



Quality Assessment of Water of the Lonar Crater in Rainy Season

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Abstract

Lonar crater is the natural water body and unique ecosystem with its own feature in Buldhana district of Maharashtra state in India. It is the crater formed by hyper velocity two million-ton meteorite the impacted on the earth. It was formed by hyper velocity meteorite impact and situated in the basaltic terrine. Lonar crater is the third largest natural saline-water lake in the world. The crater possesses the smallest forest sanctuary with great biological diversity. The crater is 150 meter in depth and is absolutely confined from all sides by the walls of the crater. There is not a single channel of water draining away from it, there by leaving the crater waters stagnant from thousands of years. Now a day's many human activities create the pollution in and around the water body, due to which natural status of this crater may come in the danger zone of water pollution. In this connection the study were carried out in which water of Lonar crater were collected and analyzed for their physico-chemical characteristics in rainy season to report the status of water quality of Lonar crater.

Keywords: Lonar crater, Crater Water, Physiochemical analysis.

1. Introduction

The Lonar Lake is originated as a meteorite impact crater around 50-60 thousand years ago having surface area 1.8 km and average depth 150 meters. It is the only crater take created in Basaltic rocks by the hyper-velocity impact. Lonar Lake is the third largest crater in the world and situated to southwest of Lonar village Buldhana district of Maharashtra state in India. It is situated about a kilometer to south west of Lonar town (North Latitude 19°55'; East longitude 75°34') in Buldhana district of Maharashtra state [1]. Lonar crater has the attention of world geologists and researcher for investigation of its origin and the source of salinity of crater water. Unique feature of this crater is its high salinity and alkalinity and its specialized biodiversity. The crater water is highly alkaline due to the high concentration of sodium carbonates exploited. Lonar crater is the third natural salt water lake in world, it comes after Bosmatvi Lake in China with diameter of 10,000 m and New Cubec

in Canada with a diameter of 3500 m. The crater was first brought to be notice in 1823 by British officer CJE Alexander in 1896, and American Geologist G.K. Gilbert conducted studies to prove that the Lonar crater was created due to meteor strikes. Water is the most vital abiotic component of the lake ecosystem and while studying the biodiversity of any lake ecosystem. The outer region of lake has water with pH value 7 while inner region has highly alkaline water with pH value around 11 [2-4]. In July 2020 Lonar crater turned pink suddenly. Investigation of the scientists revealed that the pink colour was due to the appearance of salt loving Haloarchaea microbes in large scale. The Knowledge of the physicochemical quality of crater water becomes important. The physicochemical character of water in rainy season prevailing in this crater has not been studied in detail. Lonar crater is a closed one without any outlet and unique due to its salinity,



alkalinity and biodiversity. Due to the uniqueness, the crater has evoked much scientific value among researchers and continues to site of attraction for much scientific view. Therefore, it was thought to undertake studies on physicochemical quality of water of Lonar crater in rainy season [5].

2. Experimental Section

Water sample was collected from sampling site of Lonar crater (Fig. 1) in 1L bottles and carried to the laboratory in rainy season. Sampling was done in the evening in August month of year 2022. The parameter selected for analysis were water temperature, pH, Colour, Odour, Electrical Conductivity, total dissolved solids, total Hardness, Calcium, Manganese, Chloride, Carbonate, Bicarbonate, Sulphate, Phosphate, Zinc, Ferrous, SAR (Sodium Adsorption Ratio) and RSC (Residual Sodium Carbonate). The pH and temperature recorded on the spot by using pH paper and thermometer and rest of the parameters were analyzed in the laboratory by standard methods. AAS method is follow for elemental analysis in water sample, AAS is an analytical technique used to determine how much of certain elements are in a sample. This method is based on the principle that atoms (and ions) can absorb light at a specific, unique wavelength. When this specific wavelength of light is provided, the energy (light) is absorbed by the atom [6-8].

