

# Study on seasonal variations in the water quality of Bhima river flowing through Khed Tehsil

<sup>1</sup>Pardeshi B. M., <sup>2</sup>Bhor G.L., <sup>3</sup>Salve A. N., <sup>4</sup>Sardesai M. M.

<sup>1</sup>Research scholar BAMU, Aurangabad,

<sup>2</sup>Associate Professor H.R.M. College, Rajgurunagar,

<sup>3</sup>Associate Professor & Head Government Institute of Science Aurangabad,

<sup>4</sup>Professor Department of Botany, SPPU Pune

**Abstract:** The present paper deals with study of the physico-chemical analysis of water sample of Bhima River flowing through Khed Tehsil, Pune District, and Maharashtra. The water samples were collected at an interval of a month. 10 sampling stations were selected on the basis of their topology, and various incoming water resources joining the main rivers stream. Following parameters were analyzed viz. temperature, total dissolved solids, pH, dissolved oxygen, total hardness, chlorides, alkalinity, phosphate and nitrates. The analysis of data showed marked difference in the water quality parameters at different sampling stations, which may be due to varying inputs discharged from different sites.

**Keywords:** Physical-Chemical analysis, Bhima River, Khed Tehsil.

**I. Introduction:** Water is essential for the existence of man and all living things.<sup>[1]</sup> In India the riverine system are getting polluted day by day. The riverine system is one of the most important resources of water supply in different countries of the world. It provides water for drinking agricultural and industrial purpose. <sup>[2]</sup> The quality of groundwater depends on various chemical constituent and their concentration which are mostly derived from the geological data of the particular region. Industrial waste and municipal solid waste have emerged as one of the leading cause of pollution of surface water. In many part of the countries available water is rendered non-potable because of the presence of heavy metal in excess. The situation gets worsened during the summer season due to water scarcity and rain water discharge. <sup>[3]</sup> (Gupta 2009) <sup>[4]</sup> today acute pollution prevails in many rivers. As the water flows downstream it pickup silt; minerals and mineral salt from the soil and rock in the riverbed. Many other pollutants enter river water as it flows downstream including animal waste ;sewage agricultural and urban runoff; industrial effluent due to which unfortunately most of the river are facing pollution problem or under threat of pollution. Hence there is increasing upkeep interest to clean river water.<sup>[5]</sup> People on the globe are under tremendous threat due to undesired changes in the physical and biological characteristics of water and soil. These are related to animals and plant and finally affecting on it. <sup>[6]</sup> (Mishra and Dinesh-1991)<sup>[7]</sup>. The increased use of chemical based fertilizer in agricultural revolution of the government could result in continuous rise in concentration of metal pollution of drinking water cause water borne disease which has lead to the death of millions of people. (Adefemi and Awokumi-2010)<sup>[8]</sup> Water has been a potential carrier of toxic inorganic and organic materials, non biodegradable matter. Pathogenic microbes which can endanger health and life. It is very essential to test the water before use for drinking and domestic and industrial purpose. Water must be tested with different physic chemical parameters. Selection of parameters are solely depend for what purpose we are going to use that water and what extent we need quality and purity. Water does content different types of floating dissolved suspended and microbiological as well as bacteriological impurities.<sup>[9]</sup> The river Bhima is one of the main river of Pune districts which originate from Bhimashankar which is situated at western sides of Sahyadri ranges. It flows towards south east and enter in Solapur district. The Bhima river water is the main source of water, in Khed taluka beside this it is used for industrial and domestic purpose. The agricultural activities are carried out at very large scale on the both the bank of river Bhima. Khed taluka is popularly known as vegetable hub due to agronomic practices, the use of pesticides and chemicals are washed away from the fields and ultimately reaches or accumulate in water bodies or low lying areas water pollution has created a serious impacts on human life due to various waterborne disease leads to decreased food intake and nutrients absorption malnutrition reduced resistance to infection and impaired physical growth and cognitive development. Thus it is worthwhile to assess the quality of the Bhima river water to study its physical appearance such as temp , pH, TDS etc. while chemical test should be perform for its DO ,BOD, COD, Nitrates, Phosphates, Alkalinity, Chlorides and Hardness and other for obtaining more and more quality and purity of water.

