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Research Article

ASSESSMENT OF WATER QUALITY IN KRISHNA RIVER DURING PUSHKARA

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ABSTRACT

An attempt was made to assess the river water quality during pushkara i.e 12th to 23rd of August 2016. For this study water samples were collected from important and selected ghats of Krishna River where the maximum pilgrims took holy bath/pushkara snanam. Water samples were collected from the eight ghats during 12 days of pushkara and analysed in research laboratory for essential parameters like pH, electrical conductivity, total dissolved solids, dissolved oxygen, and total coliform bacteria. The results were compared with standards of CPCB. From the results it was found that the most of the parameters of Krishna river water are within the permissible limit of CPCB and all the water samples were found excess total coliform which can influence human health. This study suggests proper chlorination and monitoring hygienic conditions at pushkar ghats need to be managed by concerned authorities.

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INTRODUCTION

Krishna River rises at Mahabaleswar in district Satara, Maharashtra in the west and meets the Bay of Bengal at Hamasaladeevi in Andhra Pradesh, on the east coast. It flows through Maharashtra, Telangana, Andhra Pradesh and Karnataka. The delta of this river is one of the most fertile regions in India and was the home to ancient Shathavahana and Ikshvaku Dynasty kings. The river flows quickly, causing much erosion in June and August. During this time, Krishna takes fertile soil from Maharashtra, Karnataka, Telangana and western Andhra Pradesh towards the delta region.

The river has a number of tributaries but Tungabhadra is the principal tributary. Other tributaries include the Mallaprabha, Koyna, Bhima, Ghataprabha, Yerla, Warna, Dindi, Musi and Dudhganga. Leaving Mahabaleswar behind, the Krishna takes the form of the Dhom lake in Panchgani, a popular hill station just 17 km from Mahabaleswar. Crisscrossing its way through Wai, Narsobachi and Wadi (near Kolhapur) in Maharashtra, the river enters Karnataka at Kurundwad, 60 km from Kolhapur. In Karnataka, the river passes through the Belgaum, Bijapur and Gulbarga districts, covering a total distance of 220 km. The Krishna enters Andhra Pradesh near Deosugur in Raichur district and meanders through Mahaboob nagar, Kurnool, Guntur and Krishna districts. The river merges into the Bay of Bengal at Hamasaladeevi. Two dams, Srisailem and Nagarjuna Sagar are constructed across the Krishna River. Nagarjuna

Sagar Dam is world's tallest masonry dam (124 meters). Krishna Basin extends over an area of 258,948 square kilometers which is nearly 8% of total geographical area of the country. The basin lies in the states of combined Andhra Pradesh (113,271 km²), Karnataka (76,252 km²) and Maharashtra (69,425 km²). Most part of this basin comprises rolling and undulating country except the western border which is formed by an unbroken line of ranges of the Western Ghats. The important soil types found in the basin are black soils, red soils, Laterite and lateritic soils, alluvium, mixed soils, red and black soils and saline and alkaline soils. An average annual surface water potential of 78.1 km³ has been assessed in this basin. Out of this, 58.0 km³ is utilizable water. Cultivated area in the basin is about 203,000 km², which is 10.4% of the total cultivated area of the country. In 2009 October heavy floods occurred, isolating 350 villages and leaving millions homeless, which is believed to be first occurrence in 1000 years. The flood resulted in heavy damage to Kurnool, Mahabubnagar, Guntur, Krishna and Nalagonda Districts.

Pushkaram or Pushkaralu (in Telugu), Pushkara or Puskar is an Indian festival dedicated to worshipping of rivers. Pushkara or Pushkar is a Sanskrit word derived from the element of Push (Pushti) meaning nourishment and Kara means one who does it. Pushkara is the energy that nourishes. With reference to the sacred rivers, pushkara means the one who energize the rivers and provide spiritual purification. Pushkara also means Lotus, sanctified water, swan, Swoord, Sky, Lake etc. Pushkaram is a

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festival of rivers that is applicable only to the 12 important rivers in India which occurs once in 12 years for each river. The rivers Ganga, Narmada, Saraswathi, Yamuna, Godavari, Krishna, Kaveri, Tambrapani, Brahmaputra, Tungabhadra, Indus, and Pranahita are the privileged rivers. The first 12 days period is called Aadhi pushkaram and the last 12 days period is called Anthya pushkar. In 2016, the celebration started on 12 August and ended on 23 August. The present study deals with the water quality and bacterial contamination assessment of Krishna River during pushkara August 12th to 23rd 2016 (12days)..

Sample Collection Site: Krishna River is the major lotic system of district, considered as longest rivers in India, measuring about 1300 km in length. Approximately 105 Kms of riverine flow covers the district. The river originates at Mahabaleshwar, passes through Maharashtra, Andhra Pradesh and Telangana State and conjoins the sea in the Bay of Bengal at Hamasaladevi (Andhra Pradesh). The mean annual discharge of water is 67305 m drainage area is 2,68786 Sq. Km 26.8% in Maharashtra, 43% in Karnataka and 29.4% in combined Andhra Pradesh (APHA, 1989).

