International Journal of
Life Sciences
International Peer Reviewed Open Access Refereed Journal

Int. J. of Life Sciences, 2019; 7 (4) 841-844
ISSN:2320-7817(p) | 2320-964X(o)

Research Article Open Access

Assessment of Alkaline water of Lonar Lake

Anil Khole

Department of Zoology, B. Raghunah College, Parbhani, (M.S.), India
Email: kholeanilm@gmail.com

Manuscript details:

Received: 21.11.2019
Accepted: 25.12.2019
Published: 30.12.2019

Cite this article as
Anil Khole (2019) Assessment of Alkaline water of Lonar Lake, *Int. J. of. Life Sciences*, Volume 7(4): 841-844.

Copyright: © Author, This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

Available online on
http://www.ijlsci.in
ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

ABSTRACT

Lake is define as, any relatively large of slowly moving or standing water body that occupies an inland basin of appriciable size. There are four types of lakes like *temporary, permanent, freshwater, saltwater, salinewater* and *crater lakes* found on Earth. Lakes are of great value to human beings helps to regulate the flow of a water. Lakes is known for its diverse natural resources and lakes are one of the major sources beauty in India. There are many lakes in almost every state of India. Lonar lake is a lake of lagoon was created due to a meteorite and having basalt rock. Its water is alkaline. The formation of the lake is believed to have been 52000 ± 6000 years ago (Govt. of Maharashtra, India). Studies has shown that physically large lakes exhibit several similarities to seas and oceans in their thermal structure and circulation dynamics. From the chemical point of view, lakes are important accumulation. The present study was conducted on the physico-chemical parameters of Lonar lake water during 2018. The samples from three locations from the lake were collected and analyzed in relation with their physico-chemical characteristics in the laboratory. The results show fluctuations in the parameters according to anthropogenic activities, pollution problems and climatic conditions.

Keywords: *Wetland, Alkaline, Pollution, Biodiversity, Conservation*

INTRODUCTION

Lonar Lake is also known as Lonar crater, located in Buldhana District of Maharashtra State, India. The lake was created by a meteorite collision impact during the Pleistocene Epoch. Historically, the research of Lonar lake began in 1823 and was discovered by C.G. Alexander (Jhingran & Rao, 1954). Around 50 years back a massive meteorite struck the earth's surface having a range of 60 m long weighted around 20 lakh tons with with a velocity of 25 km/sec (Tambekar *et al.,* 2010). It is hydrologically active and the third largest natural salt water lake in the world (Wanjari & Dabhade, 2015). It is the only lake of its own kind in Asia. The lake is said to be mysterious due to its unsolved and unique limnology and ecological biodiversity. From past decades the lake has been mysterious

due to its unsolved and unique limnology and ecological biodiversity. Due to its uniqueness in terms of its salinity, alkalinity and biodiversity (Mahto & Kushwaha, 2018). Studies have shown that the alkaline environments are caused by a combination of geological, geographical and climatic conditions.

MATERIAL AND METHODS

All the major activities and their impacts on the different physico-chemical and biological values were recognized in the Lonar lake thorough personal survey. The study was carried out during the period 2018. The water samples were collected from three sample stations. The collected water samples were brought to the laboratory and physico-chemical parameters such as *temperature, pH, total alkalinity, salinity, dissolved oxygen, TDS* were determined by the methods suggested by APHA (1971) and IAAB (1998). The findings of previous research and views of all the concerned above have been taken into consideration for making the assessment.

Site description

LonarLake is located in Buldhana district which is one of the famous historical place in Maharashtra, India (19º58′N, 76º31′E). It is said that nearly before 50,000 years, there was formation of impact crater due to collision of meteor. There is vast chemical and biological diversity in it created due to meteor impact.

It is very essential to study this place so it may open secrets of universe Lonar crater lake (19°58′30″N 76°30′27″E) is a saline, soda lake, located at Lonar in Buldhana district, Maharashtra, India. It is one of the hyper-velocity, impact crater in basaltic rock anywhere on Earth.

Geographical features:

Lonar crater lake has a series of small hills surrounding the basin, oval shape, almost round, with circumference at top of about 8 km (5 miles). It is a saline lake created due to meteoritic impact. The sides of the basin rise abruptly at an angle of about 75°. At the base the side lake has a circumference of about 4.8 km (3 miles). The depth is 150 m (490 ft).

RESULTS AND DISCUSSIONS:

The Lonar lake ecosystem is important and a large number of activities take place in it. In the past three decades many researchers have analyzed hydro-chemical parameters of the lake water. The findings of this research work reveal the secret of this meteor which is inside the lake water. Researchers find that the Lonar lake water is very saline in nature and contains many salts in it and there is no existence of life inside it. Limnological studies on Lonar lake were studied for the period of one year (2018). The six important recorded physico-chemical parameters are mentioned in table 1.

