



## Lonar Crater: A Case Study

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### Abstract

Lonar Crater Lake is located in Buldana district, Maharashtra state India. Geographical appearance of Crater Lake is 19°58'N and 76°31'E. Lake is oval; bowl or circular gloominess shape, and it have no any outlet. Geomorphometric status of Crater Lake is included in to five major zones these are, Ejecta-blanket, Rim, Escarpment or Slope, Alluvium and Lake Basin proper. The crater have much more diverse vegetation and it support microbial flora and fauna.

**Keywords:** Lonar; Crater; Plankton; Diversity; Microinvertebrates; Conservation

### Introduction

Three permanent fresh water springs and a large number of seasonal streams feed the lake with no outlet. The reason the lonar ecology developed in its particular manner was [1,3,4].

- Its confined nature
- A higher basin humidity level
- A higher basin ground water level
- Abundance of enduring springs
- Salinized alluvium fan
- The vicinity of the crater's dry deciduous vegetation
- Shrubs and bushes growing on the escarpment
- Lush greenery and semi-evergreen elements along the shower line
- Plants in the alluvium that can withstand salt
- Salt-tolerant microbial flora and animals are supported by the lake.

### Material and Method

Lonar Crater (19 58'N and 76 31'E) was used in the research. A distinctive meteoritic crater in basaltic rock is called Lake. It is surrounded on all sides by escarpments that rise sharply. It is located in a nearly circular depression. Since the lake basin is enclosed on all sides, it lacks an outlet. Lonar Lake has a localised temperature system since it is a subterranean hollow that is sealed off from all sides. The lake basin is partially shaded from direct sunlight at various locations and periods throughout the day [2].

### Result and Discussion

Lonar Crater is third biggest crater in the world; the specialty of this crater is about its high salinity value which is not change throughout the year. Seasonally somewhat changes occur on water quality parametrsbut change not observed on diversity.

The goal of the current study is to learn more about the lake basin's natural features so that we can recommend sensible



**Figure 1:** Satellite View of Lunar Crater.

precautions [5]. Investigate the microscopic flora and fauna, examine various data to determine the eutrophication condition and pollution level of Lunar Crater, and look into the effects of human interference on the crater's and lake's deterioration [6]. Water is home to tiny, microscopic organisms called planktons; which carry by Waves, tides, and currents. They are divided into two groups; the first includes phytoplankton, which are plants, and the second includes zooplanktons, which are animals [7]. They aid in providing information about the environmental conditions present in the water bodies. Blue green algae and bacteria were the most notable traits found in the saline lake water. These types of tiny forms are so well adapted to this environment that there is absolutely no potential for their survival in a high alkaline medium then also such tiny microorganism adapted such environment [8]. Except for Lunar Lake, luxuriant growth of spirulina is unknown [12]. Other members of the *Chlorophyceae* family (green algae) include *Chlamydomonas species*, *Oedogonium species*, and *Rhizoclonium species*, *Anabaena sp.*, *Arthospira*, *Nostoc sphaericum*, *Ocillatoria*, *Spirulina subsalsa*, and *Hydrodycton sp.* are among the species of the blue-green algae family (*Cyanophyceae*). *Asterionella*, *Closterium sp.*, *Fragillaria*, *Cyclotella*, *Navicula*, *Navicula sp.*, *Nitzschia*, *Nitzschia sp.* are all members of the *Bacillariophyceae* (Diatoms) family. In Lunar Lake, the phytoplankton population was found to be dominated by *cyanophyceae* group algae species. More tolerant of saline-alkaline lake water than *chlorophyceae* are the *Bacillariophyceae* species *Fragillaria*, *Navicula*, and *Cyclotella* (green algae). *Chlorophyceae* were the category most vulnerable to the Lunar Lake water [9-11].

The water of lakes and ephemeral ponds contains all four species of zooplankton, including copepods, copepodoids, ostracods, and rotifera. Rotifera dominated this group. The rotifers are very useful for determining the quality of the water in tropical areas. A challenge in water filtering could result from the quantity of rotifers. However, they are also helpful in eliminating natural waste and pollution. A total of 28 taxa (Copepode 3, Cladocera 5, Rotifera 20) were identified among the groups of zooplanktonic organisms in the lake. Additionally, 23 zooplankton species (Copepode 3, Cladocera 6, and Rotifera 14) from the Ramgaya (Salinity >1 ppt.) stream that connects to the lake were studied. The *Brachionus plicatilis*, *B. Caudatus*, and *Hexarthra intermedia* species were found at all of the sampling stations. Rotifera is the dominant group in the lake. Rarely seen in the brine itself, species like *Cephalodella catellina*, *C. gibba*, *Colerella adriatica*, *Lecane lamellata*, *Keratella quadrata*, *Synchaeta oblonga*, *Polyarthra vulgaris*, and *Lecane ovalis* are frequently found in seasonal ponds near the brine that have very low salinity. Cladocera (*Diaphanosoma brachyurum*, *D. magna*, *D. longiceps*, *Allona sp.*, *Copepoda*, *Cyplope sp.*, and *Harpacticoid Copepod Canthocmpus sp.*) are also present in transient ponds near the lake's basin. *Brachionus plicatilis* and *Hexarthra intermedia* are described typical species of saline waters and characteristic pollution indicator species, and they belong to the dominant groups of Rotifers. In harsh and alkaline waters, rotifers were said to predominate. These eutrophiclake indicator species are found there. Additionally, the lake's eurithermal and eurihaline species include *Hexarthra intermedia*, *B. plicatilis*, *Keratella quadrata*, and *Lecane sp.* The rotifer *C. adriatica* is a lake species that prefers euryhaline waters with a pH range of 5.5 to 10.5 in most cases. The lake's pH is 10.5 and providesthis species with an appropriate environment. The eurithermal species, known as cosmopolitan species, include *Keratella quadrata* and *Polyarthra vulgaris*, which can live in both freshwater and saltwater. In waterswith high oxygen content, *Polyarthra vulgaris* is primarily found [13]. Wintertime is when more species are present.

