

WATER POLLUTION DUE TO IDOL IMMERSION IN WATER BODIES OF KOLKATA

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Abstract - The present study aims to investigate the reasons of water pollution due to the immersion of idol in water. India is a rich cultural country with diverse and rich heritage. Idol is an image of god which is used as an object of worship. After worship, these idols are immersed into water bodies. Idols are made of Plaster of Paris, clay, cloth, small iron rod and are decorated with different points which are rich in mercury, cadmium, lead, chromium, zinc oxide etc. The floating material released by these idols unbalances ecosystem as it kills fish, damages plants and stop the natural flow of water. To study the effect of idol immersion, water samples were collected from an immersion site in Garia, and analyzed. These samplings were done before the immersion and after the day of immersion. Several parameters like temperature, pH, dissolved oxygen, turbidity, alkalinity, BOD, TDS, total hardness etc. were estimated. This study found significant change in water quality parameters before and after immersion. Central Pollution Control Board has formulated guidelines on the practice of idol immersion in water bodies which should be followed for controlling pollution.

Key words- Water pollution, Water Quality Parameter, Idol Immersion, Water body, Garia.

1. INTRODUCTION

Water is life – a concept coined in the ancient Indian civilization. Indian Vedic scriptures have described in detail the origin of water, its importance, quality and conservation. The medicinal aspect of water has been discussed in "Rig-Veda" and "Atharva Veda". The life on the earth would be impossible without water. Water meant for human consumption should not be only "safe" but also "wholesome". Safe water is one that cannot harm the consumer even when ingested for prolonged period. The scarcity and diversity of water resource in different regions and its equitable and sustainable use has become a matter of vital importance. All great civilizations have flourished along the rivers. Religious practice in India are water centric and religious wastes are invariably immersed in water bodies. The quantity and quality of these biodegradable and non-biodegradable substances deteriorates the water quality and enhances silt load. Increase in plants and stop the natural flow of water. To study the effect of idol immersion, water samples were collected from an immersion site in Garia, and analyzed. These samplings were done before the immersion and after the day of immersion. Several parameters like temperature, pH, dissolved oxygen, turbidity, alkalinity, BOD, TDS, total hardness etc. were estimated. This study found

significant change in water quality parameters before and after immersion. Central Pollution Control Board has formulated guidelines on the practice of idol immersion in water bodies which should be followed for controlling pollution. Concentration of heavy metals like lead, chromium, cadmium are also caused due to immersion of idols in lake and river waters in different parts of India. Water pollution bring about many implications to our daily lives yet many are unaware of just how lethal water pollution can be to us. In this work, the contribution of idol immersion in water pollution is studied by collecting samples from an immersion site in Garia, Kolkata and further testing of different water quality parameters.

2. BRIEF STUDY

2.1. Constituents of idols and adverse effects

Idols are prepared by plaster of Paris, clay, cloths, small iron rods, bamboo and ornamented with different paints such as glaze, watercolors etc. Plaster of Paris (POP), which is inexpensive and lighter, has turn into the preferable material to make the idols. POP contains chemicals such as phosphorus, gypsum, sulphur, and magnesium. Plaster of Paris is extracted from Gypsum rock. POP is not easily soluble in water but gradually goes in water bed over a long time period. Large amount of POP when comes directly in contact with skin, causes serious burns because of heat produced. Material used for making POP idols contain the POP (Gypsum) 80% and above and paper (cellulose) up to 10% and other material within 1-2% like starch, Potassium sulfate, Glass fiber, Paraffin wax and Crystalline Silica. Colors used are mostly chemical and contains metals such as Copper, Chromium, Cadmium, Nickel, Lead, Mercury etc. POP makes water alkaline if deposited excessively. Calcium and magnesium concentration in water increases significantly leading to increase in the hardness of water.

Idols are ornamented with plastic and thermocols. Out of the all materials used in making the idol, thermocol and plastic are non-bio-degradable, so they are toxic. Paints which are used to color the idols contains various heavy metals such as Mercury, Cadmium, Arsenic, Zinc, Chromium and lead. Red, blue, orange and green colors contain mercury, zinc oxide, chromium and lead, which are potent carcinogens. Sindoor (a traditional red or orange-red colored cosmetic powder from India, usually worn by married women along the parting of their hair, often used in the festivals, especially in Durga Puja) results into two heavy metals. Heavy metals can

enter living systems through the food chain process they may directly incorporate through the digestive tract due to the consumption of contaminated water or food, or through indirect routes across penetrable membranes such as gills. Immersion of these idols poisons the water so flakes, rivers and these by increasing acidity and the content of heavy metals. Heavy metal pollution caused by idol immersion damage the ecosystem as it kills fishes, damages plants, blocks the natural flow of the water, causing stagnation. It damages health of human beings also by polluting drinking water sources, causing breathing problems, and blood and skin diseases

