

Preliminary Study for Ramifications of Idol Immersion on Water Quality Parameters: Environmental Impact Analysis

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Abstract:-India is religious country. Myriad numbers of different festivals have been celebrated in India since thousands of years. These festivals are celebrated with great joy and zeal. Celebrations of these festivals often lead to hindering the impact on natural resources, animals and plant life.. Our study was focussed on the area of water quality and impact on living organisms. A festival like Diwali is one of the famous festival in India and it is celebrated by burning firecrackers. Festivals like Ganesh Chaturthi and Durga Puja includes idol immersion in water. These idols are generally made of POP (Plaster of Paris). This idol immersion is done in local reservoirs, rivers or lakes. Due to this immersion of idols in water, there are changes in the characteristics of water like hardness, turbidity, temperature, alkalinity, TDS, TSS, COD, BOD, conductivity and pH. It is inevitable to identify these changes because it is harmful for marine life. It also affects the growth of plants and human health. Changes in these properties can be identified by taking sample of water and performing experiments in the laboratory. In this study, we accumulated data from various sources and scrutinized them to defend the usage of natural ingredients for preparation and celebrations of various festivals in the country to limit their serious impacts.

Keywords:- India, Festivals, Religious, Idols, Rivers.

I. INTRODUCTION

India is a multi-cultural country of myriad festivals. In India diverse cultural and religious festivals are organized in different manners. Some of these festivals include 'idol immersion' in water as celebrations finale. Mainly this can be seen in festivals like Ganesh Chaturthi and Durga Puja. Durga Puja is eminent festival in India especially in West Bengal. These idols are generally made of POP (Plaster of Paris) or Baked Clay. Idol is an image or other material object representing a deity to which religious worship is addressed or any person or thing regarded with admiration, adoration or devotion and also a religious idol is an image of a god which is used as an object of worship. People in India

see their god in these idols. These idols are worshipped in different regions of India and it requires great skills. These festivals generally are celebrated in various length periods which varies from 3 days to 10 days. At the end of these festivals these idols are immersed in local water bodies like rivers and lakes. As per the report, Ganesh festival is estimated to be an over Rs. 20,000 crores extravaganza and is clocking over 30% annual growth. Over 15000 pandals have been used only in Mumbai every year during Ganesh festival. These numbers are 5000-6000 for Pune and 1,500 for Nagpur. As per the survey conducted by the Associated Chambers of Commerce and Industry of India (ASSOCHAM) West Bengal's Durga Puja festival industry is growing at a compound annual growth rate (CAGR) of about 35 percent. Size of the industry was Rs 25,000 crores in 2013 and the gigantic increase was noticed in this industry and it reached Rs 40,000 crores industry in year 2015. Every year, over 20,000-30,000 idols are prepared only in Kolkata. However, amidst the celebrations, people tend to forget the bad-effects of the practice. The most serious impact of idol immersion is on the environment. It changes the characteristics of water in local bodies. It disturbs the ecological balance by polluting water and adversely affecting the flora and fauna. The requirement of water is in all lives, i.e. from micro-organisms to human beings. So, it is a serious problem today because all water resources have been reached to a point of crisis due to unplanned urbanization and industrialization. One of the major reasons for these is the material used for making idols which is generally POP (Plaster of Paris) as it is very cheap and light in weight. Moreover it requires less effort and time to make idols of POP and this material is non-biodegradable and that's why it takes long time to dissolve in water and it's toxic in nature. It's very easy to paint these idols. When these idols are immersed in the water the paints that are used in idols dissolves in the water and that paints contain heavy metals such as Mercury, Cadmium, Arsenic, Zinc, Chromium and lead which also dissolves in water and make water worse for drinking purpose and reduces the level of dissolve oxygen in water which is very detrimental for marine life. They also induce structural and functional abnormalities in different organs of fishes and humans. It's our responsibility to protect

our environment and valuable resources and handover safely to next generation otherwise life will be in huge danger without good quality water.

II. MATERIALS AND METHODS

The present study was carried out in the laboratory for comparison of the effects of POP and baked clay idol immersion in the water. In the beginning 3 idols were submerged in the water bucket as shown in the figure below. These idols are submerged in 25 litres of water. In which 2 idols were made of PoP while 1 was made up of baked clay. One PoP idol was submerged in water bucket in which facility of aeration was provided. After a period of one month changes in water parameters (Conductivity, Turbidity, pH, BOD, COD, Color, Hardness, Total Dissolved Solids, Dissolved Oxygen, Total Suspended Solids) were measured in the laboratory and these readings were compared with normal water.



