

Physico-chemical parameters of Turori Dam, Turori, Dist., Osmanabad, During the Period Feb 2009 to Jan 2010

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Abstract— During the present study period the water samples collected from the Turori dam with the interval of one month from the selected spots of dam during the period of one year i.e. from Feb 2009 to Jan 2010. The parameters as Air temperature, water temperature, Transparency, turbidity, pH, Dissolved Oxygen, Free carbon dioxide, Total Hardness and Total alkalinity studied, the results were as discussed in the text.

Keywords— Turori dam, Physico-chemical parameters

1. Introduction

Earth's climate changes every year due to the human activities and naturally occurring processes, by the human activities like industrialization, civilization, use of pesticides and construction of Dams. Due to Industrial revolution mean surface temperature of Earth increasing at an average of 1° Celsius per century. Due to the accumulation of green house gases in atmosphere and also due to the water pollution the water quality is also changing.. The characters of water body and pollution act as a limiting factor for occurrence and survival of organisms. So it is becoming important to check the water quality periodically by considering the need various workers worked on limnological study of water. In the world the Limnological study of the water bodies started earlier but, in India the scientist turned to limnology very late. In India remarkable works are as Bhatt S. D. and U. Negi (1985), Trivedy R. K. & Goel P. K. (1988), Pandit (1993), Hosetti (1994), Kodarkar (1994), Bhosale et. Al. (1994), Sinha (1995), Meshram C. B. and Dhande (1996), Padmavati P. and Durga Prasad (1997), Kanhere (1997), Arvinda (1998), Ajai Pillai (1999), Tiwari (1999), Sakhare V.B. and P.K. Joshi-(2002). So by considering the need, present study undertaken on the Turori dam Dist. Osmanabad. The Turori Dam is located about 11 Km from Omerga city, at latitude $17^{\circ} 48$ min and longitude $76^{\circ} 44$ min. This dam located near Turori village Tal- Omerga, Dist-Osmanabad. The purpose of constructing this dam is to provide water for nearby villages i.e. Ashta (Kasar). Turori and Dapka. This dam is having catchment area about 34.16sq. mile. Maximum height of Dam is 17.50 meters. and Length is 1192 meters. This dam is having cross command area of 2660 Hect. Whereas the cultivable command area is about 2394 Hect. and Irrigable

command area is about 2190 Hect. This dam is having two canals the Length of right canals is 10 km the Length of left canal is 8 Kms. This Dam surrounded by Agriculture fields of villages Turori, Ashta (kasar) and Dapka.

2. Material and Methods

During the present study period. The water samples collected from the Turori dam with the interval of one month from the selected four spots of dam during the period of one year i.e. from Feb 2009 to Jan 2010. pH, Temperature of water were recorded on the spot as these parameters may change during the transportation and for the remaining parameters the water samples brought in the laboratory. Analyses of parameters were carried out according to standard Methods given by APHA, IAAB (Hyderabad) and Methods of water analysis by Trivedi and Goel (1986).

3. Result and Discussion

The monthly variation in physicochemical parameters was as shown in table No. 1 and the coefficient of correlation as shown in table no. 2.

3.1 Air temperature

During present investigation air temperature ranged from 18°C to 40°C , with annual average of $30.13^{\circ}\text{C} \pm 6.96^{\circ}\text{C}$. The minimum temperature 18°C recorded during the month of Jan and the maximum temperature 40°C recorded during the month of May. The air temperature also showed seasonal variation, the air temperature was maximum during summer season with seasonal average of $37.3 \pm 1.65^{\circ}\text{C}$, Intermediate during rainy season with seasonal average $31.72 \pm 2.66^{\circ}\text{C}$ and Minimum during winter season with seasonal averages of $21.37 \pm 2.31^{\circ}\text{C}$. The air temperature positively correlated with water temperature, Turbidity, CO_2 whereas negatively correlated with Transparency, pH, D.O., Total hardness and Total alkalinity.

