



Monitoring Water Quality Parameters from Some Freshwater Wetlands of Warora Taluka, Chandrapur District, Maharashtra State

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Abstract:

In the present investigation an attempt was made for assessment of some physico-chemical characteristics of some selected wetlands from Warora Taluka, District Chandrapur, Maharashtra State during the year 2014-2015. The present investigation deals with the study of physico-chemical parameters like Temperature, pH, Alkalinity, Turbidity, Dissolve oxygen, Carbon dioxide, from some fresh water wetlands of Warora Taluka. To reveal the present status of wetlands, water quality of the sample compared with the standard guideline values recommended by BIS (1991) to understand use of water for drinking, irrigation & fishery. The analysis of various parameters carried out by using standard methods (APHA/NEERI). The study reveals that most of the properties of all the sites shows moderate variations in their concentration for all seasons.

Keywords: - Physico-chemical parameters, Water quality, Warora Taluka

Introduction: -

A fresh water wetland which full fill variety of human needs is full of value only when it is not abused. Lakes and rivers are the prime source of water for drinking, irrigation and other domestic purposes. The water is essential for life without water neither plant and animal survives nor would industries thrive, we all know appreciate these facts. The changes in the global environmental parameter have been resulted in great alteration in the pattern of summer, winter, rainfall, wind direction etc. Human seemed to be adjusting well to these changing circumstances with the help of modern technology and equipment, but animal are still struggling to adjust themselves to such a great and sudden change.

The Warora Taluka is located in eastern Maharashtra. The Warora city is about 44 km away from Chandrapur in NW direction which lies at latitude 20°23' N and longitude 79°0' E. Warora, a township worldwide known for the great socialist Baba Amte's Anandwan and for its natural beauty & pollution free environment. But, since last decades rapid industrialization in particular coal mines, thermal power plants etc. changes the pristine environment of entire Warora Taluka. Due to rapid industrialization and urbanization, the water quality of nearby wetlands was found to be degraded. These wetlands are used by local inhabitants for domestic purpose and fishing activities, therefore a present study was carried out to monitor major wetlands in Warora region, i.e. Wardha river, Chargaon dam, Anandwan Lake and Gandhi Sagar lake to obtain their present status, whether wetlands are fit for aquatic life, irrigation and domestic purposes.

Wardha river flows nearly 4 km from Warora city. Wardha river water sample taken from latitude 20°12'25"N and longitude 78°57'44"E. Chargaon dam is about 28 km from Warora city and is located between 20°23'19"N to 20°26'25"N latitude





and $79^{\circ}9'25''\text{E}$ to $79^{\circ}11'39''\text{E}$ longitude. Anandwan lake is very close to Warora city and lies between $20^{\circ}15'31''\text{N}$ to $20^{\circ}15'38''\text{N}$ latitude and $79^{\circ}1'20''\text{E}$ to $79^{\circ}1'27''\text{E}$ longitude. GandhiSagar lake is situated in the middle of Warora city and lies between $20^{\circ}13'50''\text{N}$ to $20^{\circ}14'8''\text{N}$ latitude and $79^{\circ}0'10''\text{E}$ to $79^{\circ}0'32''\text{E}$ longitude. Water quality of Warora region wetlands is analyzed by comparing with the guidelines, given by bureau of Indian standard parameters of drinking water.

The present study mainly focuses on impact of seasonal changes in physico-chemical characters like Temperature, Turbidity, pH, Alkalinity, CO_2 and Dissolve oxygen from four different wetlands in Warora Taluka of Chandrapur District, Maharashtra State.

Material and Methods: -

Water sample were collected from four wetlands (Wardhariver, Chargaon dam, Anandwan Lake and GandhiSagar Lake) at fishing sites with the help of fisherman. Sampling is done in the morning hours in the clean plastic bottles at monthly interval for one year from Feb.2014 to Jan.2015. Temperature recorded at sampling site with the help of Thermometer after that samples were kept in the dark and cool box before being transported to a laboratory for quantification of other parameters. Various physico-chemical parameters were analyzed as given in standard manual of water and waste water analysis (APHA/NEERI).