Table 1 Physiochemical Parameters of Bhima River Water

	pH			Temp			Conductivity			Total dissolved solid		
	Feb-May 14	June-Sept 14	Oct-Feb15	Feb-May14	June-Sept14	Oct-Feb15	Feb-May14	June-Sept14	Oct-Feb15	Feb-May14	June-Sept 14	Oct-Feb15
S1	7.5	7.2	6.9	25.75	25.5	24	0.54	23.91	94.94	0.73	0.19	0.28
S2	7.6	7.5	6.3	26.25	25.75	25.5	0.55	24.34	92.2	0.83	0.24	0.38
S3	7.3	7.2	6.4	25.25	26.25	24.5	0.34	20.73	97.94	0.91	0.34	0.56
S4	7.5	7.3	6.3	27	27.5	24.5	0.39	21.93	116.32	0.09	0.41	0.68
S5	7.7	7.2	6.6	27.5	27.75	25.25	0.43	28.81	124.66	0.08	0.31	0.96
S6	7.3	6.7	6.3	29.25	28.25	26	0.63	28.53	130.26	0.08	0.47	1.03
S7	6.7	6.6	6.4	29	27.25	26.25	1.27	40.37	180.9	0.44	0.5	1.2
S8	7.2	6.5	6.4	28	27.25	27.75	0.58	41.3	182.72	0.14	0.55	1.3
S9	8.5	6.9	6.7	28.5	27.5	25.75	0.31	42.58	187.32	0.21	0.65	1.5
S10	8.5	7	7.7	29.5	28.25	25.25	0.45	42.36	185.4	0.23	0.69	1.62

Table 2 Physiochemical Parameters of Bhima River Water

	Total solids			Alkalinity			Hardness			Calcium Hardness		
	Feb-May14	June-Sept 14	Oct-Feb15	Feb-May14	June-Sept14	Oct-Feb15	Feb-May14	June-Sept14	Oct-Feb15	Feb-May14	June-Sept 14	Oct-Feb15
S1	0.93	0.26	0.14	311.2	335	152.8	140.55	156.5	78.52	20.94	23.49	20.72
S2	1.12	0.35	0.19	314.7	327.5	153.6	197.85	143.8	78.32	20.2	24.38	21.95
S3	0.015	0.23	0.23	678.7	631	170.2	74.5	243.5	227.72	28.31	28.84	24.82
S4	0.14	0.36	0.23	660	667.8	180.46	89.875	247.1	233.9	30.51	35.23	26.88
S5	0.05	0.44	0.54	721.25	724.3	240.26	108.15	242.3	235.84	28.96	34.69	30.23
S6	0.3	0.4	1.7	807.5	886.5	270.6	119.27	391	277	28.86	42.48	34.53
S7	0.2	0.37	1.76	1052.5	1022.3	291.54	611.52	596.5	484.74	34.26	43.58	43.01
S8	0.6	0.43	1.93	1075.5	1087.8	340.88	554.02	660.5	445.44	43.52	47.9	46.4
S9	0.5	0.55	1.97	967.5	1272.7	460.34	555.67	683.6	482.62	44.4	39.69	48.6
S10	1.5	0.67	2.14	1067.5	1238.2	501	549.42	708.07	483	44.27	54.75	46.93

Table 3 continue...

	COD			Nitrates			Phosphates		
	Feb-May14	June-Sept14	Oct-Feb15	Feb-May14	June-Sept14	Oct-Feb15	Feb-May14	June-Sept14	Oct-Feb15
S1	2.5	1.8	2.6	1.16	0.86	1.75	0.67	0.28	0.27
S2	2.8	3.1	3.2	1.27	0.97	1.49	1.12	0.72	0.69
S3	3.5	3.8	4	1.17	1.33	1.47	1.27	1.33	1.75
S4	4.1	4	4.9	2.38	1.49	2.29	1.51	2.14	1.77
S5	6.1	4.4	5.4	3.47	1.83	3.02	2.14	1.98	2.07
S6	7.6	5.4	6.3	3.66	2.77	4.55	2.24	2.06	2.14
S7	9.4	6	7	4.23	2.8	5.36	2.93	2.33	2.49
S8	10.2	6.5	7.1	5.51	3.36	5.9	3.36	2.56	2.85
S9	10.8	7.2	7.9	6.49	3.52	6.58	4.27	2.75	2.84
S10	11.4	8.29	8.3	7.73	5.44	7.13	4.26	2.89	3.12

