid	Gravimetric method
Conductivity	Conductivity meter

Table2(a). *Physico-chemical parameters of Shivnath river sampled water.*

Sampling points	**SS1**			**SS2**			**SS3**			
Parameter	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**Average**
Temperature (°C)	20.04	20.02	20	20	19.68	19.58	19.03	19.03	19.02	±19.6
pH	7.22	7.2	7.2	7.18	7.16	7.16	7.12	7.1	7.1	±7.16
TDS (mg/l)	156.9	155.97	155.96	150.95	150.95	150.92	150.91	150.9	150.9	±152.7
DO (mg/l)	1.8	1.8	1.75	1.6	1.6	1.57	1.17	1.17	1.11	±1.5
Alkalinity (mg/l)	113.9	112.7	112	110	110	99.5	85.5	84.1	84	±101.3
Total Hardness (mg/L)	135	135	120	92	92.5	94	96	96	97.1	±106.4
Turbidity (NTU)	5.12	5.12	5.08	4.85	4.65	3.96	3.4	3.25	3.28	±4.3
Chloride (mg/L)	118.15	118.15	98.65	88.55	87.13	85	79.13	78	78	±92.3
Fluoride (mg/L)	1.9	1.9	1.89	0.99	0.89	0.89	0.59	0.56	0.56	±1.13
BOD (mg/L)	14.89	13.68	13.68	12.53	12.57	11.88	9.94	9.94	8.96	±12
COD (mg/l)	3.18	3.18	3.13	2.92	2.92	2.88	3.24	3.13	3.56	±3.12
Conductivity (MS/cm)	88	86	87	72	73	70	70	68	70	±76

SS1, SS2, SS3 – Three sampling points of Shivnath river.

SS1 (A,B,C) – first sampling point in triplicates.

SS2 (D,E,F) – second sampling point in triplicates.

SS3 (G,H,I) – third sampling point in triplicates.

Table2(b). *Physico-chemical parameters of Kelo river sampled water.*

Sampling points	**SK1**			**SK2**			**SK3**			
parameter	**A1**	**B1**	**C1**	**D1**	**E1**	**F1**	**G1**	**H1**	**I1**	**Average**
Temperature (°C)	20.58	20.58	20.56	20.5	20.5	20.5	20.43	20.43	20.42	± 20.5
pH	8.15	8.15	8.14	8.09	8.08	8.09	7.99	7.99	7.98	± 8.07
TDS (mg/l)	162.05	159.05	158.02	157.25	157.25	157.34	154.28	154.27	154.25	± 157.8
DO (mg/l)	4.88	4.88	4.86	3.72	3.77	3.75	2.17	2.17	2.17	± 3.6
Alkalinity (mg/l)	137	137	129	126	125	125	123	122	122	± 127.3
Total Hardness (mg/L)	166	165	166	154.5	152	152	139	139.8	140	± 152.7
Turbidity (NTU)	7.9	7.9	7.8	7.2	7.1	7.1	6.7	6.6	6.6	± 7.2
Chloride (mg/L)	129	129	127	125.64	125.64	123.66	120.83	120.83	118.97	± 124.5
Fluoride (mg/L)	1.54	1.55	1.55	1.16	1.13	1.12	1.08	1.06	1.06	± 1.25
BOD (mg/L)	22	20.9	20.8	19.6	17.4	17.2	15	15	14.1	± 18
COD (mg/l)	3.75	3.75	3.69	3.38	3.45	3.35	3.09	2.98	2.98	± 3.38
Conductivity (MS/cm)	98.4	97.75	97.75	96.17	96.08	96.08	94	94	93.8	± 96

SK1, SK2, SK3 – Three sampling points in Kelo river.

SK1 (A1,B1,C1) – first sampling point in triplicates.

SK2 (D1,E1,F1) – second sampling point in triplicates.

SK3 (G1,H1,I1) – third sampling point in triplicates.

3. RESULT AND DISCUSSION

The results of the study has summarized in Table -2(a) and 2(b).

