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# Review Of Research



## MONTHLY VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS OF KATEPURNA RESERVOIR, DISTRICT AKOLA, M.S., INDIA



Jaya R. Pawar and Dilip S. Dabhade

Department of Zoology, R.A. Arts, Shri. M.K. Commerce and Shri. S.R. Rathi Science Mahavidyalaya, Washim.



Jaya R. Pawar

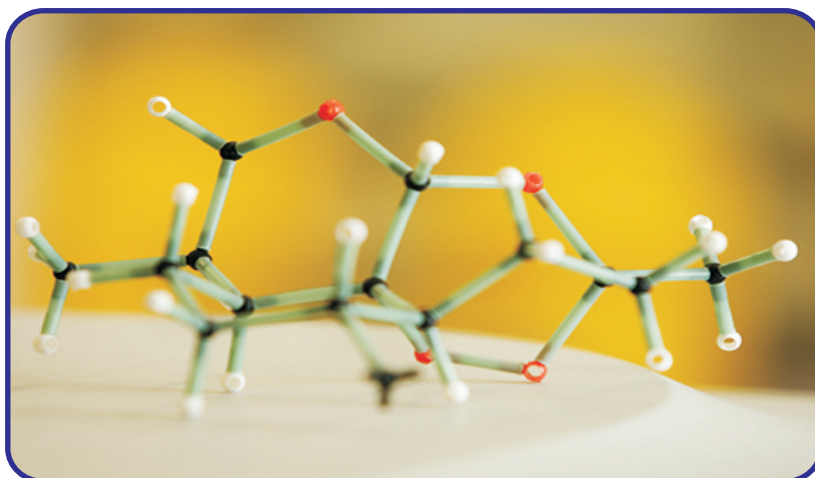
### ABSTRACT

The physico-chemical parameters like temperature, Conductivity, Total Dissolved Solids (T.D.S.), transparency, pH, free CO<sub>2</sub>, alkalinity, dissolved oxygen, total hardness of Katepurna reservoir of district Akola, Maharashtra were analyzed every month.

**KEYWORDS:** Physico- chemical characteristics, Monthly variations, Katepurna reservoir.

### INTRODUCTION:

Water plays a vital role in life and better quality of water described by its physical, chemical and biological characteristics. Because of increased human population, industrialization, use of fertilizers in agriculture and man-made activity. Water of good quality is required for living organisms. Water quality provides current information about the concentration of various solutes



at a given place and time. Water quality parameters provide the basis for judging the suitability of water for its designated uses and to improve existing conditions.

The study of water is essential to identify the potential as a recreational source and the assessment of physico-chemical properties as the water is used for many purposes by the aquatic animals as well as for human being.

The temperature, salinity, pH, conductivity, transparency, Dissolved oxygen, Carbon dioxide, alkalinity, hardness, etc. are physico-chemical aspects present in the water and their minimum and

maximum quantities indicates the environmental health of that particular water body and therefore the study of water quality is the important fact. These aspects also shows their impact on the population of fish also hence this fact also suggests the study of the water qualities.

The management of any aquatic ecosystem is a means of conservation of fresh water habitat with an aim to maintain the water quality of to rehabilitate the physico-chemical and biological settling of water (Kumar et al., 2005).

**MATERIAL AND METHOD:**

The Katepurna reservoir is the construction on the Katepurna which is originated from Kata village located near Washim City. The flowing direction of the Katepurna river is from South to North. The latitude of the reservoir is 77-09-00" whereas the longitude is 20-28-30".

The physico-chemical parameters were analyzed by according to the standard methods recommended by APHA (1998, 2008). There are two types of characters i.e. physical and chemical. For this work, the physical parameters are such as Temperature, pH, Conductivity and Total Dissolved Solids are estimated with the help of SYSTRONIC DIGITAL PORTABLE WATER ANALYSIS KIT AND CST Meter whereas transparency was estimated by using the a standard 20cm diameter Sacchi disc consisting of black and white quarter.

Chemical parameters are Dissolved oxygen, Carbon Dioxide, Alkalinity (Carbonate and Bicarbonate), Total hardness are analyzed Digital DO Meter and also by titrometric method.

