

STUDY OF PHYSICO-CHEMICAL PROPERTIES OF TERNA DAM WATER RESERVOIR DIST. OSMANABAD M.S. (INDIA)

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ABSTRACT

The present investigation was undertaken to study the physicochemical properties of Ternawater reservoir dist. Osmanabad M.S. (India). Monthly variation in Atmospheric Temperature, Water Temperature, Transparency, pH, Dissolved Oxygen, Free Carbon Dioxide, Total Hardness, Total Dissolved Solids, and Total Alkalinity, Chloride were studied during October 2016 to November 2017. The water samples were collected monthly from the three sampling stations. All the parameters were analyzed and compared with standard of WHO, ICMR and APHA (1998) were used. The Terna Dam is constructed on the river Terna which is situated about 20km from Osmanabad city. The water of Terna dam is useful for drinking, farming and fish production, because it cannot cross the permissible limit given by ICMR and WHO.

KEYWORDS: Ternadam, Physico-Chemical Parameters

INTRODUCTION

The present investigation was undertaken to study the physicochemical parameters of Terna water reservoir Tq & dist. Osmanabad M.S. (India). Was studied during October 2016 to November 2017. The Terna reservoir is located on Terna River, near to the historical village Ter and it is started from village Terkheda. This Project is situated about 22km from Osmanabad city. Geographically it is located on 18° 19' - 19° 59' N latitude and 76° 06' - 76° 14' E longitudes. The Terna dam main purpose is to provide drinking water to Osmanabad, Gowerdhanwadi, Mulewadi, and Dhokietc. The water is also utilized for irrigation purpose by the right and left canals of about 14 kms from dam. Total 14 villages get the benefit of water from this dam. The Project also provides natural habitat for plants, birds, and grazing animals and see the attractive water falls from KT weir (outlet). The fish culture is also carried out in this dam. Therefore, it is necessary to study the physicochemical characteristics of the Terna dam.

MATERIALS AND METHODS

The three selected sampling sites were visited monthly for the study of the various ecological parameters. The study was complete in two years from October 2016 to November 2017. Terna dam Water sample collected of three sites was during the day time to analyze the physical, chemical and biological parameters. The water samples were collected in the plastic cans. Before collecting, the can was rinsed thoroughly by sampling water and the can was sealed after collecting the sample. The temperature were recorded at the time sampling on the spot at the time of water collection of three sites were

thermometer. The pH was measured by using Hanna pH meter. The chemical parameters of water were determined by standard methods described by American Public Health Association (APHA 1980), Trivedy et.al.(1998) and Kodarkar et.al. (1998).

RESULT AND DISCUSSION

The physico-chemical parameters for one year are given in table no.1 The Morphometric feature of any reservoir depends on its catchment area and the topography of region. The geological region of Terna dam is responsible for availability of the specific nutrients, which ultimately decides the productivity of the reservoir and the nature of the bottom of the reservoir. The human interference in the catchment area have direct and significant bearings on the structural and functional attributes in the aquatic habitat and may be responsible for the alteration of morphometric characters of the reservoir (Hutchinson, 1957).

ATMOSPHERIC TEMPERATURE

In the present study, the atmospheric Temperature of the Terna dam was recorded in between 17.5-28.2 °C at the site I, 17.0-28.2°C in site II, and 17.5-28.2 °C at site III.. In the present study, the atmospheric temperatures range between 17-28.2°C during one year study period from October 2016 to September 2017. The highest atmospheric temperatures were recorded in April in all sites during October 2016 to September 2017 and minimum in January. The seasonal variation of atmospheric temperature showed a minimum in winter and maximum in the summer season. Meera and Nadan (2009) recorded water temperature ranges between 27.0-31.5°C. According to Meera and Nadan, the surface water temperature greatly influenced by Atmospheric temperature since the water body was shallow having the marginal difference between surface and bottom water.

