

BIOLOGICAL ASSESSMENT OF LAKE WITH RESPECT TO IDOLS IMMERSION

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ABSTRACT:

On the earth's surface, relatively small portion are occupied by lakes, but their importance to human being is far greater than their area. To meet the domestic and industrial needs, lakes are the convenient and cheapest source of water. Most of the lakes are built for aesthetic purposes but their contribution to the ecosystem functioning is very significant. Many lakes are used for the immersion of holly deities' idols during festival seasons. Presented investigation was based on Planktonic study and Plamer's Pollution index (P.P.I.) calculated before and after Ganesh idols immersion in Railway Station Lake of Gondia city. The observed value of P.P.I. before immersion was 16 and after immersion 20 indicates increase in organic pollution of Railway Station Lake, after immersion of idols.

Key Words: Idol immersion, lake pollution, eutrophication phytoplanktons, P.P.I.

INTRODUCTION

Aquatic ecosystem is the most diverse ecosystem in the world. The first life originated in the water and first organisms were also aquatic where water was the principal external as well as internal medium for organisms. Thus water is the most vital factor for the existence of all living organisms. Water covers about 71% of the earth of which more than 95% exists in gigantic oceans. A very less amount of water is contained in the rivers (0.00015%) and lakes (0.01%), which comprise the most valuable fresh water resources. Lakes have a more complex and fragile ecosystem as they do not have a self cleaning ability and therefore readily accumulate pollutants. The increasing anthropogenic activities in and around lake areas have contributed to a large extent to deterioration of water quality and dwindling of water bodies leading to their accelerated eutrophication. Eutrophication has very adverse effect on the flora and fauna of water bodies.

Lakes provide human being with service that includes water for irrigation, drinking, industry and dilution of pollutants, hydroelectric power, transportation, recreation, fish and esthetic enjoyment. But, more than 90% of all available liquid surface freshwater are contaminated in lakes and reservoirs [4]. Now a day's most of the aquatic bodies are becoming polluted due to rapid growth of industries and increasing anthropogenic activities. The improper treatment and disposal of inadequately treated waste water from industries have become the main cause of pollution.

For monitoring water pollution, physical and chemical parameters were used in general. During recent years, attempts towards evaluating biological methods by many scientists have been made and results are quite encouraging. The biological indicators of pollution are important to know the level and degree of the pollution. Some organisms, which are sensitive to changes in the environment, are called bio-indicators. Some phyto and zoo planktons are acts as bio indicators. Some algal forms are more valuable as biological indicators because of their acute presence. They also show quick response to environmental changes than other living organisms [6]. Biological monitoring or bio-monitoring, is the use of biological response to assess changes in the environment, generally changes due to anthropogenic causes. Bio-monitoring is a valuable assessment tool that is receiving increased use in water quality monitoring programs of all types [5]. The presence or absence of an indicator species or indicator community reflects environmental conditions. A great deal of work has been done on using algae as bio -indicators of pollution [7], [14],[8].

Phytoplankton are representing the microscopic algal communities of open water as a major element (at primary level) in aquatic biota. The Phytoplankton is at the base of nutritional cycle of an aquatic ecosystem. They form a bulk of live food for zooplankton, fishes and other aquatic organisms at higher levels of food

chain/web and help generation of potentially functional and dynamic aquatic community. Thus the planktonic study is a very useful tool for the assessment of biotic potential and contributes to overall estimation of basic nature and general economic potential of a water body.

Here we have discussed general anthropogenic activities through which lakes / water bodies get polluted. But, In India there is unique type of water pollution, which is not seen in any part of the world and this problem is very critical because it is directly related to Hindu religious group of community. The cause is immersion of holly deities' idols in the nearby water bodies which included used flowers, garlands and other decorative and worship materials. The cumulative effect of all this activities leads to degradation of quality of water. The idols of Lord Ganesha and Goddess Durga worshiped by Hindus are immersed in the months of September and October respectively every year [15]. Ganesh festival is celebrated traditionally in the state of Maharashtra all in a big way as a social and community activity. When started by Lokmanya Tilak, the objective of the festival was mainly to bring people together and promote freedom movement. Now with the passage of time, the celebration of Ganesh festival has change in terms of its scale as well as involvement of the people. These activities also cause serious environmental pollution. Besides the noise created by the several mandals during the festival, the immersion of idols made out of chemical materials causes significant water pollution. The traditional mud idols have been replaced by plaster of paris statues which are then painted using toxic chemical dyes to make them bright and attractive to buyers. During idol immersion some solid waste are also thrown in water along with the idols. (**Table 1**). The biodegradable matter after decomposition recycles to the system while non-biodegradable substances form sediments. The non-bio-accumulation of heavy metals in biological system transfers the toxic elements from producer to consumer level, which can be a future health hazard [9]. While idols made out of naturally occurring clay (*Shaadu* in Marathi) dissolve within hours of immersion in water, PoP idols may take anywhere between several months to years to fully dissolve. These materials poison water bodies, by increasing chemical and organic content. In the process, ecosystems in these water bodies gate harmed, plant and fish species die in large numbers. Water that has been polluted in this way can cause diseases when drunk by people living near by areas. Considering all the above facts, the present study was undertaken in Railway Station Lake, Gondia for the determination of water quality using algae as bio-monitors before and after immersion of lord Ganesha idols. The Gondia is situated on North-Eastern side of Maharashtra state having state borders of Madhya Pradesh and Chattisgarh. The Studied Lake is situated near the Railway Station of Gondia City.

