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Study of Physico-Chemical Parameters of Bhima River, Indapur Tehsil (Maharashtra: India)

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ABSTRACT

The research article is carried out on the study of water quality with reference to Bhima River. The monthly changes of river water quality were analyzed by different parameters such as pH, temperature, dissolved oxygen (D.O.), carbon-dioxide, hardness, chloride and alkalinity were investigated to assess the suitability of water for various different purposes. The investigated parameters determined showed the fluctuations in the parameters. These fluctuations in parameters can be caused due to various reasons such as industrialization, over population, man- made activities, pollution and many more due to which water is being highly polluted and that adversely affect aquatic as well as terrestrial life. It is important to check the quality of water before drinking because there are many water borne diseases which adversely affect human population which later can cause death. These parameters can easily describe the quality of water as well by graphical representation it is relevant to find fluctuations month to month.

Keywords: Bhima River, Water quality, Physico-chemical parameters.

I. INTRODUCTION

Water is the basic need of all living beings. It is impossible to live without water. Water is the gift by nature to all of us. This natural resource is diminishing day-by-day due to ignorance towards it. There are various sources of water in India in form of lakes, rivers and reservoirs which are used for various purposes such as irrigation, fish production, generation of hydro power plants, industrial water supply, drinking and many more. In last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization, Shivashranappa and Yalakpalli; (2012). The quality of water is essential for human health as well as to maintain biotic and ecological ecosystem. But now-a-days the water quality has become degraded due to various untreated sewage, industrial, agricultural and domestic waste which has adverse effect on the flora and fauna for the aquatic ecosystem.

All living organisms on the earth need water for their survival and growth. As of now only earth is the planet having about 70 % of water, Patil*et.al*;(2015).In South Asian countries such as Nepal, India and Bangladesh, pollution of river is more severe and critical near urban stretches due to huge amount of pollution load discharged by urban activities, Joseph and Jacob;(2010). Domestic effluents continuously resulting in degradation of this habitat at alarming rate, Zingede *et.al*; (1994). The physico-chemical parameters are essential for determining water quality. The temperature is depending on the solubility of oxygen in water. DO (dissolve oxygen) is important to maintain biological life of water. The

source of DO is atmosphere and photosynthesis of aquatic plants. Low oxygen is responsible for killing aquatic flora and fauna. pH (PotentiaHydrogeni) is the negative logarithm of hydrogen ions which indicates water is acidic or basic. This is measured in scale of 0 to 14. pH value 7 is neutral, less than 7 is acidic and greater than 7 is basic, Dixit *et.al*;(2013) The hardness of water is caused due to detergents and soaps used for washing clothes which makes water harsh. Alkalinity is caused by dissolved bicarbonates. The CO_2 from atmosphere and respiration of soil organism dissolves Mg and Ca in the water which produces hardness and alkalinity of water. Chloride is present in almost all natural water bodies which increase as increasing salinity. The lotic ecosystem, which deals with this research work, is Bhima River in Bhigwan (Tehsil-Indapur). BhimaRiver is Major River in south India. It flows through Maharashtra, Karnataka, Telangana states and then enters the Krishna River. In Bhigwan there is an industry BILT (Ballarpur Industries Limited) is located at village called Paundhwadi. This company provides paper and paperboards mainly coated papers. BILT has been granted clearance from Maharashtra State Pollution Control Board. The waste water in BILT is generated from paper, oil machine. These are being treated in ETP (Effluent Treatment Plant) which is useful in generation of waste water. The Indapur tehsil is at the stage of development and has major sugarcane factories which are provided with treatment facilities. The effluents are treated by sludge process which requires few months for stabilization. The under treated effluents used for irrigation causes ground water as well soil pollution.Some factories discharge it's effluents directly on land which further goes to the water and

pollutes it.The site of collection is under rural area where education is low. The people living around these area are unaware about good hygiene practices as well as there is improper drainage system. Due to this the sewage is dispersed in river water. This leads to the contamination of water and this can be observed by studying different physico-chemical parameters. The main aim and objectives of this research article is to find out the monthly variation of physico-chemical parameters from October 2017 to March 2018.