WATER TEMPERATURE

In the present study, the water temperature in the Terna dam varies from 19.0-23.0°C site I, 19.0-23.0°C at the site II and 19.0-23.1°C at site III. The seasonal variation of the water temperature in Terna dam. In the present study, study of water temperature range between 19.0-23.1°C during study from October 2016 to September 2017. The maximum value of water temperature recorded in April in site III and minimum in June. Seasonal variation of water temperature was minimum in winter season and maximum in summer season during October 2016 to September 2017. The change of temperature may depend upon Atmospheric temperature and sampling of water at a different time and site the water favorable for fish growth. The water temperature of Terna dam is 19-23.1°C which compares to other dams i.e. Bennetura dam Omurga (Jadhav and Babre, 2009) is a little lower than the temperature of Terna dam is compare Bennetura dam. Another lake is Mangi reservoir in Solapur district studied by Kamble and Reddy (2011).

POTENTIAL HYDROGEN (PH)

In the present study, the ranges of PH in between 7.7-8.2 during the one year study from October 2016 to September 2017. pH ranges at site I, 7.7-8.2 at site II, 7.7-8.1 and 7.8-8.2 at site III. The maximum value of PH was recorded in July and a minimum in October and March. The season-wise analysis showed that the highest values of PH recorded in Rainy season and lower in the summer season. Potential Hydrogen is very important in the community metabolism of an aquatic ecosystem. Natural water has pH ranging from 4 to 9 units; otherwise, it is alkaline toward neutrality (Ahirwar, Singh and Ahi, 2013). The property of chlorine in the water to kill bacteria gets reduced if the pH of water is more.

DISSOLVE OXYGEN

Healthy water dissolve oxygen is above 6.5- 8 mg/l and its permissible limit is 80-120 % In the present study, the Dissolve Oxygen ranges in between 5.3-6.9 Mg/L at the site I, 5.4-6.9 Mg/L at site II, and 5.4-6.9 Mg/L at site III. In present values Dissolve Oxygen ranges between 5.3-6.9Mg/L. The highest value of Dissolve oxygen was recorded in December and August and minimum in April. The season-wise analysis showed that maximum value was recorded winter and rainy season and a minimum amount of dissolve oxygen recorded in summer. Manjare, Vhanalkar and Muley (2010) was studied water quality using the Physico-chemical parameter Tamadolge tank they were recorded ranges 6.0-92.0 cm during one year. Simpiet. al. (2011) was recorded Dissolve Oxygen in between 7.25-16.0Mg/L.

FREE CARBON DIOXIDE

In the present study, the concentration of carbon dioxide ranges from the 1.5-3.0 Mg/L at the site I, 1.5-3.8 Mg/L at site II, and 1.7-3.99 Mg/L at site III. In the year October 2016 to September 2017. In the present study values of free carbon dioxide are 1.5-3.99 Mg/L during the one year study from October 2016 to September 2017. The maximum values were recorded in September and the minimum in May and March. The season-wise analysis shows the highest value in the Rainy season and lowest in summer. Kumar (2015) recorded that the source of free carbon dioxide has fluctuated range i.e. absent or 0.00-4.0 Mg/L. in this, he gives a minimum in November and maximum in September. Sharma and Walia (2015) were worked on water quality and Physico-chemical on GovindSagar Lake. They observed ranges in between 3.1-4.6 Mg/L.

TOTAL HARDNESS

In the present study, the nitrate of Terna dam ranges in between 0.03-0.45 at the site I, 0.4-0.46 Mg/L at site II and 0.03-0.46Mg/L respectively during the study of one year from October 2016- September 2017. In the present study, the value of Total Hardness ranges in between 100.2-117.2 Mg/l during the one year study period from October 2016 to September 2017. The minimum value in December and the maximum value of July. Water hardness means water is so heavy and not suitable for drinking and fish production. Choudhari, Rawtani and Vishwakumara (2011) were studied on drinking water quality parameter of three manmade reservoirs they recorded total hardness ranges 118.0-170.0 Mg/ at Karwa dam according to the dam water is potable.