3.2 Water temperature

The water temperature ranged from 13 to 35°C with an average of $25.075^{\circ}\text{C} \pm 6.423$. The minimum water

temperature 13 °C recorded during month of January and maximum temperature 35 °C recorded during month of May. Water temperature also showed seasonal variation, the water temperature was maximum during summer seasons with seasonal averages of 30.75 ± 2.912 °C, Intermediate during rainy seasons with seasonal averages 27.425 ± 2.367 °C and minimum during winter season with seasonal averages of 17.05 ± 2.75 °C. The water temperature exhibited positive correlation with Air temperature and Turbidity, where as exhibited negative correlation with Transparency, pH, D.O., Total hardness and Total alkalinity.

The Air temperature was always higher than the water temperature during study period. The temperature was higher in summer and rainy season as compared to winter season. A rise in temperature of water leads to the spreading up of the chemical reactions which leads to reduction in solubility of gases in water like O₂ and CO₂.

Water quality is depends on the atmospheric and water temperature. The water temperature also affects on the biochemical reactions in the aquatic animals, so the atmospheric and water temperature play important role to indicate the water quality. Rise in the water temperature leads to spread up of the chemical reactions and reduces the solubility of gasses like O₂ and CO₂ in water. Water temperature in summer and monsoon seasons was higher as compared to that in winter. According to Welch (1952) all metabolic, physiological and life process influenced by temperature. Trivedy and Goel (1988) have reported that the temperature of water was higher in March and lower in November in some water bodies of Satara District.

Lendhe and Yeragi (2004) Studied the Phirange Kharbav lake district Thane and reported that water temperature was lower during winter and, it was always lower than Air temperature. Madhuri Pejaver et al (2004) Have reported high water temperature during month of May and lower during month of January in two quarries near Thane City.

3.3 Transparency

The Transparency ranged from 30 to 92 cm with an annual average of 51.53 ± 17.320 cm. The minimum transparency 30 cm recorded during the months of July, where as maximum transparency 92 cm. recorded during month of January. Transparency also showed seasonal variations the minimum seasonal transparencies were recorded during rainy season, intermediate during summer season and maximum during winter season. The transparency exhibited positive correlation with pH, dissolved oxygen, total hardness and total alkalinity where as Transparency exhibited negative correlation with, Air temperature, Water temperature and Turbidity.

Transparency was minimum during July and maximum during January. This transparency indicating high tropic status of wet land (Trivedy and Goel-1988). Transparency

values indicated eutrophication similar results obtained by Kadam et al (2005) in Bhategaon Dam Dist. Parbhani,,

3.4 Turbidity

During present study period turbidity ranged from 7 to 24 NTU with an annual average of 15.74 ± 5.16 NTU. The minimum turbidity 7 NTU recorded during month of Jan and the maximum turbidities 24 NTU recorded during month of July. The turbidity also shown seasonal variations the turbidity was minimum during winter season, Intermediate during summer season and was maximum during the rainy season. The turbidity exhibited positive correlation with Air temperature, water temperature, where as exhibited negative correlation with Transparency, pH, Dissolved Oxygen, Total Hardness and Total Alkalinity.

During the study period the transparency was low indicating high tropic status of Dam. The transparency values were lower in rainy season, due to sewage contamination from rain water from surrounding area. The turbidity was higher during rainy season due to the addition of silt and sewage in the dam water from surrounding areas and earthen bund.

The high turbidity values during monsoon were due to addition of silt load with influx of monsoon run off and earthen bundh. Sinha (1995), Patil S.G. et al (2002), Sahib (2004), Pailwan and Muley (2006).

pH : During present study the pH ranged from 7.1 to 8.4 with an annual average of 7.77 ± 0.40 . The water of Turori dam was Basic during the study period. The minimum pH 7.1 recorded during month of April and maximum values 8.45 recorded during month of December. The pH also shown seasonal variations the pH was minimum during summer season, intermediate during rainy season and was maximum during winter season. pH of dam water exhibited positive correlation with Transparency, Dissolved oxygen, Total Hardness and Total alkalinity where as pH exhibited negative correlation with Air temperature, Turbidity, free CO₂.