**OBSERVATION:**

Monthly variation in Physico-Chemical Parameters of the Katepurna reservoir (±S.D.) are as follows-

**Table 1: Monthly variations in physico-chemical parameters of Katepurna Reservoir during August 2013- July 2014.**

PARAMETERS	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN	JULY
Air Temperature (°C)	24.8 +0.72	187.5 -0.55	16.6 +0.66	21.75 +2.12	23.62 +1.88	21.12 -3.92	23.95 +0.84	31 -2.44	30.37 +3.09	32.87 +1.54	29.62 -2.28	30.07 -1.04
Water Temperature (°C)	20 ±0.91	17.4 ±0.52	15.37 ±0.47	20.46 0.56	21.87 ±0.25	19.12 ±0.75	22.75 ±0.81	29 ±1.82	26.35 ±1.92	29 ±0.81	26.87 ±0.85	27.00 ±1.82
pH	7.25 ±0.19	7.72 ±0.09	7.3 ±0.16	7.37 ±0.15	7.21 ±0.17	8.27 ±0.17	8.22 ±0.09	8.57 ±0.09	8.12 ±0.18	8.77 ±0.17	7.95 ±0.26	8.42 ±0.22
Transparency (°c)	71.83 ±18.78	66.5 ±13.29	62.85 ±10.51	61.07 ±11.88	62.68 ±8.17	64.5 ±18.621	63.56 17.18	63.87 ±9.31	23.37 ±7.64	29.37 ±8.19	62.2 ±17.2	56.2 ±11.63
Salinity (mg/l)	0.720 ±0.002	0.632 ±0.003	0.568 ±0.003	0.619 ±0.002	0.592 ±0.003	0.624 ±0.005	0.744 ±0.004	0.809 ±0.007	0.896 ±0.004	0.0861 ±0.006	0.785 ±0.011	0.756 ±0.006
Conductivity (µmhos/cm)	172.47 ±15.27	220.75 ±38.35	181 ±7.52	221.75 ±31.44	217.75 ±34.16	221.25 ±13.74	231.75 ±30.12	256.00 ±17.14	270.5 ±2059	271.5 ±27.68	196.25 ±16.76	176.75 ±12.60
Total Dissolved Solids (mg/l)	208.5 ±15.77	180.06 ±11.33	181.32 ±8.22	179.65 ±9.89	178.17 ±10.25	182.84 ±17.38	172.00 ±12.60	165.43 ±16.95	176.42 ±11.58	178.12 ±13.63	186.3 ±18.38	182.07 ±20.26
Dissolved oxygen (mg/l)	8.2 ±0.18	9.05 ±0.12	9.45 ±0.17	9.6 ±0.18	90.07 ±0.28	9.45 ±0.20	9.22 ±0.09	7.67 ±0.35	7.22 ±0.09	6.47 ±0.17	7.8 ±0.21	8.2 ±0.21

MONTHLY VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS OF KATEPURNA RESERVOIR.....

Free CO <sub>2</sub> (mg/l)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total alkalinity (mg/l)	117.4 ±3.12	115.3 ±2.14	125.25 ±9.38	131.6 ±4.89	181.00 ±10.51	186.6 ±6.94	189.5 ±7.72	234.1 ±22.73	214.25 ±11.34	185.3 ±8.20	170.0 ±22.84	149.62 ±40.46
Total Hardness (mg/l)	214.0 ±5.00	219.0 ±2.58	193.0 ±2.58	198.0 ±3.65	163.0 ±26.00	149.5 ±6.806	202.9 ±9.02	199.9 ±3.13	150.6 ±4.55	154.9 ±2.70	219.5 ±16.21	210.75 ±10.43

