



**STUDY OF WATER QUALITY OF BHIMA RIVER WATER AT TULAPUR. DIST.  
PUNE. MAHARASHTRA (INDIA)**

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**ABSTRACT**

The present investigation deals with the assessment of seasonal physicochemical variations of parameters of Bhima river water at Tulapur. Dist. Pune.(MS). The study was carried out during the year 2011-2012 in three seasons .The water samples were collected monthly for a period of one year from the sampling station. During the study period, river maintained well alkaline nature of water in the study area. Parameters like COD, BOD, Conductivity, total hardness pH etc. showed variations.

**Key Words**

Physicochemical, Bhima River, Water, Seasonal Variations

**INTRODUCTION**

Water is very much important for existence of organisms. It is the basic need of the living organism as well as plants. 3\4th of the earth is covered with water. Life on earth would be impossible without water. It is a gift to man by nature. But man"s activities have made water as a source of potential danger to his health and every existence. The most basic and important benefit of fresh water is related to the health of people, ecosystem and societies. The present investigation attempts to find out the seasonal variations in the physico-chemical parameters and also focus on water quality.

The lotic ecosystem selected for the present study is the Bhima River, which is the only Perennial River of the area. Wetlands are vital to balance the ecosystem of river and crucial for the diversity of animal and plant species .The owners of agricultural lands on the river banks must help in the framework of





landscape and river basin management. (Khobragade K S 2012). Rich diversity of organisms in an aquatic ecosystem always reflects good water quality and change in water quality due to addition of pollutants or toxic chemicals which affect the diversity and abundance of organisms. Scientific study of water requires qualitative and quantitative assessment of phytoplankton and zooplankton with physicochemical factors affecting over it. (Sarwade A B 2013).

The present piece of work was carried out for one year i.e. from October - 2011 to September - 2012. The parameters like Water pH, Conductivity, Total solids, Total dissolved solids, Total Alkalinity, Chlorides Sulphates, Nitrates, COD, BOD etc. were analyzed Chemical analyses of water provide a good indication of the chemical quality of the aquatic systems, but do not integrate ecological factors such as altered riparian vegetation or altered flow regime and therefore, do not necessarily reflect the ecological state of the system (Karr et al., 2000).

## **MATERIALS AND METHODS**

To analyze physico-chemical parameters, water samples were collected every month for the period of one year. Water samples were collected from the marginal areas at 1 to 1.5 m depth in dried plastic cans of five liter capacity during morning hours. The sampling site selected is the sampling station at Tulapur Dist. Pune. The parameters like water pH, temperature, turbidity were analyzed at the sampling station and CO<sub>3</sub>, NO<sub>3</sub>, Nitrates, alkalinity, COD, BOD were analyzed in the laboratory using pertinent literature, APHA (2005).

## **RESULTS AND DISCUSSION**

Physical parameters for water quality such as turbidity, conductivity and water mass influence the chemical nature of water. Quality of water plays a vital role in the chemical and organic status of water reservoir, therefore, it is necessary to check and maintain water quality standards through proper management strategies. (Goswami A P 2013). Physico-chemical characteristics



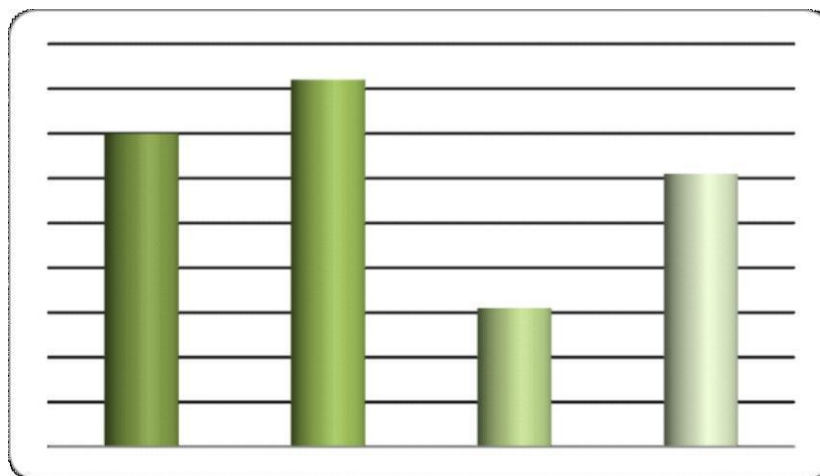


are very important since they have a profound effect on the diversity of living organisms dwelling in them. The seasonal variations in physico-chemical parameters of Bhima river water at Tulapur. Dist. Pune (MS) are represented in Tables 1.

