

Original Research Article

Biomonitoring of Tapti River Water Flowing Through Jalgaon District with Reference to Water Pollution

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ABSTRACT

Keywords

Physico-chemical parameter, Tapti River, Water quality

In the present study various physicochemical factor were assessed over a period of six month from January 2014 to June 2014. To note the chemistry and quality of river water Tapti, which flowing through Jalgaon District with special reference to water pollution. Physicochemical factors like Temperature, D.O., CO₂, Chloride, C.O.D, Alkalinity, Hardness, Magnesium, pH and Total solids analyzed as per standard method recommended by APHA, (1975); WHO, (1984) and ICMR. The obtained values were compared with standard limits. The results of this study reveal that the physicochemical parameters were within the maximum permissible limits of WHO with some slight variation in some parameter. Hence, there is an urgent need to control the discharge of domestic sewage and other domestic activity to restore the potability and also having high aquacultural potential in the river for the benefit of mankind of villages which are situated on the bank of Tapti River flowing through Jalgaon District.

Introduction

Water is very important life supporting material. We depend on water for domestic needs, irrigation, industry and disposal of wastes. River are one of the important sources of water but almost all the river's in India are polluted. It directly or indirectly affect the life process of flora and fauna of the water body, surrounded by chemical toxicants (Kumari *et al.*, 2006; Indra and Shivaji, 2006; Krishnan *et al.*, 2007). Pollution in water body was studied by Bekci (2009). The use of biomaterial absorbant for the treatment of waste water

will provide as a potential alternate to the conventional treatment and in expensive ways of removing dyes from large volume of effluents. Algae are ubiquitous naturally and serve as one of the biomaterial with high capacity for removing dye from contaminated water (Pansamriut *et al.*, 2007) compare to physicochemical process.

The main objective of this study are to assess seasonal changes in chemical quality and potability of water during January 2014 to June 2014, water sample were collected

monthly from different sight of river flowing through Jalgaon district and analysed the data of sample.

Materials and Methods

Study area

The Tapti is a river in central India. It is one of the major river of peninsular India with a length around 724KM. Tapti river rise in the eastern Satpuda range of southern M.P. state and flows Westward draining M.P. Nimbar region, Maharashtra, Khndesh and East Vidharbha region in northwest corner or the Deccan plateau. The Tapti river water becomes more polluted at number of places. Few of them will be selected for the study purpose.

Station A - Lentic environment of Tapti River (Changdev Temple, Changdev Village).

Station B – Lotic environment of Tapti River (Tapti River at Deep Nagar).

Station C – Lentic environment of Tapti River (Mehun Bridge at Ordinance Factory at Varangaon).

Station D – Lotic environment of Tapti River (Near Juga Devi at Bhusawal).

Results and Discussion

The monthly value of physicochemical parameters as air temperature, water temperature, CO₂, D.O., C.O.D., nitrate, phosphate, chloride, hardness, magnesium, total alkalinity, total solids and pH are shown in table 1.

Temperature: There is a close relation between the atmospheric temperature and water temperature. Air temperature is one of the most important ecological factors, which control the physiological behavior of the aquatic system and distribution of micro-

organism. The air temperature varies from 24 to 35⁰C and the temperature of collected water sample varies in between 20 to 24⁰C were recorded.

CO₂: The CO₂ reaction between the water molecules gives carbonate and bicarbonate and are also dependent on the other element such process might use magnesium content to produce MgCO₃ and enhance pH (Shastri and Pendse, 2001) and decrease CO₂ content due to luxuriant growth of algae. CO₂ were recorded as 0.4 mg/lit to 4.45 mg/lit.

Dissolved Oxygen (D.O.): DO is one of the most important parameter in assessing the water quality and understanding the physical and biological process prevailing in the water. The importance of the D.O. was reported by many researcher because D.O. in aquatic ecosystem brings out various biochemical changes and it influence on metabolic activities on organism. D.O. was recorded 4.77mg/lit to 6.15 mg/lit. In these six months it is minimum in summer season.

C.O.D.: Chemical oxygen demand also recorded of the six months ranges from 16mg/lit to 25.25mg/lit.

Nitrate: Nitrate is also deposited in the water ranges from 11.mg/lit to 12.92mg/lit. It is highest in May.

