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A STUDY ON THE WATER QUALITY DURING GODAVARI PUSHKARAM, RAJAHMUNDRY, ANDHRA PRADESH

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Abstract

Introduction: Godavari Pushkaram is a festival of rivers pertains to 12 rivers in India which occurs once in 12 years. The present study reveals how the Godavari water is contaminated during Pushkaram. The present study was aimed at assessing the quality of river water during Pushkaram. To analyze the physical and microbiological parameters of the water from Godavari Puskar Ghat during the time of Pushkaram. To suggest about the quality and purification measures from the study.

Material and Methods: This is a prospective study conducted from the Department of Community Medicine, GSL Medical College, Rajahmundry. The samples were collected at the Main Ghat for Pre, during and Post Pushkaram. Standard methods are used for sampling collection, preservation and estimation of physico chemical and microbial parameters like PH, Electrical Conductivity, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Total Coliform count and E-Coli.

Results The natural PH range of a river is largely determined by the geology and soils of the area. The fluctuations in PH value of river water can affect the aquatic life. In the present study the lowest value of PH is recorded in the month of July i.e., 6.02 at station S1. This is due to anthropogenic activities during Pushkaram in Godavari River. The conductivity of water is an expression of its ability to conduct an electric current [EPA 2001]. Variations in temperature are greatly affected the conductivity of water. If there is change in chloride ion, sulphate ion, sodium, magnesium, calcium, iron affects the conductivity of water. In the present study the highest electrical conductivity is recorded in the month of July i.e., 561 µS/cm at station S1. This is because there lots of pollutants are discharged into the water during Pushkaram due to human activities.

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Conclusion: There is a deviation of PH, Electrical Conductivity, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Total Dissolved Solids (TDS), sulphate from standard values during Pushkaram. But there is a drastic change in E-Coli which causes health problems. Due to different anthropogenic activities during Pushkaram there is a disturbance created in the physico chemical and microbial aspects of Godavari water causes health problems and creates imbalance in water ecosystem.

Keywords: Godavari Pushkaram, E-Coli, Biological Oxygen Demand.

Introduction

Godavari holds the special religious importance in India. Godavari is one of the sacred river in India. According to the puranas river Ganga should only be visited after the visit to the Godavari. There 9 are several temples and pilgrimage places on the banks of the river. Godavari, is the second longest river in India after the river Ganges is also referred as "Dakshin Ganga or "Ganga of South". It is one of the large river basins and the only river in India that flows from west to east.

Godavari Pushkaram is a festival of rivers pertains to 12 rivers in India which occurs once in 12 years. The Godavari Pushkaram held last time in the year 2003. During Godavari Pushkaram lakhs of people from all over the country took a dip and bath in the river Godavari. In the year 2015 from July 14th to 25th lakhs of people from different places of the country too bath in the river Godavari. So, in that time Godavari water quality is degraded due to anthropogenic activities. Water pollution affects the entire biosphere. In almost all cases the effect is being damaged not only to individual species and population but also the natural biological communities.

Water is the basic need for human beings. Rivers are the sources of water for drinking, for obtaining food etc. In terms of length, catchment area and discharge the Godavari River is the largest in peninsular India and had been dubbed as the Dakshina Ganga – The south Ganges River. Godavari originates at Triumbakam, Nasik District of Maharashtra state and flows through southern state of Andhra Pradesh and reaches the Bay of Bengal. Godavari water plays a key role in providing potable water, transportation, electricity, and dams' construction.

The present study reveals how the Godavari water is contaminated during Pushkaram. The present study was aimed at assessing the quality of river water during Pushkaram. To analyze the physical and microbiological parameters of the water from Godavari Puskar Ghat during the time of Pushkaram. To suggest about the quality and purification measures from the study.

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Material and Methods

This is a prospective study conducted from the Department of Community Medicine, GSL Medical College, Rajahmundry.

The samples were collected at the Main Ghat for Pre, during and Post Pushkaram. Standard methods are used for sampling collection, preservation and estimation of physico chemical and microbial parameters like PH, Electrical Conductivity, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Total Coliform count and E-Coli.

