A primary report on physico–chemical parameters of Sonala dam in Washim district of Maharashtra, India

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Abstract
Average monthly value of physical parameter like Air temperature (21.95 ºC), Water temperature (19.37 ºC), Transparency (25.52 cm) P^H (7.48) and Chemical Parameters like Total Dissolve Solids (274.08 mg/L), Dissolved oxygen (9.52 mg/L), Chlorides (41.73 mg/L) , Sulphates (0.18 mg/L) and Nitrates (0.30 mg/L) were observed from August 2013 to January 2014 in Sonala Dam of Washim District ($20^0.32$'N and $77^0.20$'E.), Maharashtra.
Higher values of pH indicated slightly alkaline nature of water suitable for drinking as per the guideline range prescribed by WHO. Main sources of dissolved oxygen in the range of 7.97 to 11.08 mg/L is the photosynthetic activity within water while nutrients like Sulphates and Nitrates and Chlorides provide suitable environment for the biota in the dam however further study is required to get the exact status of water quality of the dam.

Keywords: Physico-chemical parameters, Sonala Dam, water quality

1. Introduction
Water is one of the most important natural resources that helps to sustain life on earth. It is one of the natural resources that is unique and essential that makes life possible .But freshwater has become a critical natural resources due to number of reasons such as increasing demands in all sectors like drinking, agriculture, aquaculture and industry.
In India large number of studies on limnology of lentic water bodies have been carried out in past 30 years viz.,Shardendu and Ambasht (1988); Pathak and Bhatt(1990); Pandey, *et. al*., (1993); Lohar and Patel (1998) and Shashtri, *et. al*., (1999).
Accurate and timely information on the quality of water is necessary to shape a sound public policy and to implement the water quality improvement programmes efficiently. One of the most effective ways to communicate information on water quality trends is with indices. Water quality index (WQI) is commonly used for the detection and evaluation of water pollution and may be defined as "a rating reflecting the composite influence of different quality parameters on the overall quality of water." (Mishra and Patel, 2005)
The indices are broadly characterized in to two parts: the physico-chemical indices and the biological indices. The physico-chemical indices are based on the values of various physico-chemical parameters in a water sample, while biological indices are derived from the biological information and are calculated using the species composition of the sample, the diversity of species, their distribution pattern, the presence or absence of the indicator species or groups etc.

Present study deals with the physico-chemical parameters of Sonala Lake in Washim District of Maharashtra.

2. Materials and Methods
The Sonala dam serves as a rich source of water supply for irrigation, drinking to nearest villages and fish culture. Sonala dam situated in Malegaon Tahsil of District Washim in Maharashtra (($20^0.32$'N and $77^0.20$'E.) is locally known as "Sonala lake" or "Sonala Talav". Dam was constructed as part of irrigation projects by Government of Maharashtra in the year 1981.
Water samples were collected for six months from August 2013 to January 2014 on monthly basis .Throughout the study period the water sample was collected in the morning hours and then brought in suitable polyethylene bottles in the research laboratory for further investigation.
Parameters like Air temperature, Water temperature, transparency and pH were analyzed at Lake Site whereas dissolved oxygen, total dissolved solids, chlorides, sulphates and nitrates were analyzed in the laboratory on the same day by titration methods as given in standard methods for the examination of water, sewage and industrial waste (APHA 1998) and Golterman *et al.* (1978).

3. Result and Discussion
Table 1 presents the physico-chemical parameters of Sonala Dam during the period of investigation from August 2013 to January 2014.
Temperature is basically important factor in aquatic media as it affects on certain chemical and biological activities in the organisms inhabiting in it. In present study, atmospheric and water temperature values ranges from 20.22 ^{0}C to 23.68 ^{0}C and 18.17 ^{0}C to 20.57 ^{0}C respectively. Average air temperature was recorded as 21.95 ^{0}C while water temperature was recorded as 19.37 ^{0}C. Water temperature followed more or less similar trends as that of atmospheric temperature. Kaur *et al.* (1995) also observed similar trend in fresh water ecosystems in and around Patiala.
Transparency in any water body is influenced by the turbidity which in turn is majorly caused because of silt, clay, planktons and colloidal organic matter. During the study period the transparency values were minimum during month of monsoon i.e. August, September and October followed by winter season. The values of transparency ranges between 23.96 to 27.13 cm. Low values of transparency during months of monsoon may be due to silt brought into the reservoir from adjoining catchment area through rain water while high value of transparency in winer months might be due to gradual settlement of suspended particles. Similar trend of increased value for transparency during winter and decreased during

rainy season was noted by Thirupathaih *et.al* (2012). Minimum transparency in rainy season may be attributed to the turbid condition of water, influx of suspended silt with colloidal particles, high waves and cloudy weather. Ade and Vankhede (2001) and Meshram and Dhande (1996) also recorded minimum transparency during rainy season.