CALCIUM

In the present study, calcium ranges vary from 15.1-19.1Mg/l at the site I, 15.1-19.2 Mg/l, at site II and 14.2-19.2 Mg/l at site III respectively during the one year from October 2016 to September 2017. In the present study,, calcium ranges in between 14.2-19.2 Mg/l during the one year from October 2016 to September 2017. The maximum value of calcium is 19.2 Mg/l in June and Minimum value 14.2 Mg/l in November. The seasonal value of calcium is the minimum in the winter season and maximum in the rainy season. Ahmed and Khan (2013) were studied on groundwater in Banal river basin at Rajasthan they recorded calcium ranges in between 9.61-94.58 Mg/l. Kaur and Singh (2005) were studied on groundwater at Bikaner. They recorded ranges in between 20.0-64.0 Mg/l according to them calcium is a common constituent of Natural water.

NITRATES (NO₃)

In the present study, the nitrates of Terna Dam ranges in between 0.03-0.45 mg/l at the site I, 0.4-0.46 Mg/l at site II and 0.03-0.46 Mg/l at site III respectively during the study of one year from October 2016 to September 2017. In the present study, the values of nitrates range from 0.03-0.46 Mg/l. the maximum value of nitrates recorded in December and the minimum value recorded in June. Excretory products and dead organisms further add organic nitrogen. Atmospheric nitrogen fixed into nitrate by a nitrogen-fixing organism is also a contributor to nitrate in the water (Trivedy and Goel, 1987). Nitrates are one of the critical nutrients for the growth of algae and help to accelerate eutrophication (Trivedy et al. 1998).

MAGNESIUM

In the present study, the magnesium in the Terna dam ranges between 12.2-15.6 Mg/l at a site I, 12.3-15.5 Mg/l at site II and 12.2-15.6 Mg/l at site III. In the present study, the value of magnesium ranges from 12.2-15.6 Mg/l during one year study period from October 2016 to September 2017. The minimum values are 12.2Mg/l recorded at the site I in month November and the maximum value is 15.3 Mg/l recorded at site III during the May. Magnesium originates almost entirely from the weathering of rocks, particularly Mg-silicate minerals and dolomite. Atmospheric inputs are minimal, and pollution contributes only slightly (Dutta, thesis, 2011). It is related to water hardness of concern to the limnologist in its role as an essential nutrient in plant growth and development especially is related to its function in the chlorophyll molecule (Kumbhar & Kulkarni, Thesis, 2006).

CHLORIDES

In the present study, chloride ranges vary from 32.1-34.2 Mg/l at the site I, 32.1-34.3 Mg/l at site II and 32.2-34.2 Mg/l at site III. During the one year study from October 2016 to September 2017. In the present study, the chloride ranges between 32.2-34.3 Mg/l. the maximum value is 34.3Mg/l in August and the minimum value is 32.1 Mg/l in March. The seasonal value of chloride was the minimum in the summer season and maximum in the rainy season. It is harmless up to 1500 Mg/L concentration but produces a salty taste at 250-500 Mg/L. Singare, Trivedi and Mishra (2011) are recorded chloride ranges 55.0-2087.00 Mg/l during the winter it is lowest and in summer it increases. Shekher, Mandal and Das (2011) are recorded chloride ranges in between 4.0-8.10 Mg/l during the winter season it lowest and summer season it is highest

