Assessment of the water quality status of Alsand Lake, Dist. Sangli (M.S), India.

ABSTRARCT

The present investigation deals with the seasonal variation in some important ~~Physico~~physico-chemical parameters of Alsand Lake, District Sangli. The study was carried out from February 2022 to January 2023. Water samples were collected from four different selected ~~four different~~ sites at 15 days of intervals. Physico-chemical parameters such as pH, electrical conductivity, total dissolved solids, total hardness, total alkalinity, calcium, magnesium, phosphate, sulphate and nitrate, were ~~measured and analyzed by~~determined using standard methods of APHA. The data revealed that there ~~is~~ were no significant seasonal variations in parameters throughout the year. The lake water ~~is~~ was suitable for drinking, agricultural and ~~fish culture point of view~~aquaculture purposes. This work is useful for proper monitoring and conservation of water bodies in the future.

***Keywords**: -Alsand Lake, Physico-Chemical parameters, Seasonal variation.*

1. Introduction:-

Water is the most valuable resource on earth and critically important for life on earth. India has vast freshwater resources in the form of both lentic and lotic ecosystems. The lentic ecosystem include ponds, lakes, tanks and reservoirs. These reservoirs play ~~an~~ important role~~s for~~ in domestic use, agriculture and aquaculture as valuable water resource (Mohit Arya~~,~~ et al., 2015).

Aquatic ecosystems are affected by several health stressors that significantly deplete biodiversity (Wanjari et al. 2012). Due to increased human population, industrialization, use of fertilizers in the agriculture, manmade activity. It is highly polluted with different harmful contaminants. ~~That~~ that leads to ~~a~~ scarcity of potable water. Therefore, continuous monitoring of water bodies for water quality is necessary (Amit ~~G. K.~~ et al., 2021). The physicochemical properties will also help in identification of sources of pollution for conducting further investigation of ecobiological impact and also help in the initiating necessary steps for remedial actions in case of polluted water bodies (Gaikwad et al., 2021).

Alsand Lake is a manmade lake situated in Khanapur Tehsil, District Sangli. Various anthropogenic activities adversely affect physicochemical parameters of the water. So this

Commented [H1]: What do you mean by this. Two weeks or for 15 days at a stretch every month

Commented [H2]: What of spatial variations since the study was carried out in four sites

Commented [H3]: Not necessary. Please delete. Please define the objective of this study

Commented [H4]: Is this a compound name???

Commented [H5]: Please rewrite. It is not clear

Commented [H6]: What is this lake used for or the purpose of constructing it

Commented [H7]: Please present all the anthropogenic activities in details. It will help in interpreting and understanding the water quality

present study ~~is~~ was undertaken to ~~analyze~~ assess various physicochemical parameters of water in order to interpret the water quality of the reservoir. ~~The various~~ Various physicochemical parameters ~~are~~ were used to ~~check~~ determine the quality of water such as pH, electrical conductivity, total dissolved solids, total hardness, total alkalinity, calcium, magnesium, phosphate, sulphate, and nitrate. ~~This work will be helpful for conservation of the water bodies and aquatic ecosystems.~~

2. Material Method

2.1 Study Area:-

The ~~selected~~ study area ~~for the present study~~ is located near Alsand Village in Khanapur Tehsil, District Sangli (MH). Alsand Lake was ~~selected for sample collection and subsequent analysis for around the~~sampled for one year, from February 2022 to January 2023. It is situated 60 km ~~away~~ from the district headquarter Sangli. The lake is manmade, its depth is around 29 to 30 feet and the lake is surrounded by agricultural fields. The co-ordinates are between the latitude 17°12'5"N and longitude 74°29'27"E. The water from the lake is used for irrigation and drinking in nearby villages.

2.2 Sample collection:-

The water samples were collected from Alsand Lake. The collection was done at four sites around the lake in 15-day of interval for a year in the morning at 6 am to 7 am. Water samples were collected in four different well rinsed and pre-cleaned plastic bottles with 1-liter capacity. After collection, sample~~s~~ ~~was~~ were brought to the research laboratory for further analysis. ~~of water's~~The physical and chemical ~~parameters~~ analyses were carried out according to ~~was done with the help of~~ standard ~~guidelines~~ methods of the American Public Health Association (APHA, 2017).