II. MATERIALS AND METHODS

For determining the physico-chemical parameters, water sample were collected between 8:00-8:30am from the site of the collection. For estimation of dissolve oxygen content, the water sample was fixed immediately on the field and estimated in the laboratory using Wrinkle's method. Temperature and pH were recorded on the field by centigrade thermometer and pen pH meter respectively. The carbon-di-oxide, alkalinity, hardness, dissolved oxygen, chloride where investigated by titration method on the same day in the laboratory, (Golterman *et.al*, 1978 and APHA, 1985).

Table 1. Method of Analyzing parameters.

SR.NO	WATER QUALITY PARAMETERS	METHOD OF ANALYSIS
1	Temperature	Thermometer
2	pH	pH meter
3	Dissolved oxygen	Winkler's method
4	Carbon-di-oxide	Phenolphthalein method
5	Alkalinity	Titration
6	Chloride	Mohr's method
7	Hardness	EDTA method

III. RESULT AND DISCUSSION

The investigation involves Physico-chemicals parameters of Bhima River in Bhigwan (Tal- Indapur) to find out the month variations. Physico-chemicals parameters like pH, temp., DO, CO_2, alkalinity, Cl and hardness were tested in month of October and November 2017.In the study water temperature range was 27^0C (October), 21^0C (November) and 19^oC. pH range was 6.4 (October), 5.0 (November) 5.0(December). Tazzwell (1957) suggested that minimum of 3mg/l dissolved oxygen is necessary for

healthy life of fish and aquatic life. In the study dissolve oxygen range was 0.12 mg/l (October), 1.12mg/l (November) and 0.42mg/l which is not suitable for flora and fauna of the river. CO_2range was 15 mg/l (October), 9.0 mg/l (November) and 5.0mg/l (December) which depends on respiration of the aquatic animals. The estimated hardness of water range was 310 mg/l (October), 240 mg/l (November) and 222mg/l (December) it depends on Ca, Mg salts from detergents and soaps used for washing cloths by villagers. Alkalinity range was 28 mg/l (October), 102mg/l (November) and 51.6mg/l(December). The chloride range was 226.92mg/l (October), 70.97mg/l (November) 17.9mg/l which depends on pollution by organic matter.

Table 2. Monthwise physicochemical parameters of Bhima River.

SR.NO	PARAMETERS	MONTHS		
		OCTOBER	NOVEMBER	DECEMBER
1	Temperature	27°C	21°C	19°C
2	pH	6.4	5.0	5.0
3	Dissolved oxygen	0.12mg/l	1.12mg/l	0.42mg/l
4	Carbon-di-oxide	15mg/l	9mg/l	5mg
5	Alkalinity	38mg/l	114mg/l	51.6mg/l
6	Chloride	226.92mg/l	70.97mg/l	17.99mg/l
7	Hardness	310mg/l	240mg/l	222mg/l

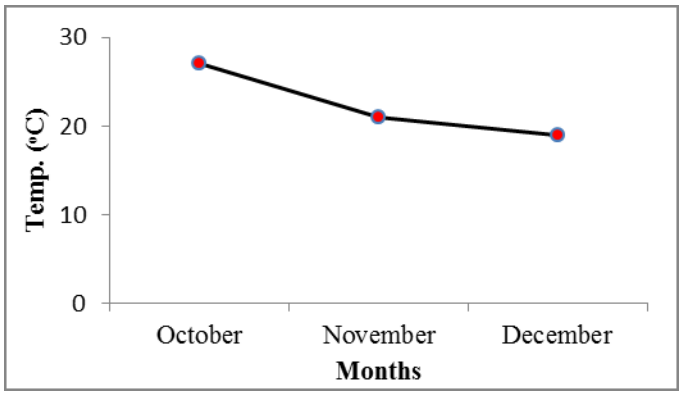

Figure 1. temperature (°C)