Fig 1:- Initial Stage-Idol Immersion

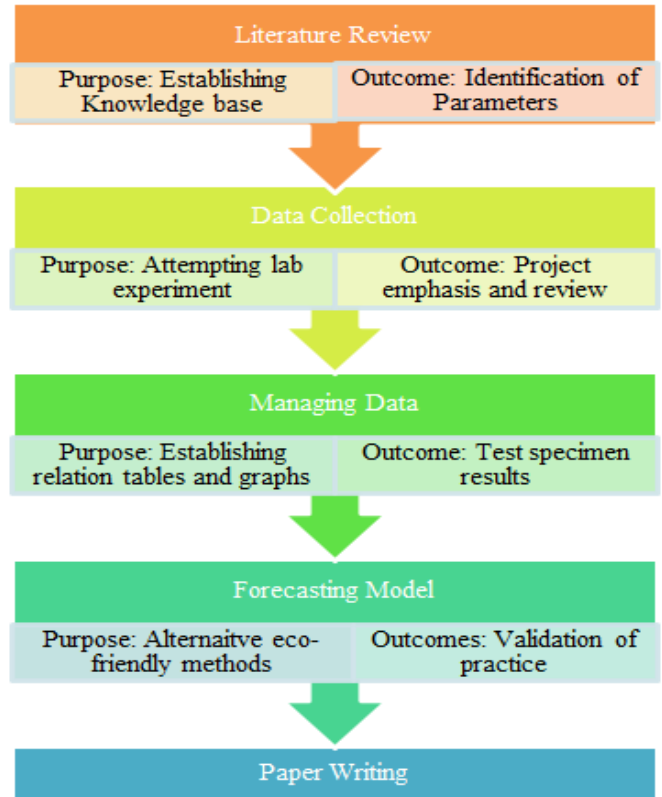


Fig 2:- Methodology

III. RESULTS AND DISCUSSION

➤ *pH:*

pH was measured by waterproof meter and it was observed that Pop idol was having 7.19 pH whereas idol with aeration was having 7.42pH. The baked clay idol had 7.60pH. So, the pH measured was lower than normal water used in experiment.

➤ *Total Hardness:*

Total hardness of sample water was very high as compared to normal water. Whereas, the hardness of baked clay was comparatively low from PoP idol with aeration and without aeration which is 1520 mg/L while hardness of sample of POP was 2140 mg/L.

➤ *BOD:*

Biological oxygen demand is direct measure of oxygen required and indirect measurement of bio-degradable organic matter. In this case also BOD of water with POP idol immersed was very high compared to normal water and baked clay water sample.

➤ *COD:*

Chemical oxygen demand is measure of the capacity of the water to consume oxygen during the decomposition of organic matters and oxidation of inorganic chemicals. POP with aeration indicated highest value of COD.

➤ *TDS:*

Total dissolved solids are the total amount of mobile charged ions. As per the IS 10500:2012, permissible amount of TDS in normal water is 500mg/L but for all the samples the higher amount of TDS were seen.

➤ *TSS:*

Total Suspended Solids is the dry weight of suspended particles that are not dissolved in the water. TSS in normal tap water, PoP-1, PoP-2 with aeration and baked clay were 20 ppm, 136 ppm, 112 ppm and 150 ppm respectively.

➤ *Turbidity:*

Turbidity was measured by digital turbidity meter. Turbidity of PoP-1 was 10 NTU whereas of PoP-2 with

aeration had 7 NTU. Also, in case of baked clay turbidity reading was 8 NTU and for normal water it was 1 NTU.

➤ *Heavy Metals:*

Heavy metals such as Zinc, Lead, Arsenic and Copper were measured by as per the guidelines of American Public Health Association 1992 standard method for examination of water and wastewater, 18th edition APHA 3500 method. The changes in values of heavy metals were not much considerable.

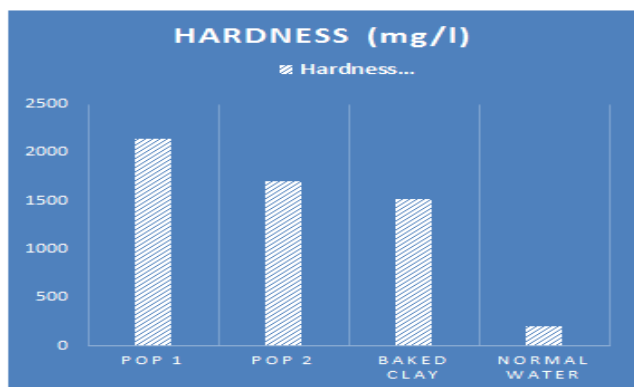
➤ *Conductivity:*

Conductivity was measured by waterproof meter. The conductivity of PoP 1 was 7.43 mS/cm while for baked clay it was 3.14 mS/cm which was much lower than PoP-1. PoP-2 with aeration had conductivity value 5.76 mS/cm.

