



**TO ASSESS THE WATER QUALITY OF THE SELECTED RIVERS IN  
GADCHIROLI AND BHANDARA DISTRICTS OF MAHARASHTRA  
STATE (INDIA)**

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**Abstract:**

The physico-chemical parameters of the selected rivers in Gadchiroli and Bhandara districts of Maharashtra are studied in the middle of October 2013 from seven different sites. These samples are analyzed for physico-chemical parameters like temperature, pH, electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO), chemical oxygen demand (COD), total alkalinity (TA), total hardness (TH), chloride (Cl<sup>-</sup>), fluoride (F<sup>-</sup>), sulphate (SO<sub>4</sub><sup>-</sup>), nitrate (NO<sub>3</sub><sup>-</sup>) and phosphate (PO<sub>4</sub><sup>3-</sup>) are determined. The results are compared with standards prescribed by WHO /IS: 10500 From the result it is found that some of the water samples are slightly polluted due to contamination with industrial, agricultural and domestic wastes.

**Key words:**

Physico-chemical Parameters, Pollution Study, River Eater, Gadchiroli and Bhandara District

**Introduction:**

Natural resources are the important wealth of our country. Water is one of them. Water is a wander of the nature. —No life without waterll, is a common saying depending upon the fact that water is the one of the naturally occurring essential requirement of all life supporting activities. But due to increased human population, industrialization, use of fertilizers in the agriculture and manmade activities it is highly polluted with different harmful contaminants. [4]. Therefore it is necessary that the quality of drinking water should be analyzed at regular time interval, because due to use of contaminated drinking water, human population suffers from various water born diseases. [13]





Natural water contain different types of impurities are introduced into aquatic system by different ways such as weathering of rocks and leaching of soil, dissolution of aeroso particles from the atmosphere and from several human activities, including mining , processing and the use of metal base materials. High level of pollutants mainly organic matter in river water causes an increase in biological oxygen demand, chemical oxygen demand, total dissolved solids, total suspended solids and fecal coli form. They make water unsuitable for drinking, irrigation or any other use. [8] Most of the river in urban areas of the developing countries is the ends of effluents discharged from the industries. African countries and Asian countries experiencing rapid industrial growth and this is making environmental conservation a difficult task.[10] The present work is an attempt to assess the water quality of the selected rivers in Gadchiroli and Bhandara districts.

### **Materials and Methods:**

Sampling and Collection of water samples : With the objective in view the present work is planned to assess the quality of water from seven different sites in Gadchiroli and Bhandara district for physico-chemical parameters and the results are compared with the standards given by WHO/IS:10500 determined the extent of pollution. [3]. The samples were collected from all the sites at 9.00 to 11.00 AM in middle of October 2013. The samples were collected in plastic can of two liters capacity without any air bubbles and adopting standard procedures. The sampling locations are given in Table

- 1 The main objectives of study are:
- 2 To evaluate the physico – chemical properties of water
- 3 To compare the result with WHO and IS: 10500





**Table - 1:** Sampling Sites and Places

Sampling Sites	Place
S1	River Kathani at Gadchiroli, Dist-Gadchiroli
S2	River Khobragadi at Deulgaon, Dist-Gadchiroli
S3	River Wainganga at Armori, Dist-Gadchiroli
S4	River Gadhavi at Armori, Dist-Gadchiroli
S5	River Sati at Kurkheda, Dist-Gadchiroli
S6	River Chulbandh at Lakhandur Dist- Bhandhara
S7	River Wainganga at Dambeviral, Dist- Bhandhara

Methodology: The temperature, pH, conductivity and dissolved solids of the water samples are determined on the spot using a thermometer, pH meter, conducto meter and TDS meter respectively. The physico-chemical analyses of samples of drinking water are carried out according to standard methods.

**Table- 2 :** Physico-Chemical Analysis of Water Samples of Seven Sites of Selected Rivers in Gadchiroli and Bhandara Districts in Maharashtra

Sr. No	Param eters	Sampling Sites							Range of Results		WHO/ IS: 10500
		S1	S2	S3	S4	S5	S6	S7	Min	Max	
1	T (OC)	27.1	26.6	26.5	26.4	26.8	27.0	26.1	26.1	27.1	--
2	pH	6.9	6.7	6.8	6.9	7.2	7.5	7.4	6.7	7.5	6.5-8.5
3	EC	133	444	282	141	114	261	295	114	444	1400
4	TDS	66	211	138	71	57	124	145	57	211	1000
5	TA	71	201	149	50	60	158	154	50	201	120-600
6	TH	52	182	113	59	38	160	122	38	182	200-600
7	DO	6.1	4.7	6.0	6.5	6.8	7.1	5.9	4.7	7.1	-
8	COD	2.6	4.2	2.4	2.8	1.9	3.1	3.5	1.9	4.2	-
10	F <sup>-</sup>	0.14	0.16	0.11	-	-	0.21	0.12	0.11	0.21	1.5
11	SO <sub>4</sub> <sup>2-</sup>	12	30	21	14	10	18	25	10	30	200
12	NO <sub>3</sub> <sup>-</sup>	1.2	2.2	1.4	1.1	-	1.8	1.6	1.1	2.2	45
13	PO <sub>4</sub> <sup>3-</sup>	0.05	0.22	0.14	0.09	0.04	0.18	0.11	0.04	0.22	-

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Total seven water samples from seven different sites of selected rivers in Gadchiroli and Bhandara districts are analyzed for physico-chemical parameters like pH, EC, TDS, TA, TH, DO, COD, Cl<sup>-</sup>, F<sup>-</sup>, SO<sub>4</sub><sup>--</sup>, NO<sub>3</sub><sup>-</sup> and PO<sub>4</sub><sup>3-</sup>. The aim of the study is to evaluate river water quality.

