



Physico-chemical Characteristics of a Rural Freshwater Lake : Chora of Bhadrawati Tehsil

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ABSTRACT

Life in an aquatic environment is largely governed by physico-chemical characteristics and their seasonal changes. All life forms exist within narrow range of physico-chemical conditions present in a lake water. So studies were made on a rural lake of Bhadrawati tehsil located in village Chora of Chandrapur district in Maharashtra State for its physico-chemical characteristics during the year 2025. In present study in all about 10 different physico-chemical characteristics were analyzed during a year span. The parameters analyzed include air temperature, water temperature, P_H , dissolved oxygen, free carbon dioxide, total alkalinity, conductivity, orthophosphate, nitrate nitrogen and total hardness.

The freshwater lake is impacted by man made activities like washing of clothes and its embankment is affected by village level defecation activities daily degrading its water quality continuously. Presence of many aquatic weeds in its basin increases its pollution level to some extent too due to their continuous death and decay in a cyclic manner.

Key words : Village lake, Chora, Physico-chemical characteristics, Bhadrawati tehsil, Chandrapur district.

Introduction

Water is the main constituent of hydrosphere in which about 70% of the earth's surface is covered with water mainly in the form of the oceans. The earth is the only planet in the universe where liquid water exists in large quantity. The lakes, rivers and ponds constitute the freshwater environment of the earth. Changes in the aquatic environment due to anthropogenic pollution are a cause of growing concern and require careful monitoring for safeguarding the organisms present aquatic in ecosystems. The monitoring of surface waters is among the top priorities of today's world.

The study of different water parameters is very important for understanding the metabolic events in any aquatic ecosystem. The different air and water quality parameters govern the abundance and distribution of flora and fauna. Therefore it becomes necessary to analyze the important water parameters to determine the stocking of fish species in order to maximize the output of the fish pond. A lake is an example of freshwater ecosystem which exhibits a self sufficient and self regulating ecosystem.

The parameters of freshwater lakes fluctuate in response to surface run off and prevailing site morphology. It is necessary to know the physico-chemical properties of water to sustain fisheries of any region.

Physico-chemical studies on freshwater lakes are important as basis for any ecological work and in establishment of water quality standards. According to Akinbuwa (1992) the physico-chemical factors are limiting and their presence or absence produce important and vital consequences on the life of aquatic fauna.

Studies on lakes and rivers and their physico-chemical characteristics were undertaken by many prominent researchers worldwide. Manjare *et al* (2010) studied the physico-chemical characteristics of Laxmiwadi tank in Kolhapur district of Maharashtra. Ecological studies of Banjara lake with reference to water pollution was done by Swarnalatha and Narsingrao (1998). Salve and Hiware (2006) studied the water quality of wanprakalpa reservoir of Beed district of Marathwada region. The other researchers who worked on various lake and river parameters are Yeole & Patil (2005), Ade and Vankhede (2001), Kaur *et al* (1995), Kedar and Patil (2002), Shah *et al* (1971), Manjre *et al* (2010), Ahmed and Krishnamurthy (1990), Khan and Choudharry (1994), Korai *et al* (2008), Hiware and Ugale (2003), Kadam *et al* (2007), Mahananda *et al* (2005), Kumar (1995), Sahu and Behera (1995), Kadam *et al* (2007), Kumar (1995), Kant and Kachroo (1975), Kumawat and Sharma (2015), Gangwar *et al* (2017). Ashutosh Tripathi *et al* (2025) and many others.

As no previous studies on the freshwater lake of village Chora of Bhadrawati tehsil of Chandrapur district were recorded in literature till date so an attempt is made by us to study it during the year 2025 to know its baseline status with respect to some of the physico-chemical characteristics.

Materials and Methods

The freshwater lake of village Chora in Bhadrawati tehsil of Chandrapur district is a freshwater lake of rural origin in which man made activities are prevalent throughout the year. The water spread area of this lake is about 9 acres which harbor a lot of aquatic weeds.