Result and Discussion:

To determine causes in seasonal variations of certain physico-chemical parameters from wetlands (Wardha river, Chargaon dam, Anandwan lake, Gandhisagar lake) were selected. The quality of water may be affected by various sources. The results on water quality in terms of physico-chemical properties are summarized in the table 1,2,3,4,5,6 and in figure 1,2,3,4,5,6.

Temperature: - The water temperature is one of the important parameter in aquatic eco-system. In the present study temperature ranges from $21.8^{\circ}\text{C} \pm 1.47$ to $27.39^{\circ}\text{C} \pm 2.12$ (Table1, Figure1). The maximum water temperature was found during summer while minimum during winter, similar result were found by Shiddamallaya et al., (2008) in Bhalki Tank, Bidar. The temperature fluctuations are dependent on season, geographical locations as well as temperature of effluents poured into the water bodies. The low temperature of water during winter may be due to high water level & low solar radiation and higher water temperature in summer might be due to low water level and greater solar radiation.

pH: -pH is essential characteristic of any aquatic ecosystem. Since all the biochemical activities and retention of physico-chemical features of water are greatly depend on pH of surrounding water. In present investigation pH values of all wetlands under study are slightly alkaline throughout the study period. The mean pH values of all wetlands ranges from 7.32 ± 0.32 to 8.47 ± 0.09 (Table2, Figure2).pH was maximum in winter season and minimum during monsoon season. Ellise (1964) pointed out that fish and other aquatic organism tolerates pH values between 6.7 to 8.4 and pH below 5 and above 8.8 may be detrimental or even lethal to aquatic life .





Alkalinity: - Alkalinity of water is its acid neutralizing capacity. In the present study, Alkalinity ranges from 121.5 ± 5.02 mg/lit to 218.5 ± 32.54 mg/lit. Total alkalinity was maximum during summer while minimum during monsoon (Table3, Figure3). Maximum mean values of alkalinity was recorded during summer due to reduction in quantity of water and accumulation of large quantity of bicarbonates due to excess production of free CO₂ in the process of decomposition of bottom deposits. Mukharji et al., (2006) reported the maximum total alkalinity in summer with the increases in temperature.

Turbidity: - Turbidity of water is directly related to the light penetration. The turbidity of wetlands during study period ranges from 3.28 ± 0.82 NTU to 10.85 ± 2.39 NTU (Table 4, Figure 4). The maximum turbidity was recorded during monsoon due to surface runoff from catchment area while, minimum in winter season. Shivanikar (1998) observed the similar result in river Godawari, Nanded (MS).

Dissolve Oxygen: -Dissolve oxygen levels in water depends on the physical, chemical and biochemical activity in the water body. In the present analysis dissolve oxygen ranges from 4 ± 0.55 mg/lit to 7.2 ± 0.25 mg/lit. (Table5, figure5). Dissolve oxygen recorded maximum during the winter season while minimum during summer season. Bharali et al., (2008) reported the same in the wetland of Kaziranga National Park, Assam.

FREE CO₂:- Surface water normally contain less than 10mg free CO₂. In most of the wetlands free CO₂ recorded maximum during summer while minimum during winter. Ingole et al (2009) found same result on Majalgaon Dam, Bid District (MS). Seasonal water analysis of water shows free CO₂ ranges from 4.5 ± 0.19 mg/lit to 14.68 ± 0.7 mg/lit. (Table6, figure6)

Table.1- Season wise record of Temperature(°c) for 1 year from Feb-2014 to Jan-2015 .

Season	Wardha river	Chargaon dam	Anandwan lake	Gandhisagar lake
Summer	27.39 ± 2.12	26.26 ± 2.52	25.87 ± 2.87	26.68 ± 1.98
Monsoon	26.91 ± 1.54	25.48 ± 0.96	25.06 ± 0.95	25.19 ± 0.72
Winter	22.65 ± 0.51	22.43 ± 1.47	21.8 ± 1.47	22.13 ± 1.19

Table. 2- Season wise record of pH for 1 year from Feb-2014 to Jan-2015.

