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Estimation of Water Quality Parameters of Shivnath River in Rajnandgoan District, Chhattisgarh, India

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Abstract: **W**ater quality parameters are key factor for the survival of any life forms on earth. The population of the country depends on water resources as it is the physical base of life. The quality of Shivnath River has become polluted due to the anthropogenic activities, Industrial effluents, West disposal etc. so An investigation was undertaken to determine the quality of Shivnath River water by analyzing various Physico-chemical parameter like Temperature, Odour, Color, TDS, DO,COD, BOD, and biological parameters like faecal coliforms. It was found that the maximum parameters were indicated that the river water is polluted and unsafe for human use.

Key words **–TDS, BOD, COD, Coliforms.**

1 Introduction

Water is important gift of nature to all living things on Earth. We cannot imagine A life without water. On Earth surface water covers 70.9% and 96.5% of the planet water found in Ocean, in glacier 1.7% in ground water 1.7%and 0.001% in the air as vapor and % of precipitation is only 2.5% on Earth 98.8% of the Water is in ice and groundwater and only 0.3% of all freshwater is in rivers, lakes and atmosphere. Hydrological cycle facilitate the movement of water on Earth that make it available for all livings in different- different forms (10).

Mahanadi is one of the major rivers of Chhattisgarh State and Shivnath is a tributary to Mahanadi originating from the mountain ranges of Maharashtra state (10). Shivnath River originates from Panabaras hill 625 meter above from sea level in Ambagarh Chowki division of Rajanndgaon District of Chhattisgarh. The river flows in north-east direction and and travel the distance around 290 kilometers before joins Mahanadi River near the town Shivrinarayan. Whereas, Arpa, Abar, Surahi, kharoon, Maniyari are the main tributaries of Shivnath River (11).

CPCB, central pollution control board which comes under Ministry of Environment, Forest and Climate Change in the year released a press note that indicated three hundred contaminated rivers in India (Ministry of Environment, Forest and Climate Change,). The list included Attawa Choe, Chambal, Tapi, Ganga, Betwa etc. The list also included the largest tributary of Mahanadi, the Seonath River or what it is popularly known as Shivnath in Chhattisgarh. The level of Pollution in the river was measured through BOD levels. The BOD level in Shivnath River exceeded 10 mg/L. This indicated that there is presence of organic waste in the river and bacteria are decomposing the waste. This level of BOD in pristine waters is dangerously high. A visit to the banks of river Shivnath can easily reveal the sources of these decomposing organic wastes. Numerous poultry, horse breeding farms and dairies that dump their waste on Shivnath's bank and people openly defecating on the riverbanks is a common site. These waste hosts numerous life-threatening bacteria such as E. coli and Salmonella with Salmonella frequently associated with livestock wastes.

Water quality of Shivnath River are highly deteriorated due to human activities some important studies are (Belorkar, 2010) found coliforms in the Shivnath water(Nair and Pandey, 2015) reported that Shivnath is the most contaminated river of Chhattisgarh .(Shukla, Pandey and Mishra, 2015) reported high level of fecal Coliforms in shivnath river.(Sao, 2015) reported that as the Shivnath river tributes itself to Mahanadi at Shivrinarayan it has better ORP and reduced BOD as compared to other Ghats. present study was designed to determine the quality of shivnath river water in Rajnandgoan, District.

2 RESEARCH METHODOLOGY

2.1 Study Area- Rajanndgaon District of Chhattisgarh is located at 21.10°N 81.03°E.It has an average elevation of 307 meters. total area of the district is 8222Km². Rajanndgaon is bounded in north side by Kabirdham district, in east side by Drug district, in west side by Madhya Pradeshdistrictand Maharashtra district, in south side by Bastardistrict. (10)

2.2Sample collection- Grab sampling process was used for collection of samples in 1000ml plastic bottle. The samples were kept normal room temperature during the testing of water sample . (6,1) following sites were selected for sample collection. The sites were selected because human-nature interaction at these sites was significant

(A) Dongaghat (Ambagarh Chowki)- Dongaghat was selected as site for sample collection because of its proximity to the Non-veg market. Local reported that some of the vendors have the tendency to wash meat in the river water before selling it in the market.

