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Short Communication

Study of Seasonal Temperature Changes and their Influence on free Corbondioxide, Dissolved Oxygen (DO) and pH in Jamwadi Medium Dam, Jamwadi, Dist- Yavatmal, MS, India

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Abstract

In the present study Jamwadi medium water dam at Jamwadi of Yavatmal district was selected; as its water is supplied to Yavatmal city for drinking purpose. To assess water quality status of this dam, the seasonal physico-chemical study was carried out. Temperature is an important parameter which regulates the self-purification capacity of reservoirs. Though not as that of air temperature, there is certainly seasonal variation in water temperature. Increase in temperature increases the rate of degradation of organic matter leading to further buildup of carbon dioxide in water. Also with increase of water temperature; dissolved oxygen decreases and pH increases. The present study was carried out with this special intension. In this study water samples were collected from three sites of the dam; season-wise with a gap of one month during July 2013 to May 2014. The temperature was recorded between 21.6°C – 31.4°C, free carbon dioxide was recorded to vary from 1.54 to 5.87mg/L, DO was varied from 5.28 to 8.35mg/L and pH was recorded between 7.45 and 8.03. Thus it can be concluded that there is seasonal variation in the reported four parameters of Jamwadi dam, but the values are within permissible range. Hence water quality of this dam is good with reference to pollution factor.

Keywords: Water quality, Parameters, Jamwadi, Pollution.

Introduction

Life cannot be imaginedwithout Water as it used for drinking, agriculture, domestic purpose etc. Day to day demand of water is increasing with increasing population in India and the percentage of rain fall is decreasing. Lakes and rivers are the prime source of water for drinking, irrigation and other domestic purposes. About 80% of the Earth surface is covered by water. Yet the inland fresh water availability is less than one percent. The lakes contribute globally 0.88% to fresh water resource, which is generally available for drinking and domestic purposes. Millions of liters of fresh water collected in natural water bodies is from agricultural runoff. Such water may contain different concentrations of pollutants in various forms. Hence good quality water is becoming essential for everyone. Various water borne diseases are making the life difficult. Water pollution is an acute problem in all the dams in India. Water is known to contain a large number of chemical elements. The interaction of both the physical and chemical properties of water plays a significant role in composition, distribution and abundance of aquatic organisms.

The Yavatmal district lies between $19^0$26' to $20^0$42' North latitude and $77^0$18' to $79^0$9' East latitude. The Yavatmal district belongs to Balaghat ranges. It is bound by the main rivers, Wardha and Penganga. Yavatmal district is surrounded by Amravati in North, Chandrapur and Wardha in the East, Nanded district and Andhra Pradesh in the South and Akola and Perbhani in the West. Jamwadi is the medium dam at Jamwadi village near Yavatmal city and is the major source of water for Yavatmal city.

Materials and Methods

Water samples were collected in previously cleaned polythene bottles. Water samples were collected from three sites namely S-I, S-II and S-III of the dam; season-wise with a gap of one month during July 2013 to May 2014, decided in the dam in the morning time (10.00 to 11.00 a.m.).

Temperature of water sample was recorded in the field itself with the help of centigrade thermometer at °C. The amount of free carbon dioxide and dissolved oxygen in the collected water samples were estimated in the laboratory by Winkler's Titrometric method[1]. pH of water sample was determined by pH meter in the laboratory.

Results and Discussion

In the present investigation the maximum temperature of water samples collected was recorded in the month of May [for site S-I (31.3°C), for site S-II (31.4°C) and for site S-III (31.4°C)]. The

minimum temperature was recorded in the month of January [for site S-I (21.5°C), for site S-II (21.6°C) and for site S-III (21.5°C)]. The mean of season wise values of temperature are given in the Table-1 given below.

The variation of temperature is smaller as any change occurs more slowly in water than in air. The measurement of ambient temperature in surface water is of vital importance for calculating the solubility of oxygen, carbonate and bicarbonate. In lake Karadkhed at Degloor, Nandedthe temperature varied from 21.0°C to 35.7°C. Deshapande et.al.[2] observed the considerable variation in surface water temperature.

Though carbon dioxide is readily soluble in water, very little carbon dioxide occurs in solution because small amount of it being present in the atmosphere. Respiration of aquatic plants and animals contribute to free carbon dioxide in water. Due to decomposition of organic matter, carbon dioxide accumulates at the bottom of water body. Carbon dioxide level in the water of Jamwadi dam was high in summer [for site S-I (5.63mg/L), for site S-II (5.36mg/L) and for site S-III (5.87mg/L)] and low in winter [for site S-I (2.16mg/L), for site S-II (1.54mg/L) and for site S-III (1.83mg/L)].

A negative correlation was observed between water temperature and dissolved oxygen. In the present investigation the amount of dissolved oxygen was found to be maximum in the month of January [for site S-I(8.35mg/L), for site S-II(8.32mg/L) and for site S-III(8.35mg/L)] and the minimum level was recorded in the month of May [for site S-I(5.35mg /L), for site S-II(5.28 mg/L) and for site S-III(5.32mg/L)]. The month wise values of Dissolved Oxygen are given in the table. Low oxygen in water can kill fishes and other organisms present in water. The potable range for drinking water of dissolved oxygen is minimum 4.0mg/L. In Jamwadi dam water the observed least value of DO was above the permissible level. Inverse relationship of DO with Temperature, free carbon dioxide and pH was observed by Deshpande et.al[2].

pH is the measure of hydrogen ion concentration. It is affected by environmental factors such as temperature, free carbon dioxide, dissolved oxygen etc. Seasonal variation in pH values was noted in the various water samples studied. Higher pH was observed in summer. In the present study, pH was recorded between 7.45 and 8.03. Higher pH in summer may be the result of utilization of dissolved carbon dioxide.

Conclusion

There is impact of temperature on free carbon dioxide, DO and pH of water. Hence all these parameters vary seasonally with temperature. Also it can be concluded that all the parameters i.e. temperature, free carbon dioxide, dissolved oxygen and pH are within the permissible limit and drinking water quality of this dam is good.

Table-1
Seasonal variation of Temperature, Free CO_2, D.O. and pH during, July 2013 to May 2014

Season	Parameters	S-I	S-II	S-III
Monsoon	Temperature(°C)	27.5	26.9	27.4
	Free CO_2(mg/L)	2.67	2.35	1.92
	D.O. (mg/L)	7.42	7.38	7.47
	pH	7.68	7.72	7.64
Winter	Temperature(°C)	23.5	22.9	23.1
	Free CO_2(mg/L)	2.16	1.54	1.83
	D.O. (mg/L)	8.35	8.32	8.35
	pH	7.45	7.53	7.49
Summer	Temperature(°C)	30.3	29.8	30.6s
	Free CO_2(mg/L)	5.63	5.36	5.87
	D.O. (mg/L)	5.35	5.28	5.32
	pH	8.03	7.95	7.94

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