



IJSRM

INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY

An Official Publication of Human Journals



Human Journals

Research Article

September 2016 Vol.:4, Issue:3

© All rights are reserved by Dr. Ranjeeta Choudhary et al.

Seasonal Variations in Physico-Chemical Parameters of Surface Water of Kaliasote Reservoir of Bhopal City



IJSRM
INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY
An Official Publication of Human Journals



Dr. Ranjeeta Choudhary¹, Dr. Pushpa M. Rawtani²

*Asstt. Professor, Dept. of Chemistry, SantHirdaram
Girls College, Bhopal, India¹*

*Asstt. Professor, Dept. of Chemistry, Sarojini Naidu
Govt. Girls College, Bhopal, India²*

Submission: 10 September 2016
Accepted: 15 September 2016
Published: 25 September 2016

Keywords: Physico-chemical parameters, Kaliasote reservoir, seasonal, BOD, COD

ABSTRACT

In the present study, attempts were made to study and analyze the physicochemical parameters of the surface water of Kaliasote reservoir of Bhopal city in different seasons i.e. summer, monsoon and winter. Water samples were collected in three different seasons and analysis was carried out according to standard methods (APHA 1995). Water quality has been determined by analyzing physicochemical parameters like temperature, pH, turbidity, total alkalinity, total hardness, chlorides, DO, BOD and COD. The study reveals that the seasonal variation in physicochemical parameters were observed during the entire study period. There is not much variation in the values of various parameters in different seasons except for turbidity which was considerably high in monsoon season. It also reveals that the value of all the physicochemical parameters studied were well within the permissible limits as prescribed by WHO except COD which was above the permissible limits of drinking water standards. Result of COD indicates that water is polluted and can be utilized for drinking purpose only after proper treatment.



HUMAN JOURNALS

www.ijsrm.humanjournals.com

INTRODUCTION:

Water is an essential natural resource without which life cannot be sustained. Safe and clean drinking water is absolutely essential for healthy living. Due to concretization of land rain water does not percolate into the ground and leads to wastage of large quantity of water. By saving this water needs of the people can be catered.

Bhopal the lake capital city of Madhya Pradesh has been facing a severe water scarcity especially during the summer season though it is surrounded by around 18 water bodies. Currently drinking water supply of Bhopal city is mainly dependent on two water bodies only i.e. Upper Lake and Kolar dam. The water of remaining water bodies are used either for irrigation or recreation purpose. Hence in the present study attempts were made to assess the drinking water quality of the water of Kaliasote reservoir of Bhopal. The Kaliasote reservoir was constructed near village Chuna Bhatti about 4 Km downstream of the existing Upper lake across the river Kaliasote, a tributary of Betwa River (Yamuna Basin) in Huzur Tehsil of Bhopal District. The Kaliasote water reservoir falls between latitude $25^{\circ} 11' 45''$ N and longitude $77^{\circ} 24'$ E. The major intake of water source for this Dam is Upper Lake. The Kaliasote dam is 1080 m long with maximum height of 34.25 m having gross storage capacity of 35.387 m.

