

## Physicochemical assessment of Lonar Lake water

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### Abstract

Present paper deals with the physicochemical assessment of Lonar Lake Waetr. Lonar lake is situated about a kilometer to south west of Lonar town (North Latitude 19° 55' 45", East Longitude 76° 34' 00") in Buldhana district of Maharashtra. Physicochemical parameters were studied and analyzed for the period of two consecutive years i.e. from October 2017 to September 2019. In order to study the water quality of Lonar Lake, certain physicochemical parameters were selected. These parameters are colour, water temperature, pH, carbonate, bicarbonate, calcium, magnesium, potassium nitrate, phosphate, dissolved oxygen, free Co<sub>2</sub>, ammonia, turbidity, total solid, total dissolved solid, suspended solids, total hardness and total alkalinity were selected to assess water quality of Lonar lake. The Lonar Lake is always alkaline. The lake water is green in colour due to dominance of algal blooms in lake water.

**Keywords:** physicochemical parameters, water quality, Lonar Lake, alkalinity

### Introduction

Lonar Lake is a natural water body. Lonar lake is situated (19° 55' 45" NL and 76° 34' 00" EL) in Buldhana district of Maharashtra state of India. The lake is believed to be originated due to meteoritic impact (Beals *et.al.* 1960, Nayak 1972 and Hagerty and Newson 2001) [3, 16, 8]. Alkaline and saline water is the unique feature of this lake. The Lonar lake water appears to be saline due to high concentration of dissolved solids and total suspended solids. Many studies have been undertaken on Lonar Lake pertaining to geological and geomorphological features. Many microecosystems are found in this lake (Dabhade *et.al.* 1998, Mahajan 2005, Kanekar *et.al.* 2007) [7, 10]. Jadhav *et.al.* (2007) [9] recorded abundance of blue green algae in water of Lonar Lake. Present study deals with the detailed physicochemical assessment of Lonar lake water for two consecutive years from October 2017 to September 2019. In order to study water quality of Lonar Lake, certain physicochemical parameters were selected. These parameters are colour, water temperature, pH, carbonate, bicarbonate, calcium, magnesium, potassium, nitrate, phosphate, dissolved oxygen, free Co<sub>2</sub>, ammonia, turbidity, total solid, total dissolved solid, suspended solids, total hardness and total alkalinity. These selected physicochemical parameters were analyzed in detail. The lake water was found green throughout the study period, it is due to growth of blue green algae.

### Materials and Methods

Water samples from Lonar Lake were collected at seasonal intervals for the period of two consecutive years from October 2017 to September 2019. Collection of water was done during morning hours 10.00 am to 11.00 am. The water samples were collected in acid washed plastic cans of 5 litre capacity. Water temperature was recorded by using centigrade mercury thermometer at the time of sampling and rest of the parameters were analyzed in the laboratory with the help of standard methods for water analysis (APHA 1998 and Trivedy and Goel 1986).



**Fig 1:** View of Lonar Lake

## Results and Discussion

Due to vigorous growth of algae colour of lake water is greenish. Dabhade (2006 & 2013), Pawar (2010) <sup>[17]</sup> and Borul (2010) <sup>[4]</sup> also observed greenish colour of water. The temperature ranged from 26.30°C to 28.20 °C. The temperature plays a vital role in the chemical and biological activities of water body. The lake has its localized temperature system and has retained high level of humidity. Water temperature values are positively correlated with pH, TS, TDS, TSS and total alkalinity. Similar kind of observation were made by Dabhade *et.al.* (2006), Pawar (2010), Sagarika *et.al.* (2010) and Khan *et. al.* (2012).

The pH of Lonar lake water Lake ranges from 10.03 to 11.8, showing alkaline nature of water. The pH of Lonar lake water is always alkaline. The pH was higher in summer and lower in monsoon. Similar results were also reported by Dabhade *et. al.* (2006) and Borul (2012) <sup>[4]</sup>. The decrease in pH during rainy season may be due to dilution of alkaline substances in rainy season. Manivasakam (1985) recorded the pH of the water was found to be mostly alkaline due to presence of salt in water by mixing inlet of water to the lake. Carbonates, bicarbonates, calcium, potassium, nitrate, total solids and total dissolved solids are found maximum in summer months. Seasonal fluctuation in pH value was also reported by Siddiqui and Rao (1995), Tandale and Dabhade (2014).

