

## Conservation and Management Strategies of an Urban Fresh Water Lake of Ajmer

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Received: 16.06.2016 | Revised: 23.07.2016 | Accepted: 27.08.2016

### ABSTRACT

Lake ecosystem is marked as a peculiar type of ecosystem. The different lakes vary in the trophic status ranging from oligotrophic to eutrophic. This trophic status is mainly the assessment of the human intervention in the lake or in the catchment area. This directly affects the productivity or the nutrient load in the water. The lakes all around the world have shown the sign of increasing eutrophication during last two to three decades. Today the need is to properly monitor the changes in the physico-chemical characteristics and the biological counter parts of the lake water. The need is also to constitute proper measures for the management and conservation of lakes. The present study of Anasagar lake gains importance because of its location in the heart of the Ajmer city.

**Keywords:** Ecosystem, trophic status, oligotrophic, eutrophic, physico chemical characteristics, management, conservation.

### INTRODUCTION

Anasagar lake, a freshwater lake is situated in the heart of the Ajmer city. The catchment area of the lake is 70.55 sq. km. and its circumference is 12.88 sq. km. The lake has significant importance as it is year round visited by pilgrims who come to visit the world famous shrine of Khwaja Moinuddin Chishti, Brahma Temple and Pushkar lake situated about 11 km. from Ajmer city, a sacred Hindu lake. The lake is surrounded by hotels, guest houses, agriculture fields, bathing spots and residential colonies in the catchment

areas. One site of the lake is a bird watching site. This area in winter season is visited by thousands of migratory birds every year and is the chief site of tourist attraction and abundance. The water influx from all of these sites is continuously increasing the nutrient load in the lake water thereby rendering the lake more eutrophic day by day.

Nowadays the common people who are the main source of degradation of water bodies are also the most concerned people about the deterioration of water quality.

**Cite this article:** Mathur, M. and Sharma, R., (2016). Conservation and Management Strategies of an Urban Fresh Water Lake of Ajmer, *Int. J. Pure App. Biosci.* 4(4), 349-352. doi: <http://dx.doi.org/10.18782/2582-2845.8954>

The twist is that the government which is forming the policies for Lake water pollution is itself organising many sport activities in the lake water like boating, fishing etc. for the gain of revenue in order to attract more people for tourism, the government has planned to develop a pathway all around the lake, giving a chance to people to intervene all the areas of the lake which will further deteriorate the water quality directly or indirectly. Earlier studies mentioned tourism as a global driving force for environmental change (Wong, 2002).

The earlier workers who studied about eutrophication of lakes marked Phosphorus values in Lake water being a limiting and most important nutrient (Edmondson, 1969). The water of Anasagar lake is also enriched by nutrients due to various anthropogenic activities in the catchment area. Sharma and Sharma (1991) assessed the trophic status using Nygaard's Trophic State Indices, reported weak eutrophic nature of this lake. They also studied the algal diversity in the littoral zone of the lake and reported around 123 algal species belonging to 60 genera from this waterbody (Sharma and Sharma, 1992). They also recorded many algal species as indicator of pollution.

#### **Present scenario of the water quality of Anasagar lake**

Due to its unique location in the heart of the Ajmer city, this lake is under acute pressure of encroachment and urbanization. Following are some of the reasons of the cause of increase in eutrophication level of the lake:

1. The progressive increase of the human activities in the nearby areas of lake has subsequently increased the nutrient load in the lake water. The nutrient load chiefly refers to the amount of nitrogen and phosphorus in the water bodies. Excess nutrients are a cause of impairment in the water bodies (Bricker *et al.*, 2008). The concentration of phosphorus is also increasing in the lake water. The chief source of phosphorus is mainly agriculture run off, macrophytic decomposition and industrial wastewater (though in case of Anasagar lake this source of phosphorus

influx is very less as there are no or very less industries in the catchment area. The increase nutrient load enhances the production of algae and other decomposers.

2. Presently the lake is becoming a hub for many tourist activities in and around the catchment area of the lake like boating, fishing, picnicking, bird watching etc. These activities are adversely affecting the quality of Lake water thereby destroying the natural fauna and flora of lake by human intervening.
3. The water coming from the nearby residential colonies and hotels brings about detergents and many types of organic wastes thereby increasing the phosphate and nitrogen levels in the water body.

All the above mentioned activities are increasing the nutrient load in the lake water which is the main cause of eutrophication (Sharma, 1993). It is seen that the lake water has turned green due to formation of algal blooms of *Microcystis aeruginosa* at several sites. It is evident that eutrophication occurs naturally as lakes age and are filled with sediments (Carpenter, 1981). In case of Anasagar lake the anthropogenic activities have accelerated the rate and extent of eutrophication. The algal blooms are creating noxious foul smell.

#### **Steps for management and conservation measures of Lake Anasagar**

Today the need is to be more concerning about our water bodies and improving the trophic status of the lake. Strong measures should be taken jointly by the local people, environmentalists and mainly by the government bodies for the restoration of lake.

Though the natural flora and fauna of the lake like heterotrophic bacteria, algal forms, fungal forms, insects etc. are doing their own task of decomposing the organic matter in the lake water and helping in the self purification process of the lake. We the human beings should also implement some measures for

conservation of lake. Some of the measures for conservation of Lake water are:

- Excess nutrients are a cause of impairment in water bodies, hence steps should be taken to decrease the nutrient load in the water body. The increase in nutrients also induces the proliferation of cyanobacteria (King *et al.*, 2007; Funari *et al.*, 2012; Paerl and Paul, 2012). Thus efforts should be made in direction of Lake restoration by removing the lake sediments by aeration process.
- The encroachment inside and around the lake should be minimised. The building of pathway and hotels around the lake should be banned. The development of more residential colonies and amusement parks in the close proximity of the lake should be avoided.
- Proper planning for disposal of sewage and other refuse should be made. Sewage treatment plants should be established. The path of effluents coming inside the lake water should be diverted.
- Aquatic weeds should be removed and properly uprooted. Algaecide such as copper sulphate is effective in reducing algal blooms (Boyd and Tucker, 1998).
- Regular dredging should be carried out. This results in removing the sediments and debris which are the main source of eutrophication.

The conservation and management of aquatic ecosystem is a tedious process. The involvement of local people is very necessary to reduce the deterioration of water quality. The public should reduce the activities going around the lake. The human activities increase the nitrogen and phosphorus inputs into the aquatic ecosystems (Schlesinger, 1997). The subsequent nutrient transport to water bodies is largely driven by precipitation and other factors affecting the run off (Gordon *et al.*, 1992), hence efforts should be made to reduce the influx of runoff into the lake water.

### CONCLUSION

Thus it is evident from the study of Anasagar lake that the water body is under continuous stress of demographic pressure and unplanned

growth. Hence the increasing human intervention should be stopped. The conservation plans should be seriously monitored by government authorities. As we all know that healthy environment is a precious wealth so proper planning should be made for making lake eco-friendly and site for tourist attraction by maintaining the rules and regulations for the lake protection and public should strictly follow these rules.

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