Commented [H8]: The purpose of this study is not defined

Commented [H9]: No description of the sampling points. No statistical analysis method here

Commented [H10]: Use metric unit

Commented [H11]: This is a coordinate of a point not the lake. The coordinates of the lake will be in a range – two latitudes and two longitudes

Commented [H12]: Please clarify this. Twice a month or 15 days at a stretch

Commented [H13]: Please reconsider this. Is it possible to collect water samples from four different sites of the lake in just one hour.

Commented [H14]: Why four different plastic containers? Is it for the four different sites or four samples per site. Please rewrite for better understanding

Figure 1. Alsand Lake (Satellite Image)

Figure 2. Alsand lake image

3. Result

In the present investigation, pH mean value ~~is~~ was highest in summer (8.29±0.33) and lowest in winter (8.067±0.422). The Electrical conductivity mean value ~~rises~~ was highest in summer (0.390±0.056), and ~~lowers down~~lowest in monsoon (0.295±0.070). ~~The present study recorded the~~ The highest mean TDS value (262.2±28.26) was recorded in winter and lowest in monsoon (187.7±45.62).The mean value of Total Hardness ~~increases~~ was highest (108±44.78) in summer and ~~decreases~~ lowest (70.75±26.35) in monsoon. ~~.The findings of the study recorded the~~ The highest mean Total Alkalinity value (329±81.69) was recorded in

Commented [H15]: None of these figures was refereed to into in the text. Secondly, one of them is ok. Thirdly, none of them shows the sampling points used in the study

Commented [H16]: Why is this result presented in season instead of site or site and season together

Commented [H17]: This is a mean value. How did you arrive at this.

Commented [H18]: Please include the unit of electrical conductivity

Commented [H19]: Please include the unit

Commented [H20]: Add unit

Commented [H21]: Add unit

winter and the lowest (130±9.63) mg/l in summer. The mean value of Calcium ~~is~~ was high in winter (62±1.224) and low in summer (32.33±2.867). Magnesium ~~value~~ mean value was highest ~~rises~~ (35.25±1.479) in winter~~,~~ and ~~lowers down~~lowest in summer (14.85±1.888). The highest mean value (0.885±0.085) of Phosphate was ~~observed~~ recorded in winter and the lowest (0.692±0.128) in monsoon. The mean value of sulphate ~~increases~~ was highest (0.692±0.128) in winter and ~~decreases~~ lowest (8.0±9.06) in monsoon. Nitrate mean value ~~rises~~ was highest (4.53±0.894) in winter and ~~lowers down~~lowest (3.48±0.390) in summer.

Table ~~No~~:-1. Seasonal record of Physico-chemical parameters of Alsand Lake during February 2022 to January 2023.

Commented [H22]: This table was not referred to in the text

Parameter	Summer (Feb-May)	Monsoon (June-Sept)	Winter (Oct-Jan)
pH	8.29±0.33	8.19±0.304	8.067±0.422
EC (µ~~m~~S/cm)	~~0.39~~390±0.056	~~0.295~~295±0.070	~~0.36~~360±0.040
TDS (mg/l)	241±38.14	187.7±45.62	262.2±28.26
TH (mg/l)	108±44.78	70.75±26.35	96.52±1.299
Total Alkalinity (mg/l)	130±11.50	189.1±46.85	329.4±81.84
Calcium (mg/l)	32.33±2.867	48.75±15.89	62±1.224
Magnesium (mg/l)	14.13±1.643	22.25±10.15	35.25±1.479
Phosphate (mg/l)	0.83±0.078	0.692±0.128	0.885±0.085
Sulphate (mg/l)	16.75±11.83	8.0±9.06	19.37±4.421
Nitrate (mg/l)	3.48±0.390	4.12±1.777	4.53±0.894