Season	Wardha river	Chargaon dam	Anandwan lake	Gandhisagar lake
Summer	8.39 ± 0.07	8.32 ± 0.34	7.56 ± 0.22	7.56 ± 0.31
Monsoon	7.9 ± 0.52	8.23 ± 0.02	7.32 ± 0.32	7.39 ± 0.3
Winter	8.47 ± 0.09	8.41 ± 0.05	8.3 ± 0.16	7.91 ± 0.23





Table. 3-Season wise record of Alkalinity (mg/lit) for 1 year from Feb-2014 to Jan-2015.

Season/Wetland	Wardha river	Chargaon dam	Anandwan lake	Gandhisager lake
Summer	218.5 ± 32.54	181 ± 11.9	162.3 ± 16.04	154.3 ± 16.05
Monsoon	172 ± 42.31	139 ± 13.10	136 ± 5.52	121.5 ± 5.02
Winter	176.5 ± 37.32	155 ± 7.04	140.5 ± 5.72	133.5 ± 7.43

Table. 4- Season wise record of Turbidity (mg/lit) for 1 year from Feb-2014 to Jan-2015.

Season/Wetland	Wardha river	Chargaon dam	Anandwan lake	Gandhisager lake
Summer	6.38 ± 0.98	6.5 ± 0.78	7.03 ± 0.18	5.8 ± 4.63
Monsoon	10.85 ± 2.39	9.68 ± 0.19	9.35 ± 0.39	7.53 ± 0.9
Winter	4.4 ± 1.47	6.35 ± 0.97	5.28 ± 0.43	3.28 ± 0.82

Table. 5- Season wise record of Dissolve Oxygen (mg/lit) for 1 year from Feb-2014 to Jan-2015.

Season	Wardha river	Chargaon dam	Anandwan lake	Gandhisager lake
Summer	4 ± 0.55	4.33 ± 0.46	4.38 ± 0.63	4.65 ± 0.38
Monsoon	5.9 ± 1.06	4.88 ± 0.43	4.85 ± 0.39	5.7 ± 0.19
Winter	7.2 ± 0.25	6.5 ± 0.25	5.65 ± 0.15	5.8 ± 0.32

Table. 6- Season wise record of free CO₂ (mg/lit) for 1 year from Feb-2014 to Jan-2015

Season/Wetland	Wardha river	Chargaon dam	Anandwan lake	Gandhisager lake
Summer	14.68 ± 0.7	7.58 ± 0.45	6.55 ± 0.74	7.75 ± 1.09
Monsoon	12.88 ± 1.15	6.63 ± 0.84	6.38 ± 0.59	7.98 ± 0.52
Winter	10.48 ± 2.29	4.5 ± 0.19	5 ± 0.35	6.3 ± 0.23

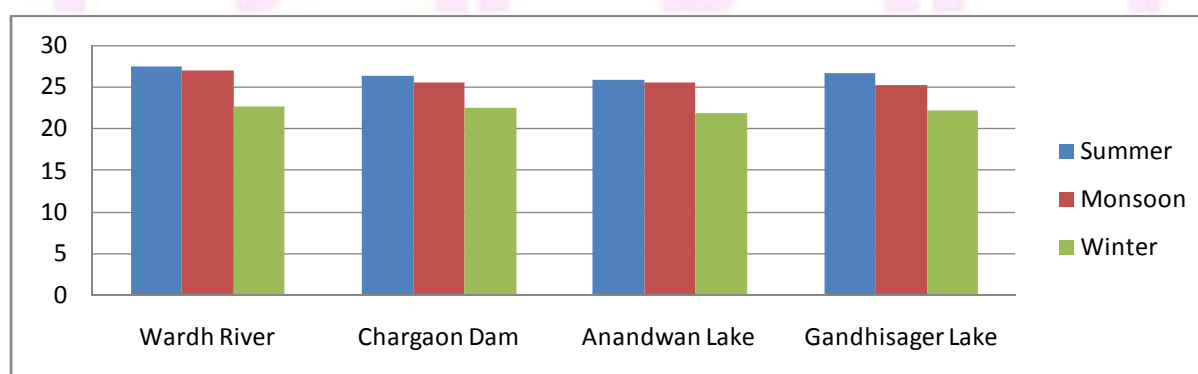


Figure. 1-Season wise record of Temperature (°C) for 1 year from Feb-2014 to Jan-2015.