MATERIALS AND METHODS

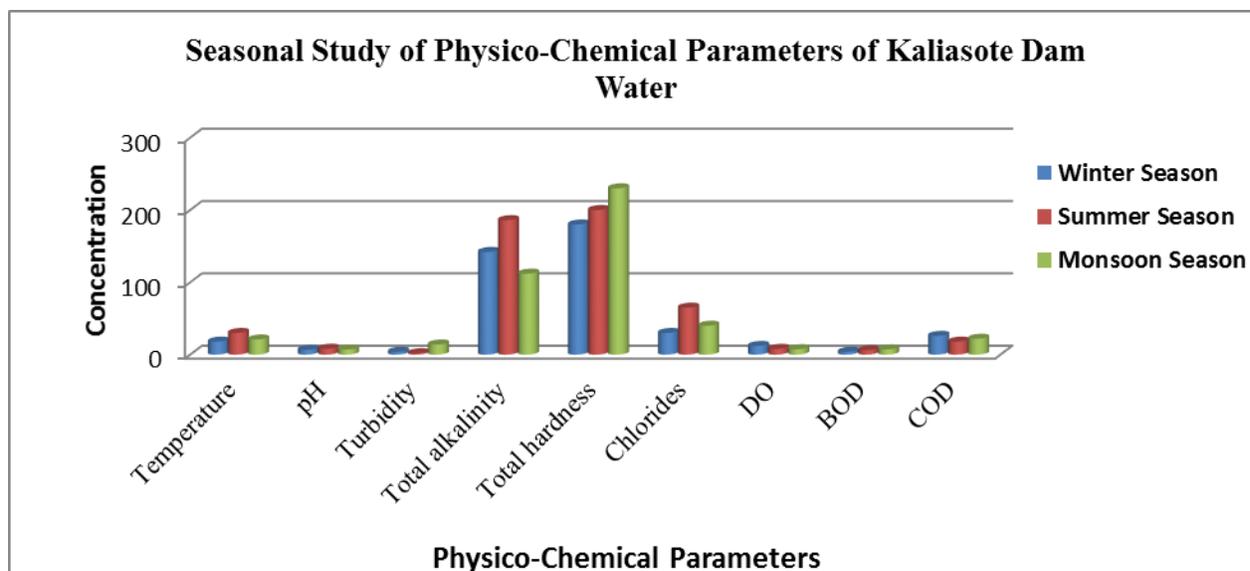
Water samples were collected from the Kaliasote Dam of Bhopal in three different seasons i.e. Winter (Jan 2015), Summer (May 2015), and Monsoon (Sept. 2015). Samples were analyzed for the physicochemical parameters like temperature, pH, turbidity, total alkalinity, total hardness, chlorides, DO, BOD and COD using standard APHA (1995) and NEERI (1991) method. The results were carefully studied and analyzed and compared with WHO Standards (WHO, 1993) and BIS Standards (BIS, 1998) with special reference to drinking suitability.



Picture of Kaliasote Dam

Table 1: Seasonal Study of Physico-Chemical Parameters of Kaliasote Dam

S.No	Parameters	Unit	WHO Standards	BIS Standards	Winter Season	Summer Season	Monsoon Season
1	Temperature	°C	-	-	18	30	21
2	pH	-	7-8.5	6.5-8.5	6.6	8.2	7.1
3	Turbidity	NTU	5	10	4.0	2.0	14.0
4	Total alkalinity	mg/l	200	600	142	186	112
5	Total hardness	mg/l	100	600	180	200	230
6	Chlorides	mg/l	250	1000	30	65	40
7	DO	mg/l	-	-	12	8.0	7.5
8	BOD	mg/l	-	-	4.0	6.2	7.3
9	COD	mg/l	-	-	26	18	22



RESULT & DISCUSSION

Temperature:

Seasonal variation in temperature was observed during the entire study period. During the study temperature of water sample of Kaliasote dam was observed minimum 18°C in winter season and maximum 30°C in summer season.

pH:

During the entire study period, the pH ranges from 6.60 to 8.20. pH was alkaline in summer season which may be due to increased photosynthetic activity and slightly acidic in winter season which may be due to low temperature. Similar seasonal variations were also observed by Trivedi, (1989). For drinking water, a pH range of 6.0–8.5 is recommended by WHO and BIS. The pH of Kaliasote dam was well within the permissible limits as prescribed by WHO and BIS for drinking water during summer and monsoon season. It is slightly below the lower range in winter season.

Turbidity:

The turbidity of Kaliasote dam ranges from 2.0 NTU to 14.0 NTU. The present results are in conformity with the findings of Sharma *et al.*, (2011).The turbidity of water of Kaliasote dam was well within the permissible limits as prescribed by WHO and BIS for drinking water in summer and winter season but is considerably high in monsoon season due to the erosion of soil by rain and agitation.

Total alkalinity:

Total alkalinity provides an idea about the nature of salts present in water. Seasonal variation in total alkalinity was observed during the entire study period. It was observed minimum 112 mg/l in monsoon season and maximum 180 mg/l in summer season. It was observed during the entire study period that the total alkalinity of water of Kaliasote dam was found to be well within the permissible limits as prescribed by WHO and BIS for drinking water.

Total hardness:

The hardness varies from place to place. Generally, surface water is softer than the ground water. In the present study maximum value, i.e. 230 mg/l of total hardness was reported in the monsoon season which may be due to increase runoff and minimum value i.e. 180 mg/l was reported in the winter season. During the entire study period, the value of total hardness of water of Kaliasote dam was found to be well within the permissible limits as prescribed by WHO and BIS for drinking water.

