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WATER QUALITY STUDY OF RAMKUND DOWNSTREAM AREA ON GODAVARI RIVER DURING KUMBHMELA

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Abstract

Millions of devotees visited and take bath in Godavari River during Kumbh mela period. Therefore an attempt has been made to find out the effect of mass bathing on water quality during kumbh mela period. Downstream area of Ramkund on Godavari River was selected for study purpose. Water sample collected before mass bathing and after mass bathing. Collected sample were analyzed for physicochemical parameter and obtained results compared with WHO and BIS Standards. Dissolved Oxygen decreases after mass bathing and pH, Electrical Conductivity, Chloride, Hardness level increases, which indicates changes in water quality of Godavari River after mass bathing.

Keyword: Kumbh mela, mass bathing, Godavari River, physico- chemical parameter.

I. INTRODUCTION

Godavari River is second largest river in India. It originates at Bramhagiri hills in Trimbakeshwar of Nasik district in Maharashtra. Kumbh mela is one of the mega events on Godavari River, which take place after every twelve years. Millions of devotees across the country visited this magnificent festival. They take a holy bath in the river which is said to bestow salvation to the devotees and absolve them off sins and sufferings. [1]

At many religious places in India, especially the river and bank of the river area are being polluted by various activities done by the pilgrims. In such mass gathering, it is difficult for local administration and event management group to cope up with requirements with their infrastructure facility, sanitation facility as well as to manage environmental condition around such areas. Dakshin Ganga i.e.Godavari River is not only affected by such mass gatherings, religious event but also gets affected by industrial pollution. Godavari River shows water contamination at many places, sewage constituents found in between 84-92% and industrial waste between 8-16% in river sources. [2]

Ramkunda is a unique place of religious importance at all the times, especially in the Kumbhmela. Devotees offer pujas and perform rituals at Godavari River. Whereas offerings increases organic load in the river. On several occasions, large numbers of people gather at such locations. Due to the sudden huge gathering of people at one time, a number of problems are generated, which adversely affect the environment and public health. The problems arising out of such activities mainly associated with mass bathing, cloth washing, idol immersion, nirmalya visarjan *etc*. [3]

Daily thousands of people take a dip in Ramkund. During kumbha parva lakhs of people take holy dip in Ramkund. Nirmalya visarjan, religious activities, bathing and Asthi visarjan are daily activities at Ramkund. Ramkund and Hanuman Ghat receive sewage and industrial load. At this particular site religious activities are prominent. This area is not having proper facilities for collection of Nirmalya and other solid waste, bathing, washing of cloths, vehicles and asthi visarjan. Also at Ram ghat there is a “Bhaji Bajar”, throwing of vegetable waste, remains etc. [3].

Downstream area of Ramkund area chosen for study purpose, as this area had access to common man during shahi snan period.

II. MATERIALS AND METHODS

Water collected from downstream area of Ramkund area on 28th in morning and on 29th August 2015 in evening i.e. one day before mass bathing, water collected from downstream area of Ramkund area and then water collected after mass bathing respectively. Samples were collected in 2 lit. capacity of clean polythene bottles. Collected sample was analyzed for following parameters Temperature, pH, Electrical Conductivity, Total Hardness, Chloride and Dissolved Oxygen.

The temperatures, pH of the water samples were determined on the spot using a Thermometer and portable pH meter respectively. Electrical Conductivity measured by Conductivity meter. Total Hardness was measured by EDTA titrimetric method using EBT indicator. Chloride contents by Argentometric method using potassium chromate as an indicator and Dissolved Oxygen was determined by using Winkler's Iodometric method. [4, 5]

III. RESULTS AND DISCUSSION

After analysis obtained results are shown in table no.1 and further it compared with the BIS and WHO standards from table no.2

Table No.1- Obtained results from Ramkund downstream area, before and after mass bathing.

Parameter	Before mass bathing (28th Aug.2015)	After mass bathing (29th Aug.2015)
Temp. ^{0}C	24^{0}C	24^{0}C
pH	7.22	8.14
EC (µS/cm)	534.5	982
TH (mg/l)	198	346
Chloride (mg/l)	168.6	242.8
D.O.(mg/l)	4.8	2.6

Table No.2: Drinking water standards

Sr. No.	Parameters	BIS (IS 10500-91)		WHO
		Desirable Limit	Max. permissible Limits in the absence of alternate source	
1	Temperature (^{0}C)	-	-	-
2	pH	6.5 to8.5	No relaxation	6.5 – 8.5
3	Electrical Conductivity (µS/cm)	-	300	-
4	Total Hardness as $CaCO_3$(mg/l)	200	600	500
5	Chloride (mg/l)	250	1000	250
6	Dissolved Oxygen	-	-	-

pH: Before one day of mass bathing pH of Ramkund downstream water was found 7.22 and it was found 8.14 after mass bathing. Ramkund downstream water sample was found within the desirable limits of BIS and WHO. Most of the times, in natural water pH is controlled by the carbon dioxide-carbon-bicarbonate equilibrium system. pH of water is influenced by geology of catchments area and buffering capacity of water [6].

Electrical Conductivity: Before one day of mass bathing, Electrical Conductivity was found 534.5 µS/cm and it was found 982 µS/cm after mass bathing. Ramkund downstream water sample was

found above the permissible limits of BIS. Nirmalya visarjan, religious activities, bathing and Asthi visarjan are daily activities at Ramkund area such activities may causes high electrical conductance at Ramkund site.

Total Hardness: Before one day of mass bathing, TH of water was found 198 mg/l and it was found 346mg/l after mass bathing. A Ramkund downstream water sample was found above the desirable limits of BIS and it was found within limits given by WHO before mass bathing but it was found above the limits given by WHO after mass bathing. The high concentration of Total Hardness in water Samples may be due to dissolution of polyvalent metallic ions from sedimentary rocks, seepage and run off from the soil. [7]

Chloride: Before one day of mass bathing, Chloride of water was found 168.6 mg/l and it was found 242.8 mg/l after mass bathing. A Ramkund downstream water sample was found within the desirable limits of BIS and WHO.

Dissolved Oxygen: Before one day of mass bathing D.O. of water was found 4.8 mg/l and it was found 2.6 mg/l after mass bathing. For outdoor bathing limit given by CPCB is 5mg/l or above that. On both days D.O. was found below the limit given by CPCB. On second day D.O. level decreases compared to first day. This clearly indicates contamination at sampling sites by anthropogenic activities. Oxygen decreases in water due to decomposition of organic matter, oxygen demanding wastes. [8]

IV. CONCLUSION

pH and Chloride in downstream area of ramkund was found within desirable limit of BIS and WHO. Electrical Conductivity, Total Hardness of Ramkund downstream area found above the permissible limits of BIS. Total Hardness of water found within limit given by WHO. Low level of DO on both days indicates low oxygen level due to organic matter.

Holy dip in downstream area of Ramkund, Nirmalya visarjan, religious activities, bathing and Asthi visarjan are daily activities at Ramkund, such activities may decreases Dissolved Oxygen in water.[3] Increased level of pH, EC, TH and decreased level of Dissolved Oxygen in water clearly indicates water pollution problem at Ramkund downstream area, after mass bathing.

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