PHYSICO-CHEMICAL STUDIES OF BHIMA RIVER WATER NEAR DAUND CITY, DIST.-PUNE (MS).

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ABSTRACT

The present work to evaluate the various water quality parameters gives factor analysis method which can help in assessing of river water quality of Bhima River near Daund city. The Bhima River is an important river in Southern India. It flows southeast through many states. The condition of Bhima River near Daund city is not good and it is polluted by industrial, residential & agriculture waste water. KURKUMBH, Maharashtra Industrial enlargement Corporation (MIDC) is located near Daund city which has large impact on river water pollution. Many Physicochemical parameters such as Temperature, pH,Total Dissolved Solid (TDS), Dissolved Oxygen(DO), chloride, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) etc. of surface water was studied on the monthly basis for six months from Jul 2016 to Dec 2016. This information will be helpful for users of the river water and an outcome of the study reinforces the need for a holistic evaluation.

KEY WORDS

Water quality, Physicochemical parameters, Bhima River, Daund.

INTRODUCTION

In the present study, physicochemical analysis of Bhima River water near Daund city has been carried out. Daund is historical city in Pune district situated near national highway 09 and it is Railway junction of the central Railway line. Water is a universal solvent and the important constituents for the living system on the earth. Water is very important for existence of living organisms because it is the basic need of the living organism as well as plants. Life on earth would be impossible without water [1-5]. Sometimes water is not suitable for drinking and other purposes because of contaminations, wrong agricultural practices also deteriorate the quality of water by percolation of contaminants through sub soil, and bedrock, and rich the ground water table [6-12]. Now a day's the excessive use of chemical fertilizers in agriculture area, wastage from industries and urban areas leads into the quality of water have become a serious issue [13].

River Bhima originates from Sahyadri hilly range area at Bhima Shankar (MS). A river is a natural flowing water source and main source of water for most of the living organisms. Rivers are the key water resources for drinking, industrial and agricultural purpose in most of the regions of the country. It is necessary to monitor the quality of water at regular interval, so that which will be useful for domestic as well as irrigation purposes [14-17]. On the basis of chemical, biological and physical properties the quality of water is decided [18,19]. According to WHO [20] and similar authorities, many of the diseases in living organisms

were originated from water. For the drinking purpose in the various regions, surface water is the major source [21]. The water is becoming polluted drastically due to the rural and urban waste [22]. Once the water is contaminated, its quality not giving the original taste of pure water even though we control the pollution causing parameters furthers [23]. The unused nitrogen goes to rivers through agricultural run-off. In drinking waters if the nitrogen is beyond permissible limit can pose serious health problems [24-28]. Continuous irrigation with polluted water will result in accumulation of heavy and toxic metals in to the soil. Plants and vegetables which are part of human diet will absorb these accumulated heavy metals from water and soil. This may lead in to long term toxic effects on human health as metals are nondegradable [29-32].

MATERIALS AND METHOD

For the general survey regarding physicochemical studies of Bhima River, water samples were collected at monthly intervals for the period of six month from Jul 2016 to Dec 2016. Water samples were collected from the marginal areas in dried plastic bottles, which were washed and rinsed with distilled water before the collection of water samples. The sampling site selected is Nimgav Khalu, near the Daund city, Dist. Pune. analysed Water sample was analysed for a number of physicochemical parameters. The parameters like pH, temperature, total dissolved salts etc. was analysed at the sampling station and carbonate, Nitrates, alkalinity, COD, BOD were analysed in the laboratory using pertinent literature, APHA (1995).

RESULT AND DESCUSSION

In the present investigation 10 parameters are studied at the time of regular interval for the period of 6 months. The present investigation attempts to find out the physicochemical parameters and also focus on water quality. In the present work various parameters are analysed in the field as well as in laboratory. Various tests are performed and data are collected to specify quality of water. The study areas have been selected where sugar industries, number of factories effluents are discharged into river. Physicochemical parameters such as atmospheric Temperature, pH, Total Dissolved Solid (TDS), Dissolved Oxygen (DO), BOD, COD etc. were monitored on monthly basis.

Table 1:

Parameters	Jul 2016	Aug 2016	Sept 2016	Oct 2016	Nov 2016	Dec 2016	Average
Water Temperature(^{0} c)	24.20	24.00	23.80	23.00	21.60	20.30	**21.82**
pH	7.20	7.45	7.50	7.40	7.20	7.05	**7.30**
DO (mg/lit)	6.9	7.1	6.9	6.7	6.5	6.5	**6.77**
BOD (mg/lit)	20	17	19	20	21	23	**20**
COD (mg/lit)	121	74	86	95	108	104	**98**
Chlorides (mg/lit)	120	118	96	103	131	138	**117.67**
Nitrate (ppm)	2.08	2.28	1.82	1.67	1.98	2.04	**1.98**
TDS (mg/lit)	287	332	320	298	307	290	**307.67**
Turbidity (NTU)	28	30	27	25	22	21	**25.5**
Alkalinity	234	240	250	267	278	290	**259.83**

