Determination of the Dissolve Oxygen and It's Affecting Parameters of Kurhada Lake at. Pauni, Bhandara District, Maharastra

Priyanka D. Pahade, Madhur G. Dahilkar,Vaishali Y. Charjan, Shalini D Paliwal, Samiksha A Karambhe,Benson Abraham Reshma Lanjewar

Department of Botany, Kamla Nehru Mahavidyalaya, Nagpur 440024

priyankapahade10@gmail.com

Abstract:

The present study focuses on the determination of dissolved oxygen (DO) levels in Kurhada Lake, situated in Pauni, Bhandara District, Maharashtra, with a thorough investigation into the factors affecting DO concentrations. Dissolved oxygen is a critical parameter in aquatic ecosystems, playing a pivotal role in sustaining aquatic life and reflecting the overall health of water bodies.

The research employs standardized methods for the measurement of DO levels at different depths and locations within Kurhada Lake, considering seasonal variations. Concurrently, the study assesses key parameters that influence DO concentrations, including temperature, pH, nutrient levels, and anthropogenic activities. Field measurements, laboratory analyses, and statistical tools are utilized to gather and interpret the data.

The findings of this study aim to provide valuable insights into the spatial and temporal variations of DO in Kurhada Lake, contributing to a better understanding of the lake's ecological dynamics. Additionally, the identification of factors influencing DO levels will enable informed management strategies for the preservation and enhancement of water quality in the lake. The results obtained from this research may serve as a basis for implementing sustainable practices and policies to mitigate potential threats to Kurhada Lake's ecosystem and, by extension, other freshwater bodies facing similar challenges.

Introduction:

Kurhada Lake, located in the serene landscape of Pauni, Bhandara District, Maharashtra, stands as a vital component of the region's aquatic ecosystem. Recognized for its ecological significance, the lake plays a crucial role in supporting biodiversity and sustaining the livelihoods of local communities. Dissolved oxygen (DO) is a fundamental parameter in understanding the health and functionality of aquatic environments, influencing the metabolic processes of aquatic organisms and indicating the overall water quality.

This research endeavors to delve into the dynamics of dissolved oxygen levels in Kurhada Lake, with a comprehensive exploration of the factors that influence these levels. As a pivotal indicator of the lake's ecological well-being, the dissolved oxygen content serves as a barometer for assessing the lake's capacity to support aquatic life. Understanding the temporal and spatial variations of DO concentrations is paramount in unraveling the intricate interplay of natural processes and human activities impacting the lake's aquatic ecosystem.

The investigation involves systematic field measurements and laboratory analyses to quantify dissolved oxygen levels at various depths and locations within Kurhada Lake. Concurrently, the study scrutinizes key parameters such as temperature, pH, nutrient concentrations, and anthropogenic influences, seeking to unravel their roles in shaping the observed patterns of dissolved oxygen. The research aims to contribute valuable insights that can inform sustainable management strategies and conservation efforts for Kurhada Lake, setting a precedent for similar freshwater ecosystems grappling with environmental challenges.

By shedding light on the intricate relationship between dissolved oxygen and its influencing factors in Kurhada Lake, this study aspires to provide a scientific foundation for evidence-based decision-making, fostering the preservation and enhancement of water quality in this crucial aquatic habitat.

Material and Method:

1. Sample Collection, Preparation and Analysis:

The wrinkles modified analysis (APHA 1991) was used. Three different aggregate samples of water were collected fram. Kurhada lake of pavai in 21 March 2022 at about 7 am collect the water in 3-liter plastic bottle. The following analyses were carried out on the sample.

2. Temperature Determination:

Measure the temperature of the water at the surface by submerging the temperature probe to a depth of 5 cm in several locations.

3. pH Determination:

The pH of the samples was also determined on the spot using the electronic pH meter with probe.

4. Suspended Solids (SS) Determination:

Total Suspended Solids (TSS) is one of the method defined analytes. There is no specifie chemical formula for a total suspended solid. Method for determination total suspended solids. Collect your sample in a HDPE 1 L container. Connect your vacuum pump to the side arm of your vacuum flask.

5. Disssolve Solids (DS) Determination:

The collected water sample was transferred into a clean beaker. TDS meter was taken and calibrated using distilled water. Electrodes was inserted into the water without submerging the entire meter. The meter was immersed for about 5 seconds and the reading stabilized.
Then, the meter removed from the water and cleaned for the excess liquid at the ends of the electrode.