Phosphate: The amount of phosphorus in all water samples was recorded from 0.592mg/lit to 0.747mg/lit. The lowest concentration of phosphate was recorded during the February and May due to uptake of phosphate by algal blooms. Similar results were recorded by Saloman (1994) in a lake filled with new water.

Chloride: High chloride ion concentration indicate organic pollution in the water. The chloride concentration in fresh natural water

is quite low generally less than that of sulphate and bicarbonates. Chloride is a natural substance present in all portable water as well as metallic salt. The chloride concentration in most of the sample were not highest desirable level 200mg/lit by ICMR value were well below the maximum permissive limit. The values of chloride in the present investigation were recorded as 70mg/lit to 134.7mg/l.

Hardness: Hardness in all the collected water sample of the river was found in the

range of 47.85mg/l to 110mg/l were recorded. Increase in hardness during the month of February due to higher photosynthetic activity. Free CO₂ is utilized and bicarbonates are converted into carbonate and precipitated as calcium salt.

Magnesium: Magnesium in all the collected water sample of the river was found in the range of 4.13mg/l to 7.17mg/l. These values are well below the maximum limit as per WHO.

Table.1 Physico-chemical parameters recorded in Tapti River during January to June 2014

	Month	January 2014	February 2014	March 2014	April 2014	May 2014	June 2014
1.	Air Temp.	26	25	27	32	35	24
2.	Water temp.	20	20	22	22	24	24
3.	Free CO ₂	Nil	Nil	4.45	0.7	0.4	Nil
4.	D.O.	5.6	6.0	6.15	5.8	4.77	5.4
5.	C.O.D.	25.25	22.0	24.5	24.35	22.92	16
6.	Nitrate	11.07	12.00	12.42	11.55	12.92	11.00
7.	Phosphate	0.747	0.592	0.615	0.730	0.606	0.700
8.	Chloride	81.75	134.7	92.0	93.25	102	70
9.	Hardness	94.55	110	87	47.85	77	80
10.	Magnesium	5.88	7.17	4.63	4.13	5.01	5.80
11.	Total Alkalinity	126.75	122.25	82.50	91.75	86.75	157.00
12.	pH	6.35	6.3	6.0	6.8	6.00	6.7
13.	Total Solids	397.5	434.5	395.0	372.75	361.25	400.00