±Mean Standard Deviation

4. Discussion

Alkaline pH ~~is~~ was observed ~~all~~ the three seasons with no significant variation in ~~the pH of~~ lake water. The value of pH ~~increases~~ was high in summer because ~~due to high heat water evaporates and makes concentrated water~~ the water was concentrated due to high

temperatures and evaporation, which increases pH of water. In the winter, water is diluted than the summer that keeps the pH of the water low ~~pH of the water~~ (Randive et al., 2015).The highest Electrical conductivity was observed in summer and the lowest in monsoon. In summer, water level decreases due to ~~heat~~ high temperatures and evaporation that makes the water concentrated ~~water~~ with high ions; ~~that is~~ responsible for high Electrical conductivity. In monsoon water is diluted due to rainfall that causes low Electrical conductivity of water (Chouhan et al., 2022). The value of Total Dissolved Solids goes up in winter because of the low water level than rainy season, fly ash form nearby jaggery factory, dead organic matter, soil and sand particles. In monsoon, water is diluted by rain water which decreases Total dissolved solids slightly in the water~~.~~ (Arya Mohit and Mishra, ~~A. K.~~ 2015). The high level of Total Hardness observed in summer and winter was due to the presence of ions in water like divalent cations, chlorides and sulphates. In the rainy season, it is slightly decreased due to the uptake of calcium and magnesium in developing animals during the breeding season~~.~~ (Hujare ~~M. S.~~, 2008, Manjare et al., 2010). Total Alkalinity increases in winter due to the presence of carbonate, bicarbonate and hydroxyl ions that leach out fro~~r~~m the ground aquifers, and water flows. In the summer, there is no water flowing in the lake that carries an ions in the lake (Sarwade and Kamble., 2014). The values of calcium ~~rises~~ were higher in winter and monsoon than in summer due to calcium coming through rain water flow and weathering of limes~~-~~tones in lake area (Yadav ~~Priyanka,~~ et al., 2013). The highest value of magnesium was observed in winter and monsoon than in summer. Magnesium is always found with calcium. Magnesium is also increased by weathering and leaching of the rocks in the catchment area (Manjare~~. S.A.,~~ 2013). The value of Phosphate ~~is~~ was high in winter and summer because there ~~is~~ was a ~~caw~~ cow and buffalo pen situated near to water body which is having more than a hundred animals. These animals~~'~~ visit~~s to~~ the lake ~~per day~~daily causinges ~~cattle manure~~their dung to mix with the water and increase the Phosphate level. Washing and cleaning of vehicles, and animals (Mishra et al., 2011). Sulphate ~~rises~~ was higher in summer and winter ~~more~~ than the monsoon because of the dead organic matter of plants and animals due to the low level of water in the lake (Borkar et al., 2022). Nitrate ~~increases~~ was higher in the winter than in summer and monsoon due to the cleaning and washing of animals, crops like zinger etc. immersion of holistic things (Gay ~~N. F.~~, 2008).

Commented [H23]: Not true. Please find a more plausible explanation

Commented [H24]: Does water flow into or out of the lake during winter

Commented [H25]: ????

Commented [H26]: How does this apply to winter

Commented [H27]: This is hanging!!

Commented [H28]: Are these done in winter???

Commented [H29]: Does religious festivals occur in winter. Besides, you did not fully describe the activities going in the four sampling sites of the lake. These could help explain the results better

5. Conclusion

The observations of physicochemical parameters of freshwater is very essential for determining the current status of water body and water pollution. There are total ten

parameters taken for the analysis of water quality. The parameters are pH, Electrical Conductivity, Total Dissolved Solids, Total Hardness, Total Alkalinity, Calcium, Magnesium, Phosphate, Sulphate and Nitrate. All above parameters are in permissible limits except Total Alkalinity ~~increases~~ in ~~the~~ winter. The water in Alsand lake is suitable for drinking, domestic and agricultural purposes. This study will help in long term provision, which will helpful to conservation of water body and to protect ecosystem.

Commented [H30]: No permissible limit was used in this study so did you come to this conclusion

Aknowlegement

The authors are thankful to Chatrapati Shahu Maharaj National Research Training and Human Development Institute, Pune (SARTHI) for granting a Junior Research Fellowship (CSMNRF-2021/2021-22/896.

