ISSN: 2321-8045

Impact Factor: 3.4218(UIF)

Science Park

Research Journal

Special Issue on NCAB-2018

Organized by

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Yeshwantrao Chavan Mahavidyalaya,

Tuljapur- 413601, Dist.- Osmanabad (M.S.)

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ISSN: 2321-8045

Impact Factor: 3.4218[UIF-2017]

Science Park

Research Journal

Special Issue on NCAB-2018

Editorial Board

SCIENCE PARK
Research Journal
ISSN: 2321-8045
IMPACT FACTOR : 3.4218(UIF)

STUDY OF SOME PHYSICO-CHEMICAL PARAMETERS OF 'TERNA PROJECT', TER, TQ.& DIST. OSMANABAD (M.S.).

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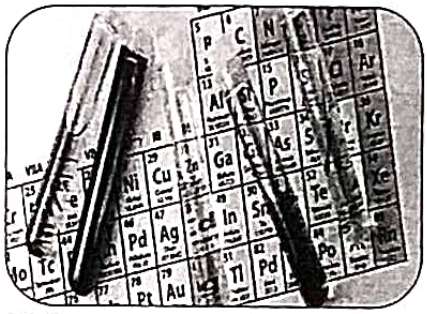
ABSTRACT

The present investigation was undertaken to study the physicochemical parameters of 'Terna Project', Ter, Tq. & Dist. Osmanabad. Monthly variation in Atmospheric Temperature, Water Temperature, Transparency, pH, Dissolved Oxygen, Free Carbon Dioxide, Total Hardness, Total Dissolved Solids, Total Alkalinity were studied during June 2009 to May 2010. The water samples were collected monthly from the three sampling stations. All the parameters was analyzed and compared with standard of WHO, ICMR and APHA (1998) were used.



The Terna Project is constructed on the river Terna which is situated about 20km from Osmanabad city. The water from this Project is useful for drinking and aquaculture practices, because it cannot cross the permissible limit.

KEY WORDS: *Terna project, physico-chemical paramaters.*

INTRODUCTION

The present investigation was undertaken to study the physicochemical parameters of 'Terna Project', Ter, Tq. & Dist. Osmanabad were studied during June 2009 to May 2010. The Terna Project is located on Ternariver, near to the historical village Ter, Ta. & Dist. Osmanabad of Maharashtra State. This Project is situated about 22km from Osmanabadcity.Geographically it is located on $18^0 - 19' -- 59''$ N latitude and $76^0 - 6' - 14''$ E longitudes.

The Terna Project, Ter Ta. & Dist. Osmanabad is constructed to serve definite purpose. The main purpose is to provide drinking water to Osmanabad and Dhoki city, as well as nearby villages like Ter and other small villages. The water is also utilized for irrigation purpose by the right and left canals of about 14 to 16 kms from dam.Total 15 villages get the benefit of water from this dam. The Project also provides natural habitat for plants, birds, grazing animals and also attracts the visitors during rainy season to see the attractive water falls from KT weir (outlet). The fish culture is also carried out in this Project. Therefore it is necessary to study the physicochemical characteristics of the project.

MATERIALS & 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 June 2009 to May 2010.

Surface water sample of three sites were collected 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 by thermomete The pH was measured by using Hanna pH meter. The chemical parameters of water were determined b standard methods described by American Public Health Association (APHA 1980) ,Trivedy et.al.(1998) an Kodarkar et.al. (1998).

RESULT & DISCUSSION

The physic-chemical parameters for 12 months are given in table no.1 The Morphometric feature c any reservoir depends on its catchment area and the topography of region. The geology of the particula region is responsible for availability of the specific nutrients, which ultimately decides the productivity of th reservoir and the nature of the bottom of the reservoir. The human interference in the catchment area hav direct and significant bearings on the structural and functional attributes in the aquatic habitat and may b responsible for the alteration of morphmetric characters of the reservoir (Hutchinson, 1957).

Atmospheric Temperature.

