

ASSESSMENT OF PHYSICO-CHEMICAL PARAMETERS OF ADAN DAM RESERVOIR, KARANJA (LAD), DIST. WASHIM (M.S.)

J.G. Patil

P.G. Department of Chemistry,
Vidya Bharati Mahavidyalaya, Amravati (M.S.) India.

ABSTRACT

In the present investigation, water samples are collected from different locations of Adan dam reservoir of Karanja (lad) Tahsil Dist. Washim in Maharashtra state of India for physico-chemical analysis for period of November 2011 to February 2012. The laboratory test of the collected water samples were performed for analysis of various parameters such as air temperature, water temperature, transparency, pH, dissolved oxygen, total solids, total alkalinity, chlorides, total hardness, sulphates, phosphates and nitrates. The method employed for analysis as per standard methods recommended by Adoni and APHA. The obtained values are compared with standard units. The results of this study reveal that physico-chemical parameters are within maximum permissible limit of WHO. Hence water is safe and suitable for domestic, irrigation and drinking purposes.

Key Words: *Physico-chemical parameters, Adan dam reservoir, Drinking water standards.*

Introduction

Water is one of the abundantly available substances in nature, which man has exploited more than any other resources for the sustenance of life. Water of good quality is required for living organisms. All living organisms on our earth are so intimately connected with water that life on this planet is believed to have evolved in and around water. We need water every day for various domestic, irrigation and drinking purposes. Economy of our country is agro based economy. Most of the people who live in villages get their jobs in agriculture field due to irrigation facilities in that sector. When there is no revolution in industry and agriculture, water quality was near about good. But due to industrial and agriculture revolution water which is collected in the various water resources become highly polluted in various ways (Kawale & Savale, 2012). Water quality

provides current information about the concentration of various solutes at a given place and time. Water quality parameters provide the base for judging the suitability of water for its designated uses and to improve existing conditions. For optimum development and management for beneficial uses, current information is needed which is provided by water quality programmers. Unequal distribution of water on the surface of the earth and fast declining availability of usable fresh water are the major concern in terms of water quantity and quality (Shinde *et.al.*, 2011).

The freshwater body of India includes a large number of rivers, ponds, dams, impoundments and lakes. The riverine systems with the constructed dams also present a different area of aquatic environment. The physico-chemical characteristics are altered or moulded due to the activities of the aquatic biota particularly the metabolism of the aquatic organisms. Any alteration in the

environmental parameters may bring in an undesirable aquatic condition which may lead to the aquatic pollution (Waghmare *et.al.*, 2012).

An attempt was made to study the physico-chemical characteristics of Adan dam water. The Adan dam reservoir is a used for irrigation, fish culture, drinking and for such other domestic purposes.

Materials and Methods

Adan dam reservoir is located near about 15 kms from Karanja (lad) city. In 1977, Adan dam was built for irrigation and providing drinking water to Karanja (lad) city. The height of dam is 30.13m and length 755m with gross storage capacity of 18,789.97m³. Adan dam is located at 20°24'28.90" N, 77°32'42.69" E, is an earthfill and rockfill dam. Water quality assessment of the experimental water body was made by analyzing various physico-chemical parameters from different spots of dam. Monthly analysis of various physico-chemical parameters was undertaken for a period of four months i.e. November 2011 to February 2012. Parameters like temperature, transparency and dissolved oxygen were estimated at the dam site whereas the other were estimated in the laboratory by using methods given by Adoni (1985) and APHA (1989).

Results and Discussion

The monthly values of various physico-chemicals parameters of Adan dam reservoir water are illustrated in Table 1.