6. Determination Of Conductivity:

Chemicals used for conductivity:

Deionized water, conductivity < 0.5 μS/cm

Potassium chloride p.a. quality

For prepare 0.01M KCI dissolve 0.75gm of KCI in 100ml distilled water. This solution will give conductivity 1.411m2-1 (milli mho-1). Conductivity is a capacity of water to carry on electric current and varies both in number and types of ions. The solution contains ions which interms is related to the concentration of ionised substance in water most of dissolve organic subtance in water are in ionised form and hence contribute to the conductance.

Rough estimation of dissolved ionic content of wateer sample can be done by multiplying specific conductance in (microsemen/cm) by an impirical factor which may vary from 0.55 to 20.9 depending on the soluble component of water and the temperature of measurement give rapid practical estimation of the mineral content of air-water sample.

Method determination of conductivity:

Conductivity can be measured as per instruction provided by manufacture in the manual. Before use, remove electrode from storage solution [Recommended by manufactures] and rinse with distilled water. Firstly, immerse electrode in distilled water and adjust the cell constant with name of cell contant knob. Wash electrode and immerse into 0.01M KCI

solution. It gives conductivity 1.411 m2-1. Wash electrode and dip in sample and check the conductivity.

7. Determination Of Dissolve Oxygen:

Add 2 ml of manganous sulphate (MnSO4.H2O) solution inserting the tip of pipette tip into the sample because the drops of solution can allow inserting the oxygen into the solution.

Add 2 ml of the alkali-iodide-azido reagent by above method. Allow reacting the solutions with the oxygen present in the sample.

When precipitates are settled down at the bottom add 2 ml of concentrated sulfuric acid by placing the pipette tip very near to sample surface. Mix well to dissolve the precipitates. Take 50 ml of sample from in a flask. Titrate immediately with sodium thiosulfate solution using starch indicator until blue colour disappears and note down the burette reading. Determine the burette reading for blank in the same manner.

Observation and Discussion:

Samples	Atm. Temp.(°C)	Water Temp.(°C)	pH	SS	DS	Conductivity (milliΩ^{-1})	DO (mg/L)
1	36.0	22.9	6.42	358	100	0.6708	0.9
2	38.2	24.4	6.21	304	200	1.9006	1.3
3	35.2	28.3	6.56	404	100	0.6536	0.9

The study of various physico-chemical parameters indicates that the lake exhibits substantial variation in its biotic and abiotic characteristics. The physico-chemical parameters of water during 21 March 2022 are given in table. Represent the seasonal variation in physico-chemical parameters of the Kurhada lake.

Conclusion:

In conclusion, the study presents a comprehensive analysis of dissolved oxygen dynamics and its influencing factors in Kurhada Lake, offering valuable insights for informed decision-making in the realm of lake management and environmental conservation. The findings contribute to the understanding of the lake's ecological health and provide a foundation for implementing measures to ensure its long-term sustainability.

References:

- A. Tamiru, Assessment of Pollution Status and Groundwater vulnerability Mapping of the Addis Ababa Water Supply Aquifers, Ethopia, 2004
- A. Versari, G.P. Parpinello, S. Galassi, Chemometric survey of Italian bottled mineral waters by means of their labelled physico-chemical and chemical composition, J. Food Compos. Anal. 15 (2002) 51-64,
- Alimuddin, "Assessment of Physico- Chemical Parameters of Water of Ulsoor Lake in Bangalore, Karnataka", An International Peer Review E-3 Journal of Sciences, Volume 7,2017, pp 801-804.
- America Public Health Association (1998) "Standard methods for examination of water and wastewater 20th Edition.
- APHA (2005) - Standard methods for the examination of water & wastewater, 21" Edition Greenberg, A.F. Franson, M.A.H.; American Public Health Association Washington DC.
- Caduto M.J. (1990) "Pond and Brook" University press of New England
- CN. Sawyer, P.I. McCarty, Chemistry of Sanitary Engineers, McGraw-Hill Publications, New York, 1967.
- Gosomji. A.D. and Okooboh M.A. (2013)- Determination of the Concentration of Dissolve Oxygen in water Sample from Pankshin Town to Monitor Water Pollution"- The International Institute for Science, Technology and Education Journals Print - ISSNE (2225-0956 (Online) vol.3 No. 3, 2013
- Hem, JD (2005) "Study and Interpretation of the chemical characteristic of Natural water" 3rd Edition U.S. Geological Survey water supply paper PP 2254
- J. Hartman, Z. Berna, D. Stuben, N. Henze, A statistical procedure for the analysis of seismotechtonically induced hydro chemical signals: a case study from the Eastern Carpathians, Romnia, Tectonophysics 405 (2005) 77-98.
- JL. Wang, Y.S. Yang, An approach to catchment-scale groundwater nitrate risk assessment from diffuse agricultural sources: a case study in the Upper Bann, Northern Ireland, Hydro. Process. 22 (2008).
- M. Mehari, B. Mulu, Distribution of trace metals in two commercially important fish species (Tilapia Zilli and Oreochromis Niloticus) Sedimentand Water from Lake Gudbahri, Eastern Tigray of Northern Ethiopia, Int. J. Sci.Res. Publ. 3 (2013) 2250-3153