Table 1: Monthly Variation of Water Parameters Oct. 2016 - Sept. 2017

Parameters /Moths	Site	Oct-16	Nov.1 6	Dec.1 6	Jan-17	Feb-17	Mar-17	Apr.1 7	May-17	Jun-17	Jul-17	Aug.1 7	Sep.1 7
Air Temperature	I	20	19.5	21.1	17.5	21	20	28	28	23	25	24	26
	II	20.2	19.5	21.1	17.5	21.1	20.2	28.2	28	23	25	24	26
	III	20.2	19.5	21	17.5	21.1	20.2	28.2	28	23	25	24	25
Water Temperature	I	20	20	21	20	20	20	23	21	19	21	21	22
	II	21.1	20.1	21.1	20.5	20.1	20.1	23	21	19	21	21	22
	III	21.1	20.1	21.1	20.5	20.1	20.1	23.1	20.9	19	21	21	22
pH	I	7.7	7.9	8	7.8	8	7.7	7.9	7.8	8.1	8.2	8.2	8.2
	II	7.7	8	8	7.8	8	8.1	7.9	7.7	8.1	8.1	8.1	8.1
	III	7.8	8	8.1	7.9	8.1	7.8	7.8	7.8	8.1	8.2	8.2	8.1
Transparency	I	34.4	36.5	39.1	39.1	36.1	33.6	32.1	32.6	32.6	36	34.5	32.1
	II	34.2	36.5	39.1	39.1	35.9	33.2	32.5	32.5	32.5	32.5	33.5	33.2
	III	34.2	36.4	39.2	39.2	35.8	33.1	32.5	32.5	32.5	32.5	33.6	33.5
Dissolve oxygen	I	6.7	6.6	6.9	5.9	5.3	6.7	5.3	5.4	5.4	6.2	6.9	6.1
	II	6.8	6.4	6.9	5.8	5.4	6.8	5.4	5.4	5.4	6.2	6.9	6.2
	III	6.8	6.4	6.8	5.9	5.3	6.8	5.3	5.5	5.5	6.1	6.9	6.2
Free carbon dioxide	I	2.9	2.8	1.9	1.5	1.6	1.6	1.9	1.5	2.4	2.7	2.8	3
	II	2.9	2.9	1.8	1.7	1.9	1.5	1.6	2.2	2.8	2.9	2.8	2.8
	III	2.9	2.8	1.8	1.7	1.8	1.9	1.6	2.1	2.8	2.9	2.9	3.9

Table 1: Contd.,

Total Alkalinity	I	152	148	150	168	171	178	176	181	155	145	148	150
	II	150	147	149	167	170	179	178	180	155	146	148	153
	III	150	148	149	168	172	121	178	179	156	146	147	150
Total Hardness	I	107.6	105.2	100.2	106.6	110.2	110.2	115.2	114.5	116.2	117.2	114.2	105.2
	II	106.2	106.2	100.4	104.5	108.5	108.5	117.2	112.2	116.5	117.5	115.2	105
	III	106.2	105.2	100.5	106.5	108.2	108.2	115.5	112	114.2	117.2	114.2	105.2
Calcium	I	15.4	15.1	15.8	16.2	18.2	17.4	1.4	20.2	21.1	19.1	17.2	18.2
	II	15.2	15.1	16.2	16.2	18.2	17.3	18.2	20	21.1	19.2	17.4	18.2
	III	15.2	14.2	16.3	15.2	17.2	17.3	18.2	20.2	21.1	19.1	17.2	19.2
Chlorides	I	33.2	33.1	33.1	33.1	33.2	32.1	36.2	40.3	34.2	34.2	33.2	31.2
	II	33.2	33.2	33.2	33.2	33.5	32.1	36.6	41.2	33.2	32.1	34.3	31.2
	III	33.4	33.2	33	33.6	33.5	32.4	35.2	41.2	33	34.2	34.2	31.2
Nitrates	I	0.04	0.44	0.45	0.045	0.045	0.045	0.061	0.05	0.030	0.035	0.043	0.41
	II	0.39	0.4	0.44	0.046	0.052	0.053	0.62	0.052	0.035	0.035	0.042	0.04
	III	0.39	0.44	0.44	0.046	0.049	0.049	0.062	0.053	0.030	0.036	0.042	0.045
TDS	I	260	270	280	270	260	260	280	280	220	230	220	210
	II	261	269	279	271	261	261	270	280	220	230	220	210
	III	261	270	279	270	261	261	270	270	220	230	220	210
Magnesium	I	13.6	12.2	13.6	13.6	14.5	13.5	14.6	15.2	13.5	14.3	14.6	14.6
	II	13.5	12.3	13.5	13.5	14.6	13.6	14.5	15.2	13.6	14.3	14.6	14.6
	III	13.5	12.2	13.5	13.5	14.5	13.2	14.6	15.3	13.5	14.2	14.5	14.5

Notes: All parameters are express in mg/l except pH, Temperature and Transparency