The monthly variation in the pH values ranges between 7.2 and 7.6. Our resultrs are well in agreement with the study of Mathivana *et. al*; (2005). Kaul and Handoo (1980) emphasized that increased surface water pH in water bodies is due to increased metabolic activities of autotrophs, because in general they utilize the CO_2 and liberates O_2 thus reducing H^+ ions. pH values are always higher than 7 confirms alkaline nature of Sonala Dam. Higher values of pH is correlated with high photosynthetic activity (Wetzel, 1975).

The average value of pH was found to be 7.48 which is in a compliance with the guideline range of pH values for drinking water (6.5-8.5) prescribed by WHO (2003) indicating suitability of water for drinking purpose.

Dissolved oxygen (DO) is very important parameter in water quality assessment and is an index of physical and biochemical processes occurring in water. Dissolved Oxygen ranges from 7.97 mg/L in the month of August to 11.08 mg/L in the month of December. Average value of Dissolved Oxygen was counted as 9.52 mg/L. Similar results have been reported by Sangpal *et al.*(2011) in Ujjani reservoir of Solapur District. Two main sources of dissolved oxygen in water are diffusion from air and photosynthetic activity within water (Kumar and Sharma, 2001)

In the present study Total dissolved solids (TDS) values range from 211.38 mg/L to 336.78 mg/L. Average value was recorded as 274.08 mg/L. Our is supported by findings of Rao (1987).

Chlorides increases the degree of eutrophication (Goel *et al.,*1980).The values of chloride ranges between 30.14 to 53.33 mg/L and average value was recorded as 41.73 mg/L. Chloride controls the salinity of water and osmotic stress on biotic communities (Banerjee, 1967).

The main source of sulphate is surface runoff of water from catchment area. Sulphate values ranges from 0.13 mg/L to 0.23 mg/L and average value was recorded as 0.18. mg/L. Nitrate values ranges from 0.18 mg/L to 0.40 mg/L and average value was recorded as 0.30. mg/L. Nitrate is the most highly oxidized from of nitrogen compounds commonly found in waters, as it is the product of anaerobic decomposition of organic nitrogenous waste.

Nutrients like SO_4 and NO_4 are responsible for causing the enrichment of natural waters and their major sources are domestic sewage, detergents, agricultural effluents with fertilizers and industrial waste water. Same trend was observed by Rao and Rao (2000) and Ade and Vankhede (2001) in their findings.

Table 1: Average values of physico-chemical parameters of Sonala dam, District Washim, during August 2013 to January 2014.

Sr. No.	Water quality Parameter	Months						Min	Max	Average
		August 2013	September 2013	October 2013	November 2013	December 2013	January 2104			
1	Air temperature (^{0}C)	23.68	22.87	21.65	21.05	21.15	20.22	20.22	23.68	21.95
2	Water temperature (^{0}C)	20.57	20.25	19.72	19.32	18.68	18.17	18.17	20.57	19.37
3	Transparency (cm)	24.47	23.96	24.98	27.08	27.13	25.97	23.96	27.13	25.52
4	P^H	7.27	7.5	7.58	7.65	7.6	7.7	7.27	7.7	7.48
5	Dissolved Oxygen (mg/L)	7.97	8.33	8.66	9.10	11.08	10.03	7.97	11.08	9.52
6	Total Dissolved Solids (mg/L)	211.38	220.13	229.09	336.78	229.43	240.69	211.38	336.78	274.08
7	Chlorides (mg/L)	30.14	32.04	33.38	43.79	49.71	53.33	30.14	53.33	41.73
8	Sulphate (mg/L)	0.13	0.17	0.20	0.23	0.19	0.23	0.13	0.23	0.18
9	Nitrates (NO_3) (mg/L)	0.18	0.24	0.26	0.28	0.40	0.43	0.18	0.43	0.30

4. Conclusion
Higher values of pH indicated slightly alkaline nature of water and its suitability for drinking purpose .Dissolved oxygen point out photosynthetic activities happening into the water while nutrients like Sulphates and Nitrates and Chlorides provide suitable environment for the biota in the dam however further study is needed to confirm the exact status of water quality of the dam .

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