Similar results obtained by Reddy K. R. (1981), Mathur et al (1987), Trivedy and Goel (1988), Sinha (1995), Chamundeshwari Devi (2001), Madhuri Pejaver (2002), Patil et al (2002). The pH of the dam water was alkaline throughout the study period, the pH ranged from 7.1 to 8.4. The present pH range showed that the water of this dam was suitable for aquatic life, irrigation and domestic purposes.

3.5 Dissolved Oxygen

Dissolved Oxygen ranged from 3.5 to 7.6 mg/lit., with an annual average of 5.21 ± 1.31 mg /lit. The minimum dissolved Oxygen value 3.5 mg/lit. recorded during the month of May and maximum value 7.6 recorded during the month of January. The values of dissolved oxygen also shown seasonal variations, the dissolved oxygen was

minimum during summer season, Intermediate during rainy season and maximum during winter season. The dissolved oxygen values exhibited positive correlation with Transparency, pH, Total Hardness and Total alkalinity, whereas exhibited negative correlation with Air temperature, Water temperature, Turbidity and free Carbon dioxide. The dissolved oxygen was higher during winter season and lower during summer season due to reduction in solubility of gases. Because due to increase in temperature the oxygen carrying capacity of water decreases and the other cause may be due to the decreased water level of dam the concentration of Aquatic organisms increase and they consume the Oxygen from the water.

In present study it was observed that water temperature in summer was high and low in winter. similar observation reported by Trivedy and Goel 1988, Sinha 1995, Goel 1995, Kanhere 1997, , Patil et al 2004, Meera Shrivastava 2004.

3.6 Free carbon dioxide

The free carbon dioxide ranged from 2 to 5.1 mg/lit. with annual average 3.75 ± 1.05 mg/lit. The minimum free carbon dioxide value recorded during month of Jan and maximum value recorded during month of April. The free carbon dioxide values also shown seasonal variations the free carbon dioxide was minimum during winter season, intermediate during rainy season and was maximum during the summer season. The free Carbon dioxide shown positive correlation with Air temperature, water temperature and Turbidity, where exhibited negative

correlation with Transparency. pH, Dissolved Oxygen, Total Hardness and Total alkalinity. Absence of free CO₂ may be due to its utilization in Photosynthetic activity (Sreenivasan 1974), Bahura C. K (1998), Patil et al (2002), Yogesh Shastri (2001), Sakhare (2004), Meera Shrivastava (2004).

3.7 Total Hardness

The total Hardness ranged from 35 to 105 mg/lit with an annual average of 72.25 ± 19.71 mg/lit. The minimum total Hardness value 35 mg/lit. recorded during the month of May and maximum values 105 mg/lit. recorded during the month of December. The total Hardness values also shown seasonal variation the minimum total hardness were recorded during the summer season, intermediate during rainy season and maximum during the Winter season. The total hardness exhibited positive correlation with Transparency, pH, Dissolved Oxygen, Total alkalinity, where as the total Hardness exhibited negative correlation with Air temperature, Water temperature, Turbidity and Free CO₂.

The total Hardness was ranged from 35 to 105 mg / lit. during present study period. Khanna (1991), classified water on the basis of hardness as soft (0-60 ppm), moderately, Hard (61-120 ppm) and Hard (121-160 ppm) so the water of the Turori dam found to be soft or Moderately Hard. So the water of Turori dam is suitable for the growth of organisms.

Table No.1. Monthly variation in physico-chemical parameters of Turori Dam from Feb 2009 to Jan 2010.