Idols are painted with oil paints of various colors which contain heavy metals which are non- biodegradable and bio-accumulate and bio-magnify along the food chain and are brutally neuro and nephrotoxic and some even carcinogenic. It is apparent that metals like copper, manganese, molybdenum, iron, Lead, chromium, nickel, cadmium, zinc and mercury are used to prepare synthetic paints of different colors. These metals are absorbed in the bodies of aquatic flora and fauna and get accumulated in the food chain. When the levels of these metals exceed the tolerable limits it results in fish kill as well as other aquatic animals like snails, frogs etc. which is a common scene for some post-immersion days.

Many metals also have harmful effect on drinking water quality like cadmium, lead etc. Cadmium is primarily toxic to the kidney, cause bone demineralization. Drinking water with very high cadmium levels severely irritates the stomach, leading to vomiting and diarrhea, and sometimes death. Lead damages the central and peripheral nervous system, the kidneys and the body's ability to regulate vitamin D. Lead negatively affects the formation of red blood cells. Very high levels of lead can cause seizures, coma and death.

2.2 Impact of different materials on water quality

1. Plaster of Paris increases dissolved solids, contribute metals and sludge.
2. Decoration material like clothes, polish, paint, ornaments, cosmetic items etc. contribute to suspended matters, trace metals(Zinc, lead, iron, chromium, arsenic, mercury), metalloids and various organic and inorganic matter, oil and grease etc.
3. Flowers and garlands increase floating suspended matter organic contamination.
4. Big pieces of bamboo sticks, beauty articles get collected and recycled while small pieces remain floating in water or settled at the river bottom inhibiting river flow.
5. Polythene bags and plastic items contribute suspended, settleable matter and hazardous material to water and chokes aquatic life.

6. Eatables, food items etc. contribute to oil and grease and organics to water bodies.

3. MATERIAL AND METHODS

The effect of idol immersion on water quality of water bodies can be studied by estimating the different water quality parameters.

3.1 Parameters affecting water quality

Temperature is an important parameter in determining water quality because all chemical and biological reaction happens at an optimum temperature. Distribution of aquatic organism is greatly influenced by water temperature.

pH of aqueous solution is the negative logarithm of hydrogen ion activity. The effect of pH on the chemical and biological properties of water makes its determination very important.

Turbidity is a measure of the degree of which the water loses its transparency due to the presence of suspended particulates. The more total suspended solids in the water, the murkier it seems and the higher the turbidity. The alkalinity of water is the capacity to neutralize the acid thereby indicating the buffering capacity of water.

Dissolved oxygen(DO) in water is of great importance to all according organisms and is the factor that reflects the biological activity-taking place in a water body and determines the biological changes. The higher values of Biochemical Oxygen demand(BOD) mean present of more biodegradable organic material. The higher values of the BOD have direct correlation with the increase in nutrient level of the lake due to immersion activity

The term solids refer to the matters either filterable or non-filterable that remain as residue upon evaporation and subsequent drying at a defined temperature. Dissolved solids influence other qualities of drinking water such as taste, hardness, corrosion and scaling.

3.2 Study Area

The environmental impact of Durga idol immersion on physico-chemical properties of water in a water body situated in Garia which is situated in Kolkata, the capital of the state of West Bengal, India. The immersion site was located near Garia Railway Station.

3.3 Sample Collection

Wastewater sampling is generally performed by two methods, grab sampling or composite sampling. The sample was collected by grab method. In this method all the test material is collected at one time. Oxygen fixation for dissolved oxygen, was performed on site. During the process of oxygen fixation, the two reagents manganese sulfate and alkali iodide-azide are used.

4. RESULT ANALYSIS

Significant changes in the quality of water were observed due to idol immersion.

The pH is noted before immersion was 7.9 and after immersion was 7.6. The pH decreases post immersion increasing the acidity of water.

The temperature of water was measured after immersion it was 25°C and before immersion it was 28°C. Temperature usually rises slightly after immersion due to chemical reaction but heavy rainfall, post immersion might have changed the results.

The transparency of water varied between pre and post immersion period. The minimum transparency observed before immersion. The turbidity value observed before immersion was 31.9 NTU and after immersion 39.6 NTU.

