



STUDIES ON THE PHYSICO-CHEMICAL PARAMETERS OF DANTARAMAKKI POND WATER IN CHIKMAGALUR, KARNATAKA

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Abstract:

In the present study an attempt has been made to find out the water quality of Dantaramakki pond in Chikmagalur, Karnataka during August and September 2016. The study was conducted to measure various physico-chemical parameters like temperature, pH, electrical conductivity, free carbon dioxide, chloride, total dissolved solids, dissolved oxygen, total alkalinity, total hardness and radon. The investigation revealed that there is a mesotrophic status of the studied pond and hence, preventive measures are required to avoid further deterioration of the pond water quality. The estimated water quality parameters were compared with the WHO and BIS standards.

Key Words: Physico-Chemical Parameters, Dantaramakki Pond & Chikmagalur

Introduction:

Today, Pollution of the water bodies is increasing due to rapid population growth, industrial proliferation, urbanization, increasing living standards wide ranges of human activities. In India too, studies on the problem of water pollution started quite early but water quality studies were given attention only during the last few decades when the situation become alarming (Oinam and Belagali, 2006). Water contamination with pathogens and pollutants create many health problems for the consuming the water. As such water quality in relation to human health is an important fact of limnology, even though ecological interrelationship, species diversity and physico-chemical properties of lakes have received considerable attention (Krishna et al.,2009; Biradar et al.,2014; Basavaraja and Kiran, 2016; Kishore Gujjar and Kiran,2017).The physico-chemical characteristics of pond water have direct impact on prevailing organisms as well as human being using such water (Banerjee, 1967; Sayeswara et al., 2010). A perusal of available literature has revealed that there is no scientific study carried out with respect to ecological characteristics of this pond. The basis of selection of Dantaramakki pond was that its water is used by a larger population. Hence, the present investigation is carried out in relation to physico-chemical characteristics of water in Dantaramakki pond of Chikmagalur.

Materials and Methods:

Study Area:

The present investigation be carried out to assess the status of the water in Dantaramakki pond of Chikmagalur district. The study area is located at 13°19'N latitude and 75°46'E longitude. The pond waters which was selected for study are used for agriculture and partly for domestic activities. The climatic condition of the study area during study period was rainy.



Figure1: A vision of Dantaramakki Pond

Methods: The present study was conducted during the period from August to September 2016. During the study period, the surface water samples from selected pond were collected in clean black plastic cans between 9.00 AM to 10.00 AM. Later the data was pooled together and represented as weekly data of the pond. Water temperature was recorded with help of mercury thermometer and pH was analysed by using pH meter and both the parameters were recorded on the sampling site itself. The samples for dissolved oxygen were fixed immediately on the spot itself. The remaining parameters like free CO₂, hardness, alkalinity, chlorides were analyzed as per the methods described in standard procedures (Trivedy and Goel, 1986; APHA, 1998). Radon in water has been analysed by using RAD7 an electronic Radon detector. The WHO and BIS standards for drinking water quality were used for comparison.

Results and Discussion:

Average and Weekly Variations of Physico-Chemical Parameters:

Figure 1 shows average water quality data of the Dantaramakki pond. The average water temperature of the pond was 23°C. pH of the water was slightly alkaline (7.4) and average EC value of 189.66 µmhos/cm recorded. The total hardness and chloride of the water were 143.5mg/l and 106.8 mg/l respectively. The Dissolved oxygen (DO) recorded with 7.14 mg/l and Free CO₂ values with 22.09 mg/l. Total alkalinity of Dantaramakki pond showed 41.57 mg/l and radon concentration of the water was 0.906 Bq/l (Figure 1). Drinking water standards as per WHO and BIS standards are presented in Table 1.

Figure 2 and 3 depict the weekly variations in water quality data of Dantaramakki pond at station I and II respectively. The water temperature of Dantaramakki pond varied from 22°C to 26°C. In an established system the water temperature controls the rate of all chemical reactions, and affects organisms' growth, reproduction and immunity. Patil et al. (2012) reported that drastic temperature changes can be fatal to aquatic organisms.

Electrical conductivity (EC) is the capacity of an solution to conduct the electric current. EC is an index to represent the total concentration of soluble salts. The conductivity values were found to vary from 139.6 to 296.4 µmhos/cm. The higher values of conductivity was due to increase in the concentration of minerals and organic matter (Sayeswara et al., 2010).