3.1. Temperature

A comparative study has been made between the two industrial area water bodies and the samples were collected in triplicates from nova industrial area, bilaspur and from anjani industrial area, raigarh respectively for analysis. The analysis (Table 3(c) of physico-chemical parameters of industrial area water bodies were done in the month of Jan-Feb 2015. Temperature is one of the most essential parameters in water. It has significant impact on growth and activity of ecological life and is greatly affects the solubility of oxygen in water. The temperature of shivnath water is 19.6ºc and that of kelo water is 20.5ºc. The pH of a solution is the negative logarithm of Hydrogen ion concentration in moles per liter. The pH of shivanth water is 7.16 and kelo water is 8.07 which shows that pH of water sample of kelo river water was slightly alkaline.

3.2. Total Dissolved Solids (TDS)

TDS indicates more suspended or dissolved solid matter present in water, which decreases the potability of water quality and may cause serious health problem specially stomach retated. The. TDS of shivnath water is 152.6 mg/l and kelo water body is 157.8 mg/l. The turbidity of shivanth water is 4.3 and kelo water is 7.2 which is above the potability level.

3.3. Flouride

Fluoride is beneficial for human beings as a trace element, this protects tooth decay and enhances bone development, but excessive exposure to fluoride in drinking-water, or in combination with

exposure to fluoride from other sources, can give rise to a number of adverse effects. The fluoride content of shivnath water is 1.13 mg/l and that of kelo river is 1.25 mg/l. The chloride content of shivnath water is 92.3 mg/l and that of kelo water is 124.5 mg/l.

3.4. Electrical Conductivity

Electrical conductance is a good measure of dissolved solids. It makes water hard due to dissolution of calcium and magnesium in water. In present study the conductivity vary from 76-96 which is under the permissible limit.

3.5. Dissolved Oxygen

Most waste water contains more oxygen demanding material than the amount of DO available in air saturated water. In the present study the average DO content of dagori water is 1.5 and raigarh water is 3.6 which is within the limit. In the present study the average COD for shivnath river is 3.12 and kelo river is 3.38 which is at the border of the permissible limits. In the present study, High BOD values indicate presence of large no. of organic matter which indicates a high level of pollution in lake water bodies. The greater the BOD,more the rapidly oxygen is depleted in the river. The BOD of shivnath river is 12 and kelo river is 18 which are above the permissible limits.

4. CONCLUSION

The results of water investigation shows that the physico-chemical quality of river water sample like BOD, COD, turbidity, pH, alkalinity above the permissible limits as per the Indian standard institution. This indicates the pollution load on the river water body, and most of the parameters are found within the prescribed limits of WHO : e.g. EC, Chloride, T-H, D.O., C.O.D. Water of almost all study points of raigarh is hardened contaminated because of this, people of these areas are prone to immediate health problems such as stomach diseases, gastric troubles etc.

REFERENCES

[1] APHA-AWWA-WPCF Standard methods for the Examination of Water and Wastewater, Editor A.D. Eaton, 18th ed., *American Public Health Association.*

[2] Bhattacharya T, Chakraborty S. And Tuck Neha, Physico-chemical characterization of ground water of Anand district, Gujarat, India *Int. Res. J. Environmental Sci,* **1(1),** 28-33 **(2012**)

[3] BIS (Bureau Indian Standard), Specification for drinking water IS : 10500 Institution, New Delhi **(1991)**

[4] Mumtazuddin S, Azad A.K, Bharti Prabhat and Ranjan Rakesh, Physico-chemical analysis of groundwater of the Budhi Gantak belt in Muzaffarpur district, India*), I. Res. J.Environme Sci*.**, 1(1),** 7-11 **(2012)**

[5] Rajiv P, Hasna Abdul Sadam, Kamaraj M, Rajeshwari Sivaraj and Sankar, Physico-chemical and microbial activity of different river waters in western Tamil Nadu, India *Int. Res. J. Environmental Sci,* **1(1),** 2-6 **(2012)**

[6] Rao.V.J., Kavitha P., Srikanth K., Usman P.K. and Gnaneshwar Rao T., Environmental contamination using accumulation of metals in marine sponge, Sigmadociafibulata inhabiting the coastal waters of Gulf of Mannar, India, *Toxicological and Environmental Chemistry,* **89(3),** 487-498 **(2007).**