



## **Evaluation of Water Quality in Bhiwapur Lake, Dist. Nagpur (M.S) India on the Basis of Some Physico-Chemical Parameters.**

**A. D. Bobdey<sup>1</sup>, P. P. Ingale<sup>2</sup>, A. N. Lonkar<sup>3</sup>**

<sup>1</sup>Shivaji Science College Congress Nagar, Nagpur, India - 440012.

<sup>2</sup>Research Academy, SevadalMahilaMahavidyalayaNagpur.India

<sup>3</sup>NutanAadarshmahavidyalayaUmred.Dist: Nagpur, India -441203.

### **Abstract:**

The physico-Chemical Observation was monitored on Bhiwapur Lake during July-2012 to June 2013 to determine the lake water quality. The month wise water sample was collected from the lake by estimating the various physicochemical parameters like- Temperature, pH, Free Carbondioxide, D.O. Were measured simultaneously. The data revealed that there was significant seasonal variation in some Physico-chemical Parameter. Now a day's many human activities created pollution in and around the water body, due to which natural status of this lake may come in the danger zone of water pollution, In this relationship the study was conceded out in which water samples from different (i.e. Five) locations Bhiwapur Lake were collected and analyzed for their physico-chemical characteristics to report water quality. It has been found that the water is not good for drinking purpose in summer seasons. The nutrients are included in sufficient amount for the growth of aquatic organisms in the lake. Present work also embodies suggestion for the conservation of lake environments.

### **Keywords:**

Bhiwapur Lake, Physico-chemical analysis, Lake environmental conservation.

### **Introduction:**

Water is the basis of all kinds of life. It is one of the most essential to good health, necessary for digestion and absorption of food. It helps to various metabolic activities in cell, generation of electrical power, transportation, recreation and Industrial activities. Water is known as a universal solvent. Many water, providing systems treat water with chlorine to demolish disease producing contaminants that may be present in water. The study of different water parameters influenced each other and also the sediment parameter study also very important for understanding of metabolic events in aquatic ecosystem as well as they oversee the abundance and distribution of the flora and fauna. This type of study when done from time to time can indicate the favourable or unfavourable changes occurring in the ecosystem. (S.E Shindeet.al., 2010). The water of Bhiwapurlake is used for aquatic animals, domestic purpose. Domestic animals and most of the population are benefited by this lake for domestic, agriculture purpose. Many researchers have done studies on physico-chemical characteristics of Dam, reservoir, river and lake water Trivedi and Goel (1990), A.M. Kalwale et al., (2012) Bade B.B et al.,





(2009), B.S.Chavan (2012), S. B. Borul (2012). This is a first record such type of study from Bhiwapurlake that's why present study was planned.

## **Material and methods:**

Bhiwapurtahsil of Nagpur district in Maharashtra (India). Bhiwapur town is located east from Nagpur at 74 km. having  $79^{\circ}$ ,  $31^{\circ}04.78''$ E latitude and  $20^{\circ}45^{\circ}40.77''$ N longitude. While, on the way after Bhiwapur three districts border connected in Bhiwapurtahsil namely Nagpur, Bhandara and Chandrapur. Bhiwapur Lake is in Bhiwapurtahsil.

Five sampling stations are selected for the collection of water samples in view of human activities observed along the lake. Station A is located in the Eastern part, Station B is located in the Northern part, Station C is located at south western part and Station D is located in Western and middle part of a water body is considered as station E. A study was conducted from July 2012 to June 2013. For the analysis samples were collected from Bhiwapur Lake in the early morning between 8.30 to 11.00 a.m. in every month at regular interval. The samples were collected three litre container from a depth of 15-20 cms below the surface of water by holding the container upward. Temperature, pH, D.O (Dissolve Oxygen) was analyzed in the field by means of ELIKO makes a digital Water analysis kit and periodically tested by using standard methods given by APHA (1985).