The acidity or alkalinity of water is measured in terms of its pH or hydrogen ion concentration. Neutral water has the pH value of 7.0. If the pH value is less than 7.0, the water is acidic. Similarly, the water is alkaline, if the pH value is more than 7.0. pH values are found slightly acidic to slightly alkaline and found within permissible limit of 6.5 to 8.5 as per the Bureau of Indian Standards (BIS). The pH is important since aquatic organisms are well adapted to specific pH range and do not withstand abrupt changes in it (Khadsan et al., 2003; Sayeswara et al., 2011). During the present study, pH values fluctuated from 7.0 to 7.9.

In this study, free CO₂ values fluctuated from 3.52 to 64.48 mg/l respectively. Carbon dioxide values fluctuated between 9.9 to 25.2 mg/L. The highest and the lowest values were recorded in August and January, respectively. The variation of CO₂ was due to the absorption by plants for photosynthesis and activity of other living organisms. The abundance of carbon dioxide exerts certain specific effects on aquatic biota (Chandanshive et al., 2008).

The total alkalinity of Dantaramakki pond ranged from 13 to 78 mg/l. Alkalinity in the water samples is primarily a function of carbonate, bicarbonate and hydroxide content. It is within permissible limit of 200 mg/L (BIS, 1991). Alkalinity around 150 mg/L has been found conducive to higher productivity of water bodies (Ball, 1994). The above results clearly indicate that the water body in the present study was found to be less productive.

Dissolved oxygen is another vital parameter regulating survival of aquatic life. The variations of DO depend on the primary production and respiration of aquatic organisms. From the above data the higher DO values of Dantaramakki Pond (5.30 mg/l to 8.2mg/l) may be due to presence of biotic components (i.e. aquatic plant) releasing oxygen and it may be due to in higher interference of atmosphere air with the aquatic bodies.

Chloride levels less than 10 mg/l are desirable. Level more than 250 mg/l may cause a salty taste. Chloride content in fish ponds is important to know the quality of water and sources include fertilizers from surrounding areas and animal wastes. In the current study, the chloride of Dantaramakki Pond is found to be from 87 mg/l to 145 mg/l. show that chloride content is below than the maximum permissible limit prescribed by the WHO standards (WHO, 1971; Kiran, 2010).

Total Hardness is the property of water which prevents the lather formation with soap and increases the boiling point of water. Hardness of water mainly depends upon the amount of calcium or magnesium salts or both (Trivedy and Goel, 1986). The total hardness of Dantaramakki pond water ranged in between 121 mg/l & 157 mg/l indicating the water is moderately hard. Total hardness of water is not a pollution parameter but indicates water quality mainly in terms of Ca²⁺ and Mg²⁺ contents. Total hardness above 200 mg/L is not suitable for domestic use in drinking and cleaning (Sayeswara et al., 2011).

Total Dissolved Solids (TDS) refer to suspended and dissolved matter in water. They are very useful parameter describing the chemical constituents of the water and can be considered as general of edaphically relation that contributes to productivity within the water body (Goher, 2002). In the present

study, TDS values ranged from 180 to 360 mg/l. It is observed that the pond water belongs to good class category (160 – 480).

Radon in the Dantaramakki pond water of Chikmagalur area was measured. The highest concentration recorded was 1.40Bq/l while, lowest was found with 0.29Bq/l. The overall concentration of radon in the surface water of the studied pond is found to be below the permissible limits.

Many studies have been done in our country to assess the quality of pond water but very few of them have studied the assessment of physico-chemical parameters of ponds receiving domestic waste (Kanungo et al., 2006; Sayeswara et al., 2010). In general, such characteristics are largely affected by human activities and influx of domestic waste in pond water, which cause a greater degree of eutrophication (Kaur et al., 1996; Sayeswara et al., 2010). The information of physico-chemical parameters under study exhibits that the pond water is not eutrophicated. In the light of standard of water quality recommended by WHO and Indian standard, the pond water should be used by the human beings especially for drinking and cooking after water treatment. Pond water is also fit for aquaculture and irrigation.