**Table 2: Monthly variations in physico-chemical parameters of Katepurna Reservoir during August 2014 - July 2015.**

PARAMETERS	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN	JULY
Air Temperature (°C)	28.8 ±0.72	18.5 ±0.55	16.6 ±0.66	21.75 ±2.12	23.62 ±1.88	21.12 ±3.92	23.95 ±0.84	31 ±2.44	30.37 ±3.09	32.87 ±1.54	29.62 ±2.28	30.07 ±1.04
Water Temperature (°C)	20 ±0.91	17.4 ±0.52	15.37 ±0.47	20.46 ±0.56	21.87 ±0.25	19.12 ±0.75	22.75 ±0.81	29 ±1.82	26.35 ±1.92	29 ±0.81	26.87 ±0.85	27.00 ±1.82
pH	7.25 ±0.19	7.72 ±0.09	7.3 ±0.16	7.37 ±0.15	7.21 ±0.17	8.27 ±0.17	8.22 ±0.09	8.5 ±0.09	8.1 ±0.18	8.7 ±0.17	7.9 ±0.26	8.4 ±0.22
Transparency (cm)	71.83 ±18.78	66.5 ±13.29	62.85 ±10.51	61.07 ±11.88	62.68 ±8.17	64.5 ±178.61	63.56 ±17.18	63.87 ±9.31	23.37 ±7.61	29.37 ±8.19	62.2 ±17.2	56.5 ±11.63
Salinity (mg/l)	0.720 ±0.002	0.632 ±0.003	0.568 ±0.003	0.619 ±0.002	0.592 ±0.003	0.624 ±0.005	0.744 ±0.004	0.809 ±0.007	0.896 ±0.004	0.861 ±0.006	0.785 ±0.011	0.756 ±0.006
Conductivity (µmhos/cm)	172.47 ±15.27	220.75 ±38.35	181 ±7.52	221.75 ±31.44	217.75 ±34.16	221.25 ±13.74	231.75 ±30.12	256.00 ±17.14	270.5 ±20.59	271.5 ±27.68	196.25 ±16.76	176.75 ±12.60
Total Dissolved Solids (mg/l)	208.5 ±15.77	180.06 ±11.33	181.32 ±8.22	179.65 ±9.89	178.17 ±10.25	182.84 ±17.38	172.00 ±12.60	165.43 ±17.14	176.42 ±11.58	178.12 ±13.63	186.3 ±18.38	182.07 ±20.26
Dissolved oxygen (mg/l)	8.2 ±0.18	9.5 ±0.12	9.45 ±0.17	9.6 ±0.18	9.07 ±0.28	9.4 ±0.20	9.2 ±0.09	7.67 ±0.35	7.22 ±0.09	6.47 ±0.17	7.8 ±0.21	8.2 ±0.21
Free CO <sub>2</sub> (mg/l)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total alkalinity (mg/l)	117.4 ±3.12	115.3 ±2.14	125.25 ±9.38	131.6 ±4.89	181.00 ±10.51	186.6 ±6.94	189.5 ±7.72	234.1 ±22.73	214.25 ±11.34	185.3 ±8.20	170.0 ±22.84	149.62 ±40.46
Total Hardness (mg/l)	214.0 ±5.00	219.0 ±2.58	193.0 ±2.58	198.0 ±3.65	163.0 ±26.00	149.5 ±6.806	202.9 ±9.02	199.9 ±3.13	150.6 ±4.55	154.9 ±2.70	219.5 ±16.21	210.75 ±10.43

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## RESULT AND DISCUSSION

The Katepurna reservoir is a fresh water perennial reservoir including human activities such as fishing, bathing and cloth washing. Physico-chemical parameter influences the biological properties of a water body. Monthly water samples were collected for the study period of two years i.e. August 2013- August 2015 to analyze physico-chemical properties and their values are mentioned in Table 1 and Table 2.

### AIR TEMPERATURE:-

The air temperature of Katepurna reservoir was ranged from  $18.750\text{ C} \pm 0.64$  to  $33.950\text{ C} \pm 0.83$ . During this period the minimum air temperature  $18.750\text{C}$  was recorded in the month of October 2013 while maximum temperature  $33.950\text{C}$  was recorded in the month of May 2014. Increasing values of the air temperature was recorded from the month of March to June i.e. during the summer season while decreasing values was recorded from the month of October to February i.e. during winter season. During second year the range of air temperature was recorded from  $16.60\text{C} \pm 0.66$  to  $32.870\text{C} \pm 1.54$ . The minimum range  $16.60\text{C}$  was recorded in October 2014 while maximum range  $32.870\text{C}$  recorded in May 2015. The monthly increasing and decreasing value of temperature was recorded as same as first year.