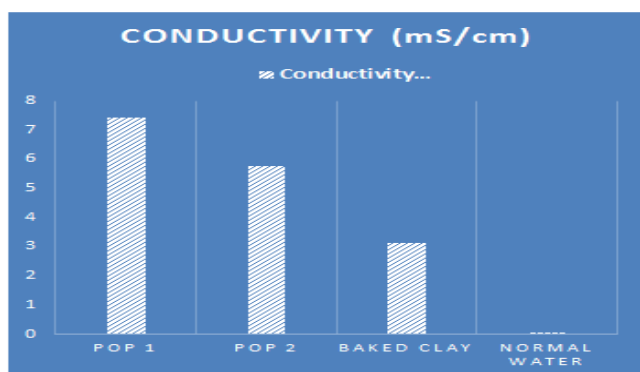
The readings are shown below in Table 1.1

Description	PoP-1	PoP-2(Aeration)	Baked Clay	Normal (Tap) Water
Colour (Hazen)	7.5	8.4	5.67	3.5
pH value	7.19	7.42	7.60	7.89
Conductivity(mS/cm)	7.43	5.76	3.14	0.05
Temperature (°C)	23.7	24.7	28.96	20.0
Turbidity (NTU)	10.0	7.0	8.0	1.0
Hardness (mg/l)	2140.0	1704.0	1520.0	370.0
TDS (mg/l)	3660.0	2950.0	1900.0	360.0
COD (mg/l)	ND	240.0	20.0	-
TSS (mg/l)	136.0	112.0	50.0	20.0
BOD (mg/l)	14.0	17.60	9.46	1.2
Zinc (mg/l)	0.106	0.035	0.026	0.010
Copper (mg/l)	0.054	ND	ND	-
Lead (mg/l)	0.002	ND	ND	-
Total Arsenic (mg/l)	0.005	0.006	0.005	-

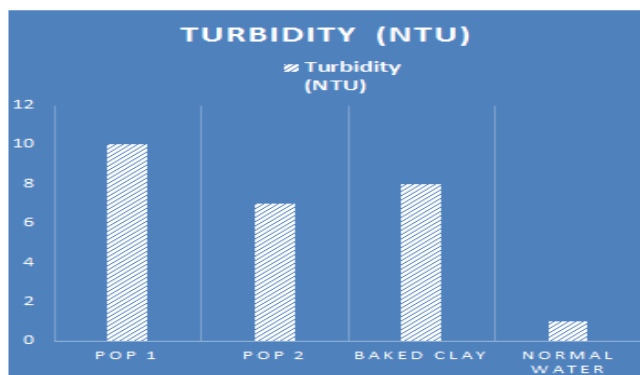
Table 1



Graph No-1.Comparison of Hardness



Graph No-2.Comparison of Conductivity



Graph No-3.Comparison of Turbidity

IV. CONCLUSION

Idol immersion changes the characteristics of water and it can cause ill effects to humans, marine life, and plants. Also due to high amount of TDS in water it can lead to increase in hardness and corrosion of pipes and fittings. High amount of hardness can increase risk of cardiovascular ailment and can also cause skin problems like Eczema. Water tub in which facility of aeration was provided indicated major changes in the reading in comparison to normal water condition. So, we can conclude that aeration can reduce the bad effects in water at some extent and can be easily provided in rivers and lakes using different methods like

surface aeration or subsurface aeration. The present study was conducted for 28 days using a few idols for immersion in the lab conditions, though there are a variety of idols available in the market. Hence, before finalizing any guidelines, detailed study by an expert agency should be conducted to reach on any conclusion on exact impact of idol immersion particularly of PoP idol.

V. RECOMMENDATION TO PREVENT WATER POLLUTION

➤ *Adding Ammonium Bicarbonate or Sodium Bicarbonate for Immersion of Idols:*

This is new eco-friendly technique developed to disintegrate idols within 48 hrs. The ammonium bicarbonate or sodium bicarbonate is added as same weight of idols. This method is much easy to follow and the government also encourages devotees to use this idol immersion technique. There are many other methods.

People should use idol made of baked clay or eco-friendly idols made up of shadu clay, paper pulp, natural gum, and eco-friendly colors which pollute less water in comparison to PoP.

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