3.1) Problem: The pollution level of Railway Station Lake, Gondia is being increased year after year due to increased anthropogenic activities. People use this lake for various purposes which in turn increases organic load in the lake. In addition various religious activities such as immersion of idols and Nirmalya (used flowers, garlands and other solid waste materials) are often the major cause of increase in organic pollution which in turn changes the physical, chemical and biological composition of lake.

MATERIALS AND METHODS

For biological analysis, samples were collected in 100 ml polyethylene bottles. Water samples are collected for phytoplankton were preserved in Lugol's Iodine solution. Samples were brought to the laboratory for microscopic examination. Analysis of physico-chemical and biological parameters were made after following the work of Edmondson [2], Ward and Whipple [18], Needham and Needham [10], Pandey *et al.* [13], NEERI [11], APHA [1], Gaur *et al* [3].

3.1) Identification of Phytoplanktons: The sample was collected from 10 cm below the water surface. Phytoplanktons in the water samples were concentrated by centrifugation. The phytoplankton population was analyzed quantitatively under microscope. The identification of phytoplanktons was made after following the work of standard literature.

3.2) Biotic score and diversity Indices Palmers Pollution Index (PPI): Indicator species for organic pollution are always helpful in limnological studies. Palmer [12] considered the tolerance capacity of these species to organic pollution and expressed them numerically. Palmer also specified ranges of organic pollution for both the species and genus indices. According to Sullivan and carpenter [16], Palmers genus indices were more sensitive to different in organic pollution. Palmers genus index was used during the

present investigation to determine the pollution level in the Railway Station Lake, Gondia. The pollution rating values are given in **Table 2**. The summation of these values in a sample gives the value of Palmer's Pollution Index. The ranges of index values indicative of organic pollution are.

- 0 – 15 : Organic pollution is absent
- 15-20 : Presence of organic pollution
- > 20 : presence of high level of organic pollution

RESULT AND DISCUSSION

The Railway Station Lake, Gondia has been surveyed before and after immersion of Ganesha idols. PPI is a biotic index based on organic pollution indicator species. After going through the list of identified phytoplankton species it is found that some organic pollution indicator species (*Anacystis* and *Phacus*) were recorded after immersion of idols. The PPI values before immersion was 16 and after it was 20 (**Figure 1**) it revealed that there is increase in organic load after immersion of Ganesha idols in Railway Station Lake, Gondia.

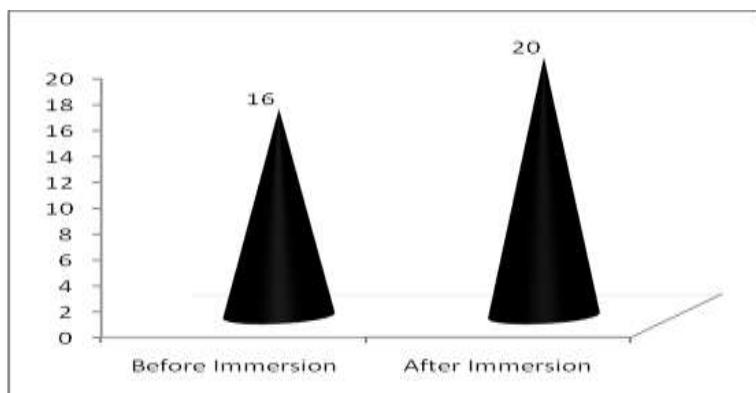


Figure 1: PPI values before and after Ganesha idol immersion

4.1) Remedial measures:

