Limnology of Metero Crater Lake, Lonar, Dist. Buldana Maharastra India: A Physio-chemical aspects

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Abstract
The present study has been undertaken to assess the physiochemical aspects of the high impacted Meteor Crater Lonar Lake. The physiochemical properties of the water of the lake -Temperature, pH, Color, Alkalinity, Transparency, Total solids, Total hardness, Electrical Conductivity, Dissolved oxygen, Nitrates, Phosphates, Sulphates, Chlorides has been assessed. Water of the Crater Lake is highly alkaline with pH 9-10.5 having ambient temperature 25-35 degree Celsius. A water of the lake is good conductor of electricity, it indicate water of the lake contains good quantity of dissolved ions. The major ions of the water is sulphur, chlorides and nitrites. The lake water contains high concentration of Sulphur and it gives foul smell to the water. The water of the lake is unfit for eukaryotic life.

Keywords: Physio-chemical properties, Total hardness, Electrical Conductivity, Lonar Lake

1. Introduction
Lonar town is situated longitudinal 19.59N and 76.34 E Latitude situated in Buldhana District of Maharashtra state in India. Lonar Lake is the world's third largest crater. Lonar lake is natural beautiful with spectacular design. It is rated as oldest and largest meteoric crater in the world. It has its genesis nearly 50,000 years ago, when two million tons meteorite impacted the earth to create a depression 1.83 kilometer in diameter and 150 meter deep. Its size is about 1800-200 meter in diameter width 1830 meter, depth 150 meter. The comprehensive Indian work made preliminary study on limnology by Das [1]. The only pioneering limnological study of Lonar Lake was done [2, 3]. The rapid growth of human population high demand of agriculture and horticulture products, unplanned urbanization over exploitation of lake water and tourism related antropogenic activities on the nearby lake sites are leading to the deterioration of lake water quality. The main identified problems are of domestic and sewage contamination and heavy growth of weeds due to enrichment of nutrients which has even resultant into problem of eutrophication. Phyto-remediation by floating rafts technology was implemented for conservation of these fresh water resources along beautification of lakes and tourist sites Still data regarding aquatic ecology is insufficient, hence present work have been undertaken to highlight some physiochemical properties of lake water.

2. Material & Methods
Superficial water samples were collected from 05 randomly selected limn logical significant sampling sites. The water sample were collected from the crater Lake at the depth of one feet using polythene container of two liter capacity for a period of one year (July2014-June2015) at monthly intervals. pH and temperature were measured at the site of sample collection. pH was measured on the spot using battery operated pH meter and temperature with the help of mercury filled Celsius Thermometer having the accuracy of 0.1C. The transparency was measured by using Sachi disc. The chemical analysis was carried out by standard methods.

3. Results

Parameter	Monsoon	Winter	Summer	Mean
Color of Water	Light Green	Dark Green	Dark Green	-
pH	8.2	8.9	9.3	8.8
Temperature	29	26	35	30
Electrical Conductivity	12300 umhos\cm	12700 umhos\cm	15300 umhos\cm	13433 umhos\cm
Dissolved Solids	65-160 mg\lit	68-189 mg\lit	78-250 mg\lit	70.33-199.66 mg\lit
Alkalinity	450-480 mg\lit	467-488 mg\lit	480-513 mg\lit	465.6-493.6 mg\lit
Total Hardness	120-147 mg\lit	127-137 mg\lit	132-153 mg\lit	126.3145.66 mg\lit
Chlorides	23.50-30.32 mg\lit	25.46-35.62 mg\lit	27.42-35.70 mg\lit	25.46-33.88 mg\lit
Sulphate	106-109 mg\lit	108-111 mg\lit	110-117 mg\lit	108-112.3 mg\lit
Nitrates	13.7-15.3 mg\lit	15.1-16.8 mg\lit	17.3-19.5 mg\lit	15.3-17.2 mg\lit
Dissolved Oxygen	13.2-16.1 mg\lit	12.3-14.4 mg\lit	11.1-12.7 mg\lit	12.2-14.4 mg\lit