Temperature

Temperature is an important physical quantity that expresses the sense of hot and cold or measures the average kinetic energy of the atoms in the system. During analysis temperature was recorded in the range of 21° - 31°C, highest temperature was recorded during the month of May. Minimum temperature was recorded during November to December months. Similar findings were recorded by Singh & Meenakshi (2018) and other researchers.

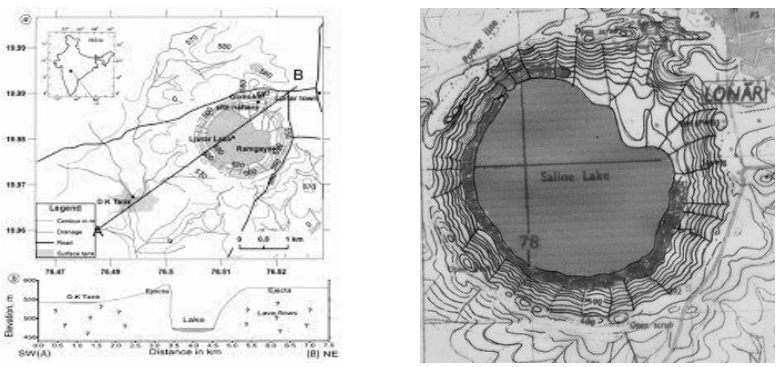

Figure 1: Lonar creater

Table 1. Preliminary phytochemical analysis of roots fraction of *Achyranthus aspera*

Sr. No.	Phytochemical Test	Roots fraction of *Achyranthus aspera*		
		Ethanol Fraction	Ethyl acetate fraction	Pet. Ether fraction
1	Alkaloids	+ +	+ +	+ +
2	Tannins	+ +	+ +	--
3	Saponins	+ +	+ +	--
4	*Glycosides*	*+ +*	*+ +*	--

Alkaline lake is a lake that is relatively high in dissolved salts and generally has a pH level between 9 and 12. In the present study pH ranged from 7.8 to 11.2 and kept fluctuating irrespective of the seasons. The pH variation must be exerting heavy stress on the inhabitant organism in the water body (Clayton, 1993). But the high pH values point to salinity that does not support the growth of another organism.

Salinity

The term salinity refers to the number of dissolved salts that are present in water. Salts such as sodium and chloride are the predominant ions in alkaline water, and the concentrations of magnesium, calcium and sulfate are also substantial. The salinity of the present study was recorded in the range of 8400 to 10800 mg/lit. It is possible that rocks like halite, black salt and sea salt are the main sources of sodium and chloride content which increases salinity of water (Jadhav & Mali, 2018).

Dissoloved Oxygen (DO)

The amount of oxygen that is present in dissolve condition in water, which plays an important role in aquatic environments. Percentage of dissolved oxygen fluctuate diurnal and seasonal. Dissolved oxygen is not affected by pH because there is no physical-chemical connection between the two. The present work shows dissolved oxygen in the range of 0.06 – 1.6 mg/lit. However, dissolved oxygen on an average is hypoxic due to pollution problems at some sample stations. Maximum concentration of DO was observed during the month September and October, while minimum during April and May. Life in saline conditions is difficult from a biological point of view. The low dissolved oxygen value indicates low aquatic life existence.

Total Dissolved Solids (TDS)

TDS represents the total concentration of dissolved substances in water. TDS is made up of inorganic salts, as well as a small amount of organic matter. The common inorganic salts include calcium, magnesium, potassium and sodium creates hardness. As compared to other natural water resources lake water shows more concentration of total dissolved solid either mix-up due to pollution or during post-monsoon season. The present study shows a high range of TDS in the lake water. It was ranging 12442 – 15400 mg/lit and showed fluctuation during pre- and post-monsoon. The TDS for any drinking water is 300 mg/lit recommended by WHO.

Ecological importance of Lonar lake

A Ramsar site is a wetland site designated to be of International Importance under the Ramsar Convention, also known as "The Convention of Wetlands'', an intergovernmental environmental treaty established in 1971 by UNESCO, which came into force in 1975. Wetlands are selected for Ramsar sites on account of their international importance, established on the basis of their basis of ecological, botanical, zoological, limnological, or hydrological criteria (Dabhade et al., 2006). India's tally of 49 designated wetlands spread over 10936 sq km in eight states and two union territories is the largest network of Ramsar sites in South Asia. Lakes regulate the flow of river water, storage of water during the dry seasons, to maintain the ecosystem. Mahabale (1987) has reported different phytoplankton species from the lake. The ecological importance of the Lonar lake includes flora, fauna and economies and other abiotic factors responsible for their emergence.