REFERENCE

1. APHA (1980) . 'standard methods for the examination of water and waste water' (19th edition). American Public Health Association, Washington DC.
2. Appavu A., et. al. 2016. Study of water quality of parameters of Cauvery river water in erode region Physicochemical Analysis of Borewell.3-7.
3. Balajiparasath B., et. al. 2013. Seasonal variation in physico-chemical characteristics of pond and ground water of Tiruchirappalli, India.529.532.
4. Banpurkar A. R. and Bhandarjar S.E. 2008. Study of portability of water of different sources located at Bhadrawati, Chandrapur (M.S.) I.
5. Barve M.B. and Sonawane D.L. 2017. Water Quality assessment with references to physicochemical parameters of lower Dudhana Dam (M.S.) India 985, 987-991,993-996.
6. Bhagat P.R. 2008. Study of physiochemical characteristics of the accumulated water of pond of Lohara at Yavatmal(M.S).1.
7. Das S.M. (1988). Handbook of limnology and water pollution. 1-2,50,101.
8. Deepa P, et. al. 2016. Seasonal variations of physico-chemical parameters of KoratturLake, Chennai, Tamil Nadu, India 6.
9. Hutchinson G. E.(1957). A Treatise on limnology (1 and 2) John Wiley and sons, Inc, New York.
10. Hussain M. (1977). Ecobiology of fresh water protozoa. Ph.D. the sis, Osmania University,Hydrabad.
11. ICMR (1975).Manure of standards of quality for drinking water supplies, Special report series44,2nd Ed.
12. Kamble A. B. and Reddy K.R.(thesis) 2011. Hydrobiological studies of a freshwater reservoir Mangi from Solapur district (Maharashtra).1-2,35-40,93-99.

13. Kamboj R., et. al. 2016. Comparative study of primary productivity in Yamuna River canal of different parts of Yamuna nager Haryana, India.3-4.Solapur district (M.H.) 1-7,22, 106.
14. Kumbhar A. C. (2006). Ph. D. Thesis submitted to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
15. Manjare S. A., S. A. Vanalakar and D. V. Muley (2010). Analysis of water quality using physicochemical parameters Tamdalge tank in Kolhpur dist., Maharashtra. *J. of Advanced Biotech. And Research* 1(2):115-119.
16. Nazneen S. (1980). Influence of hydrological factors on the season abundance of phytoplankton in Kin Jharlake, Pakistan. *Hydrobiology*,65:269-282
17. Sakhare V. B. and P. K. Joshi (2003). Ecology of Palas and Nilegaon reservoir in Osmanabad dist. Maharashtra. *J. Aqua. Biol.* 18(2):17-22.
18. Sathe S. S., Suresh Khabade, Milind Hujare(2000). Studies on wastelands of Tasgaon Tahashil and its important in relation to fisheries and agricultural productivity, final report submitted to U.G.C., New Delhi.
19. Sawyer C.N., Lackey J.B. and A.t. Lenz (1945).Investigation of the odur nuisances in the Madisonlakes, particularly lakes Monoua, Wanbesa and Kegnosa from July 1943to 944.Madison University Press.
20. Sharma Dushyant and Jain Renu (2000).Physico- chemical analysis of Gopalpura tank. *J. Ecological Environment and cons.* 6(4): 441-445.
21. Shinde S. E., Pathan T. S., Raut K. S., More P. R., and Sonwane D. L.(2010). Seasonal variations in physicochemical characteristics of Harsool- Savangi dam. Dist-Aurangabad, India. *Save nature to survive.* 4(1):37-44.
22. Trivedy R. K. (1982): "Some observations on algal flora of Jaipur Rajasthan", *Phykos*: 21:160-163.
23. Trivedi R.K. and GoelP.K..1984, *Chemical and biological methods for water pollution studies.*167.
24. Trivedy R. K., Gopal B. and. Goel P. K (1993): "Comparative study of primary production and chlorophyll concentration in a non-polluted and sewage receiving reservoir", *International Journal & Ecology & Environmental Science* 19: 103- 120.
25. Ajala, Olumuyiwa Olasunmibo, and Olatunde O. Fawole. "Comparative Studies of Some Physico-Chemical Parameters of Water in Two Tropical Reservoirs." *International Journal of Applied and Natural Sciences (IJANS)* 8.6 (2019):21-28