J. Mater. Environ. Sci. 6 (1) (2015) 220-223
ISSN : 2028-2508
CODEN: JMESCN

Hydrological changes in water due to idol immersion in artificial pond

Gadhia Mohini, Surana Ranjana, Talsania Niharika and Ansari Ekhalak
Department of Aquatic Biology
Veer Narmad South Gujarat University, Udhana Magdalla road
Surat-395007 (Gujarat) India

Received 1 Jan 2014, Revised 2 Oct 2014, Accepted 2 Oct 2014,
**Corresponding author: E-mail: aquatic44@yahoo.com*

Abstract
Pollution of water-bodies is a major apprehension in today's era. Idol immersion activities during festival are adding to pollution load of the water- bodies. Study of physico-chemical properties of water is an important exercise to evaluate the nature and extent of pollution in water bodies. An artificial pond nearly 20x10 metre size with polythene lining was constructed in September 2013 near Dumas Ovara by SMC for immersion of idols. The present study concerns on the water quality assessment to evaluate the nature and the extent of pollution in artificial pond due to idol immersion. Pre-immersion and post-immersion samples were collected from the artificial pond and analyzed for various water quality parameters such as pH, turbidity, total Solids (TS), total dissolve solids (TDS), total suspended solids (TSS), turbidity, conductivity, total hardness, calcium hardness, dissolved oxygen (DO), BOD, COD and oil & grease. Present study was conducted to evaluate the changes in water quality in artificial pond after idol immersion.

Key words: Pollution, Idol Immersion, Water quality assessment and artificial pond

1. Introduction
Water is one of the most essential requirements of life. All forms of life depend upon water and it provides sustenance to plants, animals, aquatic organisms and to meet the human need like agriculture and industries [1]. Water is necessary for the development of any country around the earth.

Water is used for the generation of electricity, fishery, agriculture and lots more! So there is need to protect the water resources free from pollution and prevent the depletion of water resources. Water resources provide life to all from minute microscopic organisms to the human beings. Water resources are undergoing all kinds of depletion. Due to polluted fresh water is no more available for various activities in several countries. Most of the water bodies all over the world are getting polluted due to domestic waste, sewage and industrial waste, agricultural and religious activities like idol immersion [2]. Festivals are an integral part of prosperous and different cultural heritage of India. In India, idol immersion is an anthropogenic activity [3].

Earlier idols were made of traditional soil but with increase in time, idols made up of plaster of paris are being used which are light weight and attractive. Plaster of paris does not dissolve easily in water. Sometimes bulldozers are required to crush them into particles. Plaster of paris contains gypsum, sulphur, phosphorus and magnesium. Immersion of these can poison the waters of lakes, rivers and the sea by increasing solid matter, organic matter and heavy metals etc. These activities make the water polluted and water loses its value and can become a threat to animals as well as human health and to the survival of aquatic fauna living in it [4]. These actions damage the ecosystem by killing the fishes damaging the plants and blocking the natural flow of the water [5].

To overcome this problem Surat Municipal Corporation (SMC) made artificial ponds in Dumas for the immersion such pond was about 20x10 metre size near Dumas Ovara. Nearly 34,000 Ganesha idols were immersed in different parts of the Surat city and nearly 40 per cent of those idols are made of POP [6]. Idols made of POP from the City were also immersed in this artificial pond. Present study was conducted to find out the changes in water quality in artificial pond after idol immersion. An attempt was made first time in City to save natural water quality and biota.

2. Materials and methods

For the present study, water samples were collected from surface area of artificial pond (20x10 metre with polythene lining) during morning hours at the site of immersion, Dumus Ovara during the Ganesh festival 2013 at different period i.e. Pre-immersion and Post-immersion. The artificial pond was constructed by SMC to save natural water quality and biota. The measurement of temperature, pH and fixation of dissolved oxygen were done at the site and physico-chemical parameters including dissolved oxygen, conductivity, salinity, turbidity, total solid, total dissolved solid, total suspended solid, total hardness, calcium hardness, total alkalinity, biological oxygen demand, chemical oxygen demand and oil and grease were analyzed following the standard methods of [7&8].

