



Assessment of Biochemical Oxygen Demand in Banshelki lake at Banshelki Udgir: An Indicator of Water Quality and Ecosystem Health

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Abstract:

The oxygen content in Banshelki lake of Udgir, is a critical parameter that profoundly influences the health and sustainability of aquatic ecosystems. This research paper aims to provide an overview of the factors affecting oxygen levels in lakes, the importance of dissolved oxygen for aquatic organisms, methods for measuring oxygen content, and the implications of oxygen depletion for lake ecology. BOD levels were observed in the range of 10 ppm to 30 ppm. The findings emphasize the need for ongoing monitoring and management strategies to preserve and restore adequate oxygen levels in lakes, ensuring the long-term viability of these vital ecosystems.

Key words: BOD, Oxygen, aquatic ecosystems, factors, monitoring.

Introduction:

Water quality of any specific area or specific source can be assessed using physical, chemical and biological parameters. The values of these parameters are harmful for human health if they occurred more than defined limits (WHO, BIS 2012, EPA 2009, CPCB 2013). Water is mainly polluted due to discharge of various effluents like industrial waste water, domestic waste which are discharged directly or indirectly into the water bodies without treatment

Lakes are essential freshwater resources that support diverse aquatic life and provide valuable ecosystem services. The oxygen content in lakes is a crucial component of the water quality, affecting the distribution, behavior, and survival of aquatic organisms. Dissolved oxygen (DO) plays a pivotal role in nutrient cycling, energy flow, and the overall health of lake ecosystems. Understanding the dynamics of oxygen in lakes is essential for effective management and conservation efforts. the DO concentration responds to the Biological Oxygen Demand (BOD) load. (T. N. T. K. Nawarathana, M. Makehelwala 2016).

Factors Affecting BOD Levels:

Several natural and anthropogenic factors influence BOD levels in rivers. These include the presence of organic matter from sources such as plant debris, animal waste, and sewage, as well as temperature, flow rate, and the degree of microbial activity. Human activities, such as industrial discharges and inadequate wastewater treatment, can significantly contribute to elevated BOD levels in Lakes. The unsaturated organic matter consumes the dissolved oxygen from water. S.J.Kulkarni (2016)

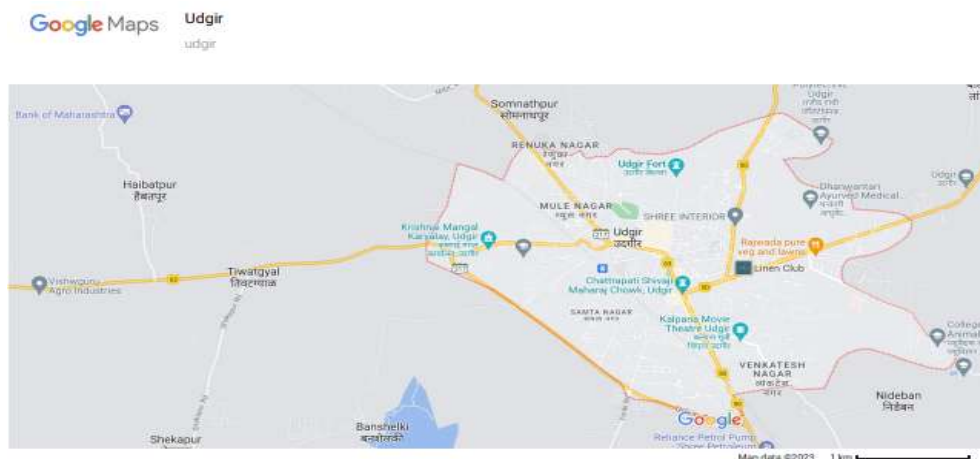
Significance of BOD in Lakes:

BOD is a direct measure of the biodegradable organic matter present in water. It indicates the potential for microbial decomposition, leading to oxygen consumption during the degradation process. Elevated BOD levels in lake can deplete dissolved oxygen, leading to hypoxia or anoxia, which can harm aquatic organisms, disrupt ecosystems, and degrade the aesthetic and recreational value of the water. There is Relationship of dissolved oxygen with chlorophyll and phytoplankton composition in aqueous system (Kunlasak et al.2013). incorporating organic matter in the form of leaves, flowers etc., as a part of these

activities, reduce dissolved oxygen which in turn adversely affect the aquatic environment (Desai and Tank, 2010). The discharge of wastes with high levels of BOD can cause water quality problems such as severe dissolved oxygen depletion and fish kills in the receiving water bodies (Penn et al. 2003).

Study area

Udgir, is second largest city and municipal council in Latur district of the Indian state of Maharashtra. It is located in the Marathwada division of the state. The city is located very close to the borders of Karnataka and Telangana states. Udgir is home to the historical Udgir Fort.