There is a close relation between the atmospheric temperature and water temperature. Air temperature is one of the

most important ecological factor which controls the physiological behavior of aquatic systems and hence the quality of water. In the present investigation, the air temperature of Adan dam reservoir was recorded in the range of 26.05°C to 28.05°C, while the water temperature fluctuated in the range of 23.00°C to 26.00°C. The minimum temperature was recorded in January 2012 while maximum during February 2012. Savant *et.al.*, (2010) recorded the similar trend of temperature while studying hydrobiology of Atyal pond in Gadhinglaj Tahsil Dist. Kolhapur (M.S.). Fluctuation experience in air and water temperature may be due to the influence of season, location and difference in the time of collection. Our results are well in agreement with Angadi *et.al.*, (2005).

Monthly transparency of experimental water body was varied from 14.30 to 23.20 cm. The high value was recorded in February 2012 whereas low in November 2011. Mustapha (2009) also reported high transparency in summer season at shallow tropical African reservoir.

pH is the measure of the concentration of hydrogen ions, which provides the range of the acidity or alkalinity of a solution. During the study period the value of pH oscillated from 7.00 to 7.50 which is very close to normal range. Similar findings were recorded by Sadhwani (2010) while studying the limnological parameters of Shaha lake, Karanja (lad), Dist. Washim (M.S.).

Dissolved oxygen content indicates the health and ability of waterbody to purity itself through biochemical processes. Oxygen is also needed for many chemical reactions that are important to

lake functioning, such as oxidation of metals, decomposition of dead and decaying matters etc. (Ramachandra and Solanki, 2007). During the study period maximum dissolved oxygen recorded in winter i.e. with the highest value as 11.00 mg/L. Similar trend was also reported by Islam (2007).

Total solids refer to matter suspended and dissolved in water. Waters with high total solids generally are of inferior palatability and may induce an unfavorable physiological reaction in the transient consumer (APHA, 1989). In present investigation total solids of the selected experimental water body was recorded maximum in summer (February 2012). Similar seasonal peak was recorded by Manimegalai *et.al.*, (2010) in Walayar reservoir, Pelghat, Kerala. Total solids peak in summer may be due to low water flow into water body and higher evaporation rate (Karne & Kulkarni, 2009). The present findings are similar with that of above authors.

Alkalinity is a measure of the capacity of water to absorb hydrogen ions. During the present study high alkalinity value was observed in summer season and low in post monsoon period. Increase in alkalinity in summer may be due to concentration of salts in water as a result of evaporation. A decrease in the value of alkalinity during post monsoon period attributed to heavy monsoon showers that resulted in the dilution of water. Similar observations were also made by Bhongade and Patil (2010).

Chloride anion is generally present in natural waters. High chlorides content has damaging effect on agricultural crops (Ramachandra *et.al.*, 2006). In present investigation, the maxima in summer and

minima in winter were noted. Karne and Kulkarni (2009) reported chloride maxima in summer while minima in winter from freshwater bodies in Khatau Tahsil, (M.S.).

Total hardness of water is the measure of the capacity of water to react with soap. Calcium & magnesium are the principal cation that imparts hardness. The total hardness of water therefore reflects as the sum total of alkaline metal cations present in it (Ramchandra *et.al.*, 2006). In present investigation the maxima of seasonal total hardness was recorded in November 2011 whereas minima was recorded in January 2012. Similar findings were also recorded by Patil *et.al.*, (2008).

Sources of sulphates are mainly sulphates rocks such as gypsum and sulphur minerals such as pyrites and also due to air and water pollution. Sulphates contribute to the total solids content and in a reduced and anaerobic condition produced hydrogen sulphide which gives rotten egg odour to the water (Ramchanda *et.al.*, 2006). In the present investigation the sulphate contents were ranged between 0.06 to 0.13 mg/L with maxima in summer (February 2012) and minima in post monsoon season. Similar results were also reported by Angadi *et. al.*, (2005) from Papnash pond, Bidar, Karnataka. The present results are in conformity with above authors.

Phosphorous is one of the major macronutrients responsible for biological productivity (APHA, 1989). All three types of phosphorous i.e. total, Inorganic and organic were estimated from experimental water body. All types of phosphorous recorded maximum in summer. Similar type of seasonal peak was also reported by Yewale (2011)

Table 1: Physicochemical parameters of Adan Dam Reservoir during November 2011 to February 2012.

