



Water Quality Assessment of Tambraparni River at Kowad, Kolhapur District, Maharashtra

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ABSTRACT

Studies on pollution status of Tambraparni river was made from February 2008 to January 2009 to assess the quality of water. Water is alkaline throughout the study period, dissolved oxygen and BOD value shows, that water can be utilized for drinking and agricultural purposes. Chloride is little higher in summer indicating a lot of anthropogenic activities. At present the water is clean and free from pollutants but in due course, if anthropogenic activities continue they may lead to pollution.

INTRODUCTION

Water is indispensable element of both human life and civilization. River is a natural stream of freshwater larger than other sources. River system provides water for cultivation, drinking. Also it is a means of transportation and used to generate electricity. Ever since the prehistoric times man has been closely associated with water and it has been proved by the evidences that all historic human settlements were around inland freshwater resources.

The biological phenomenon of any water body could be better understood by research. To get adequate drinking water, man has created more and more water resources such as dams across rivers, ponds, lakes, etc. Nowadays water bodies are becoming polluted because of anthropogenic activities. Many workers like Singh (1985) from Bihar, Bath & Singh (1988) from Punjab, Shastri (2000) from Maharashtra and Sunkad (2008) from Karnataka have carried out work on water bodies to assess their pollution.

The present investigation was carried out on Tambraparni river near Kowad to find out its water quality. Tambraparni river is one of the important rivers in Chandagad taluk of Kolhapur district. It originates at Zambra. The river water is used for many purposes such as irrigation, drinking and water supplies to the industries like Doulat sugar industry, and Gokul milk industry.

MATERIALS AND METHODS

Water samples were collected in 2-litre clean polyethylene cans at the intervals of 30 days from February 2008 to January 2009. All collections were made between 7:00 a.m. and

8:30 a.m. The collected samples were brought to the laboratory for estimation of various physico-chemicals parameters by standard methods given in APHA (1991). Temperature and pH were recorded on the same day at site. CO₂ was estimated by titrimetric method; dissolved oxygen by using Winkler's method; chloride by argentometric method; hardness by EDTA titrimetric method and alkalinity by titrimetric method. All data were statistically analysed.

RESULTS AND DISCUSSION

The results of the study are given in Tables 1 and 2. Temperature is an important factor in aquatic ecosystems because no other single factor has so many profound influences directly or indirectly (Welch 1952). The water temperature was lower than the ambient temperature and ranged from 22.1°C to 31.4°C. The maximum temperature was recorded in May, and minimum in December. Statistically water temperature positively correlated with BOD ($r = 0.2930$), chloride ($r = 0.598$), and negatively correlated with pH ($r = -0.1077$).

pH was alkaline in nature and varied between 6.9 and 7.9. The natural water pH may range between 4.4 and 8.8 (NEERI 1988). Reducing pH depicts that free CO₂ was almost constantly high in river. Similar observation was recorded by Saha & Pandit (1985).

The dissolved oxygen concentration fluctuated from 7 mg/L to 8.6 mg/L. Minimum values were recorded in April, and maximum in October and December. There is slight fluctuation in oxygen throughout the study period. Higher oxygen values in any river may be due to no contamination and continuous running of water which dissolves oxygen from the atmosphere.

Table 1: Monthly variations in physico-chemical characteristics of Tambraparni river at Kowad during February 2008 to January 2009.

Month	Temp. °C	pH	DO mg/L	CO ₂ mg/L	BOD mg/L	Chloride mg/L	Alkalinity mg/L	Hardness mg/L
February 2008	28.1	6.9	7.8	1.99	0.48	42.8	54.2	20.8
March	30.0	7.3	8.2	1.99	0.46	44.6	52.4	28.5
April	31.2	7.4	7.1	3.99	0.58	88.4	52.6	29.4
May	31.4	7.6	6.9	3.99	0.62	76.6	58.4	26.4
June	27.3	7.9	6.8	3.99	0.68	76.2	57.9	28.8
July	26.4	7.5	7.9	5.99	0.70	62.2	42.3	30.4
August	27.1	7.3	8.3	3.99	0.78	58.4	40.8	30.8
September	28.4	7.8	8.4	2.99	0.80	54.7	46.8	34.6
October	28.3	7.9	8.6	3.99	0.60	51.8	51.8	32.8
November	22.4	7.9	8.4	3.99	0.50	48.4	42.4	26.4
December	22.1	7.4	8.6	5.99	0.48	40.8	40.1	30.4
January 2009	24.6	7.3	8.4	2.99	0.40	40.5	42.2	27.7

Temp. = Temperature, DO = Dissolved Oxygen, CO₂ = Free Carbon Dioxide, BOD = Biochemical Oxygen Demand

Table 2: Simple correlation coefficient test for physico-chemical parameters of Tambraparni river at Kowad.