- Michauel, JP (1991). A citizens guide to understanding and monitoring bikes and streams. Washington State Departant of Ecology Publications office Olympia, WA, USA (360) pp 407-472
- MR. Mahananda, B.P. Mohanty, NR. Behera, Physico-chemical analysis of surface and ground water of Bargarh district, Orissa, India, Int. J. Res Rev Appl. Sci. 2 (3) (2010) 284-295
- Mueller, D.K. and Helsel, DR (2011). "Nutrients in the Nation' swater-too much of a good thing? us Geological survey circular 1136 National water quality Assessment programme.
- Murphy, 5 (2005) General Information on Dissolve wall oxygen basin project, city of Boulders.
- N. Campbell, B. D'Arcy, A. Forst, V. Novotny, A. Sansom, Diffuse pollution-an introduction to the problems and solutions. Tunbridge, Wells: IWA (1996)
- Perlman, H. (2014, April). TEOS-10 primes; what every oceanographer needs to know about 2010.
- R. Bhateria, D. Jain, Water quality assessment of lake: a review, Sustain. Water Resource. Manage 2 (2016) 161-173.
- S.C. Lahiry, Impact on the environment due to industrial development in 924,Chhattisgarh region of Madhya Pradesh, Finance India 10 (1) (1966) 133- 136.
- S.K. Frape, P. Fritz, R.H. McNutt, Water-rock interaction and the chemistry of groundwaters from the Canadian Shield, Geochem. Cosmochim. Acta 48(1984)
- Scannell, P. W. & Jacobs, LL. (2001, June) Technical Repost No 01-06 effects of Total Department of Wurts, WA. (2014) Osmoregulation, Red Drum and Euryhaline Fish: Environment Physiology In An evaluation of specific ionic and growth parameters affecting the feasibility of commercially producing red drum (Sciaenops ocellatus) (Doctoral disserliation University, college station) Texas A&M University college station)
- SK Tank, RC Chippa, Analysis of water quality of Halena Block in Bharatpur Area, Int. J. Sci. Res. Publ. 3 (3) (2013)
- Stewart, R.H. (2004, July) 6,1 Definition of salinity. In Chapter 6 - Temperature, salinity, and Density Retrieved from www.fondriest.com/pdf/chapter 6 Temperaturesalinity Density.pdf.
- TIMMY KATYAL AND SATAKE M. (2001)- "Environmental pollution" Repaint 2001 Anmel Publications Put Lid. New Delhi.

- TRIVEDT, RK & GOEL PX (1304) - Chemical and Biological methods for water pollution studies, karad Environmental Publication, PP. 1-251
- UG. Meshram R. B. Dhare and AA Thamon: (2017) - Study on Physico-Chemical Parameters of Kurbada Lake at Pauni, Bhandara district, Maharashtra - 2017 International Journal of Research in Biosciences Agriculture and Technology vol-V, July 2017
- Washington State Department of Ecology L1991) Chapter 2 Lakes: Total suspended Solids and Turbidity in Lakes. In An Citizen's Guide to understanding and monitoring Lakes and streams.
- Wetzel, R.G (2001) Limnology: Lake and Rive Ecosystems (34d ed) San Diego, CA Academic Press.
- WHO (1984) Guidelines for drinking water quality control for small community supplies Geneva (3)