Sr. No.	Parameters	Nov	Dec	Jan	Feb	Min	Max
1	Air Temperature (⁰ C)	26.05 ±0.14	28.00 ±0.15	26.05 ±0.11	28.05 ±0.10	26.05 ±0.11	28.05 ±0.10
2	Water Temperature (⁰ C)	24.05 ±0.12	25.40 ±0.10	23.00 ±0.19	26.00 ±0.18	23.00 ±0.19	26.00 ±0.18
3	Transparency (cm)	14.30 ±0.16	16.40 ±0.15	21.80 ±0.40	23.20 ±0.18	14.30 ±0.16	23.20 ±0.18
4	pH	7.50 ±0.05	7.00 ±0.10	7.00 ±0.18	7.22 ±0.10	7.00 ±0.10	7.50 ±0.05
5	Dissolved Oxygen (mg/L)	11.00 ±0.20	8.10 ±0.17	9.04 ±0.13	8.05 ±0.11	8.05 ±0.11	11.00 ±0.20
6	Total Solids (mg/L)	650.00 ±0.40	840.00 ±0.70	930.00 ±0.80	980.00 ±0.90	650.00 ±0.40	980.00 ±0.90
7	Total Alkalinity (mg/L)	76.00 ±0.24	77.00 ±0.40	76.40 ±0.30	79.30 ±0.25	76.00 ±0.24	79.30 ±0.25
8	Chlorides (mg/L)	55.40 ±0.10	68.00 ±0.20	57.00 ±0.30	74.45 ±0.35	55.40 ±0.10	74.45 ±0.35
9	Total Hardness (mg/L)	99.40 ±0.70	97.60 ±0.55	96.00 ±0.50	97.37 ±0.24	96.00 ±0.50	99.40 ±0.70
10	Sulphates (mg/L)	0.06 ±0.002	0.08 ±0.003	0.12 ±0.002	0.13 ±0.003	0.06 ±0.002	0.13 ±0.003
11	Total Phosphorous (mg/L)	0.80 ±0.010	1.30 ±0.014	0.97 ±0.009	1.50 ±0.007	0.80 ±0.010	1.50 ±0.007
12	Inorganic Phosphorous (mg/L)	0.05 ±0.001	0.19 ±0.004	0.50 ±0.006	0.07 ±0.002	0.05 ±0.001	0.50 ±0.006
13	Organic Phosphorous (mg/L)	0.80 ±0.007	1.20 ±0.010	0.60 ±0.007	1.80 ±0.012	0.60 ±0.007	1.80 ±0.002
14	Nitrates (mg/L)	0.25 ±0.006	0.15 ±0.003	0.30 ±0.005	0.35 ±0.008	0.15 ±0.003	0.35 ±0.008

The nitrate is one of the most oxidized forms of nitrogen and is an essential plant nutrient Nitrate concentration is associated with rain water runoff, sewage, and sludge discharge (Jha & Barat, 2003). During present investigation nitrates of the present water body ranged from 0.15 to 0.35 mg/L

with maxima in summer. Similar seasonal peak was also recorded by Bhongade and Patil (2010). Summer peak of nitrates may be due to its negative proportionality to dissolved oxygen (Jakher & Rawat, 2003).

Conclusion

The analysis of water quality parameters of Adan dam reservoir showed that the values are well within the permissible limits. The result of study

reveals that the quality of dam water is though fit for domestic, irrigation and drinking purposes, need continuous monitoring of physico-chemical parameters to improve the quality of water.