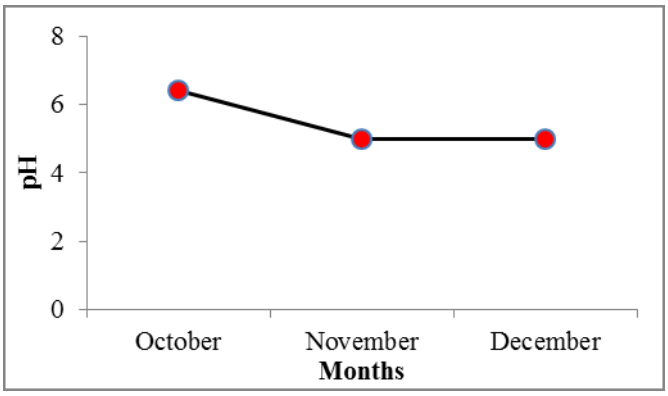

Figure 2. pH

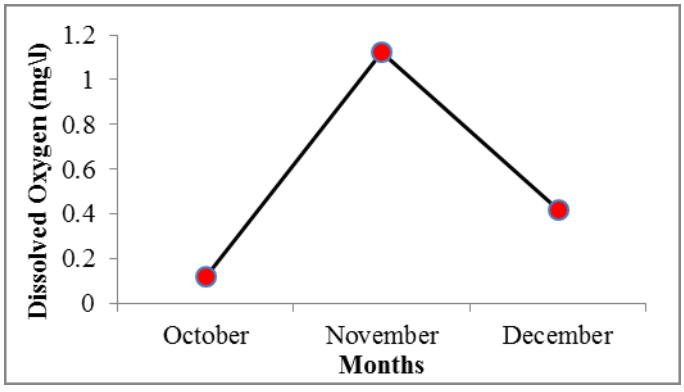

Figure 3. Dissolved Oxygen (mg\l).

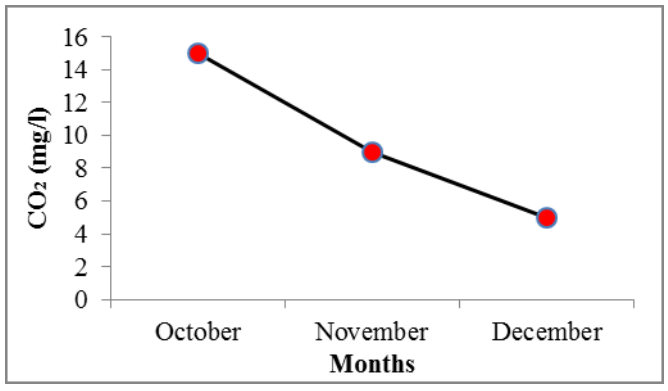

Figure 4. CO_2 (mg/l)

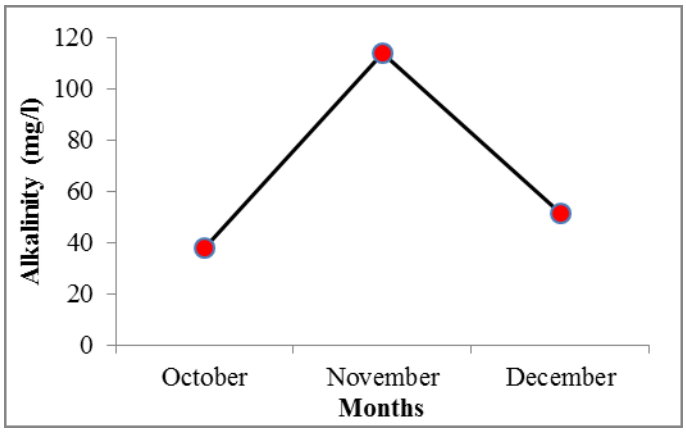

Figure 5. Alkalinity (mg/l)