## **Result and discussion:**

### **Temperature:**

Temperature plays significant role in aquatic ecosystem as an important factor. It affects physico-chemical characteristics of water as well as biochemical reaction, population instability in a water body. Atmospheric Temperature followed seasonal climatic pattern. The atmospheric temperature as well as Water temperature observed lowest during the month of January and highest during the month of June. The temperature started decreasing from October and became lower in January. Enhanced values of temperature during summer may be due to intense solar radiation, higher ambient temperature and low water level in the lake. It is supported by Gaike et al., (2011) and Khan et al., (2012) has recorded similar findings.

### **pH:**

Hydrogen ion concentrations play an important role in the biological processes of almost all aquatic organisms. pH is the term used universally to express the intensity of acid or alkaline condition of a solution (S. R. Raut et al., 2013). Maximum pH was recorded during the June month because of increased carbonates and bicarbonate in water, due to increased photosynthetic activities of aquatic flora. Overnight respiration of aquatic flora adds more  $\text{CO}_2$  in water. Moreover microbial degradation of bottom sediments





and pollutants increase ionic content of water. Similar results observed by, P. C. Mane et al., (2010) and Bawankar et al., (2011)

**Free Carbondioxide:**

Free CO<sub>2</sub> plays a significant role in the aquatic environment. Respiratory activity of aquatic organism and process of decomposition are important sources of CO<sub>2</sub> in water bodies. In the present investigation, maximum CO<sub>2</sub> was recorded during summer season and minimum in winter season at all sites. Bobdey et al., (2012) has recorded maximum value during monsoon and summer.

Organic matter input by Slaughterhouse wastes, and anthropogenic activities is responsible for enhanced carbon dioxide in lake water. It showed maximum values during summer season. However, low values of free CO<sub>2</sub> during winter may be due to increased aquatic vegetation and maximum utilization of CO<sub>2</sub> by them during winter, Low values of CO<sub>2</sub> recorded during the winter season were also recorded by Swarnalatha (1994) in Saroornagar Lake, Hyderabad. In present investigation similar results observed by S. G. Kalbandeet al., (2012)

**Dissolve Oxygen:**

Dissolved Oxygen is one of the most important physico-chemical parameter of water, which determines the distribution of aquatic organisms. Animals living in the water utilize this dissolved oxygen for their respiration and metabolic process. It is important both as a regulator of metabolic processes of the organism and community.

Present investigation, maximum dissolved oxygen was found during winter and minimum during summer season. Higher dissolve oxygen values because of circulation of cold water as well as higher solubility of oxygen at lower temperature. Microbial degradation of sewage input and other pollutants are responsible to decline dissolved oxygen from lake water. Kulkarni, R.R. and zade, S. B (2012), Bobdey et al., (2014) has recorded higher value during winter season and lowest recorded during summer season in Ramala water body Chandrapur. Decreasing dissolved oxygen is correlated with increasing atmospheric and water temperature. K. Sehgal et al., (2013).

**Table. 1-** Seasonal temperature of water of Bhiwapur Lake, Bhiwapur.

Spot→ Month↓	A	B	C	D	E
JULY	27.1±0.091	26.5±0.168	26.6±0.129	26.4±0.108	26.8±0.374
AUG	25.0±0.070	25.1±0.177	25.0±0.177	24.5±0.182	25.4±0.336
SEP	27.8±0.195	28.0±0.158	27.8±0.212	27.6±0.129	28.2±0.365
OCT	29.5±0.187	29.8±0.313	29.6±0.185	29.3±0.070	30.0±0.316
NOV	25.0±0.254	25.6±0.129	25.4±0.168	25.3±0.147	25.8±0.316
DEC	21.8±0.168	21.5±0.147	21.4±0.129	21.2±0.129	21.7±0.216





JAN	18.7±0.216	19.2±0.091	19.0±0.108	18.8±0.195	19.6±0.408
FEB	22.3±0.158	22.8±0.129	22.6±0.108	22.5±0.108	23.0±0.244
MAR	28.7±0.108	29.4±0.158	29.0±0.187	28.9±0.168	29.8±0.294
APR	30.5±0.195	31.3±0.091	31.0±0.178	30.8±0.204	31.5±0.244
MAY	32.2±0.182	35.3±0.129	34.7±0.158	33.2±0.108	33.1±0.258
JUNE	33.4±0.091	35.5±0.091	35.0±0.108	33.6±0.182	33.5±0.294