Chlorides:

Concentration of chloride in water is an indicator of degree of pollution. High chloride concentration represents high pollution load due to domestic sewage. In the present study, the chlorides concentration ranges 30 mg/l to 65 mg/l. The higher value of chloride was observed in the summer season which may be due to high rate of evaporation and lower value was reported in the winter season. Required desirable limit of chloride suggested by BIS is 250 mg/l, beyond this limit taste, corrosion and palatability of water is affected. During the entire study period, the

value of chloride of water of Kaliasote dam was found to be well within the permissible limits as prescribed by WHO and BIS for drinking water.

Dissolved oxygen (DO):

Seasonal variation in the value of dissolved oxygen was observed during the entire study period. The value of dissolved oxygen ranges from minimum 7.5 mg/l in monsoon season to maximum 12 mg/l in winter season. The results of present study are in conformity with the findings of Parashar *et al.*, (2006).

Biological Oxygen Demand (BOD):

During the entire study period, seasonal variation in the value of biological oxygen demand was observed. The value of BOD ranges from minimum 4 mg/l in winter season to maximum 7.3 mg/l in monsoon season. Researchers like Jayalakshmi *et al.*, (2011) reported that the higher values can be attributed to the increased effluents discharged into the drains.

Chemical Oxygen Demand (COD):

Seasonal variation in the value of chemical oxygen demand was observed during the entire study period. The value of COD ranges from minimum 18 mg/l in summer season to maximum 26 mg/l in winter season which is very high. The results of present study are in conformity with the observations of Reza *et al.*, (2009).

CONCLUSION:

From the analysis of various physicochemical parameters like temperature, pH, turbidity, total alkalinity, total hardness, chlorides, dissolved oxygen (DO), biological oxygen demand (BOD) and chemical oxygen demand (COD) it can be concluded that the water of Kaliasote Dam is less polluted. Systematic analysis of data reveals that the value of turbidity was above the permissible limits in monsoon season. Thus in monsoon season it needs proper treatment before its supply. In summer and winter season it is within the permissible limits. Present study also reveals that the values of BOD were within the permissible limits and COD were above the permissible limits of drinking water standards. WHO does not recommended a BOD limit for drinking water but generally BOD of less than 7 mg/l is desirable and for COD it is 10 mg/l. Result of COD

indicates that water is polluted and does not fit for drinking purpose. It can be utilized for drinking purpose only after suitable treatment. It is therefore recommended that water filtration plant should be installed so that water can be used for drinking water supply in Kolar area where the problem of water scarcity is more acute and serious and it gets worst during summer season. The water quality improvement recommendations of the reservoir are based on the results of the physicochemical analysis.

ACKNOWLEDGEMENT:

I would like to thank my supervisor for her guidance and support in preparing this manuscript. My sincere thanks to Management of my institution (Sant Hirdaram Girls College, Bhopal) for providing me their continuous support.

REFERENCES:

- [1]. APHA, 1995, Standard methods for the examination of water and wastewater, 6th edition, American Public Health Association, Washington D.C.
- [2]. B.I.S, 1998, Bureau of Indian Standards Drinking water specification, 1st revision, ISS 10500, New Delhi.
- [3]. NEERI, 1991, Manual of water and pollution control, 9.
- [4]. WHO, 1993, World Health Organization, Guidelines for drinking water quality-I, Recommendations, 2nd Edi., Geneva.
- [5]. R. Reza, and G. Singh, 2009, Physico-chemical analysis of ground water in Angul-Talcher Region of Orissa, India, Journal of American Science, 5(5), pp. 53-58.
- [6]. V. Jayalakshmi, N. Lakshmi, and Charya, M. A. Singara, 2011, Assessment of physico-chemical parameters of water and waste waters in and around Vijayawada, International Journal of Research in Pharmaceutical and Biomedical Sciences, 2(3), pp. 1041-1046.
- [7]. C. Parashar, S. Dixit, and R. Shrivastava, 2006, Seasonal variations in physico-chemical Characteristics in Upper Lake of Bhopal, Asian Journal of Experimental Sciences, 20(2), pp. 297-302.
- [8]. S. Sharma, R. Vishwakarma, S. Dixit, and P. Jain, 2011, Evaluation of water quality of Narmada River with reference to physico-chemical parameters at Hoshangabad city, MP, India, Research Journal of Chemical Sciences, 1(3), pp. 40-48.
- [9]. R.K. Trivedi, Limnology of three freshwater ponds in Mangalore, National Symp. on Advances in limnology conservation of endangered fish species, 23-25 Oct 1989, Srinagar.