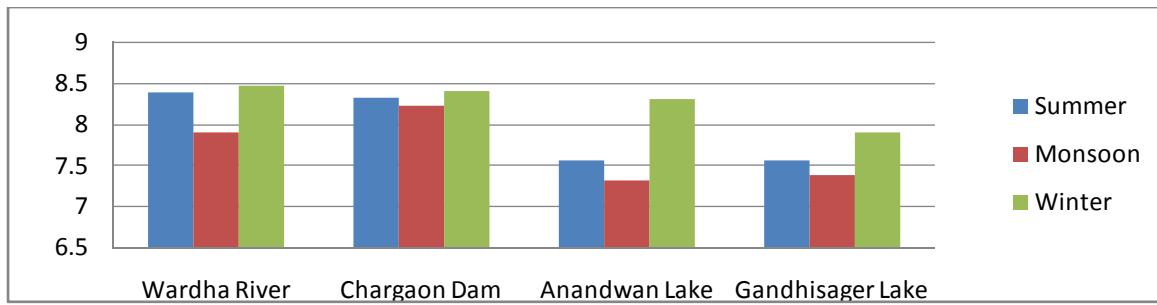


Figure. 2- Season wise record of pH for 1 year from Feb-2014 to Jan-2015.

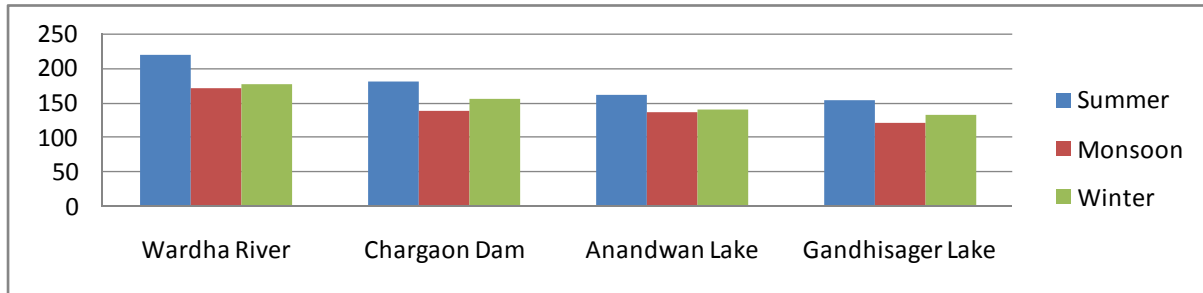


Figure. 3- Season wise record of Alkalinity (mg/lit) for 1 year from Feb-2014 to Jan-2015

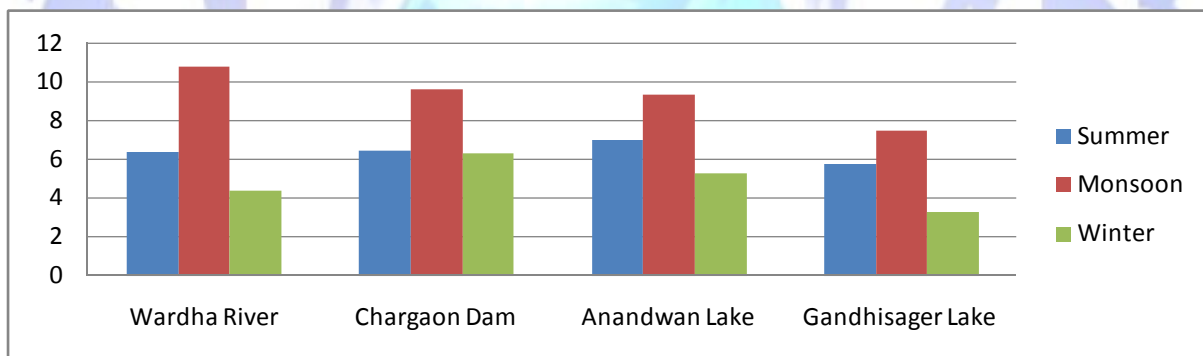


Figure. 4- Season wise record of Turbidity (mg/lit) for 1 year from Feb-2014 to Jan-2015

