

Impacts of Religious Festivals on the Water Quality of Kapildhara Pond at Varanasi, India

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Received November 07, 2020; Revised December 08, 2020; Accepted December 15, 2020

Abstract Ponds in India are one of the primitive and important sources of water since past. Like ocean and rivers, ponds have been personified as religious symbols. Some ponds, as one under study are highly significant as they gather and cater religious ethics in India. The catchment area of this ponds a part from rain water and drains from contingent temples and pilgrims, are said to be intrinsically connected with Ganga River. Thus, spiritual and the environmental of pollution level of this pond (Kapildhara) was under taken during 2008-2009. The observations leads to the conclusion that the pond changes periodically its PH, alkalinity, DO, BOD, COD, DS, TS, turbidity, conductivity, temperature, hardness, acidity, residual chloride ,nitrate, potash and iron contents. The peculiarity observed in this pond was that an enormous hike in pollution level was observed during April and October 2008 and 2009. This abnormal change may be attributed to the rituals and ethics observed by Hindus during Navratra festivals in April and October of the study years.

Keywords: *idols, pilgrim activities, festivals, non-biodegradable*

Cite This Article: Sanju Dwivedi, and N.P Singh, "Impacts of Religious Festivals on the Water Quality of Kapildhara Pond at Varanasi, India." *Applied Ecology and Environmental Sciences*, vol. 9, no. 1 (2021): 83-85. doi: 10.12691/aees-9-1-13.

1. Introduction

Ponds as water resources are the strong and brawny base on which our life stands. Ponds played most vital role in developing our culture throughout past ages. It is an indisputed fact that we are consuming natural resources more and more intensively today with the aid of technical means that have grown immensely in lower and have there by immeasurable improved the conditions for developing our civilization.

India has a legacy of culture embedded in the religious inclinations of their people [1,2]. A country where festivals and festivities are espoused from a wide gamut of culturally varied rituals for different communities. Durga puja, Ganesh puja, Diwali, Holi, Chhat puja, Jvitputrika vrat puja etc. are auspicious occasion comprising immense joy, happiness and celebrations across the country. The idols of respective gods and goddesses after puja celebration are immersed in various ponds, lakes and other water bodies resulting in significant ecological imbalance [3,4]. The different sources of drinking water get contaminated due to the use of various toxic and synthetic materials in these idols.

The brewing environmental crisis is mainly due to the non-biodegradable materials that are used for making idols, plaster of paris, polythene bags and harmful paints on the idols to mention a few, where as surplus bamboo

sticks, plastic flower, clothes, camphor and other materials are directly dumped into the ponds, which further pollute the water bodies. When an idol made of plaster of paris is immersed in water, it changes to gypsum, sulphur, phosphorus and magnesium, which further breaks down while adding to the hardness of water and deteriorating its life [5,6].

A significant amount of enrichment of the pond takes place of the regular bathers of the pond. During the time of religious festivals, thousands of men and women rushed to the pond in order to take 'holy bath'. During this time huge amount of fruits, leaves, flowers, sweets etc., are offered to the pond water [7,8]. It is very much interesting to note that sometimes litres of milk also offered during this time. Idols of different 'pujas (worship) are always immersed in the pond water.

Ponds are habitats of great human importance as they provide water for domestic, industrial and agricultural use as well as providing food .In spite of their fundamental importance to human, freshwater system have been severely affected by a multitude of anthropogenic disturbance, which have led to serious negative effects on the structure and function of these ecosystem [9]. The biodiversity of lake and pond ecosystem is currently threatened by a number of human disturbances, of which the most important include increased nutrient load, contaminations, acid rain and invasion of exotic species [10].

Government of India has also launched in 2019 a national program for providing safe drinking water to all

citizen now named as 'Jal Jivan Mission' (Water is life Mission) under which they will introduce a special programme 'Nal se Jal' (Water from Tap) to ensure piped water for every household by 2024. The mission is also dealing with ground water management, monitoring of water quality, identification of problems and their solution to be insured that water available is of acceptable quality.