	Feb.	Mar ch	April	May	Jun e	July	Aug ust	Sept .	Oct.	Nov.	Dec.	Jan.	Aver.	S. D.	Min.	Max .
A. T.	35.6	36.5	37.1	40.0	35.5	32.6	30.5	28.3	24.2	22.6	20.7	18.0	30.13	± 6.96	18.0	40.0
W. T.	27.5	28.7	31.8	35.0	30.6	28.3	26.7	24.1	20.4	18.5	16.3	13.0	25.07	± 6.42	13.0	35.0
Transp	58.5	49.0	42.2	40.8	40.2	30.0	37.2	42.2	48.3	59.0	79.0	92.0	51.53	± 17.32	30.0	92.0
Turb.	11.1	14.4	18.5	18.1	19.5	24.0	23.1	18.5	14.0	11.3	9.4	7.0	15.74	± 5.16	7.0	24.0
pH.	7.4	7.3	7.1	7.3	7.8	7.9	7.9	7.8	7.9	8.2	8.4	8.3	7.77	± 0.40	7.1	8.4
D. O.	4.8	4.2	3.9	3.5	3.8	4.3	5.1	5.8	5.9	6.6	7.1	7.6	5.21	± 1.31	3.5	7.6
CO₂	3.9	4.6	5.1	5.0	4.8	4.1	3.9	3.8	2.9	2.7	2.3	2.0	3.75	± 1.05	2.0	5.1
T. H.	78	68	48	35	56	65	63	78	81	92	105	98	72.25	± 19.71	35	105
T. A.	156	140	110	102	98	80	73	60	82	158	173	160	116	± 37.76	60	173

Table: No. 2.Coefficient of correlation Among physico-chemical parameters of Turori Dam from Feb 2009 to Jan 2010.

	A. T.	W. T	Transp.	Turb.	pH	D. O.	CO ₂	T. H.	T. A.
A. T.	--	0.98	-0.72	0.60	-0.89	-0.97	0.97	-0.89	-0.35
W. T.	--	--	-0.80	0.70	-0.85	-0.98	0.98	-0.94	-0.47
Transp	--	--	--	-0.92	0.55	0.80	-0.78	0.77	0.80
Turb.	--	--	--	--	-0.36	-0.69	0.69	-0.72	-0.84
pH.	--	--	--	--	--	0.83	-0.86	0.78	0.24
D. O.	--	--	--	--	--	--	-0.97	0.93	0.45
CO ₂	--	--	--	--	--	--	--	-0.93	-0.46
T. H.	--	--	--	--	--	--	--	--	0.55
T. A.	--	--	--	--	--	--	--	--	--

Abbreviations: A.T.- Air temperature, W.T.- Water temperature, Trans.- Transparency, Turb.- Turbidity, D.O.- Dissolved Oxygen, CO₂-free Carbon di oxide. T.H.- Total Hardness, T.A.- Total Alkalinity.

3.8 Total alkalinity

Total alkalinity ranged from 60 to 173 mg/lit. With an annual average of 116 ± 37.76 mg/lit. The minimum total alkalinity value 60 mg/lit. recorded during month of September, where as maximum value 173 mg/lit recorded during the month Dec. The total alkalinity values also shown seasonal variations the total alkalinity was minimum during the rainy season, Intermediate during the season summer and was maximum during winter season. Total alkalinity exhibited positive correlation with Transparency, pH, Dissolved Oxygen and Total Hardness, whereas Total alkalinity exhibited negative correlation with Air temperature, Water Temperature, Turbidity and and Free CO₂.The alkalinity was minimum during rainy season because of dilution of Dam water by rain water due to increase in water level the alkalinity decreased Madhuri Pezaver et al (2004) Alkalinity was maximum during winter and summer due to decreased water level. The alkalinity of water was usually interpreted as quantity of compounds as bicarbonates, carbonates present in water shift the pH to alkaline side of neutrality. Kanhere (1997), Sing (1999), Narsimha rao (2001), Patil et. al (2002).

Total alkalinity was minimum during rainy season and maximum during winter season. The present water of dam seems to be productive. Thus present water of dam seems to be moderately polluted due to domestic sewage and agricultural runoff which indirectly suggest beginning of eutropication.

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