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Assessment of water quality parameters of salt lake Didwana, Rajasthan, India

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Abstract

This research paper is based on a study carried out to evaluate the physico-chemical parameters of the Didwana Lake water. The Didwana Lake is one of the major salt water lake. To find out the outcome of steps taken by the Govt. for its conservation and existing status of its water quality, it was decided to perform an analytical study. The samples of water were obtained from identified spots of the lake for a continuous period of two months during November–December 2022. The sampling process was strictly according to the procedure of the Central Pollution Control Board, Govt. of India and the testing protocols followed for analysing samples were as per the Indian and APHA standards. The parameters of physico-chemical nature found during assessment were suitable to inland saline culture of aquatic animals. This study also suggested that water quality and its correlation among various parameters support to culture of *Artemia nuplia* in lake water.

Keywords: Didwana lake, water pollution, physico-chemical parameters, Artemia, aquatic ecosystems

Introduction

Water is an essential need of life and lakes are one of the best storages of water. The Didwana Lake is a type of natural salt water lake which is situated in the Didwana city of Nagaur district. This lake is known as the only significant water body and one of the major salt producing lake. It is enclosed by Aravalli Hills from three sides and the fourth side consists of plains that are densely inhabited now a days. Along the eastern part of the Thar Desert this was second largest playa which was 5.6 km long and 2.4 km wide, supporting salt production at commercial level. The Didwana Lake is a habitat to a variety of migratory birds and also provides sustainable living to species of aquatic ecosystem. In recent times, the lake has increased its water spread area due to deposition of silts on the lake bed, thus decreasing the bed depth of the lake. The lake was getting polluted day by day due to inflow of partly treated and untreated wastewater of city sewage. In past, many researchers have carried out similar studies on water quality of different lakes and water bodies of Rajasthan (Kavindra *et al.*, 2020; Kavita Sahni *et al.*, 2011; Chetna Pradhan *et al.*, 2016; Neera Srivastava *et al.*, 2009; Meenakshi Singh *et al.*, 2010)^[9, 10, 4, 16, 14] and other major cities of India like Bhopal (Dixit S. *et al.*, 2008)^[20], Hyderabad (Aruna Jyothi Kora *et al.*, 2017)^[5], Una–Bilaspur, Himachal Pradesh (Vandana Sharma *et al.*, 2015) and have reported that in almost all of the these cities, the lake were polluted. In Rajasthan, for the estimation of fish production potential of different water bodies, their physico-chemical and primary productivity have been studied by several researchers Durve (1976)^[7], Sharma *et al.* (1984)^[21], Sharma *et al.* (1994)^[19], Sharma and Kaushal (2004)^[23], Rajkumar (2005)^[17], Balai *et al.* (2014)^[3], Mishra *et al.*, (2017)^[13]. Similar study of assessment of water quality parameters of this saline lake was done in this study to generate overall estimation of its productivity richness in terms of production of euryhaline aquatic species.

Materials and Methods

Study area

The study will be conducted at Didwana lake. The lake is situated near Didwana town in Nagaur district of Rajasthan.

Sample Collection

During the study period, surface water samples were collected using plastic bucket. However,

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water samples were collected separately in bottles of 1 liter for the analysis of certain chemical parameters of water quality in the laboratory.

Water quality analysis

Water quality parameters such as water temperature, pH, dissolved oxygen, alkalinity hardness and nitrate of lake water.

Table 1: Average water quality parameters of lake Didwana

Parameters	T0(Control)	T1	T2	T3	T4	min	Max	SD	Avg
Temperature	26.02	26.23	26.19	26.18	26.18	26.02	26.23	0.08	26.16
pH	8.55	8.65	8.96	9.40	9.95	8.55	9.95	0.58	9.10
Total Hardness	1524.17	1900.00	2230.67	2305.42	2355.00	1524.17	2355.00	349.66	2063.05
DO	9.38	9.38	9.38	14.98	14.98	9.38	14.98	3.07	11.62
Alkalinity	114.38	136.50	193.25	198.13	205.25	114.38	205.25	41.20	169.50
Nitrate	135.25	140.50	142.88	157.63	162.13	135.25	162.13	11.59	147.68

Table 2: Correlation matrix among water quality parameters

Parameters	Temperature	pH	Total Hardness	DO	Alkalinity	Nitrate
Temperature	1.00	0.34	0.70	0.23	0.23	0.56
pH	0.34	1.00	0.83	0.90	0.85	0.97
Total Hardness	0.70	0.83	1.00	0.70	0.98	0.85
DO	0.23	0.90	0.70	1.00	0.71	0.96
Alkalinity	0.23	0.85	0.98	0.71	1.00	0.84
Nitrate	0.56	0.97	0.85	0.96	0.84	1.00

Result and Discussion

Physico-chemical parameters of lake Disdwana (Table 1) were found throughout the study period were suitable for salt making and other use as well as fisheries purpose. The average of water temperature at lake was 26.16 ± 0 . A positive correlation was found among other parameters. The mean value of pH was 9.10 ± 0.58 , found during the study period, which is moderately alkaline and supports fairly good aquatic productivity and mesotrophic status of lake. pH showed a positive correlation with total alkalinity, nitrate-nitrogen and other. Same pattern was observed by Sumitra *et al.* (2007)^[25] in Lake Pichola, Kavindra *et al.* (2019)^[8] in Jawai dam and Ranu (2001)^[18] in Bandi River of Pali, and as potential artemia producing site by using ground saline water by Mali *et al.* (2023)^[11].

The dissolved oxygen was relatively moderate. The average of dissolved oxygen found at Jawai dam was 11.62 ± 3.17 mg l⁻¹. Correlation between DO and other water quality parameters *viz*; temperature, alkalinity and hardness were found positive.

Conclusion

From the above discussion it is clear that on the basis of water quality parameters and observations on productivity, it is appropriate to place this water body somewhere between "low to medium productive water", with conclusive remark for its use as a potential saline aqua-cultural site in near future with a source of additional income along with salt production.

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