Conclusion:

The results of physico-chemical study have revealed that the Dantaramakki pond is not contaminated so much by human activities. In the light of standard water quality recommended by WHO and BIS, the pond water should be used by human beings especially for drinking and cooking after proper treatment. Almost all the physico-chemical parameters in selected water body was within desirable limits. Nevertheless, government authorities should take necessary steps to beautify the pond before reaching eutrophic condition. To improve quality of water, there should be continuous monitoring of water in Dantaramakki pond of Chikmagalur, Karnataka. Proper scientific planning is needed to use this pond water effectively

References:

1. American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF). 1998. Standard Methods for the Examination of Water and Wastewater 20th Edition. United Book Press, Inc., Baltimore, Maryland.
2. Ball, R. C. 1994. Fertilization of Lake, Good or Bad, Michigan, Conserv., 7-14 (1994).
3. Banerjee, S. M. 1967. Water quality and soil conditions of Ponds in some states of India in relation to fish production. Indian J. Fish, 14, pp. 115-144 (1967).
4. Basavaraja, D and B.R.Kiran. 2016. Seasonal variations in Physico-chemical parameters of Sagara lake, Yadgir district, Karnataka. International Journal of Applied and Pure Science and Agriculture Volume 02, Issue 09:79-83.
5. Biradar N.V, Ambarish S. Sindagi , Bellad A. S, Jayarama Reddy, Ravi Navalur, Shivaraj Naykar , Mathews P. Raj, Sadashiv S. O and Chandrashekhara Unakal. 2014. Assessment of physico-chemical and microbiological parameters of Kotur Lake, Dharwad, Karnataka, India. Int.J.Curr.Microbiol.App.Sci (2014) 3(2): 88-96.
6. BIS: 3025. 1993. Methods of sampling and Test (Physical and Chemical) for water and waste water, 1st Revision, 1- 2.
7. Chandanshive, N.E., P. M. Pahade and S. M. Kumble, Physico-Chemical Aspects of Pollution in River Mula-Mutha at Pune, Maharashtra, J. Aqua, Biol, 23(2), 51-55 (2008).
8. Goher, M.E.M. 2002. Chemical studies on the precipitation and dissolution of some chemical element in Lake Qarun, Ph.D. Thesis fac. of sci., Al-Azhar University, Egypt.
9. Kanungo, V.K., J. N. Verma and D. K. Patel, Physico-Chemical Characteristics of a Raipur (Chattisgarh) Ponds, Eco. Env. and Cont., 12(2), 207-209 (2006).
10. Kaur, H., S. S. Dhillon, K. S. Bhatta and G. Mander, Abiotic and Biotic Components of Fresh Water Pond of Patiala (Punjab), Poll. Res., 15(3), 207-209 (1996).
11. Khadsan, R.E., V. Mangesh and V. Kadu, Drinking Water Quality Analysis of Some Bore Wells Water Chikhli Town, Maharashtra, J. Indus. Poll. Con., 20, 31-36 (2003).
12. Kiran, B. R. 2010. Physico-Chemical characteristics of fish ponds of Bhadra Project at Karnataka. Rasayan Journal of chemistry Vol.3, No.4 (2010), 671-676.
13. Kishore N Gujjar & B. R. Kiran, 2017. "Assessment of Physico-Chemical Parameters of Hiremagalur Pond Water in Chikmagalur, Karnataka", International Journal of Multidisciplinary Research and Modern Education, Volume 3, Issue 1, Page Number 350-354.
14. Krishna H.R, Ramachandra M.M and Shivabasavaih., 2009. Microbial quality of total coli forms and fecal coli forms in eutrophicated water bodies of Bangalore Region, Karnataka, Indian, The Bioscan Journal, 4(3), 481-486.
15. Oinam J.D and Belagali S.K., 2006. Physico-chemical and Biological quality of drinking water in Mandya district, Karnataka, South Asian Anthropology, 16(1), 51-55.
16. Patil. P.N, Sawant. D.V and Deshmukh. R.N. 2012. Physico-chemical parameters for testing of water – A review. International Journal of Environmental Sciences Volume 3, No 3, 2012:1194-1207.