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.

One liter of samples was collected for physico chemical and microbial analysis from each station into pre sterilized bottles without air bubbles. All the samples are stored at low temperature which is less than 4°C and above freezing point. In order to minimize the volatilization or biodegradation between sampling and analysis, we kept the samples as cool as possible without freezing. PH and electrical conductivity were analyzed immediately after sampling collection. In the present study for analyzing the iron in water, water samples were collected in a separate clean bottle and acidified with acid.

Statistical Analysis

During Pushkaram, data were analyzed for the Upstream, Main Ghat and Downstream to the Main Pushkaram Ghat of Rajahmundry.

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Results

Fig 1. Comparative analysis of pH, Conductivity, Dissolved Oxygen & BOD at Main Ghat

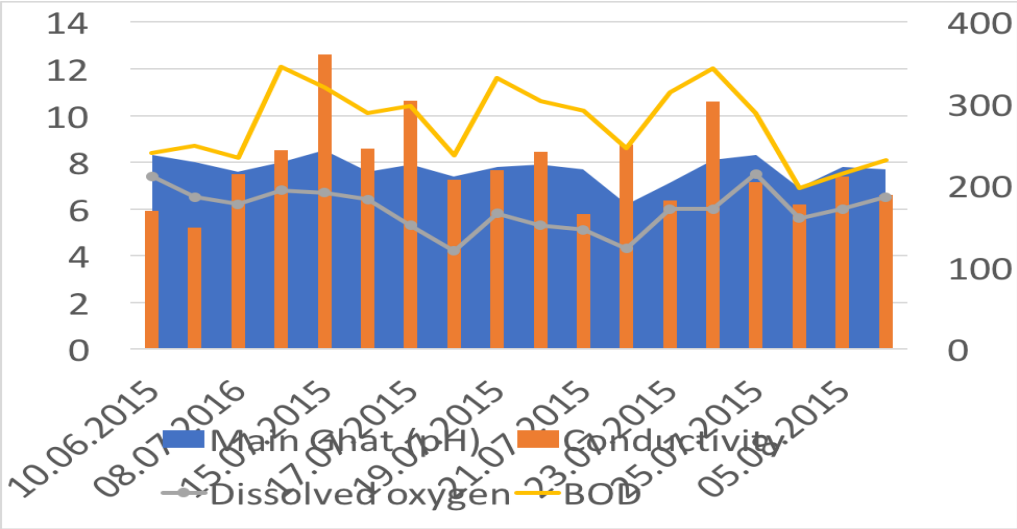

Fig 2. Comparative analysis of Total Coliform & E. Coli colony count at Main Ghat