\*All values in the table are mean of four month for each season

**II. Material and Methods:** The water samples were collected in the early in morning in between 8.00 am to 11.00 am the samples were collected from the Bhima river at 10 sampling stations. The sampling location were selected on the basis of residential area surrounding land use, highly flooded area water samples were collected over a period of 12 month from Feb -14 to Feb- 15.samples were collected from downstream direction in a plastic container of 2 liter capacity with necessary precaution. For DO and BOD samples are collected in stopper bottles 300 ml capacity.

The parameters like pH, Temp. were determined at the field at the time of sample collection.(Ph-Henna digital pH meter, temp by thermometer)the other parameters such as solids ,total solids, hardness, chlorides, alkalinity DO ,BOD ,COD are analyzed at the laboratory. All reagents are analytical grade and solutions were made in the distilled water .the analysis of parameters by using standard methods –APHA 20<sup>th</sup> edition. The instruments were calibrated before using. The 2-3 readings were made to ensure precisions and calibrating

### III. Results and discussion:

**Temperature:** Water temp plays important factor which influences the chemical biochemical and biological characteristics of water body the maximum temp is 31<sup>o</sup>C recorded in the month of May and minimum temp. 23<sup>o</sup>C in the month of December. Similar results obtained by Salve and Hiware.

**pH :** The pH value of the drinking water is an important index of acidity, alkalinity and resulting values of the acidic basic interaction of a number of its minerals and organic components. In the present study pH values of samples varies from pH 6.11 to pH 8.44 which lies in the range prescribed by APHA.

**Total Dissolved Solids:** The total dissolved solids fluctuations from 0.01 to 1.9 mg/lit. The maximum values of TDS is recorded at the sampling stations no 9 Brick Factory in the month of Feb 15 .The lowest TDS are recorded 0.01 g/lit. in the month of march at the sampling site Padali.

**Alkalinity:** the alkalinity ranges from 145 mg/lit to 1460 mg/lit. The maximum value was recorded in the month of May to July is 1460 mg/lit .and the minimum value in winter Sept to December 145 mg/lit. The alkalinity is maximum in summer and minimum in winter the similar results are obtained by Hajare<sup>10</sup>, it is due to high photosynthetic rate.

**Chlorides:** the average concentration of chlorides is in between 0.95 mg/lit to 4.99 mg/lit ( $\pm 0.1$  mg/lit)

**Dissolved Oxygen:** Among all the sampling stations DO is varies from 0.6 mg/lit to 5.8 mg/lit. The concentration of DO among all river station is low and some sampling is high. The possible reason for low DO is due to the presence of material with rich organic content responsible for depletion of oxygen. (Das and Acharya, 2003) The higher DO at the sampling station ETP Plant, HRM college and brick factory is due to the reflection of high level of photosynthetic activity.

**Electric Conductivity:** electric conductivity fluctuates in the range of 92 mhm /cm to 196.4 mhm /cm.

**Calcium and Magnesium Hardness:** the Ca<sup>++</sup> and Mg<sup>++</sup> hardness are in the range of Calcium 18.5 to 58.22 mg/lit and Magnesium is 11.4 to 775.3 mg/lit. The limits of calcium and magnesium hardness have been prescribed in range 75 -200 mg/lit and 50 -100 mg/lit. respectively.