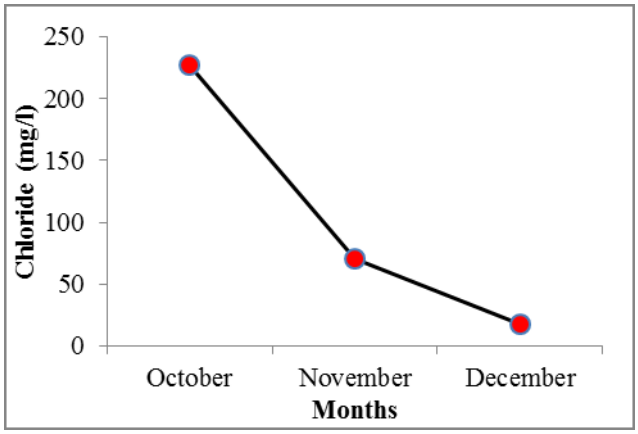

Figure 6. CO_2 (mg/l)

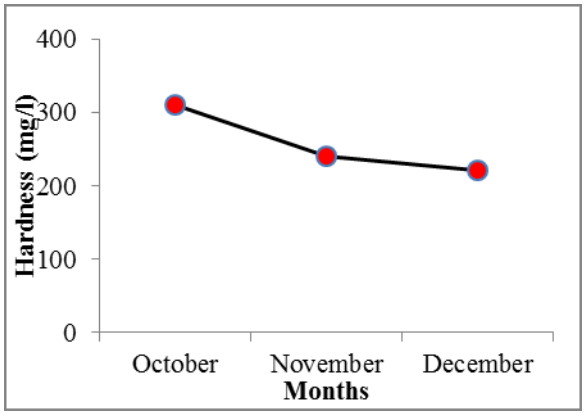

Figure 7. Hardness of water (mg/l).

Figure 1, The above graphical representation is of temperature from month of october to december. The temperature shows the gradual decrease according to the data. The decrease in temperature may be due to winter season which results water to be more cold. **Figure 2,** The above graphical representation is of pH from month of october to december. It is essential to find water is acidic or basic. According to the data from month october to december water is found to be acidic in nature which is not suitable for aquatic life. Figure 3, The above graphical representation is of dissolved oxygen (D.O.) from month of October to December. It is one of the important parameters. It plays a important role in maintaining the aquatic life. According, to the data the D.O. was very low in October it raised upin November and again decreased in December. This fluctuation during months may be depending on the amount of atmosphere oxygen dissolved as well as photosynthesis by aquatic plants. As, the amount of D.O. is very low it is not suitable for the flora and fauna and may cause death. Figure 4, The above graphical representation is of carbon-di-oxide from month of October to December.

According, to the data the CO2 decreased monthly. It depends on the atmosphere as well as respiration of the aquatic organisms.**Figure 5** The above graphical representation is of alkalinity from month of October to December. According, to this data the alkalinity shows greater fluctuations, as it is lower in October increases highly in November and again decreases in December. Alkalinity is important in stabilizing pH as well has capacity to neutralize acids. It is caused by dissolving bicarbonates. Figure 5 The above graphical representation is of chloride from month of October to December. According to the data, there is a greater fluctuation in month of October and November and less fluctuation in month of November and December compared to October. It depends on the contamination as well salinity of water. Figure 7, The

above graphical representation is of hardness of water from month of October to December. The hardness of water shows gradual decrease every month. The hardness is caused due to detergents and soap which makes water hard and destroys the capacity of water. Calcium and magnesium are the important ions that are responsible for hardness

IV. CONCLUSION

From the above experimentation result of three months it can be concluded that the water is not suitable for use. The water is highly polluted according to the data analyzed. The water has very low amount of oxygen content where no organism can survive for long period of time. As well, the water is found to be acidic which is again neither suitable for aquatic life not suitable for use of human. The water is contaminated which can't be drink. The local peoples live there use non-sanitary toilets, poor drainage system, the domestic waste are directly thrown into the river water, the clothes, vessels as well as animals are washed into the river by many people's these causes severe contamination of water. This water is directly drunk by the village peoples by whom they may suffer from many water borne diseases It is important to aware as well as educating people for hygiene and sanitary purpose. The strict action should be taken for contaminating the water. The water should always be analyzed before drinking to be safe from diseases. For healthy, living life is not only necessary to have a healthy food, it is also important to drink clean water too.

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