17. Sayeswara, H.A., Ravikumar Patil, H.S and Mahesh Anand Goudar.(2010). Studies on physico-chemical parameters of Purle pond water of Shivamogga, Karnataka (India). *Int. J. Chem. Sci.:* 8(1), 2010, 582-588.
18. Sayeswara, H.A., Mahesh Anand Goudar and R Manjunatha.2011. Water quality evaluation and phytoplankton diversity of Hosahalli pond, Shivamogga, Karnataka (India). *Int. J. Chem. Sci.:* 9(2), 805-815.
19. Trivedy, R. K., and Goel P. K.(1986), Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra.
20. WHO guidelines for drinking water quality. 2nd edition. Recommendation. World Health organization Geneva, 1, pp 30-113.
21. WHO Geneva, (2008), Guidelines for drinking-water quality (electronic resource), 3rd edition incorporating 1st and 2nd addenda, Volume 1, Recommendations.
22. WHO, 1991. International Standards for Drinking Water, Geneva.
23. WHO, 1971. International standards for drinking water, WHO, Geneva.

Table 1: Drinking water quality standards as given by WHO & BIS standards

Parameter	Permissible limit	
	World Health Organization (WHO, 1994)	Bureau of Indian Standards (BIS 10500:1991)
Colour, Hazen unit, max	Nil	5.0
Turbidity, NTU	5.0	5.0
Odour	Nil	Unobjectionable
Dissolved solids	500	500
Total hardness	100	300
Calcium hardness	75	75
Magnesium hardness	30	30
Alkalinity	200	200
Dissolved oxygen	4-6	4-6
Chloride	250	250
Nitrate	45	45
Iron	0.3	0.3
pH	6.5-8.5	-
BOD	5	-
Potassium	12	-

Table 2: Water quality of Dantaramakki pond during the study period

Area	Station I							
	August				September			
Month	I	II	III	IV	I	II	III	IV
Temp.(°C)	23	26	24	24	26	24	23	22
pH	7.0	7.2	7.2	7.3	7.2	7.2	7.3	7.3
EC µmhos/cm	160.7	148.2	159.1	210.5	190.2	170.5	208.4	182.7
TH	121	137	139	141	145	145	147	149
Chloride	139	95	88	100	99	103	112	120
DO	7.5	7.2	6.9	5.3	6.7	6.4	7.1	7.9
CO ₂	3.52	7.0	64.48	15.6	20	36	19.7	29
Total Alk.	14.6	15.6	48	53	65	78	64	49
TDS	180	185	190	198	200	240	310	320
Radon	0.41	0.29	0.45	0.52	1.12	1.05	0.94	0.85
Area	Station II							
Temp.(°C)	23	23	24	22	23	23	24	23
pH	7.3	7.9	7.5	7.5	7.6	7.6	7.5	7.5
EC µmhos/cm	198.5	296.4	197.7	139.6	144.3	200.8	220.4	206.6
TH	157	127	135	140	141	149	150	155
Chloride	145	93	87	93	101	109	112	113
DO	7.2	7.6	8.2	7.9	7.3	6.8	7.1	7.1
CO ₂	7.04	3.52	54.56	30.1	19	20.6	15.9	7.6
Total Alk.	13	17	25	48	56	60	51	38
TDS	190	210	215	240	290	310	320	360
Radon	1.32	1.40	1.35	1.15	0.69	0.78	0.89	1.29