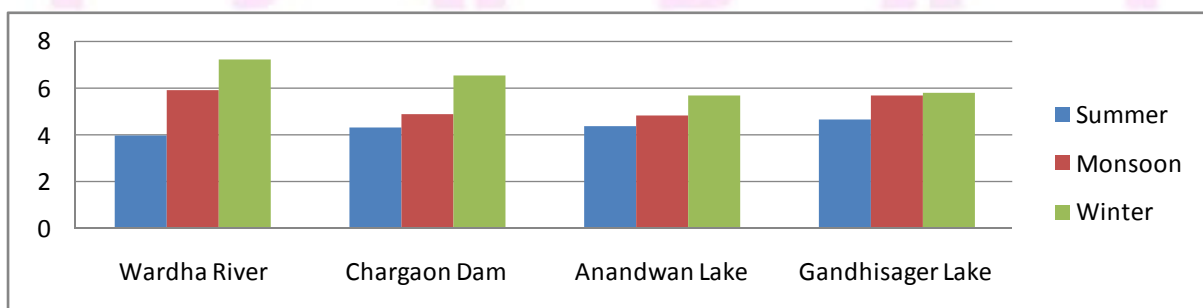


Figure. 5-Season wise record of Dissolve O₂ (mg/lit) for 1 year from Feb-2014to Jan-2015



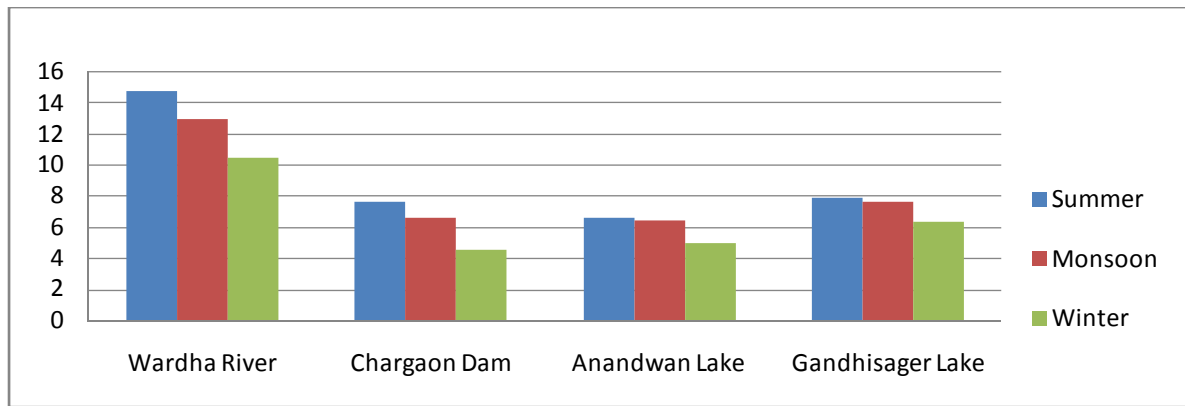


Figure 6-Season wise record of Free CO₂ (mg/lit) for 1 year from Feb-2014 to Jan-2015

Conclusion: -

Drinking water quality has become a critical issue in many countries, especially due concern that fresh water is a scarce resource in the future, so a water quality monitoring is necessary for the protection of freshwater. Any alteration or disturbances of the wetlands can have an adverse impact on the environment and fishery potential.

In the present analysis, temperature of Warora region wetlands ranges from 21.8⁰C±1.47 to 27.39⁰C±2.12. pH ranges from 7.32±0.32 to 8.47±0.09, which is slightly higher than desirable limit i.e. 6.5 to 8.5 given by BIS. Alkalinity ranges from 121.5±5.02 mg/lit to 218.5±32.54 mg/lit, which is slightly higher than desirable limit i.e. 200mg /lit. Turbidity ranges from 3.28±0.82 NTU to 10.85±2.39 NTU, which is under desirable limit i.e. 10 NTU Dissolve oxygen and free CO₂ was found under desirable limit in all wetlands.

From water quality analysis it can be concluded that, increase in temperature of water tends to increase in carbon dioxide with decrease in dissolve oxygen. The physico-chemical analysis of all wetlands in Warora region was found to be within permissible range; hence water is suitable for drinking, irrigation and aquatic animals.

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