Water samples were collected from different ghats (bathing places) of Krishna River where the maximum pilgrims have taken bath/holy dip.

Sampling stations

Table1

Sample code	Sampling station	Latitude	Longitude
S1	Alampur ghat	15 87 82	78° 13 71
S2	Beechupally ghat	16° 15 23	77° 93 54
S3	Jurala ghat	16° 33 44	77° 71 08
S4	Pasupula ghat	16° 36 12	77° 53 95
S5	Nettempadu ghat	16° 33 60	77° 59 66
S6	Jetprolu ghat	16° 05 68	78° 21 62
S7	Somashila ghat	16° 04 37	78° 33 50
S8	Gummadam ghat	16° 08 40	78° 04 15

MATERIALS AND METHODS

The water has been collected from above mentioned ghats during day time. Sample method was followed as suggested in APHA, Methods for collection and analysis of water samples. Sampling was done at the station/ghat in polythene bottles of two-liter capacity. Sampling has been done during 12days(12th to 23rd) of holy pushkara in the month of August 2016. The samples were analysed in the research laboratory, Department of Environmental Sciences, Sri Venkateswara University, Tirupati. The analysis was carried out for determination of required properties of River water such as: pH, Electrical Conductivity, Dissolved Oxygen, Dissolved Solid, and total coliform etc.

Required parameters of these samples were determined by using standard procedure.

pH: The pH was determined by Elico Digital pH meter which gives direct value of pH.

Electrical Conductivity: The conductivity was determined by using digital conductivity meter. The Conductivity meter used is Lavibond made Senso Direct Con.200.

Total Dissolved Solid: The 50 ml of water sample was filtered through ordinary filter paper and water was collected in the

evaporating dish of known weight. Further it was heated and water was totally evaporated. Whatever dissolved solid matter was present gets accumulated at the bottom of evaporating dish. The evaporating dish was cooled and weighed. By weight difference method the total dissolved solid is determined.

Dissolved Oxygen: The percentage of DO was determined by using Lavibond made Senso Direct Oxi.200.

Coliform test: Total coliform tests was determined by using standard microbial count method as prescribed by EPA method 1604.

During the pushkara (12th to 23rd of August 2016) water samples were analysed, average values of 12 samples mentioned in the tabular form.

Table2 pushkar ghats water quality

Sample Code	Location	pH	EC μ siemen/cm	TDS mg/lit	DO mg/lit	T.Coliform MPN
S1	Alampur ghat	8.4	520	265	5.2	4946
S2	Beechupally ghat	8.2	478	240	5.8	4550
S3	Jurala ghat	8.3	362	182	4.6	3650
S4	Pasupula ghat	8.0	310	148	5.1	3614
S5	Nettempadu ghat	8.3	716	363	6.8	4921
S6	Jetprole ghat	8.4	711	353	7.4	4196
S7	Somashila ghat	8.5	697	346	7.8	4354
S8	Gummadam ghat	8.1	648	325	5.3	4860

RESULTS AND DISCUSSIONS

pH: It was found that pH of the river water slightly varies in studied locations. This variation is due to change in alkalinity of water sample. The pH value ranges from 8.0 to 8.5. The highest value (8.5) found in Somashila ghat(S7) water sample and the lowest value(8.0) found at Pasupula ghat(S4). The pH is graphically represented in Fig No.1.

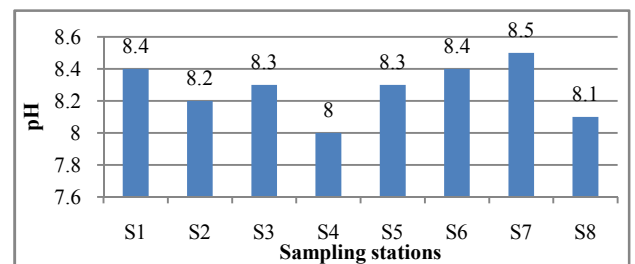


Fig No1 Graphical representation of pH present in Krishna River during pushkara.

Electrical Conductivity: The electrical conductivity varies from 310 μ S to 716 μ S. Electrical conductivity indicates the number of dissolved inorganic and organic ions. The conductivity of Krishna River water at Nettempadu ghat site is increased.

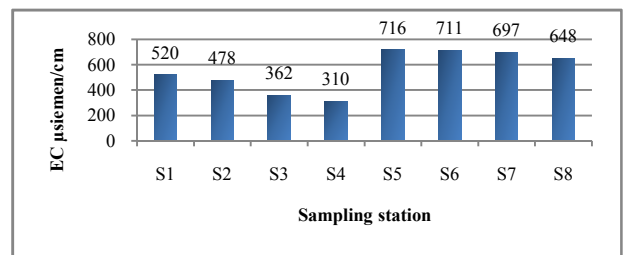


Fig 2 Graphical representation of EC Values present in Krishna River during pushkara.

