Assessment of Physico-chemical Parameters of Satara Bhosale Lake of Pombhurna Tehsil of Chandrapur District in Maharashtra State.

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ABSTRACT

The Chandrapur district of Maharashtra state harbours a lot of small and large water bodies scattered everywhere. The Pombhurna tehsil harbours some of them. In order to analyze them one of the water body was selected for investigation. In present research paper assessment of physico-chemical parameters of Satara Bhosale lake of Pomburna tehsil in Chandrapur district in Maharashtra state was done for a period of 2 years 2016-17 and 2017-18. Monthly variations of physical and chemical parameters like atmospheric temperature, water temperature, transparency, electrical conductivity, total dissolved solids, free CO_2, total alkalinity, pH, dissolved oxygen, total hardness, chlorides, phosphate, nitrate, sulphate, COD and BOD were recorded. In all 17 different physico-chemical parameters were analyzed during the study conducted on this freshwater ecosystem of perennial nature.

KEYWORDS : Satara Bhosale Lake, Physico-chemical parameters, Pombhurna tehsil, Chandrapur district, Maharashtra state.

INTRODUCTION

The physico-chemical profile and biological analysis of flora and fauna is needed to obtain a clear picture of the underlying water conditions in a freshwater ecosystem. In recent years there is increase in water pollution as side effect of industrial and anthropogenic activities. The increase in load of pollutants bring about a rapid shift in the biota of the ecosystems and thus affect the water quality and subsequently biodiversity of the area. In view of this there is need for designing an appropriate framework to safeguard our natural resources for sustainable environmental management. Today water bodies throughout the world are medium to heavily polluted by man's negligent attitude and investigations are needed to overlook the changes.

Recent works on water quality assessment were done bynumber of researchers viz. Adimasu (2015) on lake Hawassa, Chittora et.al, (2017) on Udaipur city, Rajasthan, Fule (2018) on various water sources in Ashti tehsil of wardha district, Khan et. Al., (2012) on Triveni lake of Amravati distrit, Kistan et. Al., (2013) on Ambatur lake of Chennai, Luharia and Harney (2016) on Vinjasan and Gawrala lake of Bhadrawati city, Mehta et. al., (2016) on Satpala lake of Palghar, Nautiyal et, al., on Dodital lake of Uttarkashi district of Garhwal Himalayas, Nirbhavane and Khobragade (2017) on Sion lake of Mumbai, Tichkule and Bakre (2017) in freshwater lakes near lakhni,Bhandara district, Pawar and Pejawar (2017) on Nilje and Govali ponds of Kalyan district, Pundlik et al (2018) on Lonar lake of Washim district, Rana Phul Kunwar Singh (2016) on Mohan Ram Lake Shahdol, Upadhyaya & Chandrakala (2016) on Karanji lake waters of Mysore, Pradhan et al (2012) on Chilka lake water, Yogita Babu and Ramchandra Mohan (2018) on Errarajan lake of Bangalore.

The Pombhurna tehsil of Chandrapur district in Maharashtra state harbours a lot of freshwater bodies which are still unexplored as per our literature review. So an attempt is made here to see the exact

status of physico-chemical parameters of Satara Bhosale lake during a two year span i.e. 2016-2018 in the present research work.

MATERIALS AND METHODS

Satara Bhosale is small village located 16 km away from pombhurna tehsil in Chandrapur district of Maharashtra state in which the perennial freshwater lake is situated. The Satara Bhosale lake is about 194 mt above mean sea level and is at 19º89'56.63' N latitude and 79º62'98.79' E longitude. The water depth of Satara Bhosale lake is near about 8 feet during the monsoon season and 6 feet during the summer season. This is a perennial freshwater lake with abundant water in monsoons and harbor a beautiful biodiversity of weeds and birds. The study on this water body was conducted between 2016 to 2018. Sampling spots were fixed and water samples collected as per standard protocol. Collected water samples were immediately brought in laboratory every month and 17 different physico-chemical parameters were analyzed. Some physical parameters like atmospheric temperature, water temperature, pH and transparency were determined on the spot while the chemical parameters like dissolved oxygen (D.O.), total alkalinity, total Hardness, chorides, sulphate, total dissolved solids, nitrate, COD and BOD were determined using standard literature APHA(2005), Kodarkar(1992), Trivedi and Goel (1984) in the laboratories of N.S.Science and Arts College, Bhadrawati district Chandrapur , Maharashtra state.

RESULT & DISCUSSION

The monthly values of physico-chemical parameters of Satara Bhosale lake are presented in table no.1 for the year 2016-17 and for the year 2018-19 in table no. 2. Atmospheric temperature during study period of two consecutive years was always found to be higher than the water temperature. Temperature Satara Bhosale Lake fluctuated between 22 ^{0}C to 41.5 ^{0}C in year 2016-2017 and 22 ^{0}C to 42.50 ^{0}C during 2017-2018. The water temperature fluctuated between 19 ^{0}C to 29 ^{0}C during the year 2016-2017 and 21 ^{0}C to 29.5 ^{0}C during the year 2017-2018 (Table 1 and 2). The transparency of lake water ranges between 14 cm in rains and 25 cm in summer during 2016-2017 and 11.00 cm to 20.20 cm during 2017-2018.