(B) Mohara Bridge (Maa Shaarda Mandir) - On Dalli Rajhara road this site was selected as two temples are situated on the opposite side of the banks. Both temples have significant number of visitors.

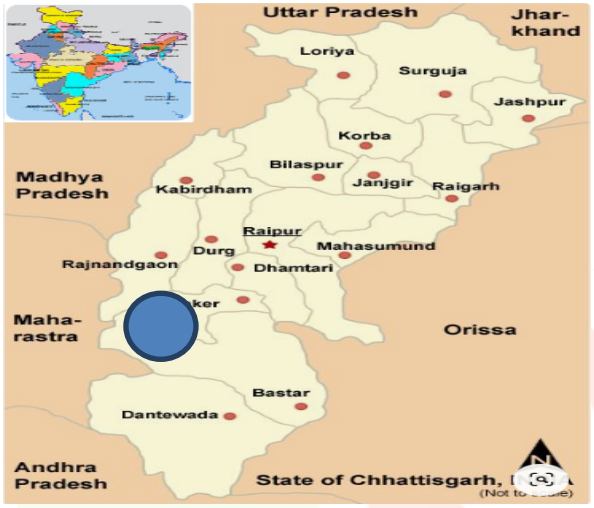


Fig -1 Chhattisgarh map shows the sample collection site

2.3 Methodology-

- The analysis of sample water is carried out by APHA norms.
- Quality of existing sample water is then compared with the water quality standards present by BIS,WHO, ICMR, APHE.The details about physiochemical properties of the water samples are given in the Table.2
- Methods which is used for Testing the samples water characteristic is show in Table 1

Table -1 shows methods of testing

S.N.	Characteristics	Method of Testing
1	pH	pH Meter
2	Temperature	Temperature sensitive probe
3	Alkalinity	Titrimetric Method
4	TDS	TDS Meter
5	DO	Titrimetric Method
6	BOD	Dilution Method
7	COD	Titrimetric Method
8	Faecal Coliforms	Membrane Filter Method
9	Pathogenic bacteria	Culture plate method

	salmonella	

3 RESULTS AND DISCUSSION

Characteristics	Unit of measurement	BIS	WHO	ICMR	Sample1 Dongaghat	Sample2 Dongaghat	Sample 3 Dongaghat	Sample1 Mohara Bridge	Sample2 Mohara Bridge	Sample3 Mohara Bridge
pH	pH scale	6.5 to 8.5	6.5 to 8.5	7 to 8.5	7.4	7.3	7.2	6.9	7.1	6.8
Temperature	°c	-	-	-	24°C	23°C	21°C	25°C	24°C	22°C
Color					Color less	Color less	Color less	Color less	Color less	Color less
odour					Odourless	Odourless	Odourless	Odourless	Odourless	Odourless
Alkalinity	mg/L	200	75	-	170	167	169	171	168	165
TDS	mg/L	500	-	-	249	242	241	245	240	243
COD	mg/L	-	-	-	23	20	17	15	14	13
DO	mg/L	6 to 8	6 to 8	6 to 8	4.8	4.5	5.3	5.8	6.5	6.8
BOD	mg/L	3	2	3	6.8	7.1	7.8	6.7	7.3	6.9
Faecal Coliforms	CFU/ 100ml	-	-	-	75	68	65	78	67	74
Pathogenic bacteria *salmonella*	-	-	-		present	present	present	present	present	present

The test result shows that due to anthropogenic activity the River water pollution load has been increased description is listed in table 2. And graphical presentations of the different water samples are shows below:

Table -2 Physico-chemical and biological parameters of Shivnath river water

Fig.2. Samples comparison for DO,BOD,COD values of Dongagha

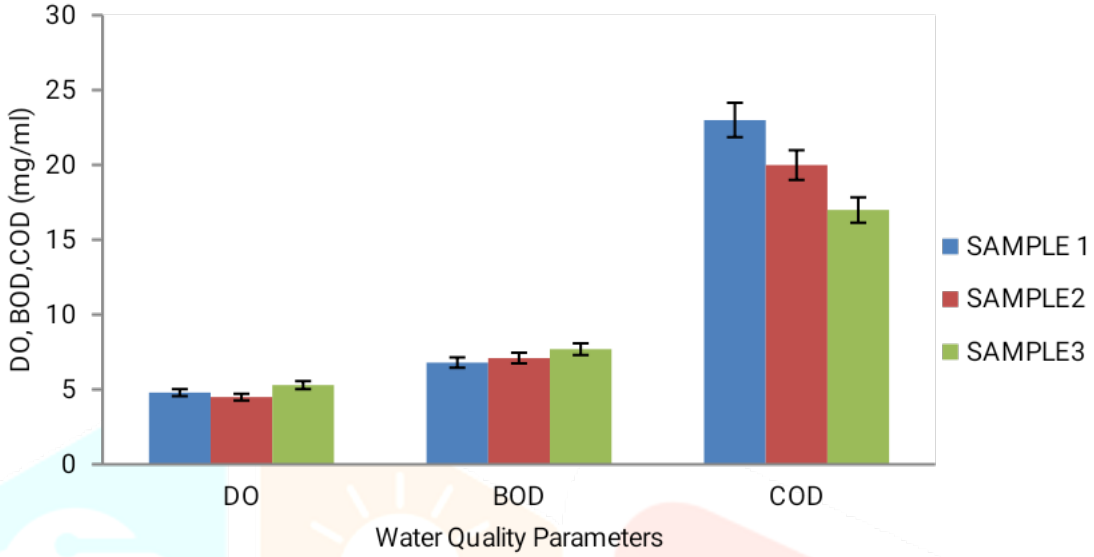


Fig. 3. Samples comparison for TDS andAlkalinity values of Dongaghat

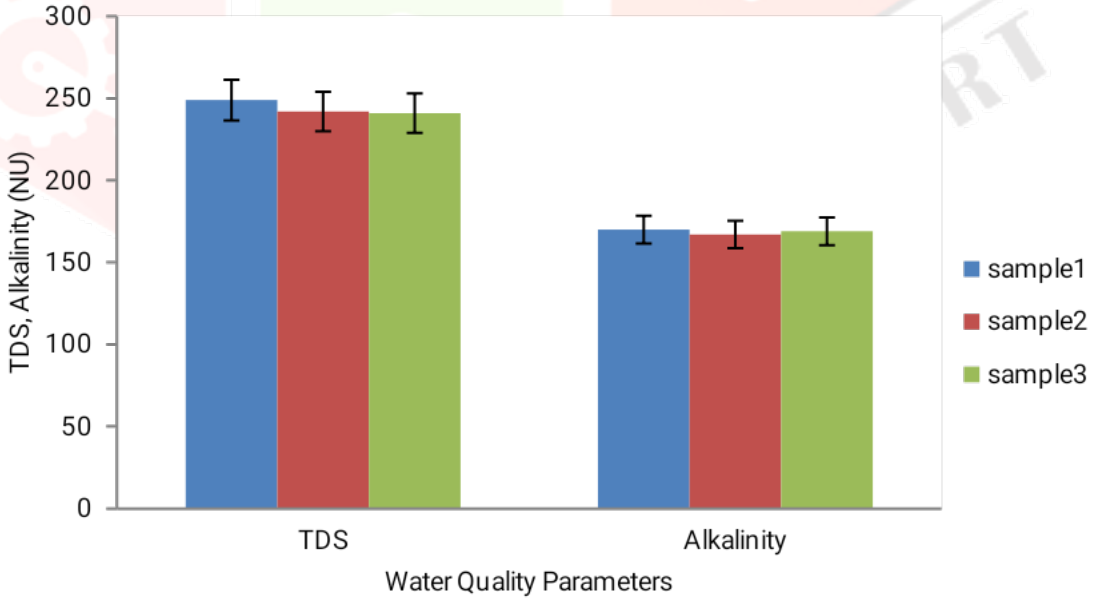


Fig.4. Samples comparison for DO,BOD,COD values of Mohara bridg

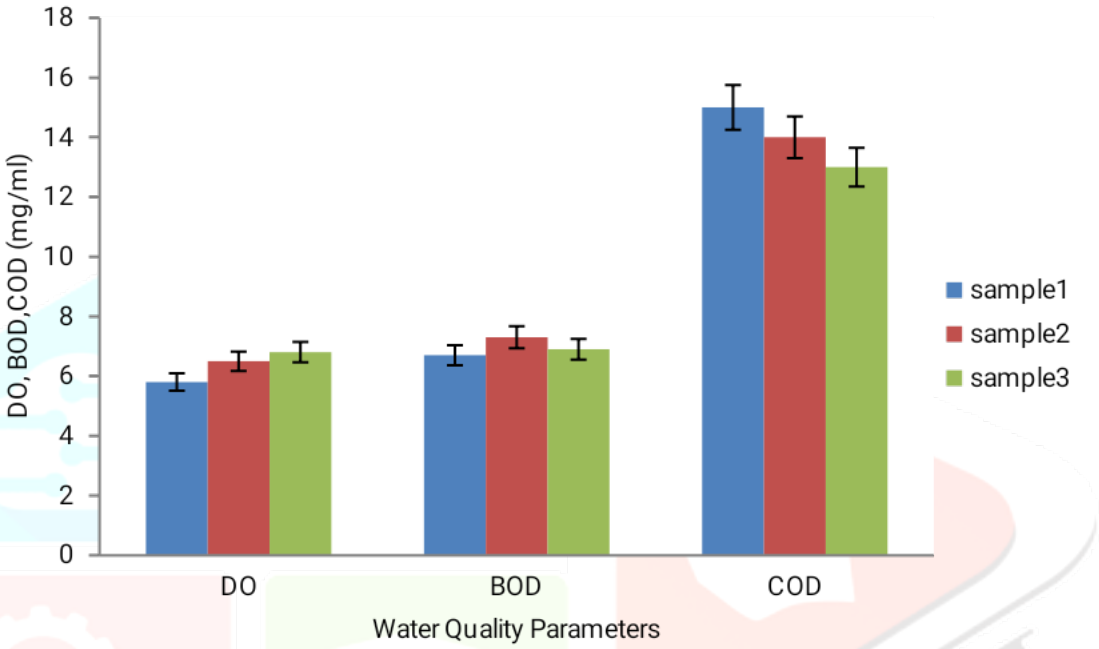
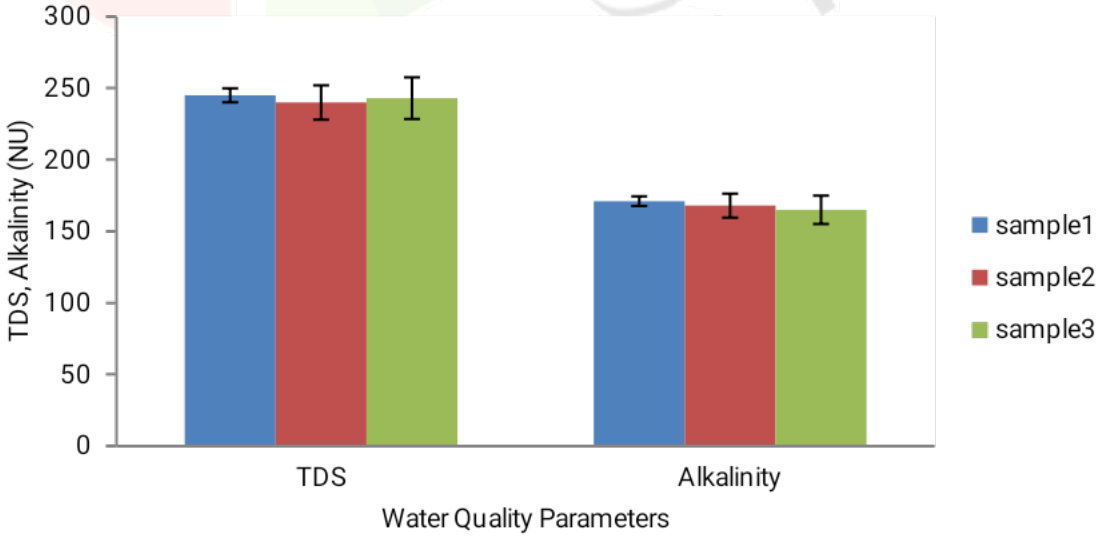


Fig. 5. Samples comparison for TDS and Alkalinity values of Mohara bridg



4. Conclusion- In the above study it was found that most of the parameters were not falls under the desirable limits of BIS, WHO and ICMR set parameters for portability of water as well as presence of fecal Coliforms and pathogenic bacteria *Salmonella* is indicate that water of Shivnath River is not suitable for drinking and household purpose.

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