This increase may be due to the effects of various anthropogenic activities performed at river site. The electrical conductivity is graphically represented in Fig No.2.

Total Dissolved Solids: An attempt was made to determine the total dissolved solids content of Krishna River water. From the result it is clear that the total dissolved solid content decreased along with downstream of River except Jurala and Pasupula ghats. This decrease may be due to the adsorption of dissolved salts on earth surface, natural purification systems like sunlight and microbial activities in the riverbed. Further the value has been increased which may indicates manmade activities performed at river site. The TDS is graphically represented in Fig No.3.

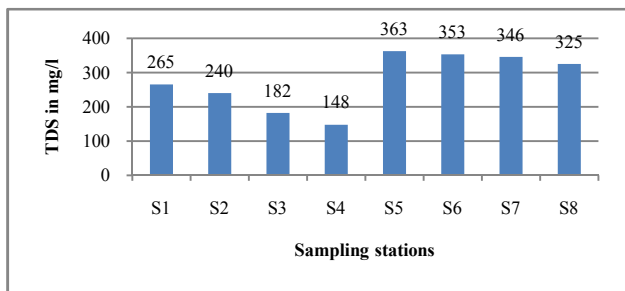


Fig 3 Graphical representation of TDS values present in Krishna River during pushkara.

Dissolved Oxygen: The maximum concentration of oxygen that can be dissolved in water is function of temperature and therefore dissolved oxygen content of water may vary from place to place and time to time. In India average tropical temperature is 27 C. Corresponding to this temperature, average dissolved oxygen saturation concentration is reported to be 8 ppm. This is the saturation limit at specific temperature, this represents 100% concentration.. The percentage of DO is suitable for survival of aquatic life. Percentage D.O. is graphically represented in Fig. No.4

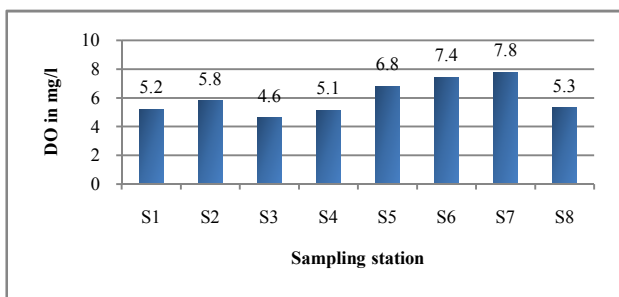


Fig 4. Graphical representation of Dissolved Oxygen present in Krishna River during pushkara.

Total Coliform: Total Coliform was found in the ranges from 3614 to 4946 MPN/100ml in the pushkar ghats. The highest total coliform found in Alampur pushkar ghat(S1) and lowest was found in Pasupula pushkar ghat(S4). The Central Pollution Control Board(CPCB), New Delhi prescribed limit for total coliform for bathing water should not exceed 500MPN/100ml where as all the samples exceeds in limits which indicates high contamination. This may due to high no. of pilgrims took holy dip in pushkar ghats.

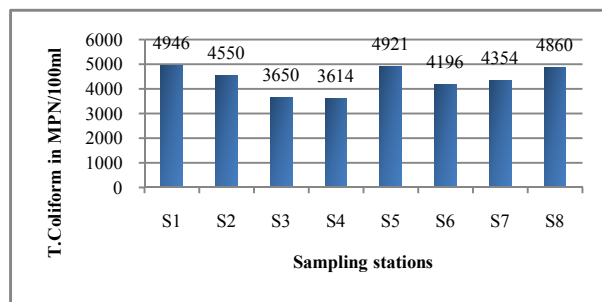


Fig 5 Graphical representation of Total Coliform present in Krishna River during pushkara.

CONCLUSION

This study concludes that the deterioration in Krishna river pushkar water quality is found. Dissolved oxygen content should be 5mg/l as prescribed by CPCB where as this study is concerned, except Jurala ghat(S3) water sample found within the limits of dissolved oxygen and all the other samples were found excess in limits. This may due to presence of oxidizing agents like using soaps and shampoos for bath in ghat areas. Microbial study reveals that all the water samples consists excess total coliform content as prescribed by CPCB limits which indicates high microbial contamination which leads to severe skin problems to pilgrims who has taken bath. It is advised to control human activities like improper disposal of refuse, mixing of ash or residues of dead body, contamination of water by sewage, surface runoff. Therefore awareness programmes must be organized to educate the general populace on the proper disposal of refuse, treatment of sewage and the need to purify river water to make it fit for drinking and bathing because the associable organisms are of public health significance being implicated in one form of infection or the other.

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