



Research Article

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Study of water quality of Lonar lake

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ABSTRACT

Lonar Lake is a natural water body situated in Buldana district of Maharashtra state. It is an inland saline crater of only one of its kind in Asia. It is formed by hyper velocity meteorite impact and is situated in the basaltic terrine. Lonar Lake is the third largest natural salt-water lake in the world. The crater is 150 meter in depth and is absolutely confined from all sides by the walls of the crater and there is not a single channel of water draining away from it, there by leaving the lake waters stagnant from thousands of years. Now a day's many human activities creates the pollution in and around the water body, due to which natural status of this lake may come in the danger zone of water pollution. In this connection the study were carried out in which water samples from different locations of lonar lake were collected and analyzed for their physico-chemical characteristics to report the status of water quality of lonar lake.

Keywords: Lonar Lake, Physico-chemical Analysis.

INTRODUCTION

The Lonar crater has the attention of world geologists for investigation of its origin and the source of salinity of lake water. It is Asia's only magnificent crater formed by haper velocity meteorite impact. Unique feature of this lake is its high salinity and alkalinity and its specialized biodiversity. 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. It is an almost circular depression with its longest and shortest diameters being 1875m and 1787m, respectively, with a raised rim about 30m and a depth of 135m. Lonar crater is the third natural salt water lake in world, it comes after Bosmatvi Lake in China with diameter of 10,000m and New Cubec in Canada with a diameter of 3500 m^{2,3}. The lake 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 was created due to meteor strikes [4]. Water is directly related to human beings. Visitors and pilgrims use the water of 'Dhar' (a natural fresh water flow in lake) and 'Sitanahani' for bathing and washing besides drinking and discharge of sewage from hotels, stales released directly into the lake water, which deteriorate the quality of water. Another source of pollution is wastes thrown by visitors and pesticide residues from the crop fields after the rains⁵. A review of literature revealed that it salinity were 40.78, 31.52, 30.87 in 1910, 1958 and 1960 respectively. Based on geological studies, it is postulated that the lake was originated as a meteorites impact crater about 60 to 65 thousand years ago. The water is alkaline with pH of 10-10.5; this high alkalinity is due to the high concentration of sodium carbonates exploited

The pH values generally higher than 10 and occasionally reaching 12. These alkaline environments are caused by a combination of geological, geographical and climatic conditions. They are characterized by large amounts of sodium carbonate formed by evaporative concentration. In the course of formation of alkalinity, other salts particularly (NaCl) also concentrate, giving rise to an alkaline saline environment. The salinity of the lake is now lowered down to 7.9%⁶. The aim of the present study was to analyze in physico-chemical quality of Lonar lake water. Lonar Lake is a closed one without any outlet and unique due to its salinity, alkalinity and biodiversity. Due to the uniqueness, the lake has evoked much scientific values among researchers and continues to site of attraction for many. Water is

the most vital abiotic component of the lake ecosystem and while studying the biodiversity of any lake ecosystem, the Knowledge of the physicochemical quality of lake water becomes important. The physicochemical character of water prevailing in this lake has not been studied in detail. Therefore it was thought to undertake studies on physicochemical quality of water in Lonar Lake.

EXPERIMENTAL SECTION

Twenty water samples were collected from ten sampling site of Lonar crater (Fig. 1) in 1L bottles and carried to the laboratory. Sampling was done in the morning in 2011. The parameter selected for analysis were water temperature, pH, colour, odour, total dissolved solids, alkalinity, total hardness, calcium hardness, magnesium hardness, dissolved oxygen, BOD (biochemical oxygen demand), COD (Chemical oxygen demand), chloride, salinity, dissolved sulphate, and phosphate. 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 methods⁷.

RESULTS AND DISCUSSION

In this study total 20 water samples were analyzed for the in physicochemical quality of Lonar Lake water. The number of physicochemical parameters in those physical parameters like pH, temperature, colour, odour, total solid and total dissolved solids (TDS). And the chemical parameter like total alkalinity, total hardness, calcium hardness, magnesium hardness, dissolved oxygen, BOD (biochemical oxygen demand), COD (Chemical oxygen demand), chloride, salinity, dissolved sulphate, and phosphate were performed. In the present study the data revealed that there were considerable variations in the quality with respect to their physicochemical characteristics. It is also observed from the present study that, the colour of the lake water is also light green to dark green because of the dense algal population with predominating spirulina. The odour of lake water is somewhat an offensive. Muley and Babar⁸ and also A.L.PAwar⁹ noted the offensive odour of the lake water. The pH of Lonar Lake water varies from 9.20 to 10.5 and temperature 24⁰C to 27⁰C. The total dissolved solid is in the range of 14260 mg/L to 18460 mg/L and alkalinity in the range of 3500 mg/L to 4870 mg/L. The total hardness was in the range of 295 mg/L to 698 mg/L; calcium hardness 110 mg/L to 162 mg/L and magnesium hardness between 120 mg/L to 540 mg/L. The dissolved oxygen content was 0.06 mg/L to 1.6 mg/L, the low rate of primary production in aquatic ecosystem of lonar lake is also indicated that the low values of BOD & COD that ranged from 0.1 to 0.9 mg /L and 0.01to 0.06 mg /L respectively, the chloride 4320 mg/L to 5650 mg/L, salinity from 8460 mg/L to 10250 mg/L was recorded. The sulphate was recorded as 20 mg/L to 26.4 mg/L, and phosphate was 0.42 mg/L to 0.82 mg/L. The Lonar Lake is always alkaline and maximum pH 10.5, A.L.Pawar⁹ 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.



Fig:-General view of Lonar Lake and Sites of water sample collections for analysis.
Site 9 & 10 Sitanahani spring water & Dhara spring water respectively.

TABLE-I-Physical parameters of water samples from selected sites of Lonar Crater

Sample points Parameters	1	2	3	4	5	6	7	8	9	10
Colour (Visible)	Dark green	Dark green	Dark green	Dark green	Dark green	Dark green	Light green	Light green	Colour less	Colour Less
Odour	Strong murky	light murky	Strong murky	Strong murky	Strong murky	Strong murky	light murky	light murky	Odour less	Odour less
Temp. in °C	25	28	24	22	23	23	24	23	25	24
pH	10.2	10.0	10.5	10.8	10.4	10.8	10.4	10.2	7.4	7.6
TDS (Total Dissolved Solids)	16620	18450	14712	16620	13340	13210	15470	14480	460	530

TABLE-II-Chemical parameters of Water samples from selected sites of Lonar crater

Sample points Parameters	1	2	3	4	5	6	7	8	9	10
Total Alkalinity	4323	3860	4390	3424	4112	3920	4718	4610	370	340
Total Hardness	365	354	360	288	311	253	256	190	45	32
Calcium Hardness	242	252	198	164	168	146	158	142	24	20
Magnesium Hardness	123	102	162	124	143	117	98	48	21	12
Dissolved Oxygen	0.09	1.02	0.08	1.4	1.6	0.09	0.8	1.02	0.06	0.06
BOD	0.4	0.9	0.3	0.4	0.7	0.3	0.4	0.3	0.2	0.1
COD	0.04	0.02	0.02	0.03	0.04	0.06	0.02	0.03	0.01	0.01
Chloride	4320	4532	5640	5020	4984	5450	4860	4760	62	54
Salinity	9420	10240	8850	9845	9240	9648	8940	8460	128	110
Sulphate	174	198	146	194	174	180	145	132	18	12
Phosphate	0.46	0.62	0.82	0.44	0.46	0.54	0.62	0.42	0.12	0.08

All results are in mg/lit

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