**Table. 2-** Seasonal pH of water of Bhiwapur Lake, Bhiwapur.

Station → Month↓	A	B	C	D	E
JULY	8.2	8.3	8.1	8.0	7.8
AUG	7.9	8.1	8.0	7.8	7.7
SEP	7.7	7.9	7.8	7.6	7.5
OCT	7.6	7.8	7.7	7.6	7.3
NOV	7.4	7.6	7.6	7.4	7.3
DEC	7.4	7.5	7.4	7.3	7.2
JAN	7.3	7.4	7.4	7.2	7.1
FEB	7.7	7.8	7.7	7.5	7.4
MAR	8.4	8.6	8.5	8.3	8.1
EPR	8.3	8.4	8.4	8.2	8.0
MAY	8.6	8.7	8.6	8.5	8.2
JUNE	8.7	8.9	8.7	8.6	8.3

**Table. 3-** Seasonal Dissolved oxygen of water of Bhiwapur Lake, Bhiwapur.

Station → Month↓	A	B	C	D	E
JULY	6.6	6.3	6.7	7.0	7.3
AUG	6.7	6.4	6.9	7.2	7.4
SEP	6.8	6.6	7.0	7.3	7.6
OCT	7.0	6.8	7.2	7.5	7.9
NOV	7.3	7.0	7.4	7.6	8.1
DEC	7.5	7.2	7.6	7.7	8.3
JAN	8.0	7.7	7.9	8.0	8.7
FEB	7.8	7.3	7.3	7.6	8.2
MAR	6.3	5.9	6.0	6.4	6.9
EPR	6.4	6.0	6.1	6.5	7.0
MAY	6.2	5.6	5.8	6.2	6.6
JUNE	6.1	5.5	5.6	6.1	6.4