2. Material and Method

The water samples were collected from pond of Varanasi city for two year 2008-09. The parameters PH, alkalinity, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), dissolved solid (DS), total solid (TS), turbidity, conductivity, temperature, hardness, acidity, residual chloride, nitrate, potash and iron were analyzed in the laboratory as per the standard procedure of APHA (1995). The water quality has been calculated by using the standard procedure of drinking water quality recommended by the (WHO) world health organization.

3. Result & Discussion

Mean value of all the sixteen physicochemical parameters before and after the religious activities from Jan. to Dec. 2008-09 are represented in [Table 1](#) & [Table 2](#). During the immersion of the idol or other anthropogenic activities near the ponds (Kapildhara) increases the value

of the parameters BOD, total alkalinity, chloride, hardness, dissolved solid, turbidity, conductivity and significant decrease in DO, COD, nitrate and potash. The high organic matter and pollution load of pilgrims on the water bodies like adding large amount of fruits, leaves, flowers, sweets and milk during religious periods decreases the water quality level. Dissolved oxygen of the water bodies disrupt and therefore lowering the level of oxygen results 5.44% to 3.44% at the year 2008-09. Low dissolved oxygen (DO) primarily results from excessive algae growth caused by potash. Nitrogen (nitrate) is another nutrient that can contribute to algae growth. As the algae die and decompose, the process consumes dissolved oxygen. This can result in insufficient amounts of dissolved oxygen available for fish and other aquatic life. Die-off and decomposition of submerged plants also contributes to low dissolved oxygen. Simultaneous increase in BOD values 5.11% to 7.11% were also observed. Increase in total alkalinity may be attributed due to presence of basic salts of potassium and sodium. The COD variation also decreases 15.12% & 9.54%. The parameters turbidity and total solid value increases from 17.70% to 19.87% respectively. Overall very minor differences were observed in PH value during research periods (2008-09). Increase in the residual chloride may further be responsible for elevating the values of dissolved solid and hardness after the pilgrims activities. Increase in the DS further directly affects the conductivities as increase in the ion content will in turn increase the conductivity due to increase in water pollution.

Table 1. Water quality parameters of Kapildhara pond for 2008-09

Months	PH	Alk.	DO	BOD	COD	DS	TS	Turb.	Cond..	Temp.	Hardn.	Acid.	Res.Cl.	NO3-	K.	Fe.
Jan.	6.9	41.3	3.8	2.32	4.2	1.82	66.3	18.7	48.3	18.6	157.1	23.6	26.52	64.5	1.86	3.01
Feb.	7.0	65.6	6.16	4.1	5.7	1.96	74.1	19.80	58.6	19.23	169.3	23.62	28.35	69.4	2.08	3.08
March	7.1	73.1	6.08	3.8	5.1	1.89	61.5	20.9	53.7	22.85	204.9	23.82	28.98	71.1	2.75	0.76
April	6.5	73.7	5.23	3.5	4.9	0.82	53.7	18.98	51.1	24.75	220.7	23.82	27.04	72.4	0.72	0.68
May	7.1	74.8	5.10	3.1	4.5	2.48	68.6	17.7	50.7	23.61	221.1	26.1	29.61	79.1	2.81	0.86
June	7.0	73.6	4.84	4.8	9.1	2.5	135.6	13.6	59.5	25.10	302.2	28.3	30.63	75.6	3.91	0.78
July	6.8	70.7	5.11	6.6	8.7	3.38	178.1	20.9	78.7	24.25	332.9	22.6	34.50	61.3	1.87	0.76
Aug.	6.7	46.3	6.23	7.1	10.1	4.32	225.0	19.00	108.9	23.50	326.9	23.3	28.67	55.1	1.99	0.71
Sept.	6.6	46.5	6.20	7.6	10.8	3.87	202.6	18.5	97.7	21.15	340.9	24.6	27.80	92.1	2.12	0.7
Oct.	6.2	47.8	5.80	7.0	9.7	3.71	174.3	16.2	67.3	20.03	399.6	23.6	25.89	101.4	0.32	0.76
Nov.	6.8	53.4	5.14	6.6	9.2	6.37	108.7	14.7	59.5	19.25	407.2	23.2	28.20	111.2	2.48	0.76
Dec.	6.7	55.5	5.70	4.9	8.5	6.81	85.9	13.5	57.5	18.00	399.3	23.7	28.64	113.4	1.82	0.78