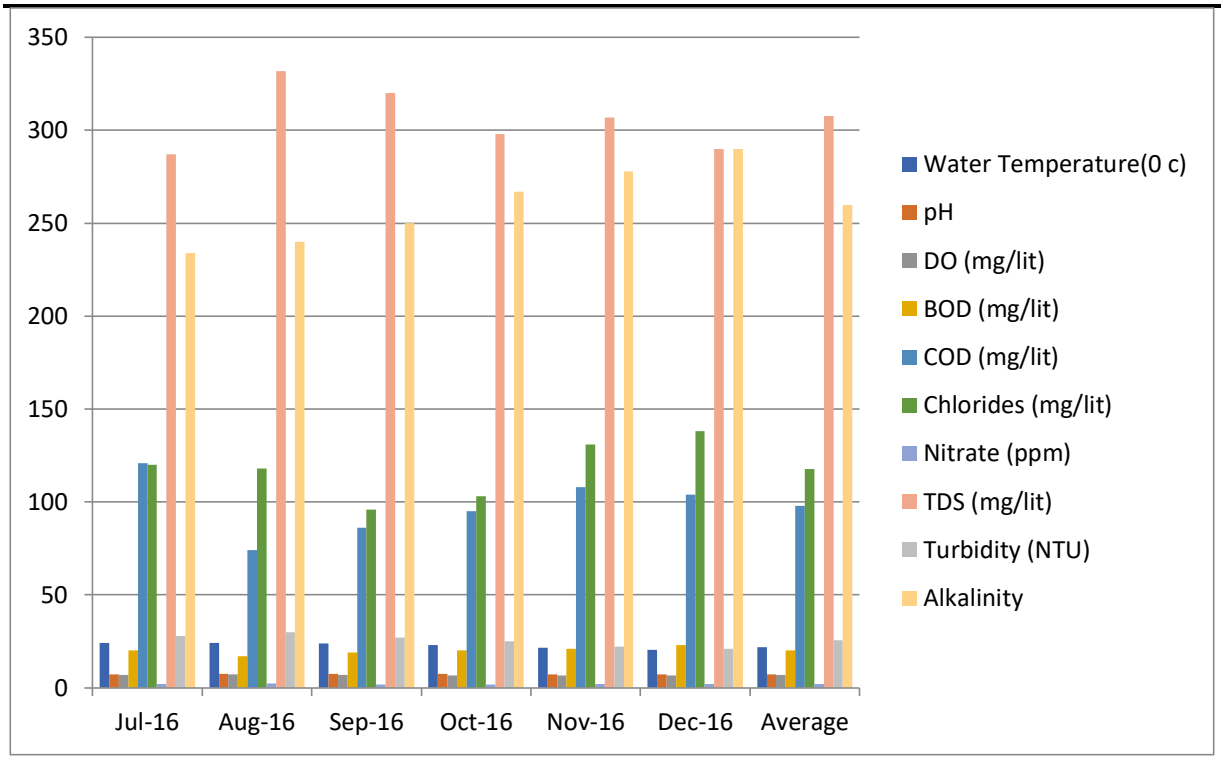

Fig. 1: Graphical abstract for Table 1:

1. **Water Temperature**

   Water temperature of Bhima River ranged between 20.30 to 24.20 ^{0} c. The average water temperature is the 21.82 ^{0} c.

2. **pH**

   The pH is an important parameter of water. Most of the aquatic organisms are adapted to average pH and do not withstand abrupt changes. The pH values were found alkaline throughout the study ranging 7.05 to 7.50 and average value is 7.30. So, pH of the water was found alkaline and it is suitable.

3. **DO**

   Solubility of atmospheric oxygen in water depends on altitude (atmospheric pressure), temperature & salt concentration in water. Higher the oxygen level, less is the pollution and lower the oxygen level, more is the pollution of water. Present work shows 6.77 mg/lit. DO in the river water and it is less and therefore not suitable.

4. **BOD**

   Present investigation shows average value of BOD, 20 mg/lit. Natural waters will have BOD, 5 mg/l or less. If BOD is increased oxygen is depleted in the river body; hence, lesser amount of oxygen is available for the aquatic life. The Bhima River water has high value of BOD and water is polluted.

5. **COD**

The COD (Chemical Oxygen Demand) is the amount of oxygen needed to oxidize the organic matter present in water. COD is also measure of the organic pollutant in water. Average COD value for Bhima River near Daund 98 mg/lit.

6. **Chlorides**

Chlorides in the water during the investigation period was ranged between 96 mg / L to 138 mg/L. The maximum values of chloride recorded in the month of December.

7. **Nitrate**

Nitrate is an excellent parameter to judge organic pollution, it is oxidized form of nitrogen. Nitrates value fluctuated between 1.67 mg/l to 2.28 mg/l during the study period. The present study shows the maximum were the value of Nitrate and therefore river water are indicative of pollution.

8. **TDS**

The total dissolved solids found in the range between 287 mg/L to 332 mg/L and the average value of TDS was 307.67 mg/L. Reading recorded proved that total dissolved solids values were maximum and water is not suitable for drinking purpose.

9. **Turbidity**

Turbidity of the water increases due to suspended solids, sediments, silts, sand, chemical precipitation. The increase of turbidity of water results into interference of penetration of light. This will cause damage to the aquatic life and deteriorate surface water. High values of turbidity minimise the filter runs, which cause pathogenic organisms too dangerous to human. Turbidity of Bhima River was in the range of 21 to 30 and therefore water was founded more turbid.

10. **Alkalinity**

The measure of buffering capacity of the water is called Alkalinity. It is generally due to the salts of carbonates, bicarbonates, phosphate, nitrates etc. During present study showed average value of 259.83 mg/l. In the present investigation, minimum value of Total Alkalinity was recorded during monsoon season.

CONCLUSION:

The present work carried out some test on Bhima River water like pH, total dissolved solids, COD, BOD, D.O. The pH values were found alkaline throughout the study, the hardness was more than the permissible limits of water, Chlorides occurred in moderately high range. The high number of nitrates indicated the water pollution. The alkalinity was also high and the COD values also supported the polluted status of water. The obtained result values are higher than permissible range hence it is concluded that Bhima River water is polluted near Daund city due to addition of unwanted parameters and disposal of wastes. The major sources of pollution are the excessive use of fertilizers, organic waste and untreated sewage water. Hence Bhima River water near Daund city cannot be utilized for drinking or domestic use without treatment.

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