Water samples for physico-chemical analysis were collected from two different sampling stations from the lake and analyzed in the college laboratory. Standard Methods (APHA, 1998) were used for analyzing the water quality of the freshwater rural lake of Chora. One year study was undertaken to study the 10 different water quality parameters during the year 2025. Dissolved oxygen was analyzed by Winkler's Iodide Azide method (APHA, 1998), in the N.S. Science and Arts College Laboratory, while PH and temperature was measured on the spot by using hand held devices. The other parameters were analyzed in the college laboratory.

Result and Discussion

The observations recorded on physico-chemical characteristics of village lake Chora are presented in Table 1 and 2. During the study period there was a marked variation of different water quality parameters. According to Hutchinson (1957) the temperature is important in controlling both the quality and quantity of plankton in a lake. The lake water temperature varied between 22-32 °C.

In the aquatic environment PH indicates metabolism of O₂ and CO₂ in water, as it is a function of dissolved CO₂ content. Many Indian lakes reported alkaline PH values.

The PH of water was on alkaline side of Chora lake and varied from 7.4 to 9.0 during present study. The alkalinity of water is caused by OH,CO₃ and HCO₃ ions.

Dissolved oxygen plays an important role in maintaining the presence and distribution of aquatic life. Aquatic macrophytes add oxygen during the day and add oxygen to water. Aquatic organisms utilize D.O. for respiration and deplete D.O. in night. Hence large variation is seen in D.O. of lakes, at different seasons of the year.

In lake ecosystem the major input of nitrate is through runoff, but this may also be contributed from the decomposition of nitrogenous matter and its further oxidation. Sharma (1980) reported nitrate value 0.01 to 0.98 mg/litre in Udaipur fateh Sagar lake. In present study nitrate nitrogen is 0.009 to 0.600 mg/litre.

Temperature is one of the most important abiotic parameters that regulate the self purification capacity of rivers and reservoirs and hence measurement of water temperature is of vital importance in the limnology field. Increase in environmental temperature decreases water solubility and carbon dioxide increase leading to degradation of organic matter and rise in CO₂ content.

The sediment flora is important in increasing concentration of phosphorus dissolved in interstitial water of sediment. Heron (1961) has also indicated that phosphate increase may be due to decayed phytoplankton and concentration of zooplankton excreta.

The Chora village lake is degrading slowly and steadily due to man made activities like washing of clothes and use of detergents which are polluting its water. In few years the pollution will slowly impact the lake fully.

References

- Ade P.P. and Vankhede G.N.(2001). Limnological studies of Amravati University reservoirs with reference to trophic status and conservation. Ph.D Thesis, Amravati University, Amravati.
- Ahmad,M and Krishnamurthy R (1990). Hydrobiological studies of Wohar reservoir, Aurangbad (Maharashtra State), India. J.Environ.Biol. 11(3): 335-343.
- Akinbuwa O.(1992). A preliminary study of diurnal vertical distribution of rotifers in Opa reservoir, Nigeria. J.Aquat.Sci. 7 : 19-28.
- APHA (1998). Standard Methods for the Examination of Water, sewage and industrial waste, APHA, AWWA, Washington D.C.
- Heron,J (1961).Phosphorus adsorption by lake sediments, Limnology and Oceanography, 6 : 338.
- Hiware C.J. and Ugale B.J.(2003). Water quality of Jagtnga samudra reservoir at Kandhar,Nanded district,Maharashtra state. Environ.Ecol. 21(1): 64-66.
- Kadam M.S., Pampatwar D.V. and Mali R.P.(2007). Seasonal variations in different physico-chemical characteristics in Masoli reservoir of Parbhani district,Maharashtra. J.Aqua.Biol. 22(1) : 110-112.
- Kant S. and P.Kachroo (1975). Limnological studies in Kashmir lakes II,diurnal movement of phytoplankton.J.Ind.Bot.Soc.54 : 9-12.
- Kaur H.S., Dhillon S,Kaur Navkiran and Bhat K.S.(1995). Physico-chemical characteristics of freshwater ecosystem prevailing in and around Patila(Punjab). Env.and Eol. 13(3) : 523-528.
- Kedar G.T. and Patil G.P.(2002). Studies on the biodiversity and physico-chemical status of Rishi Lake, Karanja (Lad) M.S. Ph.D.Thesis, Amravati University, Amravati.
- Khan M.A.G. and Choudhary S.H.(1994). Physical and chemical limnology of Lake Kaptai. African.J.Ecol. 43 : 7-13.
- Kumar A (1995). Periodicity and abundance of plankton in relation to physico-chemical characteristics of tropical wetlands of South Bihar. Ecol Env.and Cons. Vol. 47-54.