**Table 1:** Seasonal values of physico-chemical parameters in River Bhima during 2011-12 at site Tulapur.

Parameters	Winter	Summer	Monsoon	Average
pH	8.20	8.32	7.81	8.11
Conductivity	0.99	0.35	0.45	0.60
CaCO <sub>3</sub> (mg/L)	272	363	302	312
Ca (mg/L)	40	48	38	42
Mg(mg/L)	17	22	17	19
Total solids mg/L	520	570	410	500
Totaldissolvedsolid	495	556	405	485
Chlorides (mg/L)	133	138	122	131
SO <sub>4</sub> (mg/L)	60	70	58	63
Nitrates (ppm)	2.24	2.70	2.10	2.35
Total alkalinity (mg/L)	100	186	130	139
COD (mg/L)	52	28	28	36
BOD (mg/L)	10	23	10	14

### pH of Bhima river water during 2011-12 at Tulapur



**Fig. No.1:** Graph showing the variations in water pH of Bhima river at the Samping station Tulapur during the year 2011-2012





## pH

According to George (1997) pH is an important parameter of water, since most of the aquatic organisms are adapted to average pH and do not withstand abrupt changes. During study period, river maintained well alkaline nature in the study area. The pH values were found alkaline throughout the study ranging 7.81 to 8.32. The pH of water of Bhima river at the study area showed alkaline in nature and have significance for fish culture. Maximum pH was recorded during summer and minimum during monsoon season. Narain and Chauhan (2000) recorded maximum pH in summer and minimum in monsoon, similar observations were also reported by Bandela *et al.*, (1998) and Khalique (1995).

### Conductivity of Bhima river water during 2011-12 at Tulapur

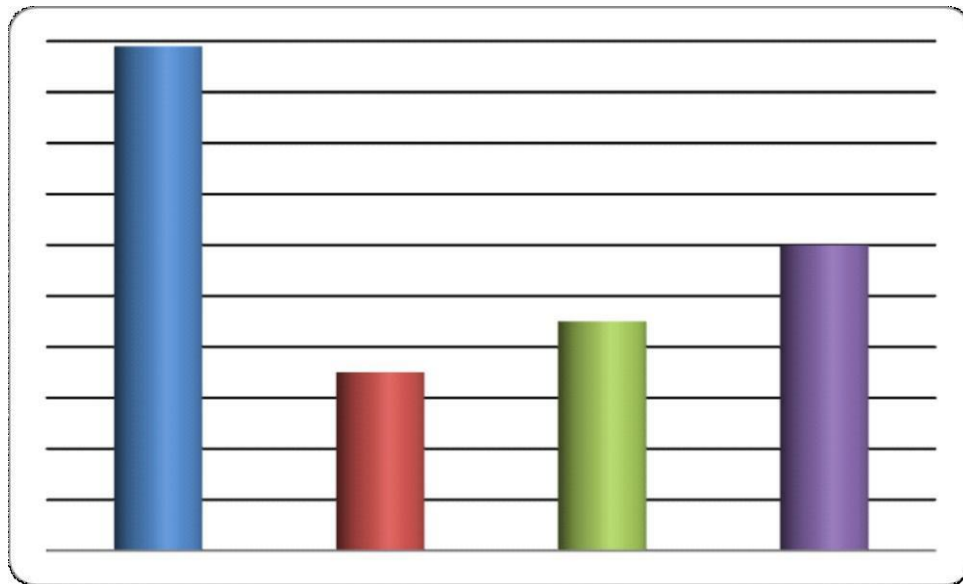


Fig. No.2: Graph showing the variations in conductivity of Bhima river water at the Sampling station Tulapur during the year 2011-2012