Das and Kar (2013), got similar results of Karbala lake and Baram Baba Pond of Cachar District, Assam and found that, water temperature was minimum in January and increased from May; Pratap and Babu (2015), in Sarada and Varaha Estuarine Complex, East Coast of India.

### WATER TEMPERATURE:-

The water temperature during first year was ranged between  $15.690\text{C} \pm 8.99$  to  $30.350\text{C} \pm 1.12$  in the month of November and May 2014. Water temperature was observed in decreasing manner during October 2013 to February 2014 while increasing range have been noted from the month March to May 2014. The observation is in conformity with earlier reports of Vyas and Kumar (1968) who investigated Indrasagar Lake of Udaipur.

During second year the temperature was fluctuated between  $15.370\text{C} \pm 0.37$  to  $290\text{C} \pm 1.82$ . The minimum range  $15.370\text{C}$  of temperature was observed in October 2014 and maximum temperature range  $290\text{C}$  was observed in May 2015. The temperature started to decrease September 2014 to January 2015. Similar results are obtained by Ahmad et al., (2012). Graphically the ranges of the water temperature of both the years are shown in. In this study variations in the water temperature i.e. maximum water temperature recorded in during the summer season and minimum during the monsoon and winter may be due to the clear sky besides high air temperature and similar observations are supported by Manickam et al., (2014).

### TRANSPARENCY:-

The range of transparency was noted between  $50.32 \pm 5.92\text{ cm}$  to  $78.43 \pm 11.02\text{ cm}$  during 2013-14. The minimum range  $50.32\text{ cm}$ . was recorded in June 2014 and the maximum range  $78.43\text{ cm}$ . was observed in February 2014. The similar results are noticed by Hammer (1971) in Quapalle lake in Canada in which during the post-monsoon period the maximum range of transparency was observed. Slightly increasing range of transparency was marked in August and September 2013 while decreasing range of transparency was observed from May to July 2014.

During 2014-15 the transparency was found the range  $23.37 \pm 7.64\text{ cm}$  and  $71.83 \pm 18.78\text{ cm}$ . The minimum range was noted as  $23.37\text{ cm}$ . in April 2015 and maximum range  $78.83\text{ cm}$ . was found in August 2014. The transparency was observed in increasing order during rainy season from June to July

2015. Abujam et al., (2011) found the similar result about the minimum range, they also found the minimum range of transparency in the month of March 2009 when studied diversity of plankton in Majjan Beel, Upper Assam. The shows the range transparency of both the years.

#### **TOTAL DISSOLVED SOLIDS:-**

In the present study the variation in total dissolved solids during first year i.e. 2013-14 ranges between  $161.75 \pm 8.85$  mg/l to  $220.11 \pm 216.5$  mg/l. The minimum value  $161.75$  mg/l was recorded in February 2014 and maximum value  $220.11$  mg/l in the month of December 2014, such maximum range of the TDS in the month of December was reported by Poongodi et al., (2009). The values was increased during August, September and December 2013 and in the months June and July 2014 and declined in October, November 2013 and from January to May 2014.

The second year i.e. 2014-15 the range was observed from  $165.43 \pm 16.95$  mg/l to  $208.5 \pm 15.77$  mg/l. The minimum range i.e.  $165.43$  mg/l was found in March 2015 while maximum range was found as  $208.5$  mg/l in August 2014. The similar results are reported by Ahmad et al., (2012) who studied the physico-chemical parameters of Lal Diggi pond in Aligarh, India and found lower value of TDS in the month of March.

#### **pH:-**

During 2013-14 the range of pH was recorded from  $7.37 \pm 0.27$  to  $8.55 \pm 0.26$  Minimum range of pH was recorded in July 2014 whereas the maximum range  $8.5$  was recorded in April 2014. The pH indicates the intensity in relation with acidity and alkalinity of the water and growth of flora and fauna of the water body is dependent upon it. It can be opined that the pH of the range  $8.0$  to  $8.4$ . The similar range has suggested by Shirgur (1986).