3. Results and discussion

Graphical representation of physico-chemical parameters are depicted in Figures 1 to 5.

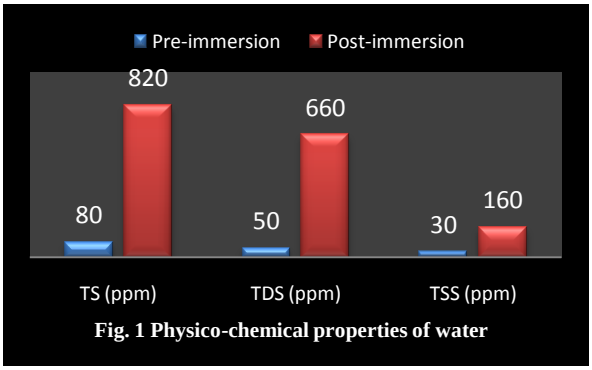

Fig. 1 Physico-chemical properties of water

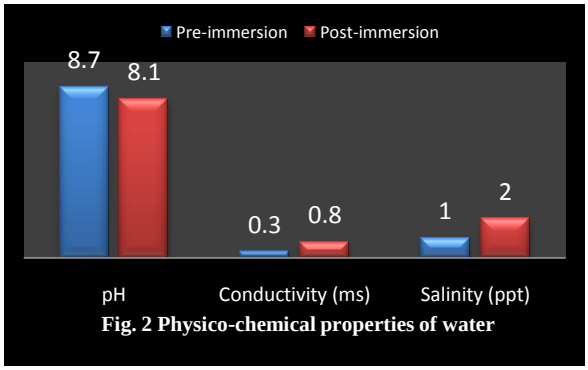

Fig. 2 Physico-chemical properties of water

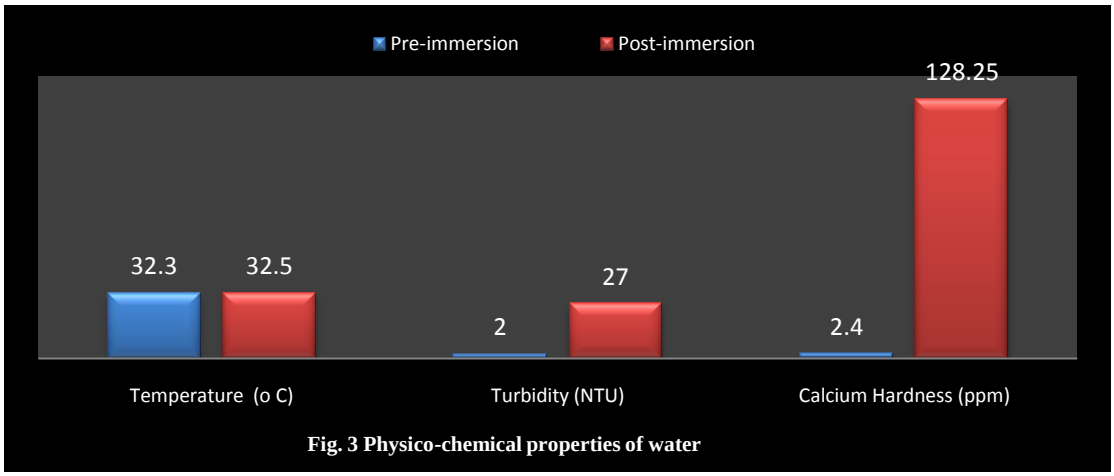

Fig. 3 Physico-chemical properties of water

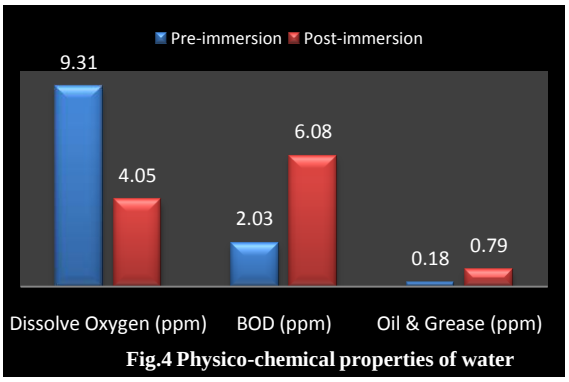

Fig.4 Physico-chemical properties of water

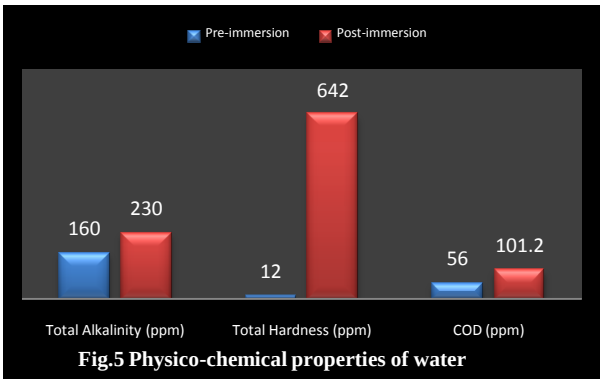

Fig.5 Physico-chemical properties of water

pH of water found alkaline. It was 8.7 during the pre-immersion while 8.1 during post-immersion period. The value of temperature during the pre-immersion and post-immersion period it was found 32.2 and 32.5°C respectively. Turbidity of water during post-immersion period was found high 27 NTU while it was observed low during the pre-immersion 02 NTU. The changes in conductivity (0.3 to 0.8 ms) and salinity (01 to 02 ppt) were prominent during pre-immersion and post-immersion respectively. Significant changes in value of total solids 80 mg/1 observed during the pre-immersion period while it was 820 mg/1 during post immersion period. Similarly total dissolved solid was recorded 50 mg/1 and 660 mg/1 during pre-immersion and post-immersion respectively. Total suspended solid was found 30.0 mg/1 during pre-immersion period while it was 160.0 mg/1 during post-immersion period. Total alkalinity was found high 230.0 mg/1 during post-immersion while it was comparatively low 160.0 mg/1 during pre-immersion period. In present work significant high value 642.0 mg/1 of total hardness was observed during post-immersion period and during pre-immersion it was found comparatively very low, 12 mg/1. Similarly calcium hardness was observed 2.40 mg/1 and 128.25 mg/1 during pre-immersion and post-immersion period respectively. Dissolved oxygen was observed low 4.05 mg/1 during post-immersion period while it was 9.31 mg/1 during pre-immersion period. BOD was 2.03 mg/l during the pre-immersion period that significantly increased 6.08 mg/1 during post-immersion period. High value of COD 101.2 mg/1 was observed during the post-immersion period that was comparatively low 56.0 mg/1 during pre-immersion period. Oil and grease was observed high 0.79 mg/1 during post-immersion period while it was 0.18 mg/1 during pre-immersion period.