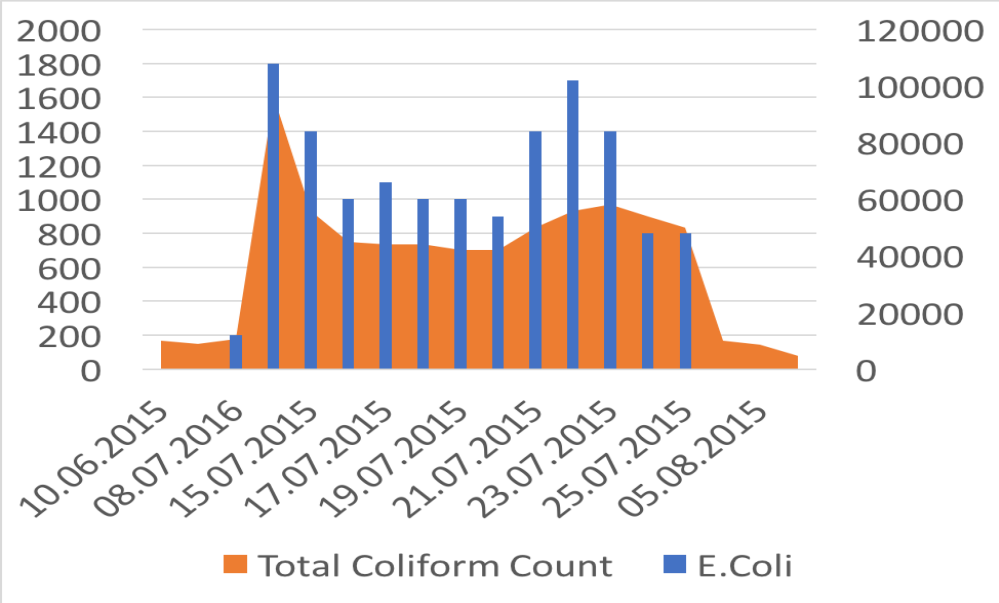

Table 1. Comparison of pH value at Up, Main and Down stream during Pushkaram

Date	Up Stream	Main Ghat	Down Stream
14.07.2015	8.6	8.0	8.6
15.07.2015	8.2	8.5	8.4
16.07.2015	7.8	7.6	8.4
17.07.2015	7.1	7.9	8.2
18.07.2015	7.0	7.4	7.8

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19.07.2015	7.0	7.8	7.5
20.07.2015	7.2	7.9	7.3
21.07.2015	6.8	7.7	7.2
22.07.2015	7.1	6.2	7.2
23.07.2015	6.6	7.1	7.5
24.07.2015	7.5	8.1	8.3
25.07.2015	8.3	8.3	8.0

Fig 3. Comparison of Conductivity at Up, Main and Down stream during Pushkaram

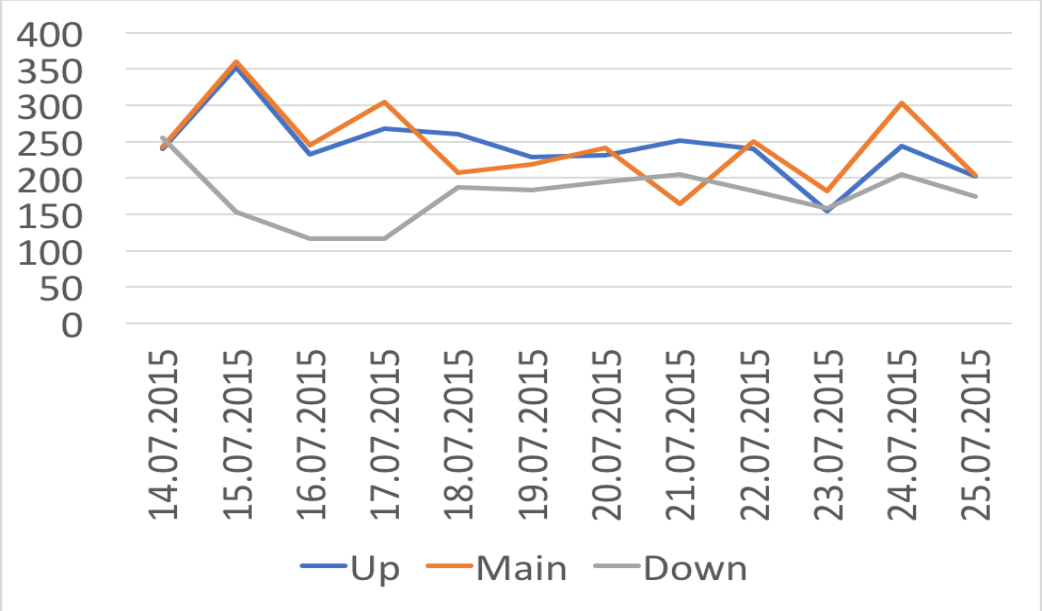

Fig 4. Comparison of Dissolved Oxygen at Up, Main and Down stream during Pushkaram