Fig.1 Monthly variation in air and water temperature at Tapti River

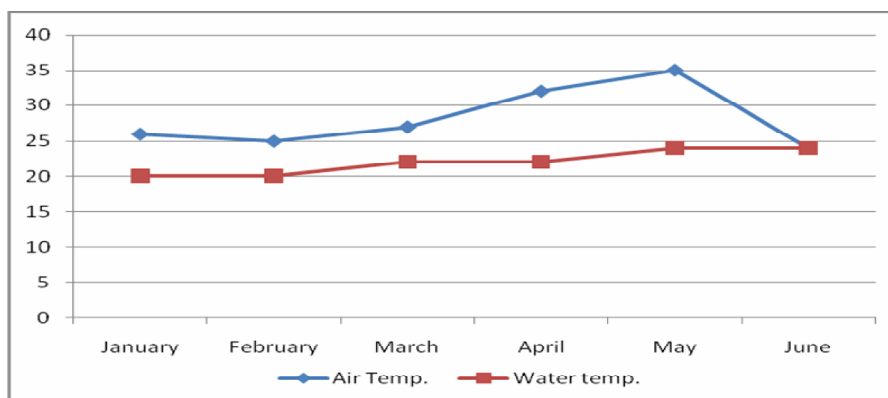


Fig.2 Monthly variation in DO and COD at Tapti River

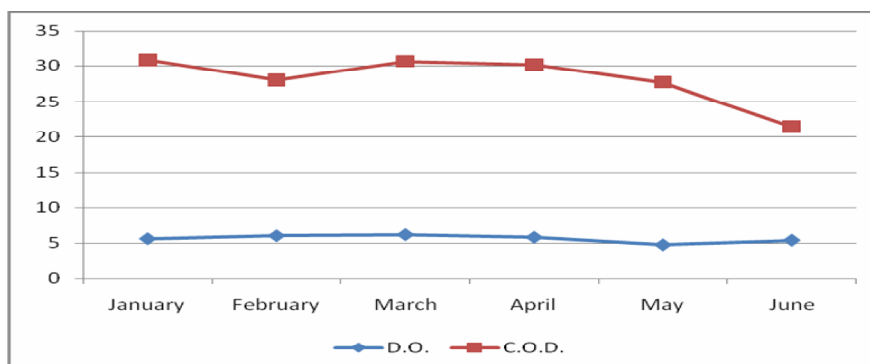


Fig.3 Monthly variation in phosphate at Tapti River

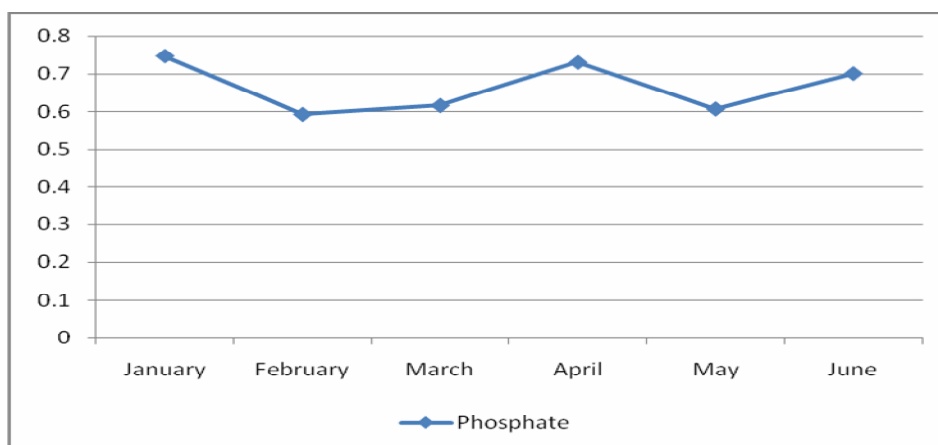


Fig.4 Monthly variation in nitrate at Tapti River

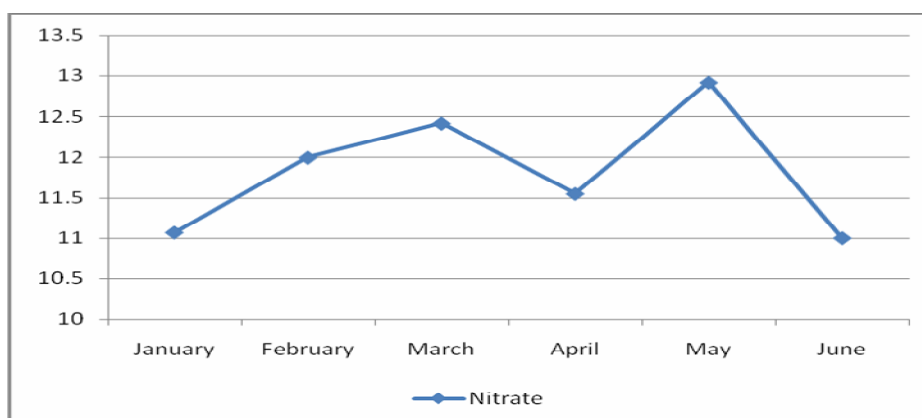


Fig.5 Monthly variation in hardness and water alkalinity at Tapti River

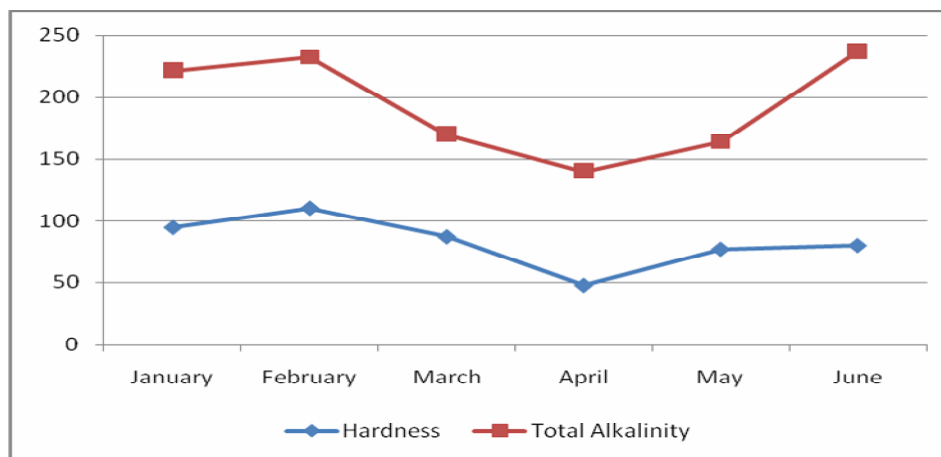


Fig.6 Monthly variation in pH at Tapti River

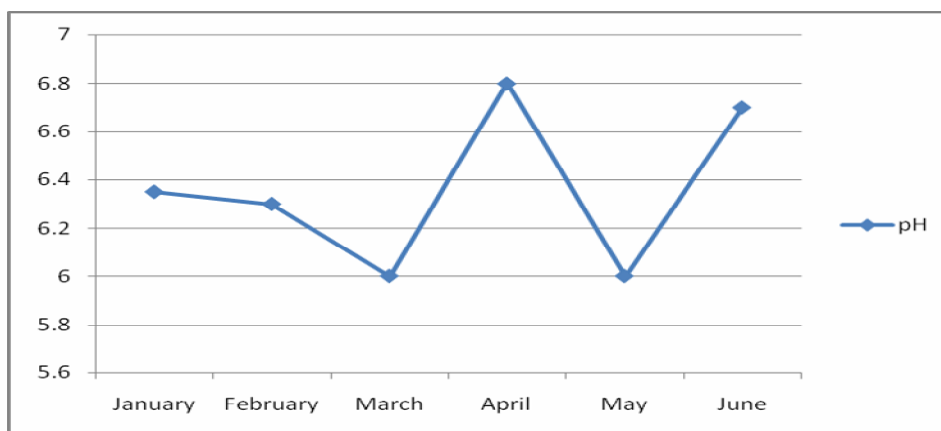
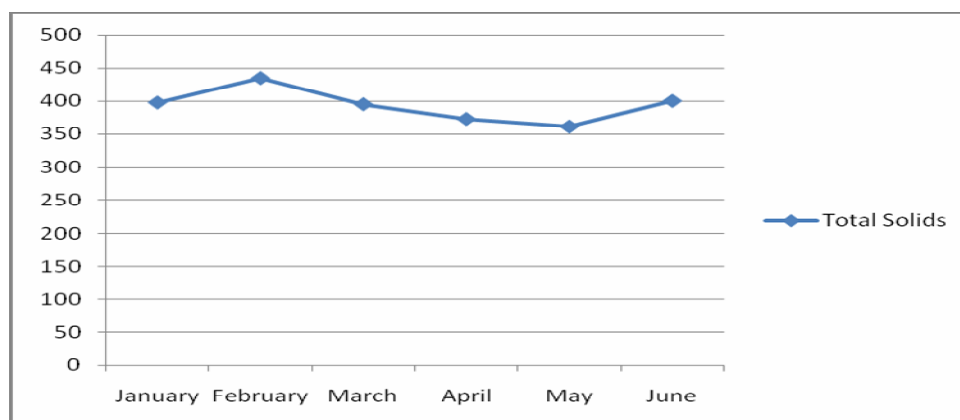


Fig.7 Monthly variation in total solids at Tapti River



Total alkalinity: Alkalinity of water is a measure of its capacity to neutralize acid. This is due to primarily salt of weak acid or

strong base. Bicarbonate represent the major form of alkalinity bicarbonate are form in considerable amount from the action of CO₂

upon basic material in soil and other salt of weak acid. Alkalinity in the river water caused by bicarbonate as carbonate value in the all collected sample ranges from 82.50mg/l to 157.0mg/l.

pH: It was observed that pH of the water normally remains higher in summer and in rainy season. It depends on photosynthetic activity. It was relatively more in winter. The variation occurs in the pH value due to change in value of CO₂, carbonate and bicarbonate in the water. In the present study the pH values in all the collected water samples range from 6.0 to 6.8 which are within limits.

Total solids: It was reported that alkaline water was richer in solid than acidic of TDS in the collected water sample varies from 361.25mg/l to 434.5mg/l were recorded.

In conclusion, the analysis of water quality parameter of river Tapti shows that temperature, CO₂, D.O., C.O.D., nitrate, phosphate, chloride, hardness, magnesium, total alkalinity, pH and total solids of the four stations A, B, C and D were well below the desirable limit but phosphate and chloride were slightly increased in the river water. The result of this study reveals that quality of river water is fit for domestic and drinking purposes. But urgent need to control the discharge of domestic sewage and domestic activities to restore the potability and also having high aquacultural potential in the water body for benefit of mankind of Tapti River.

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