Changes in water quality due to immersion of Ganesh idol on different water bodies have been reported by various scholars from different parts of country [9,10,11,12,3and 13].

In present study increasing level of conductivity after idol immersion and cations are the products of decomposition and mineralization of organic materials [14].

Water quality parameters like turbidity, TS, TDS, TSS, total hardness, calcium hardness DO, BOD and COD, have significantly increased during the post-immersion period as compare to pre-immersion period. The pre-immersion values were lower than the post-immersion values of most of the parameters. The present study indicates only slight variations in temperature and pH in the pre-immersion and post immersion samples. COD measures the organic strength of the waste. The values are especially high when biologically resistant organic matter is present. In the present study, COD values were higher in post-immersion samples as compared to pre-immersion samples.

The Plaster of Paris used to make the Ganesh idol doesn't dissolve in water, so after the immersion, many of the remaining pieces of the idol sink in the bottom of the lakes and oceans and can take several years to disintegrate. This disturbs the water's ecosystem by reducing water levels. For example, the Jidnyasa report of 1998 revealed that 6,625 idols weighing 1,144kg paint and 20,446kg Plaster of Paris were immersed in Lake Masunda. The water level of this lake reduced from 18 feet in 1993 to10 feet in 1998 [15].

Suspended sediment reduces the amount of light penetration into the water column and hence reduces the energy available for aquatic plant photosynthesis. A reduction in algae results in a major loss of food for invertebrates [16]. A 5 NTU increase in turbidity in a clear stream 0.5m deep may reduce aquatic plant photosynthesis by 13% or more, depending on stream depth [17].