References

- Adoni, A.D. (1985).** Work book on Limnology. Department of Environment, Govt. of India, *Badona printing service, New Delhi.*
- Angadi, S.B., Shiddamallayya, M. & Patil, P.C. (2005).** Limnological studies of Pannash pond, Bidar (Karhataku). *J. Environ. Biol.* 26(2): 213-216.
- APHA (1989).** Standard methods for the examination of water and waste water. *APHA-AWWA-WPCF, Washington, DC.*
- Bhongade, S.S. & Patil, G.P. (2010).** Ecological status of Mohgavhan lake Karanja (lad) Dist. Washim, (M.S.) with reference to pisciculture. *Ph.D. Thesis S.G.B. Amravati University, Amravati.*
- Islam S.N. (2007).** Physico-chemical condition and occurrence of some zooplankton in a pond of Rajshahi University. *Research Journal of Fisheries and Hydrobiology*, 2(2): 21-25.
- Jakher, G.R. & Rawat, M. (2003).** Studies on physico-chemical parameters of a tropical lake Jodhpur, Rajasthan. *Indian J. Aquabiol.* 18(2) : 79-83.
- Jha, P. & Barat, S. (2003).** Hydrobiological study of lake Mirik in Darjiling, Himalayas, *J. environ. Biol.* 24 (3) : 339-344.
- Karne, A.V. & Kulkarni, P.D. (2009).** Studies on physico-chemical characteristics of freshwater bodies in Khatav Tahsil, (M.S.), vol. 8 247-251.
- Kawale, A.M. and Savale, P.A. (2012).** Determination of physico-chemical Parameters of Deoli Bhorus Dam water. *Pelagia Research Library*, 3 (1): 273 – 279.
- Manimegalai, M., Kumari, S.M., Shanthi, K. & Saradhamani, N. (2010).** Limnological factors in relation to fungal and bacterial numbers of two ponds. *Geobios.* 5: 15-20.
- Mustapha, M.K. (2009).** Limnological evaluation of fisheries potentials and productivity of a small shallow tropical African reservoir, *Re. Biol. Trop., Int. J. Trop. priol. ISSN-0034-7744*, vol. 57(4): 1093-1106.
- Patil, G.P., Kedar, G.T. & Yeole, S.M. (2008).** Zooplankton biodiversity study of two water bodies in Washim District, (M.S.). *J. Aqua. Biol. Vol.23(1) : 13-17.*
- Ramachandran, T.V., Rishiram, R. & Kathik, B. (2006).** Zooplankton as bioindicators : hydrobiological investigations in selected Bangalore lakes, *Financial Assistance : The ministry of Science and technology. Govt. of India. Technical Report : 115.*

Ramchandra, T.V. & Solanki, M. (2007). Ecological assessment of lentic waterbodies of Bangalore. ENVIS Technical Report: 25, *Centre For Ecological Sciences, Indian Institute of Sciences, Bangalore, India.*

Sadhwani, Y.M. (2010). Analysis of limnological parameters of Shaha lake Karanja (Lad) Dist. Washim (M.S.). *Hislopia J. 2(2): 239-244.*

Sawant, R.S., Telave, A.B., Dessai, P.D. and Dessai, J.S. (2010). Variations in hydrobiological characteristics of Atyal pond in Gadhinglaj Tahil, Dist. Kolhapur, M.S. Nature Environ. and pollution Team. *Int. Quat. Sai. J. vol, 9(2): 273-278.*

Shinde, S.E., Pathan, T.S., Rant, K.S. & Sonawane, D.L. (2011). Studies on the physico-chemical parameters and correlation coefficient of Harsool-Savangi Dam, Dist. Aurangabad, India. *Middle-East J. of sci. Res. 8(3): 544-554.*

Waghmare, N.V., Shinde, V.D., Surve, P.R. & Ambdaore, N.E. (2012). Seasonal variations of physico-chemical characteristics of Jamgavan dam water of Hingoli District (M.S.). *India. Int. Multi. Res. J. 2(2): 23-25.*

Yewale, R.M. (2011). Nutrient dependent seasonal zooplankton biodiversity studies of three lentic water bodies of Washim District (M.S.) Ph.D. *Thesis S.G.B. Amravati University, Amravati.*