## Conductivity

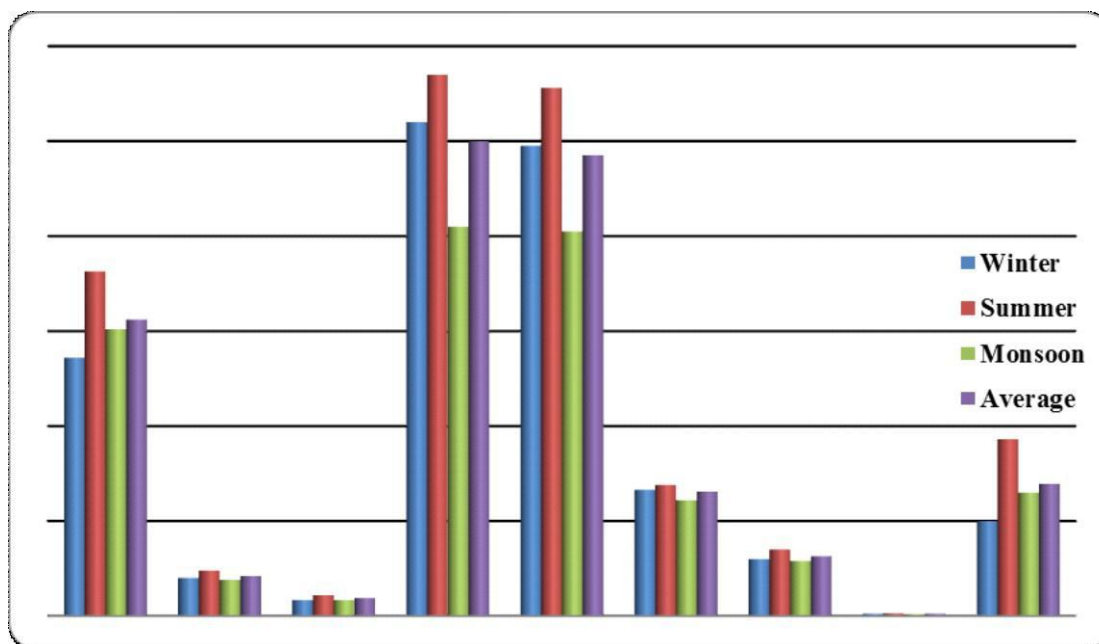
Conductivity totally depends upon the concentration of ions in the water. In the present investigation, maximum is 0.99 conductivity was recorded during winter and minimum 0.35 during summer season.



## Total Hardness

Total Hardness of water is the sum of the concentration of alkaline earth metal cations. In the present investigation, Total hardness value of the water was 410 to 570 mg/l of which higher value was in summer while the lowest in monsoon season. maximum Total Hardness was recorded during summer season at station may be due to low water level and addition of calcium and magnesium salts used for different anthropogenic activities in the vicinity. However, low values during rainy season attributed to dilution on account of heavy precipitation. The maximum permissible limit for this parameter for drinking water standards is 500 mg/l.

**Parameters of Bhima river water during 2011-12at Tulapur(MS)**



**Fig. No.3: Graph showing the variations in water parameters of Bhima river at the Samping station Tulapur during the year 2011-2012**

## Total dissolved solids

The standard range of TDS is from 405 to 556 mg/L. The values are found within the range. The TDS large amount is due to algal cell in effluents and eutrophication. Chlorides



The value of chlorides fluctuated between 122 mg/l to 138 mg/l. The minimum values were recorded in the month of July while maximum in the month of May 2012. The minimum value observed in monsoon may be due to addition of fresh rainwater during monsoon period (Narayan et al. 2007). Chlorides permissible range is between 100 to 250 mg/L. (Gupta 2004). Chourasia and Adoni (1985) also found similar behaviour of chlorides in their studies on Sagar lake with summer maxima and winter minimum.

### **Sulphates**

The permissible limit of sulphates is 200-400 mg/l. (APHA, 1989.) In the water of Bhima at Tulapur it ranges from minimum 58 mg/l to maximum 70 mg/l.