The Dissolved oxygen ranges from 2.19 to 3.18 mg/l. The depletion of dissolved oxygen values found during winter season are due to the maximum growth of planktonic community of a lake. Further depletion of dissolved oxygen to the level of anaerobic is the most critical manifestation of pollution. Water bodies poor in dissolved oxygen are due to less solubility of oxygen in salt saturated water which depends on water temperature, water movement and salinity (Mahanpatra *et.al* (2001), Lester, (1975), suggested importance of dissolved oxygen as an indicator for organic pollution. Abundance of algal blooms is the adequate example to explain the presence of planktonic community in Lonar Lake. Low dissolved oxygen in water is the indication of the presence of organic matter which results in higher Biological oxygen demand (Pawar 2010) <sup>[17]</sup>.

Magnesium, calcium and potassium are responsible for water hardness. If amount of alkali ions are more, the water is hard whereas in soft water alkali ions are found in low concentration. In present study hardness of Lonar water ranges from 326 mg/L to 472 mg/L. Hardness of water is found maximum in summer season. Magnesium was in the range of 25.758 mg/L to 51.03 mg/L and calcium between 105.51 mg/L to 141.6 mg/L. Amount of nitrate and phosphate are found maximum in Lonar Lake. Nitrate was recorded in maximum in summer season 8.438mg/L and minimum in winter season 2.644 mg/L and Phosphate was recorded in the range of 2.70 mg/L to 2.79 mg/L(Table 1). Nitrate and phosphate are the critical nutrients for the growth of algae and other phytoplanktons, helps in accelerating the eutrophication. Amount of ammonia is also found more in summer season. Range of ammonia 0.75 mg/L to 4.07mg/L was recorded. Free CO<sub>2</sub> is absent in lonar lake water during all seasons. The range of total dissolved solid was recorded 8776 mg/L to 9766 mg/L and Suspended solids in the range of 76.5 mg/L to 80 mg/L was recorded. Alkalinity values ranged between 3750 mg/L to 4250 mg/L. The alkalinity and salt content is high and it is a characteristics feature of Lonar Lake. The pH decreases during rainy season may be due to dilution of alkaline substances, and resulting in increase in turbidity of the water due to decrease photosynthetic activity of algae (Borul, 2012) <sup>[4]</sup>.

**Table 1:** Average physicochemical parameters of Lonar Lake during October 2017 to September 2019

Physico-chemical Parameters	Winter	Summer	Monsoon
Colour	Greenish	Greenish	Greenish
Water temperature	26.30	28.20	27.61
pH	10.05	11.8	10.03
Carbonates (mg/L)	319.2	417.6	388.6
Bicarbonates (mg/L)	2268	3878.35	1953.2
Calcium (mg/L)	114.4	141.6	105.51
Magnesium (mg/L)	51.03	35.963	25.758
Potassium	17.0	17.1	17.1
Nitrates (mg/L)	2.644	8.438	5.4625
Phosphate	2.70	2.71	2.79
Dissolved Oxygen	2.19	3.18	3.1
Free CO <sub>2</sub>	AB	AB	AB
Ammonia (mg/L)	0.777	1.559	0.825
Turbidity (As NTU)	69	61.5	52
Total solids	8855	9846	8955
Total Dissolve Solid (mg/L)	8776	9766	8878.5
Suspended solids (mg/L)	79	80	76.5
Total hardness (mg/L)	326	472	466
Total alkalinity (mg/L)	4250	3875	3750

## Conclusion

Physicochemical assessment of Lonar lake water reveals that, colour of water was found greenish throughout the year. The pH is always alkaline. Carbonates, bicarbonates, calcium, potassium, nitrate, total solids and total dissolved solids are found maximum during summer season. Hardness of water is caused by metallic ions

dissolved in water which includes calcium, magnesium and potassium ions. The lake water is very poor in oxygen during all seasons. Low dissolved oxygen of the lake is the indication of the presence of organic matter. Amount of nitrate and phosphate are found maximum in Lonar Lake. Nitrate and phosphate are the critical nutrients for the growth of algae and helps in accelerating the eutrophication. Present study will enrich the knowledge of water quality assessment of alkaline and saline water bodies.

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