The atmospheric temperature of Terna Project ranged from 25.30 ^{0}c in month January to 40.03 ^{0}c i month May during the year 2009-10.The atmospheric temperature ranged from 25.2 to 40.1^{0}c at site –I,25.3 t 40.0^{0}c at site – II and 25.4 to 40.0^{0}c at site –III. In the present investigations the seasonwise analysis showe that the average air water temperature in the Project was maximum during summer, comparatively less durin monsoon and less during winter. The similar pattern of changes in air temperature was also observed b Nazneen (1980) and Satheet. al. (2000).The atmospheric and water temperature depends upon the geographical location and metrological conditions at a particular place (Jhingran and Singran, 1990).

Water Temperature

In the present investigation minimum water temperature recorded in January (23.23^{0}c) and maximum water temperature was found in month May (38.70^{0}c). The water temperature ranged from 23.0 to 38.9^{0}c at site –I, 23.2 to 38.7^{0}c at site – II and 23.5 to 38.5^{0}c at site –III.According to Mosely (1983) the variation in water temperature at different time was probably due to surface hitting during the day and cooling during night.In the present investigation the seasonwise analysis showed that the average water temperature in the Project was maximum during summer and minimum during winter and moderate during monsoon seasons. The similar pattern of water temperature was also observed by Kamal et.al. (2010) and Ugale B.J. (2011).

pH

The pH of Project ranged from 7.23 in month August and 8.63 in the month May during the year 2009-10. pH ranged from 7.3 to 8.8 at site –I, 7.2 to 8.9 at site – II and 7.2 to 8.8 at site –III. During the study period the pH of the reservoir remained alkaline. The pH range between 6.0 and 8.5 indicates medium productive nature, more than 8.5 highly productive and less than 6.0 low productive nature of a reservoir (Kurbatova, 2005, Tanner et. al. 2005). According to the above statement the pH of present reservoir is in between 7.29 to 8.63, so it belongs to highly productive in nature. In the present study it was observed that pH gradually increase from mid winter to late summer and then decreases in monsoon.Increased surface pH in water bodies is due to increased metabolic activities of autotrophs, because in general they utilize the CO_2 and liberate O_2, thus reducing H^+ ion concentration, while in the bottom of water body's liberation of acids from decomposing organic matter under low O_2 concentration, result in low pH (Ojha and Mandloi, 2004). Same type of fluctuations in pH range was recorded by Shindeet. al . (2010), Manjare et.al.(2011).

Biological Oxygen Demand

During the year 2009-10 the BOD of Terna Project ranged from 3.26 mg/lit. to 3.90mg/lit. BOD ranged from 3.3 to 3.9mg/lit. at site –I, 3.2 to 3.8mg/lit. at site – II and 3.0 to 4.0mg/lit. at site –III. During the study period the maximum BOD was recorded in the month July and minimum BOD was recorded in the month Nov. BOD above 6 mg/lit. in a water body is considered polluted and high BOD values are attributed to the stagnation of water body leading to the self purification (Iqbal and Katariya, 1995). The BOD level of

Terna Project is below 6 mg/lit., so the water remains unpolluted during the study period. In the present investigation the value of BOD recorded the maximum in the rainy season and minimum in the winter season and moderate in the summer season. The observation is agreement with the Bandelaet. al. (2002).

Total Hardness.

The total hardness of water of Terna Project ranged between 105.33 mg/lit. in the month December to 119.00 in the month July. Total Hardness ranged from 104 to 120mg/lit. at site –I, 107 to 121mg/lit. at site – II and 105 to 118mg/lit. at site –III. Khan et. al. (1986) studied the hardness of different reservoir of Bhopal during the winter season and showed that the hardness varied from reservoir to reservoir due to their geological setting. Total hardness of water is mainly governed by the content of calcium and magnesium which largely combine with bicarbonates and carbonates (Temporary hardness) and with Sulphate, Chlorides and other anions of minerals (permanent hardness). Sawyer (1945) classified water on the basis of hardness in to three categories that is soft (0.75 mg/lit.), moderately hard (75 to 150 mg/lit.) and hard (151 to 300mg/lit.). By these criteria the water of Terna Project can be termed as moderately hard. In the present study the seasonal variation in total hardness shows the minimum in winter season and maximum range of hardness is found in summer and monsoon seasons. This observation is agreement with the findings of Kumbhar A. C. (2006), Roy et. al. (2010).