#### Microinvertebrates

Molluscs, Oligochaetes, and Chironomus species are among the documented benthic species. These very large species of creatures, which eat algae, bacteria, and detritus in the form of particle matter, are found in the lakesediments (Organic matter). *Eristalis*, *Liriope*, larvae of *crane flies*, *dragonflies*, *mayflies*, and mosquitoes, as well

as *chironomids* and *nematode worms*, were among the creatures found at this level. It is essential to preserve the wetland ecosystem with its wide variety of living things.

### Other aquatic fauna

Due to its low dissolved oxygen content and high salinity, Lonar Lake did not exhibit any fish species in its water body. According to the hydrological study, worsening changes that contributed to eutrophication resulted in a decline in macrophytes and flora as well as an increase in pathogenic organisms. Because of this, rotifers in general and *B. plicatilis* and *B. caudatus* in particular dominate all other zooplankton groups, and *hexarthra intermedia* is also expanding in population. *Spirulina* sp. is the leading species of blue-green algae, which make up the majority of the phytoplankton community. The rapid multiplication of these algae is noticeable along with other blue-green algae, including *Arthospira* and *Ocillotora*, right after the monsoon arrives and progressively decreases as the dry weather lasts until June. Before the few years ago Agriculture activities is done inside the alluvium, for that cultivation farmer used fertilizers, insecticides etc. hence the heavy load of nutrient causes excessive development of algae and degradation. Due to excessive development of the algae causes algal Blooms, this blooms on the surface of water which prevent light from penetration hence the other microorganisms cannot survive after all they settle down at bottom. Some rotifers can tolerate salt, while others are indicators of the condition of the water, according to *B. Palcatilis*, a Cosmopolitan. *Rotataria* sp. and other benthic rotifers, which tolerate salt, contaminate lake water. *Ostracoda* presence is another sign of dirty water. Environmental degradation is due to, used pattern of land, water utilization, farming in the alluvium of the lake.

### Conclusion

Because of this, rotifers in general and *B. plicatilis* and *B. caudatus* in particular dominate all other zooplankton groups, and *hexarthra intermedia* is also expanding in population. *Spirulina* is the most prevalent type of blue green algae, which make up the majority of the phytoplankton community. The rapid multiplication of these algae is noticeable along with other blue-green algae, including *Arthospira* and *Ocillotora*, right after the monsoon arrives and progressively decreases as the dry weather lasts until

June. Zooplankton are also markers of pollution; while some benthic rotifers, such as *Rotataria* sp., are salt-tolerant, they also contribute to lake water pollution. *B. Palcatilis* is cosmopolitan, *Ostracoda* presence is another sign of polluted water. Pollution and degradation, Water and land use pattern, Agriculture in the lake alluvium, Exploitation of water resources must be investigated to save the ecological wonder. to reduction of flora fauna and macrophytes and increase in pathogenic organisms must be investigated thoroughly to conserve the Lake.

### Recommendation

#### Human intervention

In the southern part of Lonar Crater, this temple can be found. Due to this temple, a sizable number of pilgrims journey through the ejecta blanket every year. During the Navratri celebration, College, School Tours etc. visit the crater every day. More than two lakh pilgrims/visitors do this. Clearly, this delicate environment cannot support this enormous number of pilgrims/visitors. This is a warning sign of unpleasant things to come in the future.

#### Deforestation

The agricultural operations of the framers, who cut trees and bring the firewood and fodder while retaining to the town from their fields that are at the bottom of the crater, have increased the deforestation on the escarpment and in the forest of alluvium. *Prosopis juliflora*, an invasive species that the forest department introduced, is quickly displacing a number of other indigenous species, which is a cause for serious concern. This situation needs to be fixed right away since it poses a serious threat to the crater ecosystem's floral diversity. To allow for the succession of native plants, *Prosopis juliflora* must be completely eliminated. It is suggested that native species be planted.

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