Sediment directly affects invertebrates. Some invertebrates are filter feeders and sediment clogs their filter mechanisms; sediment also abrades (harms) the gills of some invertebrates, impairing respiration [18]. Conductivity measure the water's ability to conduct electricity, which provides a measure of what is dissolved in water. Higher conductivity value indicates that there are more chemicals dissolved in the water. Common ions in water that conduct electrical current include sodium, chloride, calcium, and magnesium. Because dissolved salts and other inorganic chemicals conduct electrical current, conductivity increases as salinity increases. Aquatic animals and plants are adapted for a certain range of salinity. Outside of this range, they will be negatively affected and may die. Some animals can handle high salinity, but not low salinity, while others can handle low salinity, but not high salinity. In addition to its direct effects on aquatic life, salinity also has many other important effects on water chemistry and water density. [19].

Higher level of total dissolves solids affect animals much more than humans. In bodies of water, like rivers, higher levels of total dissolved solids often harm aquatic species. The TDS changes the mineral content of the water, which is important to survival of many animals. Also, dissolved salt can dehydrate the skin of aquatic animals, which can be fatal. It can also increase then temperature of the water, which many animals can't survive in [20].

Conclusion

The change in water quality due to immersion of idol was studied in present study. The current research indicates that the pollution load on artificial pond has increased significantly after idol immersion so the trial of artificial pond which saved the natural water body condition.

Acknowledgements-The authors are grateful to SMC staff members of Dumas immersion site for their kind help and cooperation for the collection of samples for this study.

References

1. Prasad D and Gaur HS., *Environmental pollution: Water*, Venus Publishing House, New Delhi (1992) 294-330.
2. Bhagat and Singh., *International Journal of Scientific Research*, Volume 3. Issue 2. (2014) 180-181.
3. Gupta A.K., Mishra K., Kumar P. ,Singh C. and Srivastava S., *India Plant Archives* 11 (1) (2011) 297.
4. A. Waheed, F.S. Hamid, N. Ahmad, S. Aslam, Z. Naheed, H. Ahmad, F.M. Abbassi, H. Ali, A.H. Shah *Mor. J. Chem.* 2 N°4 (2014) 330-342.
5. www.memumbai.com
6. Anon, *Times of India*, 18th September (2013).
7. Trivedy PK, Goel RK, *Chemical and Biological methods water pollution studies*. Environmental publication, Karad, India (1986).
8. APHA, *Standard method for examination of water and waste water*, 19th ed. American public health association, New York (2005).
9. Dhamijia SK, Jain Y., *Poll. Res.*, 14(3): (1995) 341-346.
10. Kalita B, Bhuyan KC, Kusre D, Dutta A (2006). *J. Ecobiol*., 18(1): (2006)17-21.
11. Devi O.J. and Belgali S.L., *Nature Environment and Pollution Technology* 4(4) (2005) 589-596.
12. Jadhav Priti, Dongare Meena, *Nat. Env. and poll. Tech*., 8(3): (2009) 561 -564.
13. Shirbhate Nayana S, Malode SN, Wadankar GD, Shelke PB, *Int. J. Innov. Bio-Sci*., 2(1): (2012) 51-54.
14. Abida B. and Harikrishna, *E-Journal of Chemistry*. 5, (2), (2008) 377-384.
15. http://www.ehow.com/info_8750908_ganesh-immersion environmental-effects.html
16. Sorenson, D.L., M.M. McCarthy, E.J. Middlebrooks, and D.B. Porcella, *United States Environmental Protection Agency,* Report 600/3-77-042,(1977). Environmental Research Laboratory, Corvallis, OR.
17. Lloyd, D.S., J.P. Koenings, J.D. La Perriere, *North American Journal of Fisheries Management* 7(1987)18-33.
18. Newcombe C.P. and MacDonald D.D., *North American Journal of Fisheries Management* 11: (1991) 72-82.
19. http://www.fondriest.com/news/what-is-conductivity.htm
20. http://www.thirteen.org/edonline/studentstake/water/lowerhudson/dissolvedsolids/dissolvedsolids.