3. Results and Discussion

In this study water sample was analyzed for the in physicochemical quality of Lonar Lake water. The number of physicochemical parameters in those physical parameters like pH, temperature, Electrical Conductivity, colour, odour, total dissolved solids (TDS), as in Table 1. And the chemical parameter like total Hardness, Calcium, Manganese, Chloride, Carbonate, Bicarbonate, Sulphate, Phosphate, Zinc, Ferrous, SAR (Sodium Adsorption Ratio) and RSC (Residual Sodium Carbonate), as in Table 2 were performed. In the present study the data revealed that there were considerable variations in the quality with respect to their physicochemical characteristics in rainy season. From the present study it is also observed that, the colour of the crater water is also

dark green because of the dense algal population with predominating spirullina. The odour of crater water is somewhat an offensive. The pH of Lonar crater water was found 10.2 it is higher from limit range and temperature 22⁰C. The total dissolved solid of Lonar crater water is higher as 3090 mg/L, the normal range of TDS as 500-2000. The normal value range of Electrical conductivity in between 0.1 to 1.0 dSm⁻¹ and actually it was found to be 3.28 dSm⁻¹ and it is very high value [9, 10]. The normal range of Calcium is 75-200 mg/L, in Lonar crater water it is found to be 16.3 mg/L. Magnesium normal range between 30-100 mg/L and it is found 37.98 mg/L. The normal range of Sodium in between 4.5 to 60 mg/L and it was found to be 3598.52 mg/L that is very high value. The normal range of Potassium in between 2 to 5 mg/L and it was found to be 6.51 mg/L that is high value. Normal range of Chloride in between 250-1000 mg/L but in sample water it is found to be 1391.6 mg/L and it is high value. The normal range of sulphate is < 200 mg/L and sample water was recorded as 191.29 mg/L. The normal range of Copper in between < 0.2 and it was found to be 0.01 mg/L that is normal value. The normal range of Zinc in between < 2 and it was found to be 0 mg/L that is normal value. The normal range of Ferrous in between < 5 and it was found to be 0.06 mg/L that is normal value. Manganese normal value < 0.2 mg/L and it is found to be 0.01 mg/L. The total hardness is very low which is 128 mg/L value and the normal range is 300-600 mg/L. The normal range limit of SAR (Sodium Adsorption Ratio) is < 10 meq/L and the actual value found 111.1meq/L, it is very high value. The normal range limit of RSC (Residual Sodium Carbonate) is < 1.25 meq/L but sample value recorded 26.83 meq/L [11-13].

The Lonar crater is always alkaline and maximum pH 10.5, A. L. Pawar noted that maximum pH 10.5 in the pre-monsoon, minimum 10.2 in post-monsoon and 10.3 in monsoon. The decrease pH during rainy season may be due to dilution of alkaline substances in rainy season, and resulting in increase in turbidity of the water due to decrease photosynthetic activity of algae [14].

Table 1 Physical Parameters of Water Samples from Selected Sites of Lonar Crater

Parameters	Limits	Results	Remark
Colour	Colourless	Dark green	--
Odour	Odour less	Strong Murky	--
Temp in °C	--	22°C	--
pH	6-7.5	10.2	High
Electrical Conductivity	0.1-1.0	3.28	High
TDS (Total Dissolved Solid)	500-2000	3090	High

Table 2 Chemical Parameters of Water Samples from Selected Sites of Lonar Crater

Parameters	Limits	Results	Remark
Calcium	75-200	16.3	Low
Magnesium	30-100	37.98	Normal
Sodium	4.5-60	3598.52	High
Potassium	2.00-5.00	6.51	High
Carbonate	3.00-45.00	408	High
Bicarbonate	10.00-610.0	1049.2	High
Chlorides	250-1000	1391.6	High
Sulphate	<200	191.29	Normal
Copper	<0.2	0.01	Normal
Zinc	< 2.0	0	Normal
Ferrous	< 5.0	0.06	Normal
Manganese	< 0.2	0.01	Normal
SAR (Sodium Adsorption Ratio)	< 10.0	111.1	High
RSC (Residual Sodium Carbonate)	< 1.25	26.83	High
Hardness	300-600	128	Low

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