Concentration of total solids, dissolved solids and suspended solids is usually higher after immersion but heavy rainfall post immersion have reduced the concentration of dissolved solids. Dissolved oxygen was observed low 4.25mg/l while it was 6.35mg/l during post immersion period. BOD₅ was 1450mg/l before immersion and BOD₅ was 3025mg/l after immersion. Value of BOD observed was high during idol immersion period which is related to the increase of nutrient level in the water body due to the immersion activity.

Bicarbonate and carbonate alkalinity of pre water sample is 135 mg/l and 120mg/l and post water sample is 35 mg/l and 165 mg/l. Increase in value of total alkalinity was related to carbonate & bicarbonate concentration and the total alkalinity value were fluctuated due to idol immersion. Any type of metal like cadmium or lead could not found in pre or post immersion.

Table-1: Pre-immersion Parameters

Parameters		Values	
Temperature		28°C	
pH		7.9	
Turbidity		31.9	NTU
Solids	Total	1.97	mg/l
	Dissolved	1.93	mg/l
	Suspended	0.04	mg/l
DO		4.25	mg/l
BOD	BOD ₁	300	mg/l
	BOD ₂	1150	mg/l
	BOD ₃	1200	mg/l
	BOD ₄	1350	mg/l
	BOD ₅	1450	mg/l
Alkalinity	Carbonate	120	mg/l
	Bi-carbonate	135	mg/l
Metals	Cadmium	<0.02	mg/l
	Lead	<0.1	mg/l

Table-2: Post-immersion Parameters

Parameters		Values	
Temperature		25°C	
pH		7.6	
Turbidity		39.6	NTU
Solids	Total	1.74	mg/l
	Dissolved	1.7	mg/l
	Suspended	0.04	mg/l
DO		6.35	mg/l
BOD	BOD ₁	300	mg/l
	BOD ₂	1275	mg/l
	BOD ₃	1400	mg/l
	BOD ₄	2125	mg/l
	BOD ₅	3025	mg/l
Alkalinity	Carbonate	165	mg/l
	Bi-carbonate	35	mg/l
Metals	Cadmium	<0.02	mg/l
	Lead	<0.1	mg/l

