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 andBhandara districts of Maharashtra are studied in the middle of October 2013 fromseven different sites. These samples are analyzed for physico-chemical parameterslike temperature, pH, electrical conductivity (EC), total dissolved solids (TDS),dissolved oxygen (DO), chemical oxygen demand (COD), total alkalinity (TA), totalhardness (TH), chloride (Cl-), fluoride (F-), sulphate (SO4- -), nitrate (NO3-) andphosphate (PO43-) are determined. The results are compared with standardsprescribed by WHO /IS: 10500 From the result it is found that some of the watersamples are slightly polluted due to contamination with industrial, agricultural anddomestic wastes.

Key words:

Physico-chemical Parameters, Pollution Study, River Eater, Gadchiroliand 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 water”, is a common saying dependingupon 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 offertilizers in the agriculture and manmade activities it is highly polluted with differentharmful 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 systemby 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 organicmatter in river water causes an increase in biological oxygen demand, chemical oxygendemand, 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 effluentsdischarged from the industries. African countries and Asian countries experiencing rapidindustrial 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 inGadchiroli and Bhandara districts.

Materials and Methods:

Sampling and Collection of water samples : With the objective in view the presentwork is planned to assess the quality of water from seven different sites in Gadchiroli andBhandara district for physico-chemical parameters and the results are compared with thestandards 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 ofOctober 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

Temperature:

In an established system the water temperatures controls the rate of all chemicalreactions and affect fish growth, reproduction and immunity. Drastic temperature changescan 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 isabove 7, this will indicate that water is probably hard & contains calcium & magnesium. [9]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 electriccurrent it signifies the amount of total dissolved salts.11 EC value varies from 114 to 444micro-Siemens, which reveals that EC values for S2 sample are comparatively higher valuethan other, indicating the presence of high amount of dissolved inorganic substances inionized 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 alkalinewater was richer in solids than acidic water. The quantity of TDS was proportional to thedegree 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 presentinvestigation DO values varies from 4.7 to 7.1 mg/l. The low value observed may be as aresult of the increase run off agricultural wastage & industrial effluents discharge into thedrains that place high demand on the DO.

Chemical Oxygen Demand (COD)

Chemical Oxygen Demand (COD) provides a measure of the oxygen equivalent ofthat portion of the organic matter in a water sample that is susceptible to oxidation under testcondition.11 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 normallydue 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 withsoap and increases the boiling points of water. Hardness of water mainly depends upon theamount of calcium or magnesium salt or both.

In present study TH value varies from 38 to182 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 pollutionin water.

Fluoride (F-)

Probable source of Fluoride in Indian water seems to be that during weathering andcirculation 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 presentanalysis fluoride value varies from 0.11 to 0.21 mg/l are within the permissible limits for allsamples.

Sulphate (SO4--)

Sulphate is one of the least toxic anions for drinking water. But it is important due toits cathartic effect in some human when present in excessive amount. Sulphate may occurdue to industrial discharge, contaminant from mines, paper mills etc. The value of sulphatevaries from 10 to 30 mg/l.

Nitrate (NO3-)

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 .Nitratevalue varies from 1.1 to 2.2 mg/l.

Phosphate (PO43-)

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

The above result reveals that EC, TDS, TH, Cl- and SO4

-- values for S2 sample arecomparatively higher value than other.

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 Dambevirali,Dist- Bhandhara

Methodology: The temperature, pH, conductivity and dissolved solids of the watersamples are determined on the spot using a thermometer, pH meter,

conducto meter and TDSmeter respectively. The physico-chemical analyses of samples of drinking water are carriedout according to standard methods.

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

Sr. No	Parameters	Sampling Sites							Range of Results		WHO/ IS: 10500
		S1	S2	S3	S4	S5	S6	S7	Min	Max	
1	T (0C)	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^-	0.14	0.16	0.11	-	-	0.21	0.12	0.11	0.21	1.5
11	SO_4^{--}	12	30	21	14	10	18	25	10	30	200
12	NO_3^-	1.2	2.2	1.4	1.1	-	1.8	1.6	1.1	2.2	45
13	PO_4^{3-}	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 Gadchiroliand Bhandara districts are analyzed for physico-chemical parameters like pH, EC, TDS, TA,TH, DO, COD, Cl-, F-, SO4
--, NO3- and PO43-. The aim of the study is to evaluate river water
quality.

Conclusions:

Deviations are observed by river water samples in seven different sites of selectedrivers in Gadchiroli and Bhandara districts. The water samples from site S2 showscomparatively 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 ofNitrate, Chloride, Sulphate, TA, TH, EC, COD and TDS than other samples. The result forhigh contamination is due to pesticide residues, agricultural wastes and burning of deathhuman bodies. Hence this water is not suitable for direct drinking as it contains the highervalues 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 AmravatiUniversity, Amravati (M.S.) India. The authors have taken samples from the Malkhed Lakeand analyzed the results. This is the part of the present ongoing research work inenvironmental studies.

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