### **Nitrate**

Nitrate is an excellent parameter to judge organic pollution and it represents the higher oxidized form of nitrogen. Nitrate value fluctuated between 2.10 mg/l to 2.70 mg/l during the study period. The present investigation shows the maximum value of Nitrate during summer and minimum during monsoon season. The most important source of nitrates is biological oxidation of nitrogenous substances present in sewage, industrial wastes, chemical fertilizers, decayed vegetables, animal feed lots, leachates from refuse dumps, septic tank effluent, etc. High amounts of nitrates in river water are indicative of pollution.

### **Total Alkalinity**

Alkalinity is the measure of buffering capacity of the water. It is generally imparted by the salts of carbonates, bicarbonates, phosphate, nitrates etc. (Yellavarthi, 2002). During present study showed minimum value of 100 mg/l and maximum value of 186 mg/l. In the present investigation, maximum value of Total Alkalinity was recorded during summer and minimum during monsoon season. Sankaran (1988) in Adyar River reported high values of alkalinity in summer and low during rainy season.





## COD

The Chemical Oxygen Demand (COD) determination is a measure of the oxygen equivalent of that portion of the organic matter in a sample that is susceptible to oxidation by a strong chemical oxidant. COD test is used to measure the load of organic pollutants in the industrial waste water. COD values were found to be 28 mg/L to 52 mg/L at sampling station Tulapur of Bhima river water. The estimation of COD is of great importance for waters having unfavourable conditions for the growth of microorganism, such as presence of toxic chemicals (Saxena, 1994). Highest COD value was observed in winter season.

## BOD

BOD is the tendency of micro-organisms to use oxygen. Therefore, no specific standards given. It is the quantity of oxygen required to stabilize degradable organic matter under anaerobic conditions. The values range from 10 to 23mg/l at sampling station Tulapur. (Srivastava Manish, 2004).The present investigation shows the BOD maximum during summer at Tulapur. Increased temperature and sedimentation load reduce BOD (Pyatkin and Krivoshein, 1980).

### COD & BOD of Bhima river water during 2011-12 at Tulapur

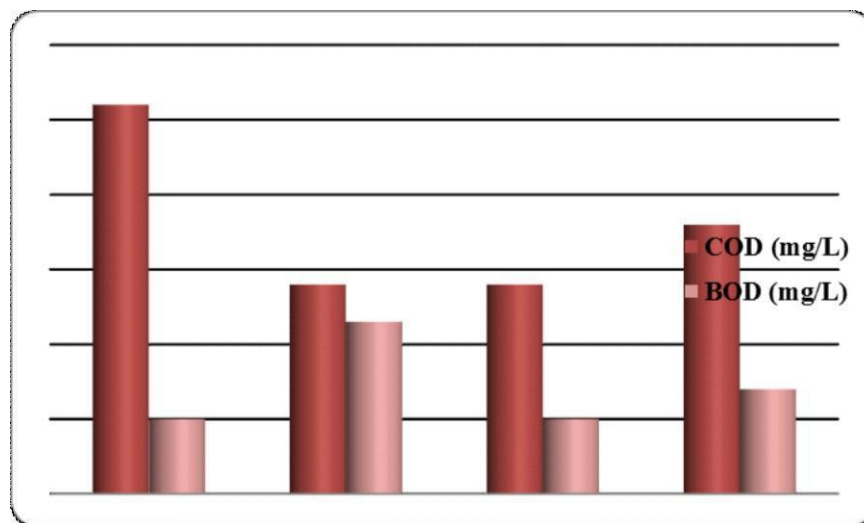


Fig. No.4: Graph showing the variations in COD and BOD of Bhima river water at the Samping station Tulapur during the year 2011-2012





## CONCLUSION

During the study of Bhima river at Tulapur the pH values were found alkaline throughout the study ranging 7.81 to 8.32. The electrical conductivity was more in winter than summer, the hardness was more than the permissible limits of water. The TDS values were within the range. Chlorides and sulphates occurred in moderately high range. The high amount of nitrates indicated the water pollution. The alkalinity was also high and the COD values also supported the polluted status of water.

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