**Total Hardness:** The value of hardness is fluctuating from 78 mg/lit to the u775.6 mg/lit. The hardness of water is minimum in the month of September and minimum in October and maximum in the month of April to June. The hardness is higher at the downstream of river. The similar result is obtained by Hajare.<sup>[10]</sup>

**Biological Oxygen Demand:** BOD test is found to be more sensitive test for organic pollution. The samples collected from the HRM College site ETP Plant and Retawadi shows highest BOD 11.5 and minimum at sampling station Wada ,Chas , Saygaon it ranges from 0.74 to 11.5mg/lit .according to the royal commission of sewage disposal water having BOD more than 5 mg/lit is unsafe for domestic use.

**Chemical Oxygen Demand: (COD)** A huge range of variation is recorded among the collected water samples. The maximum COD at HRM College sampling stations and brick factory is 54.0 mg/lit minimum 1.7 mg/lit. The permissible limit of COD is cod is 10 mg/lit <sup>[11]</sup> (Usharani *et.al.*, 2010). The high value of COD is due to the direct removal of sewage into rivers. It is observed that cod value is more than permissible limit.

**Nitrates:** Nitrates is observing in the range of 1.0 mg/lit to 30.74 .The nitrate proportion is higher at downstream in the month of April May at HRM College Brick factory and Retawadi.

**Phosphate:** The values of phosphates fluctuation from 0.2 to 12.38 mg/lit. The maximum value of phosphates is observation in the month of July and August in the sampling station HRM College brick factory. The minimum value in the month of October. The high value of phosphate is due to rain, surface water runoff; agricultural runoff waterman's activity could have also contributed to the inorganic phosphates. <sup>[12]</sup> The similar results are obtained by Aravindkumar.

**Conclusions:** The present study provides data on Bhima river water quality and help to understand the contamination of water and its possible influences. The major source of pollutants' is local anthropogenic activities, agricultural runoff containing fertilizers, pesticides insecticides and industrial effluents. In the present study it's our effort to evaluate many physicochemical parameters and its characteristics behaviors of river water sample from Feb 2014 to Feb 2015. Many values of the parameters are cross the limit and certain are within the limit. The heavy discharge of domestic sewage in the river basin indicating deterioration of Bhima river water quality. The study highlights the present status of water quality and to protect the important natural water body.

### References:

- (1) Salve V.B. and Hiware C.J. (2008) Study on water quality of Wan prakalpa reservoir Nagpur, near Parli-vaijanath dist. Beed. Marathwada region J.Aqua. Biol 21 (2)- 113-117
- (2) A.J.Dhembre, G.M. Podhe, C.R. Singh- Pollution Research, 1998, 17, 87.
- (3) APHA Standard methods for examination of water & waste water, 16 edit. APHA, AWWA & WPCF; Inc, New York -1985.
- (4) Gupta D.P., Sunita & J.P. Saharan (2009) physicochemical analysis of ground water of selected area of Kaithal city (Harayana) India. Researcher 1(2) pp1-5
- (5) Das J Acharya B.C.(2003) Hydrology and assessment of lotic water quality in Cuttack city, India, water air and soil pollutant 150: 163-175.
- (6) Analysis of raw portable 7waste water, London (1972) Hermajestys stationary office.
- (7) Mishra S.G. and Dinesh D,(1991) Soil Pollution Ashish publishing house New Delhi, India
- (8) Adefemi S.O. and E.E. Awokummi (2010) Determination of physic chemical parameters and heavy metal in water sample from Itaogholu area of Ondo state Nigeria, African Journal of environmental sciences and technology 4(3) pp 145-148.
- (9) B.K. Sharma Environmental Chemistry, Goel Publication house 2005- 19 editions
- (10) Hajare M.S. (2008) Seasonal variation of physicochemical parameters in the perennial tank of Talsande, Maharashtra. Ecotoxicol. Environ. monit 18(3) 233-242.

- (11) Usharani k.,Umrani k ,Ayyasamy P.M. Shanthi K. Lakshmanaperumalsamy P.Physico chemical and Bacteriological chts ofNoyyal river &ground water quality of Perur, India J. Appl. Sci. Environ Manage June 2010 vol-14(2)29-35.
- (12) Aravindkumar, (1995) Some Immunological aspect of the freshwater Tropical wetlands of Santhal pargana (Bihar) India. I.Envi. poll. 2(3):137.