References

1. APHA, (2017). Standard Methods for the Examination of Water and Wastewater. 17th Edition, American Health Association, Washington DC.
2. Agarwal, P., ~~Dr.~~ Kumbhar, A., (2016). Study of Physico-chemical Parameters of Sambhaji Lake Solapur, perspective of Conservation, Indian Journal of Applied Research. 6(6), 122-124.
3. Arya Mohit, Mishra A.K., (2015). Studies on physicochemical parameters of the Madhav lake Shivpuri, M.P. India, Journal of Environmental Sciences, Toxicology and Food Sciences, 9(6), 10-14, DOI: 10.9790/2402-09611014.
4. Borkar, K. R., Chaudhari S. S., (2022). Evalution of Physicochemical Parameters Janala Lake from Mul Taluka of Chandrapur District, Maharashtra State (India). International Journal of Sciences Technology and Management. 11(8), 38-40.
5. Chauhan, A., ~~Dr.~~ Prakash, B., (2022). Seasonal variation in Physico-chemical Characteristics of the Kalyan lake: A Study. International Journal of Food and Nutritional Sciences. 11(8), 2173-2177.
6. Gaikwad V. D., Padule A. R., More R. B., (2021). Study of physicochemical parameters of Uttermand Reservoir in Patan Tehsil, District Satara, (M.S) India. International Journal of Creative Research Thought. 9(7), 188-190.
7. G K. Amit., Shinde P. P., Ansari Gulista R., (2021). Physicochemical characteristics of Vadape Lake of Bhiwandi City, Dist-Thane, Maharashtra, India. International Journal of Engineering Sciences Invention, 10(5), 47-52. DOI: 10.35629/6734-1005014752.

Commented [H31]: Not in the text

Commented [H32]: Not in the text

8. Grey, N.F., (2008). Drinking Water Quality Problem and Solutions. Published by United State of America by Cambridge University Press, New York, Second Edition, 125.
9. Hujare, M. S., (2008). Seasonal variation of Physico-chemical parameters Perennial Tank of Talsande, Maharashtra, India, Ecotoxicol. Environ. Monit, 2008; 18(3):233-242.
10. Manjare, S. A., (2013). Hydrological Study of Shirol Freshwater body from Kolhapur District, Maharashtra, India. International Journal of Scientific Research, 5(3), 2085-2088.
11. Manjare, S. A., Vhanalakar, S. A., Muley, D. V., (2010). Analysis of water quality using Physico-chemical parameters Tamdalge Tank in Kolhapur District Maharashtra, India, International Journal of Advanced Biotechnology and Research, 1(2):115-119.
12. Mishra, R., Prajapati, R. K., Duivedi, V. K., Mishra, A., (2011). Water Quality Assessment Rani Lake of Rewa (M.P) India. GERF Bulletin of Biosciences. 2(2), 11-17.
13. Rajni ~~r~~V. (2023). A case study of physicochemical and Biological parameters of Plankton Biodiversity and fish Abundance in freshwater lake of Karminagar District, Telengana state, India, An internationally quarterly journal of Biology and Life Sciences, 11(2), 40-44.
14. Randive, S. R., Deshmukh, A. L., Kamble, V. S., (2015). Studies on Physicochemical Parameters with Reference to Zooplankton of Walekhindi Tank from Jath Taluka, Dist. Sangli, International Journal of Advances and Applied Research. 2(4), 87-97.
15. Sarwade, A. B., Kamble, N. A., (2014). Hydrobiological Assessment of water bodies from Miraj Tehsil, Maharashtra: A Comparative Study. Octa Journal of Environmental Research. 2(3), 247-254.
16. SM, Shoba., D. Shiva Kumar, (2022). Seasonal variation in physicochemical Characteristics of the Kalyan Lake: A Study. International Journal of Food and Nutritional Sciences. 11(8), 2173-2177.
17. Trivedy, R.K., Goel P.K., (1986). Chemical and Biological methods for Water pollution studies. Environmental publications, karad.
18. Wanjari, H. V. and Chabba S. G. (2012). Comparative analysis of various physicochemical parameters of different freshwaters bodies of Washim Region of Maharashtra, Journal of Global Sciences, 1(2), 42-48.

Commented [H33]: Not in the text

Commented [H34]: Not in the text

Commented [H35]: Not in the text

19. Yadav P, Yadav VK, Yadav AK, Khare PK. 2013. Physico-chemical characteristics of a fresh water pond of Orai U. P. Central India. Octa Journal of Biosciences 1(2): 177-184.