- ✓ Use of eco-friendly idols made by paper pulp and sand would be appreciable
- ✓ Immersing the idol in a water tank constructed by the government, instead of directly into natural water bodies
- ✓ Using only a natural clay idol and immersing it either in the tank or in a bucket of water at home
- ✓ If one is using a PoP idol, simply sprinkling a few drops of water on it as a symbolic immersion and donating the idol to be recycled for the following year
- ✓ Avoid the use of thermocole and plastic decorations
- ✓ Avoiding the use of non biodegradable material such as thermocole altogether
- ✓ Instead of immersing all the 'Nirmalya' into water bodies, installed large bins as traditional pots or "Kalash" to receive this 'Nirmalya'
- ✓ Composting all bio degradable material
- ✓ Distributing food items such as coconuts and fruits among the poor
- ✓ Recycling flowers/garlands to make hand made paper or dried flower products.

Table 1: Impact of various items on aquatic environment during immersion of idols.

Sr. No	Item contributed	Impact on aquatic environment through idol immersion
1.	Clay/plaster of Paris	Increase dissolved solids, suspended solids in water, Sludge.
2.	Decoration material viz. clothes, polish, paint, ornaments cosmetic items etc.	Contributes suspended matter, trace metals (Zinc, lead, iron, chromium, arsenic, mercury etc.) metalloids and various organic and inorganic matter, oil and grease etc.
3.	Flowers, Garlands, oily	Increase floating suspended matter organic contamination, oil and

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	substance	grease and various organic and inorganic matter.
4.	Bamboo sticks, Beauty articles	Big pieces got collected and recycled while small pieces remain floating in water or settled at the lake bottom inhabiting lake flow.
5.	Polythene bags/plastic items	Contribute suspended, settleable matter and hazardous material to water and chokes the aquatic life.
6.	Eatables, food items etc.	Contributes oil and grease, organics to water bodies.

Source: Anju Vyas *et al* [17].

Table 2: Palmer's Pollution Rating of Organic Pollution Indicator Algal Genera For Palmer's Genus Index

Sr. No.	Algal species	Pollution rating
1.	<i>Anacyclis</i>	1
2.	<i>Ankistrodesmus</i>	2
3.	<i>Chlamydomonas</i>	1
4.	<i>Chlorella</i>	3
5.	<i>Closterium</i>	1
6.	<i>Cyclotella</i>	1
7.	<i>Euglena</i>	5
8.	<i>Gamphonema</i>	1
9.	<i>Melosira</i>	1
10.	<i>Micractinium</i>	1
11.	<i>Navicula</i>	3
12.	<i>Nitzschia</i>	3
13.	<i>Oscillatoria</i>	5
14.	<i>Pandorina</i>	1
15.	<i>Phacus</i>	2
16.	<i>Phormidium</i>	1
17.	<i>Scenedesmus</i>	4
18.	<i>Stigeoclonium</i>	2
19.	<i>Synedra</i>	2

Table 3: List of identified phytoplankton species before and after Ganesha idol immersion.

Sr. No.	Species	Before	After
1.	<i>Actinastrum</i>	+	+
2.	<i>Anabaena</i>	+	+
3.	<i>Anacyclis</i>	-	+
4.	<i>Ankistrodesmus</i>	+	+
5.	<i>Clostridium</i>	+	+
6.	<i>Coelastrum</i>	+	+
7.	<i>Cosmarium</i>	+	+
8.	<i>Fragillaria</i>	+	+
9.	<i>Merismopedia</i>	+	+
10.	<i>Navicula</i>	-	+
11.	<i>Nitzschia</i>	+	+
12.	<i>Oscillatoria</i>	+	+
13.	<i>Pediastrum</i>	+	+

14.	<i>Phacus</i>	-	+
15.	<i>Scenedesmus</i>	+	+
16.	<i>Selenastrum</i>	+	+
17.	<i>Spirulina</i>	+	+
18.	<i>Stigeoclonium</i>	+	-

CONCLUSION

Pollution load in terms of organic pollution was found to be increase by many folds in Railway Station Lake, Gondia after immersion of Ganesha idols. Therefore, it is suggested that the authorities looking into the environmental protection of the lake need to take necessary steps. Along with other measures, including strict implementation of central and state level legislation, they should conduct environmental awareness programmes, may be through different media, particularly before the ‘Vinayakachaturthi’ day, to educate the public of the city and make them aware of the harmful environmental effects. This is very critical environmental issue. In order to protect the urban and rural lakes from such threat, mass public awareness is needed. Also state pollution control board along with some local bodies should formulate stringent norms to protect the water bodies from such environmental hazards.

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