### **Temperature:**

In an established system the water temperatures controls the rate of all chemical reactions and affect fish growth, reproduction and immunity. Drastic temperature changes can be fatal to fish. In the present study, temperature ranges from 26.1 to 27.1.

### **pH**

The pH value is the hydrogen ion activity and a major of acidity & alkalinity in aquatic bodies. It is one of the most important operational water quality parameters. If pH is above 7, this will indicate that water is probably hard & contains calcium & magnesium.<sup>9</sup> The low pH affected the bacterial growth. The pH value varies between 6.7 to 7.5.

### **Electrical Conductivity (EC)**

Electrical Conductivity (EC) is the measure of water capacity to convey electric current it signifies the amount of total dissolved salts.<sup>11</sup> EC value varies from 114 to 444 micro-Siemens, which reveals that EC values for S2 sample are comparatively higher value than other, indicating the presence of high amount of dissolved inorganic substances in ionized form.

### **Total Dissolved Solids (TDS)**

Total Dissolved Solids (TDS) indicates the general nature of water quality or salinity.





In present investigation TDS value varies from 57 to 211 mg/l. It was reported that alkaline water was richer in solids than acidic water. The quantity of TDS was proportional to the degree of pollution.

### **Dissolve Oxygen (DO)**

Dissolve Oxygen (DO) is one of the most important parameter in water quality assessment and reflects the physical & biological processes prevailing in the water. In present investigation DO values varies from 4.7 to 7.1 mg/l. The low value observed may be as a result of the increase run off agricultural wastage & industrial effluents discharge into the drains that place high demand on the DO.

### **Chemical Oxygen Demand (COD)**

Chemical Oxygen Demand (COD) provides a measure of the oxygen equivalent of that portion of the organic matter in a water sample that is susceptible to oxidation under test condition.<sup>11</sup> In present study, COD values varies from 1.9 to 4.2 mg/l.

### **Total Alkalinity (TA)**

Total Alkalinity (TA) of water is its capacity to neutralized acids and it is normally due to the presence of bicarbonates, carbonates & hydroxide compound of calcium, sodium & potassium. In present study, the alkalinity value varies from 50 to 201 mg/l, in which sample S2 shows slightly higher values than others.

### **Total Hardness (TH)**

Total Hardness (TH) is the property of water which prevents the lather formation with soap and increases the boiling points of water. Hardness of water mainly depends upon the amount of calcium or magnesium salt or both.





In present study TH value varies from 38 to 182 mg/l.

### **Chloride (Cl-)**

Chloride gas is highly toxic but Chloride ions are essential for life. The Chloride value varies from 06 to 21 mg/l. High chloride ion concentration indicates organic pollution in water.

### **Fluoride (F-)**

Probable source of Fluoride in Indian water seems to be that during weathering and circulation of water in rocks and soils, fluorine is leached out and dissolved in ground water. Excess intake of fluoride through drinking water causes fluorosis in human being. In present analysis fluoride value varies from 0.11 to 0.21 mg/l are within the permissible limits for all samples.

### **Sulphate (SO<sub>4</sub>--)**

Sulphate is one of the least toxic anions for drinking water. But it is important due to its cathartic effect in some human when present in excessive amount.

Sulphate may occur due to industrial discharge, contaminant from mines, paper mills etc. The value of sulphate varies from 10 to 30 mg/l.

### **Nitrate (NO<sub>3</sub>-)**

Surface water contains nitrate due to leaching of nitrate with the percolating water. Surface water can also be contaminated by sewage and other wastage rich in nitrates. Nitrate value varies from 1.1 to 2.2 mg/l.

### **Phosphate ( PO<sub>4</sub><sup>3-</sup> )**

Phosphates may occur in surface water as a result of domestic sewage, detergents and agricultural effluent with fertilizers. The high level of both phosphates and nitrates can lead to eutrophication, which increases algal growth and ultimately reduces dissolved oxygen in the water.<sup>14</sup> Here the phosphate value varies from 0.04 to 0.22 mg/l.

The above result reveals that EC, TDS, TH, Cl- and SO<sub>4</sub>

-- values for S2 sample are comparatively higher value than other.





### **Conclusions:**

Deviations are observed by river water samples in seven different sites of selected rivers in Gadchiroli and Bhandara districts. The water samples from site S2 shows comparatively higher values of some parameters than other water samples. The result from the present study reveals that water of site S2 is having high level of Nitrate, Chloride, Sulphate, TA, TH, EC, COD and TDS than other samples. The result for high contamination is due to pesticide residues, agricultural wastes and burning of death human bodies. Hence this water is not suitable for direct drinking as it contains the higher values of some parameters. Hence this water needs some conventional treatment including disinfection.

### **Contribution:**

The present paper is the research project undertaken in Sant Gadge Baba Amravati University, Amravati (M.S.) India. The authors have taken samples from the Malkhed Lake and analyzed the results. This is the part of the present ongoing research work in environmental studies.

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