During 2014-15 the pH range was fluctuated from  $7.25 \pm 0.19$  to  $8.7 \pm 0.17$ . The minimum range  $7.2$  was found in December 2014 i.e. during winter while maximum range was noted in May 2015 i.e. during summer. Similar observation was made by Manjare et al., (2010) when they studied physico-chemical parameters Tamdalge Tank in Kolhapur District, Maharashtra.

#### **Free CO<sub>2</sub>:-**

The free CO<sub>2</sub> is the important parameter which is the main compound used for the process of photosynthesis. In the present study of Katepurna reservoir the free CO<sub>2</sub> was found to be absent throughout the study period. The similar results were found by Shinde and Pawar (2013), during the study of physico-chemical parameters of Mohgavhan Lake that may be due to the increased activity of the photosynthesis which requires a large amount of the free CO<sub>2</sub> as a main source to enhance the photosynthetic process.

#### **Alkalinity:-**

During the study period of the 2013-14 the total alkalinity was ranged between  $126.55 \pm 2.02$  to  $266.2 \pm 16.10$  mg/l. The minimum range i.e.  $126.55$  mg/l was found in November 2013 and the maximum range was  $266.2$  mg/l in March 2014.

In the second year i.e. 2014-15 the range of alkalinity was noted between  $115.3 \pm 12.14$  mg/l to  $234.1 \pm 22.73$  mg/l. The minimum range i.e.  $115.3$  was observed in the month of September 2014 and maximum range i.e.  $234.1$  mg/l was in the month of March 2015. The range was gradually decreasing from August 2014 up the February 2015 while it was found in the increasing manner from March 2015 till the July 2015.

The higher of alkalinity values may be due to the discharge of municipal and domestic sewage. Sitre and Zade (2012) reported the higher range of the alkalinity during summer season.

#### **Dissolved Oxygen:-**

During the present study the dissolved oxygen ranges between  $7.3 \pm 0.18$  mg/l to  $9.2 \pm 0.21$  mg/l in 2013-14 while it ranges between  $6.4 \pm 0.17$  to  $9.6 \pm 0.18$  mg/l was marked in the year 2014-15. During 2013 the minimum range i.e. 7.3 mg/l was noticed in April 2014 and maximum range i.e. December 9.2 mg/l was in December 2013. The range was gradually increased in August to February and decreased in to from gradually decreased from March up to the May. During 2014-15 the minimum range i.e. 6.4 mg/l was found in May 2014 while in November the range was maximum i.e. 9.6 mg/l. It was found to be decreasing from March up to the June 2015 and increased from August 2014 up to the December 2014 and January and February 2015.

In both the year the range of dissolved oxygen was minimum during summer and maximum during the winter season. The similar investigations are made by Shinde (2002), in Zirpurwadi Lake in Yavatmal district in which he observed the highest value of dissolved oxygen during winter and the lowest value during the summer which may due to the depletion and consumption of oxygen content by micro-organism which are responsible for decomposition of organic matter while during the monsoon and during the winter the oxygen content is increased due to the decreased activity of the micro-organisms.

#### **Total Hardness:-**

The range of total hardness in 2013-14 is found between  $144.5 \pm 4.12$  mg/l to  $214.65 \pm 3.51$  mg/l. Minimum value is noted during summer season i.e. in April 2014 and maximum value is observed in during monsoon i.e. September 2013 but Hujare (2008) reported the high total hardness during summer than monsoon and winter. During the second year i.e. 2014-15, minimum value of total hardness was  $149.5 \pm 6.806$  mg/l in the month of January 2015 and maximum range i.e.  $219.5 \pm 16.21$  mg/l was noticed in June 2015. Seasonally the total hardness was found to be maximum during monsoon season whereas it is found minimum in the summer season.

#### **CONCLUSION:-**

The studies indicate that there are variations in Physico-chemical parameter in water of lake under study in different seasons. These studies are helpful for fishing and irrigation purposes.

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