4. Discussion
Colour: The apparent colour of Crater Lake water resembles dark green due to algal bloom witnessed in winter. During mansoon and summer the colour were fairly light. On filtration eliminates entities causing apparent colour.
PH: The pH measured invariably ranged between 8-10.5 during different seasons. It proved important barrier for natural growth of fauna. The extreme alkali lake is naturally capable of playing host only to biologically limited yet interesting plethora of extremophilic aquatic life.
Temperature: The ambient temperature and subsurface water temperature showed marked seasonal pattern. It ranges from 25 ^{0}C in winter to 35 ^{0}C in summer. Temperature is an

important in controlling both quality and quantity of planktons.

Transparency: Transparency of the crater water comes nil or zero due to abundance algal bloom. It adversely affect penetration of Sun light.

Electrical conductivity: The observed electrical conductivity varied widely from 12400-14200 umhos\cm during the winter and 15300 umhos\cm during summer. It indicate high amount of dissolved ions in the Crater Lake. Conductivity is a measure of total amount of ions in the body of water. Therefore it is useful indicator of chemical richness.

Dissolved solids: Total suspended solids in Crater Lake water varied from 65-250 mg\lit.

Alkalinity: It is an environmentally critical parameter in maintenance of buffering capacity of aquatic life. It is also known as carbonate alkalinity .The range of alkalinity of the Crater Lake were ranges 450-513 mg\L. The high alkalinity of the Crater Lake might be due to chemical interaction in volcanic rocks. It greatly affect faunal life of the lake. It has complex inter-relationship which is responsible for poor species diversity.

Total hardness: The hardness predominantly caused by divalent cations such as calcium, magnesium, alkaline earth metals such as iron, manganese, etc. The reported total hardness value of the Crater water lake were ranges 120-155mg\lit. Calcium hardness is an important micro-nutrient in aquatic environment and specially needed in large quantities by molluscs and vertebrates. Total hardness can be used as an indicator for classifying domestic pollution [4].

Chlorides: In present study noted chloride value of crater water is ranges from23.50-35.70mg\lit. The chloride contents in Khumanpat lake Manipur were reported as 43.8 to 96.3 mg\lit [5]. High concentration of chloride indicate pollution by sewage. High chloride content have tremendous effect on plant life.It also significantly influences general osmotic salinity balance and ion exchange

Sulphate: Lonar Lake is a Sulphate rich crater .The value ranges 5.2-30mg\litre in most of lakes all over the World. In Lonar lake sulphate ions ranges between 106-117mg\ lit. The sulpher bacteria react with sulpher converting it into hydrogen sulphides. If offers foul smell to water. The limnological importance of sulphur cycle is significant not merely as nutrients for complex biotic communities but also influencing cycling of other nutrients, ecosystem production, distribution and abundance of biota [6]. Extreme aquatic environment like sulpher rich Lonar crater lake offer unique opportunity for understanding the importance of sulpher cycle and its influence in trophic relationship in crater lake due to its rich, unexplored microfloral diversity of extremophiles (bacteria- phytoplankton and their ecological role through bacterial metabolism).

Nitrates: in Lonar Crater Lake the estimated nitate value ranged between 13.7-19.5 mg\lit. From the study the level of nitrates in the water samples were within the recommended (50mg\lit) threshold limit. Swamy and coworkers have reported 40.0 mg\lit nitrates in Victoria lake [7]. A high value of nitrates in water is an indicator of water pollution with nutrient loads from human activities such as farming, industrial and domestic effluent. The common form of nitrogen of importance in aquatic environment dissolved and particulate nitrogen and product of organic decomposition is nitrate and nitrite.

Dissolved Oxygen: The range of dissolved oxygen in the Crater Lake were11.2 to16.1mg\L. Dissolved oxygen necessary for the growth of phytoplanktons. Large quantity of dissolved oxygen causes algal bloom.

5. References

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