	Temp.	pH	DO	CO ₂	BOD	Chloride	Alkalinity	Hardness
Temp	1.000	-0.108	-0.577*	-0.417	0.293	0.598*	0.751**	0.002
pH		1.000	-0.040	0.306	0.388	0.292	0.092	0.544
DO			1.000	0.011	-0.188	-0.835**	-0.739**	0.330
CO ₂				1.000	0.253	0.227	-0.426	0.378
BOD					1.000	0.492	0.017	0.577*
Chloride						1.000	0.514	0.129
Alkalinity							1.000	-0.311
Hardness								1.000

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

DO decreases in summer due to increase in temperature which increases catabolic activity utilizing oxygen. Similar observations were made by Gonzalves & Joshi (1996).

Carbon dioxide concentration ranged from 1.99 mg/L to 5.99 mg/L. Minimum values were recorded in February and March, and maximum values in July and December. According to Das (1961), the decrease in pH during summer may be ascribed to decrease in the amount of water which ultimately increases the concentration of free CO₂ released by aquatic organisms. Statistically it is positively correlated with pH ($r = 0.3057$) as given in Table 2.

BOD fluctuated between 0.40 mg/L and 0.78 mg/L, which show that the water is suitable for drinking and agriculture.

Chloride values varied between 40.5 mg/L and 88.4 mg/L. Minimum values were recorded in January, and maximum in April. The presence of higher values is because of discharge of domestic animals and human waste. Similar observation is made by Karne & Kulkarni (2009).

Alkalinity fluctuated from 40.1 mg/L to 58.4 mg/L. The minimum value was recorded in December, and maximum

in May. Most of the alkalinity in natural waters is formed due to dissolution of CO₂.

Total hardness values ranged from 20.8 mg/L to 34.6 mg/L. Hardness of water is due to the presence of certain salts of calcium, magnesium and other heavy metals (Jain 1988). If hard water is used for drinking it causes undesirable effects on digestive system (Pitchammel et al. 2009). The Tambraparni river water is soft with average value of hardness as 28.92 mg/L.

It can be concluded that at present the water is free from pollutants but in due course if anthropogenic activities continue, may lead to pollution. Some preventive measures must be taken by the local people such as:

1. Washing of cloths, domestic animals and cleaning vehicles must be prohibited.
2. Sewage should not be discharged to the river water.
3. Immersion of idols must be at a specific site.

REFERENCES

- APHA 1991. Standard Methods for Examination of Water and Wastewaters. 16th Ed., American Public Health Association, Washington DC, USA.

- Bath, K.S. and Singh, Jatinderpal 1988. Limnology of polluted urban pond. *Environ. & Ecol.* 16: 776-779.
- Das, S.M. 1961. Hydrogen ion concentration, plankton, plankton and fish in freshwater extropic lakes of India. *Nature*, 191: 511-512.
- Gonzalves, E. A. and Joshi, D.B. 1946. The seasonal succession of the algae in a tank of Bandra. *Jl. Bombay. Nat. Hist. Soc.*, 46(1): 154-176.
- Jain, P.C. 1988. *Engineering Chemistry*. Dhanpal Rai & Sons, Delhi.
- Karne, A.V. and Kulkarni, P.D. 2009. Studies on physico-chemical characteristics of freshwater bodies in Khatav Tahasil, Maharashtra. *Nature Environment and Pollution Technology*, 8(2): 247-251.
- NEERI 1988. *Manual on Water and Wastewater Analysis*, National Environmental Engineering Research Institute, Nagpur.
- Saha, L.C. and Pandit, S. 1985. Limnological variations in pond and river in ecosystems. *Proc. Nat. Symp. Pure and Appl. Limn.* (ed) Adoni, A.D. Bull. Bot. Soc., Sagar, 32: 124-130.
- Singh, R.K. 1985. Limnological observation on Rihand reservoir (UP) with reference to physico-chemical characteristics. *Ecology and Pollution of Indian Rivers*. Ashish Publication House, New Delhi.
- Sunkad, B.N. 2008. Water quality assessment of Kanbargi water body (Belgaum). *Environment & Ecology*, 26: 191-194.
- Shastri, Yogesh 2000. Physico-chemical characteristics of river, Mosam. *Geobios*, 27: 194-196.
- Pitchammel, V., Subramanian, G.P. and Ranathan, R. 2009. The study of water quality at Madurai, Tamilnadu, India. *Nature Environment and Pollution Technology*, 8(2): 355-358.
- Welch, P.S. 1952. *Limnology*. II Edⁿ, McGraw Hill Book Co., New York.