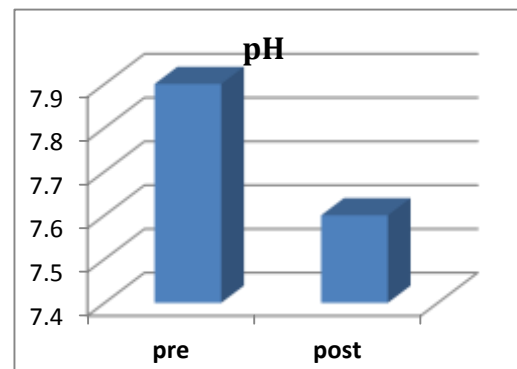


Fig -1: Variation in pH

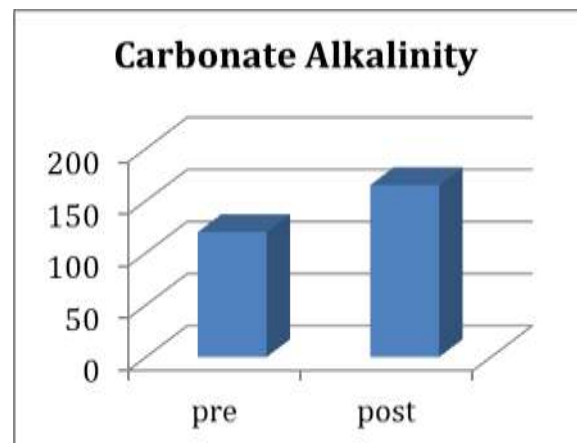


Fig -2: Variation in carbonate alkalinity

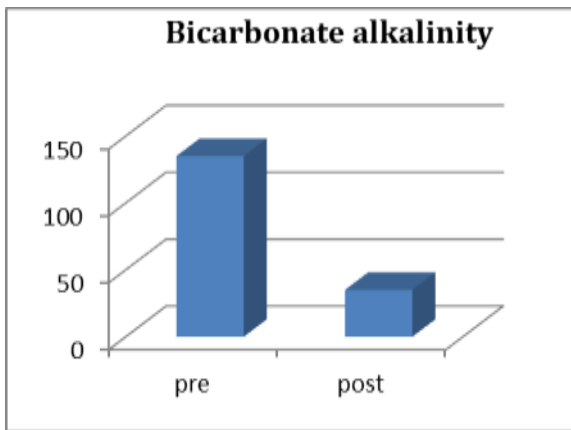


Fig -3: Variation in bi-carbonate alkalinity

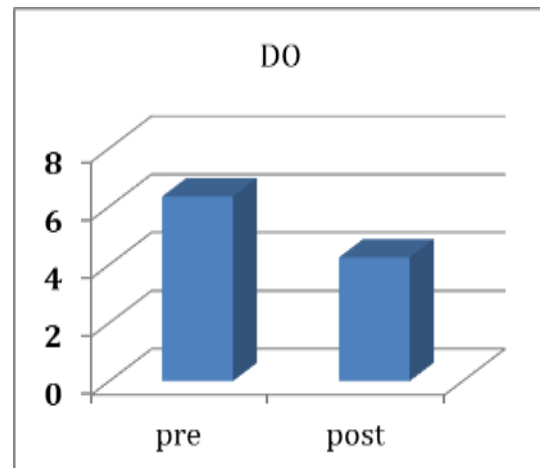


Fig -6:

Variation in DO

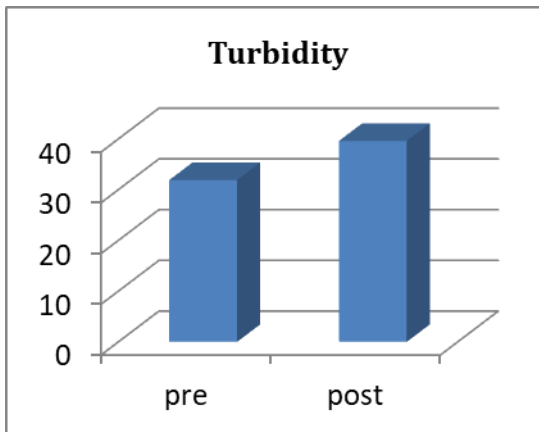


Fig -4: Variation in Turbidity

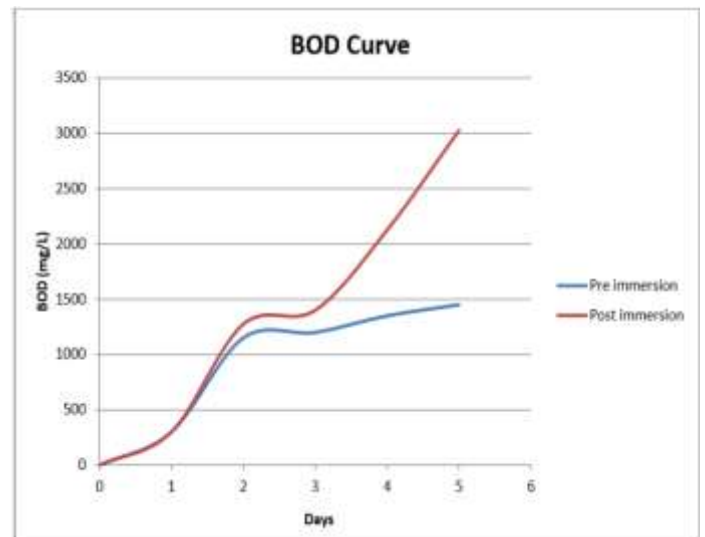


Fig -6: Variation in BOD

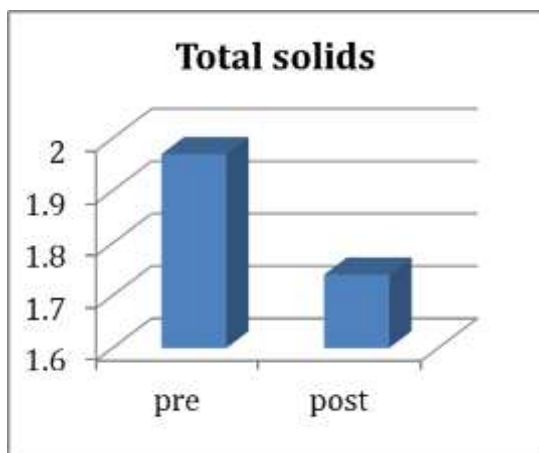


Fig -5: Variation in Total Solids

5. CONCLUSION

Water bodies are related to religious sentiments but scientifically these are not suitable for human uses. The main reason of the deterioration in water quality is the ritual activities. "Idol immersion" thus play an important role in polluting water bodies. Religious activities cannot stop but awareness among people and proper management practices like use of eco-friendly Durga Pratima natural colors etc. can reduce the pollution problem of water bodies up to some extent. Moreover, guidelines by Central and State

Pollution Control Board regarding making of idols and post immersion practices should be strictly followed.

6. REFERENCES

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