Banshelki is the water reservoir dam located near at Banselki village near Udgir city of Latur district in Maharashtra. Distance of dam from Udgir city is 6.2 km approximately. Here stored water is use to supply to the Udgir city and nearby villages. The only source of water to be stored here is annual

rain of the rainy season between months of June and October.

The lake has been divided into four sites viz site-1, Site II, Site III and Site IV as East, West North and South for the catchment area and the samples were collected on monthly basis accordingly.



4. Materials and methods

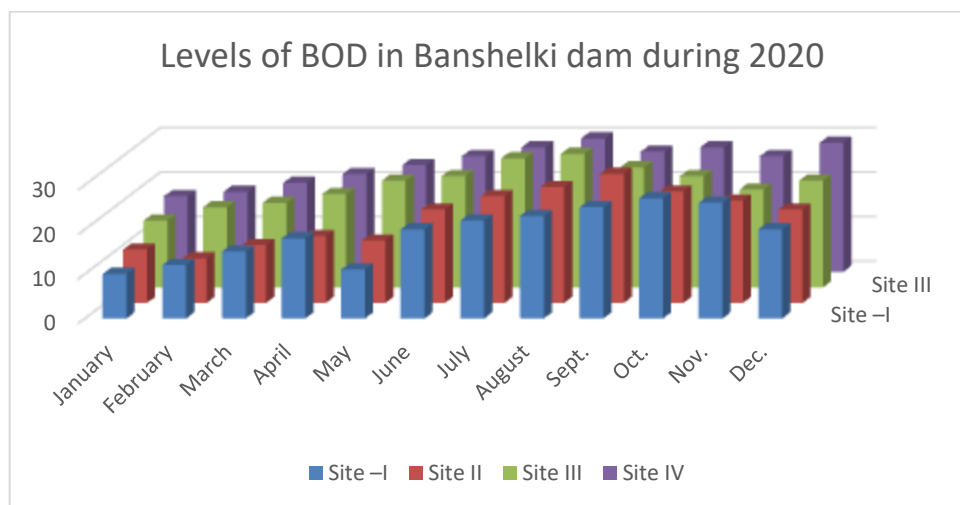
The samples were collected in glass bottles and oxygen was fixed onsite only. The method used for analysis is the Winkler's method (APHA, 2005) This is a titrimetric

method. In which Initial and Final Dissolved oxygen is calculated for Bio chemical oxygen demand. If it increases beyond the sample the sample is diluted.

Tables and Graphs:-Levels of BOD in ppm at Banshelki dam during 2020

Sr.No	Month	Site -I	Site II	Site III	Site IV
01	January	10	12	15	17
02	February	12	10	18	18
03	March	15	13	19	20
04	April	18	15	21	22
05	May	11	14	24	24

06	June	20	21	25	26
07	July	22	24	29	28
08	August	23	26	30	30
09	September	25	29	27	27
10	October	27	25	25	28
11	November	26	23	22	26
12	December	20	21	24	29



Results and discussion: In overall study it has been found that the levels of BOD were in between 10 ppm to 30 ppm. It shows that the lake is turning towards mesotrophic levels in near future. The levels of BOD at site Ist was in the range of 10ppm in January and 27 ppm in October. At site IInd the levels were in between 10 to 29 ppm in February and September respectively. At site IIIrd the amount of BOD was 15 ppm in January and 30 ppm in the month of August. At site Iv the levels were in the range of 17ppm in January and 30 ppm in August which is the highest in all sites. It indicates that the fourth site has to be monitored on regular basis to observe the BOD levels in Banshelki dam. The fluctuation in BOD of the lake water might be due to the dilution of biodegradable organic matter in the large volume of lake water. Similar trend was also observed in Hebbal and Bellandur lakes of Bengaluru (Gorain et al., 2018).

Oxygen depletion in lakes can result in significant ecological consequences. It disrupts the balance between aerobic and anaerobic processes, leading to the release of harmful compounds such as hydrogen sulfide. The decline in oxygen content affects the behavior and growth of fish and other organisms, leading to population shifts and reduced fishery yields.

To maintain healthy oxygen levels in lakes, proactive management strategies are necessary. These include reducing nutrient inputs, promoting sustainable land use practices, and implementing artificial aeration to enhance oxygen exchange in stratified lakes. Restoring riparian vegetation, which acts as a buffer zone, can also help prevent excessive nutrient runoff.

7. Conclusion:

The oxygen content in lakes is a critical parameter that directly influences the health and functioning of aquatic ecosystems. In this work it is observed that the fourth site is showing highest level of BOD. So monitoring and understanding the factors affecting oxygen levels are essential for effective lake management and conservation efforts. By implementing sustainable practices and restoration measures, we can ensure the preservation of these valuable natural resources for future generations.

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