- Mahananda H.B, Mahananda M.R., and Mohanty B.P.(2005). Studies on the physic-chemical and biological parameters of a fresh water pond ecosystem as an indicator of water pollution. *Ecol.Env & Conserv.* 11(3-4), 537-541.
- Manjare S.A., Vhanalakar S.A, and Muley D.V.(2010).A study on physico-chemical parameters of laxmiwadi tank in Kolhapur district, Maharashtra. *Ecology and Fisheries*, Vol. 3(2): 99-104.
- Sahu B.K. and Behera S.K.(1995). Studies on some physico-chemical characteristics of the Ganga river water (Rishikesh,Kanpur) within twenty four hours during winter 1994. *Ecol, Env.Conserv.* 1 : 35-38.
- Salaskar Pramod and Yeragi S.G. (1997). Studies of water quality characteristics of Shenala lake,Kalyan,Maharashtra,India. *J.Aqua.Biol.*Vol 12 (1 & 2) : 28-31.
- Shah G.N., Sehgal K.L., Mitra E and Nandy A.C(1971). Studies on the seasonal and diurnal variation in physico-chemical and biological conditions of a perennial fresh water pond. *J.Inland Fish.Soc.India.* 10(3) : 79-102.
- Swarnalatha N and Rao A.N.(1998). Ecological studies of Banjara Lake with reference to water pollution. *J.Environment.Biol.* 19(2): 179-186.
- Tripathi Ashutosh, Ranu Patidar, Ruby Kharwar and Mali Bhavesh (2025). Water quality analysis of Kahn, Narmada and Kshipra Rivers, MP, India. *Int.Res.J.of EnvSci.* 14(3) : 1-6
- Trivedy R.K. and Goel P.K.(1986). Chemical and biological methods for water pollution studies. Environmental Publication, Kard, Maharashtra.
- Yeole S.M, and Patil G.P. (2005). Physico-chemical status of Yedshi lake in relation to water pollution, *J.Aqua.Biol.* Vol. 20(1): 41- 44

Table-1**Range Physico-chemical characteristics of a Freshwater Rural Lake****Chora of Bhadrawati tehsil**

Parameter	Range
Air Temperature (°c)	20-44
Water temperature (°c)	22-32
PH	7.4 - 9.0
Dissolved Oxygen (mg/lit)	5.5 - 8.0
Total Alkalinity (mg/lit)	190 - 350
Conductivity (us/cm)	1000-2500
Orthophosphate (mg/lit)	0.05-0.09
Nitrate Nitrogen (mg/lit)	0.1-0.5
Total Hardness (mg/lit)	120-200

Table -2

**Average values of Physico-chemical characteristics of a
Freshwater Rural Lake : Chora of Bhadrawati Tehsil**

Parameter	Average
Air Temperature (°c)	35
Water temperature (°c)	25
PH	7.5
Dissolved Oxygen (mg/lit)	7.0
Total Alkalinity (mg/lit)	244.3
Conductivity (us/cm)	1300
Orthophosphate (mg/lit)	0.06
Nitrate Nitrogen (mg/lit)	0.2
Total Hardness (mg/lit)	140