Calcium

The values of Calcium varied from 16.43 to 22.38 mg/lit. during the study period.Calciumranged from 16.15 to 23.25mg/lit. at site –I, 16.20 to 22.21mg/lit. at site – II and 16.25 to 21.69mg/lit at site III. The minimum Calcium was recorded during winter and monsoon seasons and maximum calcium level is found during summer season. Calcium is the one of most abundant substance of the natural water (M. Vasanthy et. al., 2009). Being present in the higher quantities in rocks, it is leached from these two contaminate water, by the bacteria. Therefore the Calcium in natural water differs according to difference in Geographic region or anthropogenic impact. P. C. Mane et. al. (2010) has recorded Calcium range between 22.82 to 69.87 mg/lit. Bade B.B.(2008) was found the Calcium level ranges between 16.63 to 22.78 mg/lit. and which is minimum during monsoon and winter seasons and maximum during summer season. This is agreement with the present investigation.

Nitrates (NO_3).

The values of Nitrates varied from 0.035 mg/lit. in the month June to 0.046 mg/lit. in the month April of the year 2009-10.Nitrates ranged from 0.039 to 0.065mg/lit. at site –I, 0.035 to 0.062mg/lit. at site – II and 0.032 to 0.069mg/lit at site III. Nitrate is a plant nutrient and is generally non toxics to aquatic organisms. High concentration of Nitrates (710 mg/lit.) can result in over fertilization and results in algal blooms and fish mortality, test and odor problems (Ostozic, 2000). The seasonal trend in Nitrates was found to be minimum in monsoon season and maximum during summer season in the present investigation. This agreement with finding of Kumbhar A. C. (2006), Bade (2008), Soni and Bhatt (2008) S. A. Manjareet. al. (2010).

Phosphates (PO_4)

The values of Phosphates varied from 0.110 to 0.154 mg/lit. during study period. Phosphates ranged from 0.112 to 0.154mg/lit. at site –I, 0.111 to 0.155mg/lit. at site – II and 0.108 to 0.154mg/lit at site III. The most critical single element in maintaining aquatic productivity is Phosphorus, though it is one of most limiting factor of production in Indian reservoirs (Das 2000). The cycling of Phosphorous within lake and river is dynamic and complex, involving absorption and precipitation reactions, interchange with sediments and uptake by aquatic biota (Borberg and Persson, 1988). In the present investigation the minimum Phosphate were recorded during the winter and maximum during summer and monsoon seasons. The seasonal trend in the Phosphate shows minimum in winter in both the years but maximum Phosphates found in monsoon

season in first year and summer season in second year. The findings of the present investigation are in good agreement with the findings of P. N. Kamble (2008), Shinde et. al. (2010), S. A. Manjare (2010).

Magnesium

The values of Magnesium varied from 14.40 to 17.52 mg/lit. during study period. Magnesium ranged from 13.17 to 17.38mg/lit. at site –I, 14.86 to 17.35mg/lit. at site – II and 14.08 to 18.00mg/lit at site III. The general acceptable limit of Magnesium in water is usually 50 mg/lit., whereas its maximum permissible limit is 100mg/lit. (ICMR, 1975), while according to WHO (1999) maximum acceptable level of Magnesium in drinking water is 50mg/lit. The values recorded in the present investigation for Magnesium within the permissible limit as well as the water is safe for drinking purpose also. In the present investigation the minimum Magnesium was recorded during monsoon and maximum during summer seasons. The finding of present study is agreement with Bade B.B. (2008) and P.N. Kamble et.al. (2008) who found the Magnesium valves minimum in post monsoon and maximum during monsoon season.