Wetland Conservation

Globally, wetlands play a critical role in maintaining many natural cycles and supporting a wide range of biodiversity. Wetlands serve as a natural sponge against flooding and drought, protect our coastlines and help to fight against changes. Due to anthropo-genic activities and urbanization, they have been declining at an alarming rate (Adesh & Amita, 2014). Wetlands are one of the most valuable resources of the global ecosystem, they support a high level of

biological diversity and also serve an uncountable service to the environment (Malabika et al., 2015). Wet lands in India support around 2400 species and subspecies of birds. But losses in habitat have threatened the diversity of these ecosystems (Michell & Gopal, 1990). In India, the national wetland committee of the Ministry of Environment and Forests, Govt. of India has recommended a number conservative steps, which are for long term conservation of wetlands.

Table. 2 The list of largest lakes in India

Sr. No.	Largest lakes in India	State
1.	Vembanad Lake	Kerala
2.	Chilika Lake	Odisha
3.	Shivaji Sagar Lake	Maharashtra
4.	Indira Sagar lake	Madhya Pradesh
5.	Pangong Lake	Ladakh
6.	Pulicat Lake	Andhra Pradesh
7.	Sardar Sarovar Lake	Gujarat
8.	Nagarjuna Sagar Lake	Telangana
9.	Loktak Lake	Manipur
10.	Wular lake	Jammu and Kashmir

CONCLUSION

Lonar Crater Lake is a wetland which was naturally formed and provides adequate ecological, faunal and floral, geo-morphological values. Physically large lakes exhibit several similarities to sea and oceans in their structure and circulation systems. This hydrological assessment reveals deteriorating changes in the physico-chemical parameters. The factors like pollution, climate and geological factors have their role in certain changes in the lake water. Large lakes offer a wide range of ecosystem services to floral and faunal species. The lake was observed to be highly alkaline in nature with nutrient enrichment and marginal pollution. The physico-chemical parameters were responsible for the formation of blue-green algal blooms on the surface of water. Common organic salts show a high range due to the high TDS level. The lake is a unique example of salinity and alkalinity in the world and as compared to previous studies the level of salts were decreasing from the water day by day. Now, it's a challenging task and requires management to conserve this unique natural lake. If possible consistent use of satellite based remote sensors for effective management and monitoring.

Acknowledgment:

I am thankful to the Principal, Shri Shivaji College, Parbhani and Principal, B. Raghunath College, Parbhani and research guide Prof. J.M. Gaikwad for encouraging and providing me laboratory facilities to carry out this research work.

Conflict of interest

The author declares that there is no conflict of interest.

REFERENCES

Adesh Kumar and Amita Kanaujia (2014) Wetlands: Significance, Threats and their Consevation, Quarterly Newsletter, Green, Directorate of Environ., U.P., India., 7(3&4).

APHA (1971) Standard Methods for Examination of water and waste water 14th Edition, Washington.

Dabhade DS, Malu RA, Patil PS and Wanjari HV (2006) Lonar crater lake: A wetland of prospective Ramsar site, J.Aqua.Biol., 21(3):14-19.

IAAB (1998) Methodology for water analysis, Indian Association of Aquatic Biologists, Hyderabad.

Jadhav R.D and Mali H.B. (2018). A search for the source of high content of sodium chloride (NaCl) at Crater Lake Lonar, Maharashtra, India. Int. Journal of Advance Research, Ideas & Innovations in Technology, 4(5):250-61.

Jhingran AG and Rao KV (1954) Lonar lake and its salinity. Geological survey of India, 85:313-334.

Mahto SS and Kushwaha AP (2018). An assessment of inter-seasonal surface water level fluctuaation Lonar crater, Maharahtra, India Using multi temporal satelight dataset, American Jour. of Remote Sensing, 6(1):6-14.

Malabika B.Roy, Debanjana Chatterjee, Pankaj K Roy, and Asis Mazumdar (2015) Wetlands conservation, management and community education: a review of published pape of 1995-2014, Eco. Env. & Cons., 21(4):1769-1777.

Mitchell S, and Gopal B (1990) Invasion of tropical freshwater by alien species, P.S. Ramakrishnan [ed.] Ecology of Biological Invasion in the Tropics.

Prasad SN, Ramachandra TV, Ahalya N, Sengupta T, Alok Kumar and Tiwari AK (2002) Conservation of Wetlands of India, Tropical Ecology, 43(1):173-186.

Singh MR and Meenakshi Singh (2018) Comparative limnological and physico-chemical studies of Lonar crater lake, India, Journal of Bio. Sciences, 7(8):5562-5572.

Shinde VA and More SM (2013) Study of physico-chemical characterization of Lonar lake effecting biodiversity Lonar lake, Maharashtra, India, Int. Res. Environ. Sci., 2(12):25-28.

Tambekar DH, Pawar AL, Dudhane MN (2010) Lonar lake water, past & present, Nat. Environ. Poll. Technol., 9(2):217-221.

Wanjari HV, Dabhade DS (2015) Lonar crater lake of India: An Abundant Source of Highly Economic Important Spirulina, 2:274-279.

© 2013 -2019 | Published by IJLSCI