The pH value ranged between 7.50 to 7.88 in the year 2016-2017 and 7.40 to 8.00 in the year 2017-2018. The conductivity recorded is 145 µmhos/cm to 245µmhos/cm in year 2016-2017 and 155 µmhos/cm to 250 µmhos/cm in year 2017-2018. Total Dissolved Solids(TDS) ranged between 104 to 188 gm/lit during year 2016-2017 and 125 to 190 gm/lit in 2017-2018. The dissolved oxygen ranges between 4.6 mg/lit to 6.2 mg/lit in year 2016-2017 and 4.7 mg/lit to 6.3 mg/lit in year 2017-2018 respectively. Free carbon dioxide is recorded 0.8 mg/lit to 1.70 mg/lit in year 2016-17 and 0.8 mg/lit to 1.50 mg/lit in year 2017-18. In Satara Bhosale lake, the total alkalinity range fluctuates between 40.00 mg/lit to 85.50 mg/lit. during year 2016-17 and 69.90 mg/lit. to 90 mg/lit during the year 2017-18. The total hardness is found to range between 49 mg/lit. to 99.80 mg/lit. during the year 2016-17 and 92.50 mg/lit. to 115.00 mg/lit. during year 2017-18. The calcium hardness observed to be in the range of 0.35 mg/lit. to 0.57 mg/lit. during the year 2016-17 and 0.35 mg/lit. to 0.56 mg/lit. in year 2017-18. The chlorides are 15.2 mg/lit. to 39.2 mg/lit in 2016-17 and 25.00 to 38.10 mg/lit in the year 2017-2018 respectively. The phosphate content varied between 1.360 mg/lit. to 2.90 mg/lit. in year 2016-2017 and 3.10 mg/lit. to 4.20 mg/lit. in the year 2017-2018. The values of sulphate in Satara Bhosale lake are 2.10 mg/lit. to 2.99 mg/lit. in the year 2016-2017 and 3.06 mg/lit. to 4.58 mg/lit. in the year 2017-2018. The nitrate value ranged between 0.30 mg/lit. to 0.70 mg/lit. in year 2016-2017 and 0.35 mg/lit. to 0.65 mg/lit. in year 2017-2018 in Satara Bhosale lake. In Satara Bhosle lake, the BOD value was recorded between 11.10 mg/lit. to 16.10 mg/lit. in year 2016-2017 and 11.0 mg/lit. to 16.10 mg/lit. in year 2017-2018. The chemical oxygen demand values were recorded between 19.8 mg/lit. to 37.00 mg/lit during year 2016-2017 and 29.00 mg/lit. to 38.0 mg/lit during the year 2017-2018.

Our findings were supported by the works of Fule and Nimgare (2018), Khan et al (2012), Rana Phul Kuwar Singh (2016), Tichkule and Bakre (2017), Kistan et al (2013).

The physico-chemical parameters show the prevailing water quality conditions of the lake water in a particular lake and a real picture emerge from it. In India a number of ponds, lakes and reservoirs naturally found but they are not being utilized fully due to lack of insufficient knowledge about them. In this context present research work is an attempt towards it. The physico-chemical conditions vary

according to different climatic conditions and the surrounding factors which are shown in present investigation during a two year span on this beautiful reservoir of perennial nature.

Aknowledgement

The authors wish to thank Dr. L.S. Ladke Principal and Head, Institution of Higher Learning, Research and Specialized Studies (IHLR& SS) N.S. Science and Arts College Bhadrawati, District Chandrapur Maharashtra and the College Management Bhadrawati Shikshan Sanstha, Bhadrawati to carry out this research work at above mentioned research center.

Table : 1 : Monthly Variations of Physicochemical Parameters in Satara Bhosale Lake during 2016-2017.