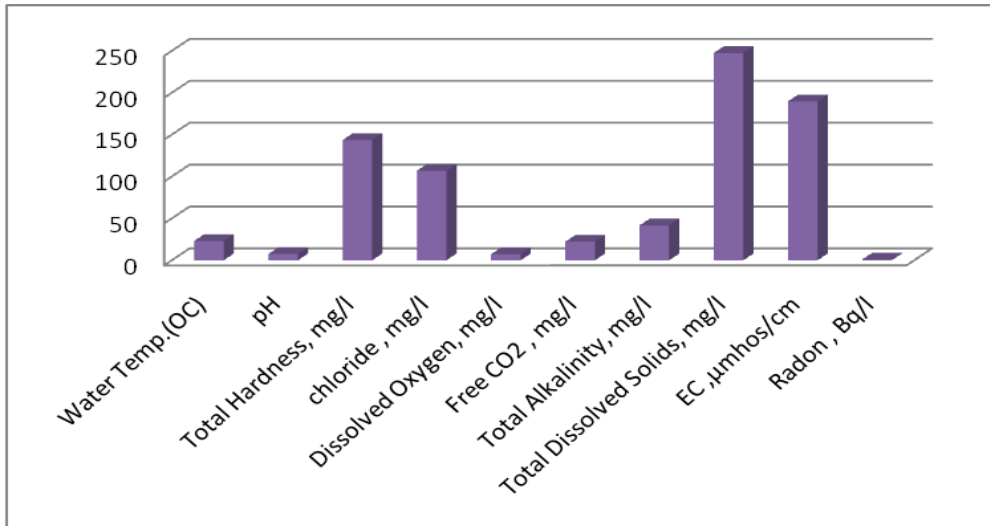


Figure 1: Average physico-chemical parameters of Dantaramakki pond

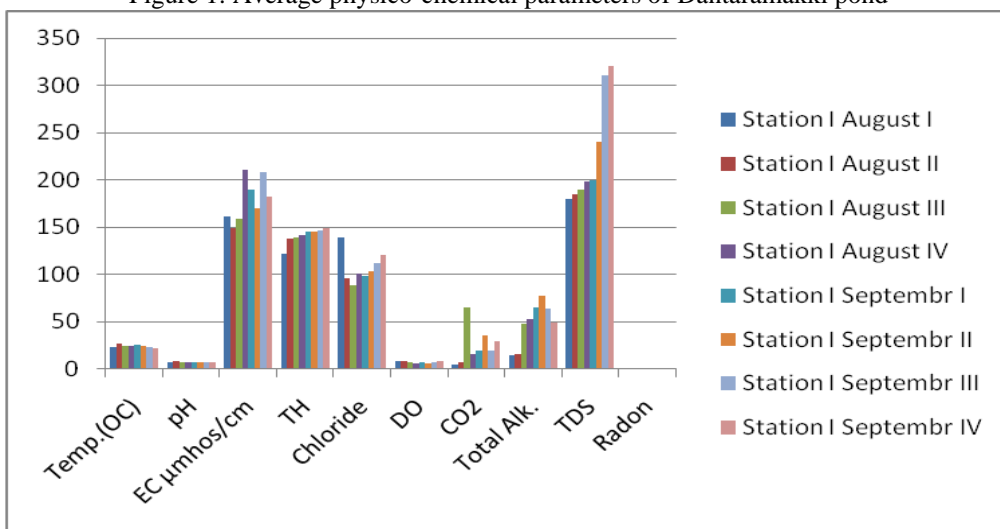


Figure 2: Water quality of Dantaramakki pond at station I

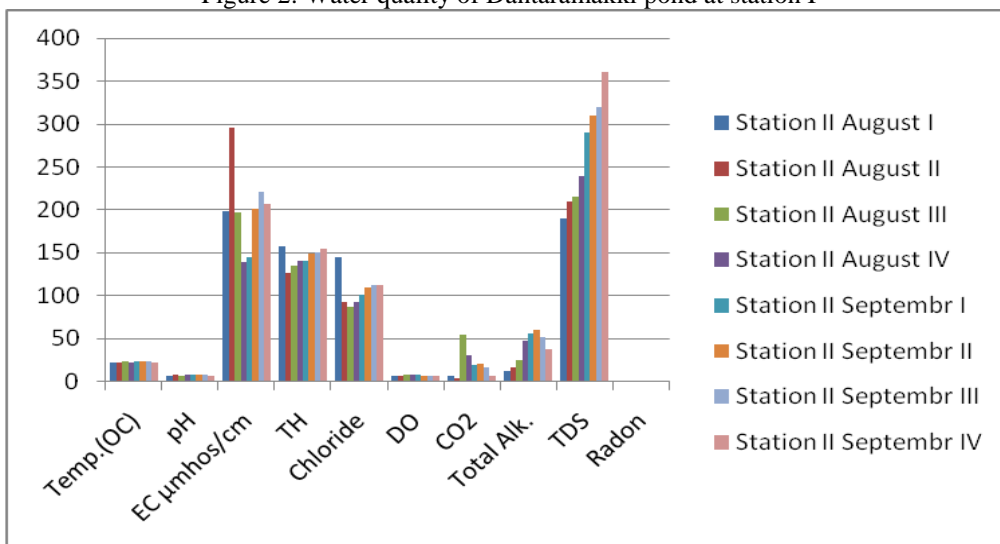


Figure 3: Water quality of Dantaramakki pond at station II