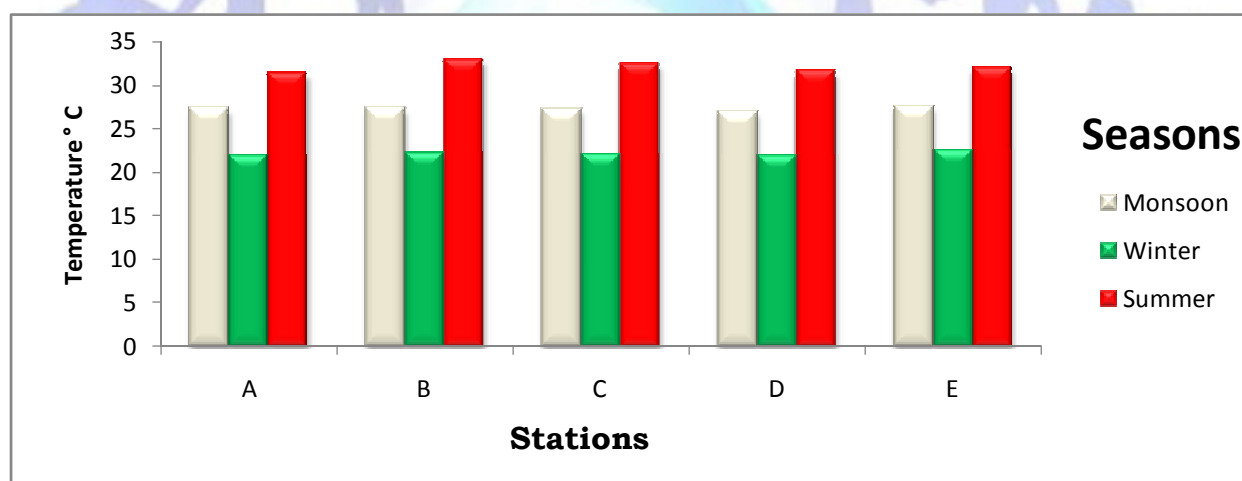




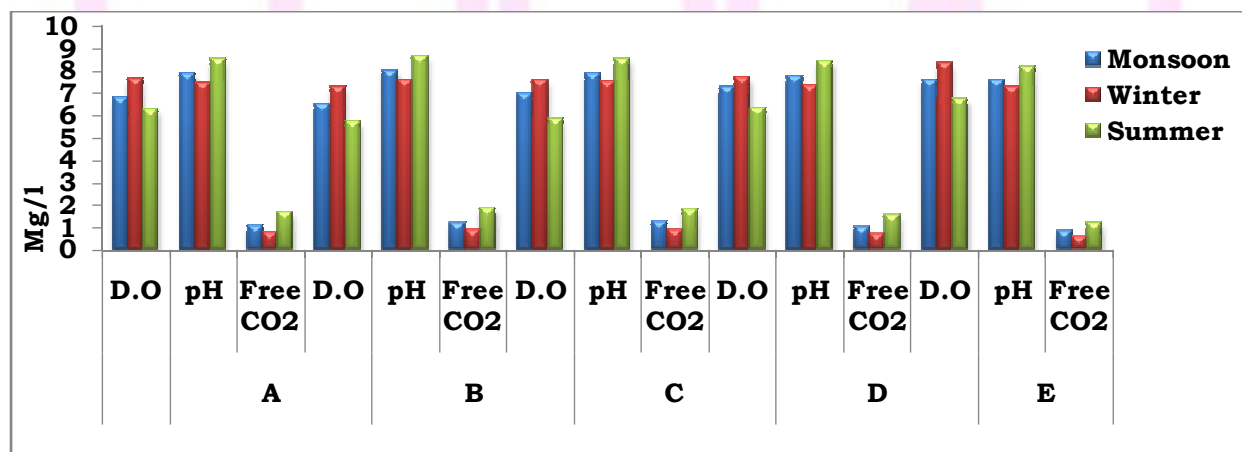
**Table. 4-** Seasonal Free carbon dioxide of water of Bhiwapur Lake, Bhiwapur

Spot→ Month↓	A	B	C	D	E
JULY	1.22±0.050	1.34±0.030	1.35±0.032	1.14±0.022	0.93±0.035
AUG	1.10±0.048	1.26±0.016	1.26±0.016	1.06±0.030	0.87±0.028
SEP	1.00±0.023	1.15±0.020	1.18±0.022	0.92±0.015	0.79±0.027
OCT	0.92±0.025	1.00±0.029	1.10±0.041	0.86±0.011	0.67±0.037
NOV	0.85±0.020	0.95±0.012	1.00±0.039	0.70±0.024	0.56±0.026
DEC	0.78±0.034	0.82±0.018	0.85±0.025	0.65±0.018	0.49±0.019
JAN	0.54±0.038	0.68±0.035	0.62±0.027	0.50±0.037	0.40±0.041
FEB	0.96±0.048	1.00±0.041	0.95±0.043	0.86±0.048	0.78±0.053
MAR	1.48±0.037	1.62±0.035	1.47±0.047	1.22±0.052	1.00±0.072
EPR	1.42±0.047	1.55±0.027	1.40±0.039	1.13±0.031	0.94±0.036
MAY	1.86±0.035	2.00±0.086	2.00±0.011	1.78±0.074	1.38±0.045
JUNE	2.00±0.023	2.14±0.017	2.20±0.018	1.95±0.039	1.53±0.030

**Figure. 1-**Graph Showing Seasonal Mean value of Temperatures:



**Figure. 2-** Graph Showing Seasonal Mean value of D.O., pH, and Free Co<sup>2</sup>:





## Conclusions:

In the present study indicates that all the parameters fluctuate seasonally and attain its peak during summer days. The high temperature of lake water and input of pollutants is only responsible to decline the levels of dissolved oxygen in water. However, the frequency of pollutant input influenced on the hydrogen ion concentration and carbon dioxide concentrations in lake water. Intense solar radiation with increased ambient temperature enhances the values of temperature of water in Bhiwapurlake. During the study period, it is concluded that human activities around the lake is the only cause of the deterioration of water.

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