Sr. No.	Parameters	Feb 2016	Mar. 2016	April 2016	May 2016	June 2016	July 2016	Aug. 2016	Sep. 2016	Oct. 2016	Nov. 2016	Dec 2016.	Jan. 2017	Min.	Max.
1	**Atm. Temp.**	28	30.1	37	41	35	32	30.5	30	26	22	22.5	28	**22**	**41**
2	**Water Temp.**	24.1	24.5	26	29	28.5	25.5	28.5	26	22	20.5	19	24	**19**	**29**
3	**Transparency**	18	15.5	17	25	18	20	14	23	20	16	16	17	**14**	**25**
4	**pH**	7.7	7.8	7.82	7.88	7.79	7.7	7.6	7.5	7.8	7.78	7.86	7.8	**7.5**	**7.88**
5	**Conductivity**	159	175	190	246	240	235	200	170	160	150	145	158	**145**	**246**
6	**Total Dissolved Solids**	130	141	150	185	162	159	160	160	165	120	110	105	**105**	**185**
7	**Dissolved Oxygen**	5.8	5.2	4.9	4.8	4.6	5.1	5.2	5.5	5.8	5.9	6.2	6	**4.6**	**6.2**
8	**Free CO_2**	1.1	1.25	1.2	1.4	1.3	1.2	1.3	1.2	0.9	0.8	0.8	1	**0.8**	**1.4**
9	**Total Alkalinity**	80	82	82	85	85.5	78	40	48	55	58	60	72	**40**	**85**
10	**Total Hardness**	92.5	94	98	99.5	99.4	95	49	55	64	68	60	70	**49**	**99.5**
11	**Calcium**	0.42	0.4	0.5	0.53	0.4	0.38	0.44	0.5	0.51	0.38	0.36	0.41	**0.36**	**0.53**
12	**Chloride**	28	28	29	39	31	34	29	15.2	17.1	21.2	24	24.5	**15.2**	**39**
13	**Phosphate**	1.46	1.52	1.59	1.65	1.91	2	2.9	2.15	2.05	2.01	1.93	1.85	**1.46**	**2.9**
14	**Sulphate**	2.36	2.56	2.68	2.74	2.88	2.86	2.75	2.98	2.46	2.56	2.72	2.46	**2.36**	**2.98**
15	**Nitrate**	0.51	0.54	0.61	0.68	0.5	0.4	0.42	0.31	0.32	0.3	0.36	0.38	**0.3**	**0.68**
16	**BOD**	12.8	12.9	11.1	11.1	11.2	12	12.4	12.6	12.9	12.9	16.1	16	**11.1**	**16.1**
17	**COD**	31	31.5	31.5	33	32.1	36	37	30.9	29.8	26.5	20.6	20.7	**20.6**	**37**

*** All the values are in mg/litre except PH, water temperature, air temperature, and conductivity**

Table: 2 : Monthly variations of Physicochemical parameters of Satara Bhosale Lake during 2017-2018.

Sr. No.	Parameters	Feb 2017	Mar. 2017	April 2017	May 2017	June 2017	July 2017	Aug. 2017	Sep. 2017	Oct. 2017	Nov 2017	Dec 2017	Jan. 2018	Min	Max
1	**Atm. Temp.**	28	29	37	42	35	32	30.1	29.3	28.6	26	25	26.4	**25**	**42**
2	**Water Temp.**	24.1	24.5	26	29	28.5	29	28.5	27.6	25.1	21	22	22.8	**21**	**29**
3	**Transparency**	13.5	15	19	18.2	16.9	15	11	16	18	14	13	14	**11**	**19**
4	**pH**	7.65	7.8	7.82	7.88	7.79	7.7	7.4	7.6	7.65	7.6	7.8	7.85	**7.4**	**7.88**
5	**Conductivity**	156	165	190	245	248	240	225	220	189	170	160	155	**155**	**248**
6	**Total Dissolved Solids**	130	141	150	159	162	159	190	180.1	165.6	167.1	150.5	140	**130**	**190**
7	**Dissolved Oxygen**	5.8	5.2	4.9	4.8	4.7	5.1	5.2	5.5	5.8	5.9	6.3	6.1	**4.8**	**6.3**
8	**Free CO_2**	1.1	1.25	1.2	1.4	1.3	1.2	1.2	1.3	0.9	0.8	0.8	1	**0.8**	**1.4**
9	**Total Alkalinity**	80	82	82	85	85.5	78	80	81	75.6	72	69.9	78.1	**69.9**	**85.5**
10	**Total. Hardness**	92.5	94	98	99.6	99.5	95	102	104	105	102	101.9	95	**92.5**	**105**
11	**Calcium**	0.4	0.4	0.5	0.5	0.41	0.39	0.4	0.42	0.44	0.44	0.46	0.42	**0.35**	**0.5**
12	**Chloride**	29.6	29.8	29	38	31	35	32	28	30	29.1	29	30.2	**28**	**38**
13	**Phosphate**	3.24	3.46	3.68	3.78	3.92	3.98	3.76	3.66	3.5	3.1	3.15	3.4	**3.1**	**3.98**
14	**Sulphate**	3.98	3.99	4.1	4.26	4.28	4.58	3.56	3.45	3.26	3.35	3.15	3.06	**3.06**	**4.58**
15	**Nitrate**	0.43	0.44	0.45	0.6	0.62	0.58	0.6	0.45	0.42	0.4	0.41	0.42	**0.4**	**0.62**
16	**BOD**	12.8	12.9	11.1	11	11.1	12	12.4	12.6	12.9	13.5	16.1	16	**11**	**16.1**
17	**COD**	31	31.5	31.5	38	32.1	31	29.1	29	30.1	33.1	34	34.6	**29**	**38**

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