The parameters DO, BOD, COD, DS, TS, Residual chloride, acidity, NO₃^{*}, K, Fe in Mg/L, turbidity NTU, Cond. Gmhl & Temp °C were measured.

Table 2. Water quality parameters of Kapildhara pond for 2009

Months	PH	Alk.	DO	BOD	COD	DS	TS	Turb.	Cond.	Temp.	Hard.	acid	R. cl ⁻	NO ₃ ⁻	K	Fe
Jan.	7.9	37.3	1.8	4.32	6.2	3.82	68.3	20.7	51.3	20.6	159.1	21.6	3.30	66.5	2.14	5.01
Feb.	8.0	61.6	4.16	6.1	7.7	3.96	76.1	21.8	61.6	21.23	171.3	21.62	3.28	71.5	1.92	5.08
March	8.1	69.1	4.08	5.8	7.1	3.89	63.5	22.9	56.7	24.85	206.9	21.82	3.37	73.1	1.25	2.76
April	7.5	69.2	3.73	6.0	6.9	4.32	57.2	23.48	54.6	26.75	224.2	22.32	3.42	74.4	1.28	2.82
May	8.1	70.8	3.10	5.1	6.5	4.48	70.6	19.7	53.7	25.6	223.1	24.1	3.46	81.1	1.19	2.86
June	8.0	69.6	2.84	6.8	11.1	4.5	137.6	15.6	62.5	27.1	304.2	26.3	3.40	77.6	1.91	2.78
July	7.8	66.7	3.11	8.6	10.7	5.38	180.1	22.9	81.7	26.25	334.9	20.6	3.37	63.3	2.13	2.76
Aug.	7.7	42.3	4.23	9.1	12.1	6.32	227.0	21.00	111.9	25.5	328.0	21.3	3.28	57.1	2.01	2.71
Sept.	7.2	44.8	3.80	9.0	11.7	7.21	177.8	18.2	70.8	22.03	403.1	22.1	3.21	103.4	1.68	2.74
Oct.	7.6	42.5	4.20	9.6	12.8	5.87	204.6	20.5	100.7	23.15	342.9	21.6	3.25	94.2	1.88	2.70
Nov.	7.8	49.4	3.14	8.6	11.2	8.31	110.7	16.7	62.5	21.25	409.2	21.2	3.18	113.2	1.52	2.76
Dec.	7.7	51.5	3.70	6.9	10.5	8.81	87.9	15.5	60.5	20.00	401.3	21.7	3.17	115.4	2.18	2.78

4. Conclusions

The results of the case study clearly depict that there is an increase in the value of water quality parameters nitrate, turbidity, BOD, DS, total alkalinity, total hardness, chloride and decrease in the value of DO and COD. There are a need for good planning, development and proper management of water bodies. Water pollution not only affects the quality of water but also threatens the human health and economic development of the country. Concerned SPCB/PCC State Pollution Control Board (SPCBs) and Pollution Control Committees (PCCs) should conduct water quality monitoring of water bodies at the immersion sites in terms of physicochemical, biological and bacteriological parameters taking suitable remedial measures to control pollution and prevent the depletion of the quality of lentic water.

Acknowledgements

The author wish to express their deep sense of gratitude to Prof. N.P Singh, Prof. B.N Yadav, Department of chemistry, Sri Baldev P.G. College Baragaon Varanasi for his constant inspiration, encouragement and direction of study at every stage of my work. The laboratory facilities assisted by Mr. Pankaj Srivastava and my youngest brother Mr. Ravi Tiwari is thankfully acknowledged for the help in carrying out the chemical analyses.

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