Chlorides

The values of Chloride varied from 44.00 mg/lit. in the month December to 57.60mg/lit. in the month May. Chloride ranged from 44.00 to 55.58mg/lit. at site –I, 44.68 to 57.66mg/lit. at site – II and 45.10 to 51.31mg/lit at site III. The source of Chloride in natural water is the discharge of sewage. Large contents of Chlorides in fresh water are an indicator of organic pollution (Venkatasubramani and Meenambal, 2007). The seasonal changes of Chloride values shows that the maximum Chloride was recorded during summer and minimum Chloride was found during the winter season. The same type of fluctuations in Chloride values was also recorded by Kumbhar A. C. (2006), Shinde et. al. (2010) and Sharma et. al. (2010). Harrison (1999) was reported that the Chloride concentration depends on water level, when water level decreases Chloride concentration increases.

CONCLUSION:

From the above study it can concluded that almost all the parameters are within the prescribed limit of WHO & BIS standards. The environmental factors and seasons are responsible for the variations in the physicochemical factors of the Terna Project. Finally it is concluded that the ecological as well as biological environment of Terna Project is free from pollution and water is quite suitable for drinking purpose, before proper treatemant and the water is also well for the agricultural and fish culture activities.

Acknowledgment:

The authors are thankful to the Principal & head of the Department of Zoology Dr. A.D. Mohekar, S.M.D.M.M, Kallam for providing necessary laboratory facilities for complete this work.

Table No. 1. Physico-chemical paramaters of Terna Project, Ter, Tq. & Dist. Osmanabad

parameters	sites	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Atmospheric Temperature	I	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9
	II	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8
	III	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8
Water Temperature	I	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1
	II	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3
	III	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
pH	I	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
	II	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
	III	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Biological Oxygen Demand	I	3.5	3.9	3.8	3.3	3.5	3.6	3.4	3.3	3.7	3.7	3.5	3.7
	II	3.7	3.8	3.7	3.9	3.7	3.2	3.5	3.8	3.8	3.7	3.7	3.5
	III	3.9	4.0	3.9	3.7	3.6	3.0	3.3	3.4	3.3	3.6	3.8	3.9

Total Hardness	I	113	113	113	113	113	113	113	113	113	113	113	113
	II	112	112	112	112	112	112	112	112	112	112	112	112
	III	115	115	115	115	115	115	115	115	115	115	115	115
Calcium	I	21.21	19.17	19.45	16.15	16.30	16.38	18.37	18.85	20.09	20.37	20.78	23.25
	II	21.02	19.19	17.42	16.20	16.75	17.82	19.16	19.30	20.17	19.82	20.45	22.21
	III	20.09	19.03	18.26	17.87	16.25	17.02	17.95	19.38	19.98	20.23	20.17	21.69
Nitrates (NO_3).	I	0.039	0.039	0.043	0.041	0.046	0.043	0.048	0.049	0.050	0.053	0.065	0.063
	II	0.035	0.036	0.038	0.035	0.038	0.045	0.044	0.050	0.054	0.055	0.062	0.061
	III	0.032	0.034	0.040	0.038	0.034	0.038	0.040	0.048	0.059	0.057	0.067	0.060
Phosphates (PO_4)	I	0.150	0.153	0.154	0.152	0.145	0.138	0.125	0.112	0.128	0.136	0.145	0.147
	II	0.152	0.155	0.151	0.149	0.147	0.146	0.127	0.111	0.132	0.140	0.138	0.142
	III	0.151	0.154	0.150	0.148	0.147	0.142	0.136	0.108	0.124	0.145	0.149	0.147
Magnesium	I	15.21	16.28	13.17	15.27	16.65	15.69	16.22	15.62	16.68	15.02	16.17	17.38
	II	15.17	14.86	15.68	15.35	16.01	15.55	15.58	15.00	15.58	14.98	16.58	17.35
	III	15.47	15.12	14.35	14.08	15.88	15.52	15.67	15.38	14.67	15.37	16.70	18.00
Chlorides	I	48.21	49.48	51.68	51.60	49.57	46.76	44.00	46.55	47.50	49.35	51.19	55.58
	II	48.35	49.50	51.57	51.68	50.63	50.55	44.68	47.01	45.90	50.68	50.58	57.60
	III	42.51	37.20	50.48	51.00	51.67	48.05	45.10	45.86	46.96	50.17	51.24	51.31

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