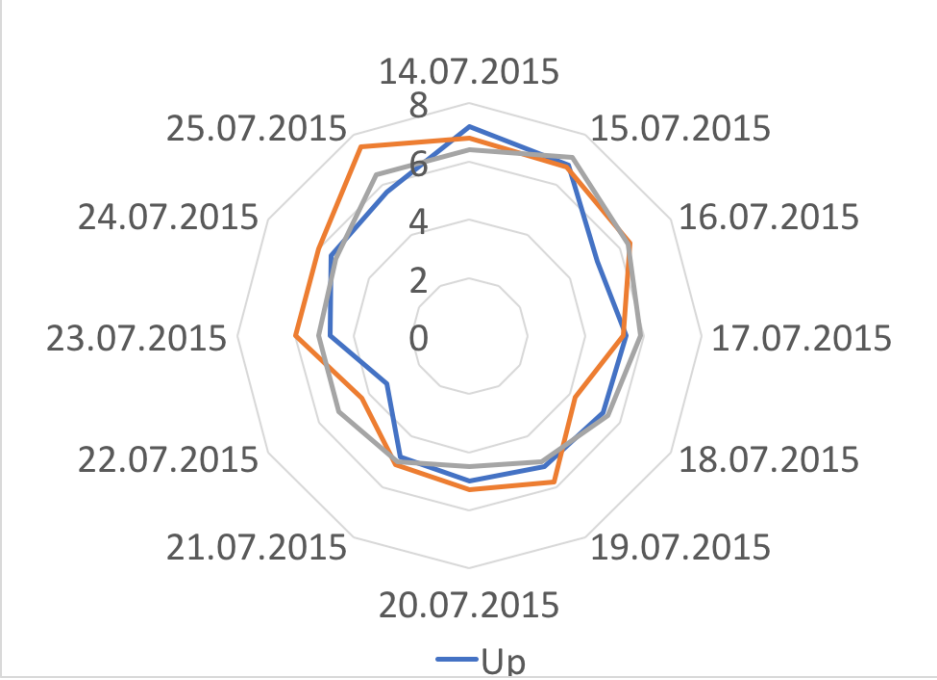

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Fig 5. Comparison of BOD at Up, Main and Down stream during Pushkaram

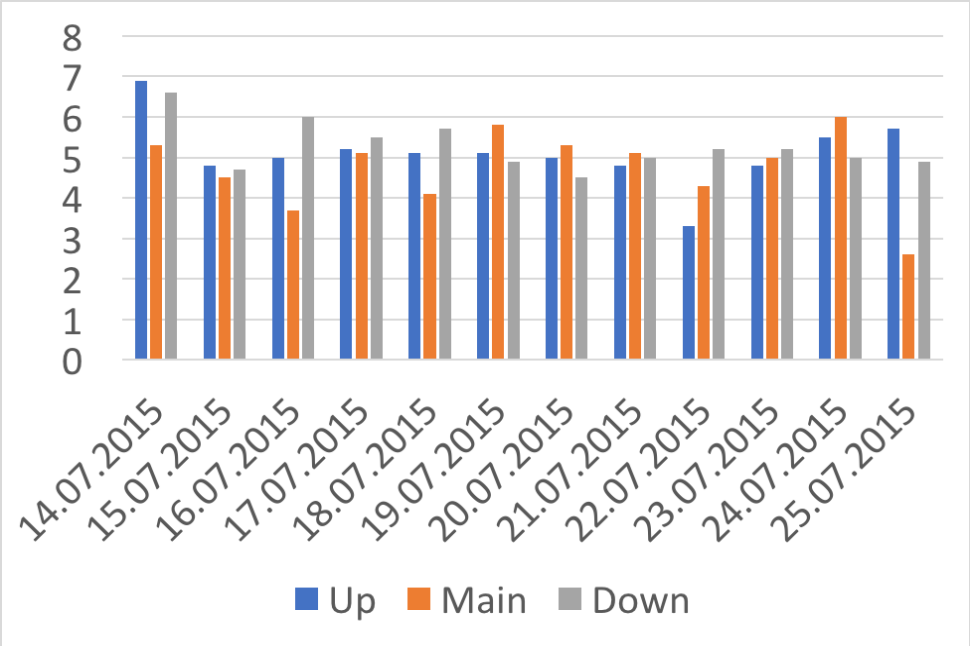

Fig 6. Comparison of Total Coliform Count at Up, Main and Down stream during Pushkaram

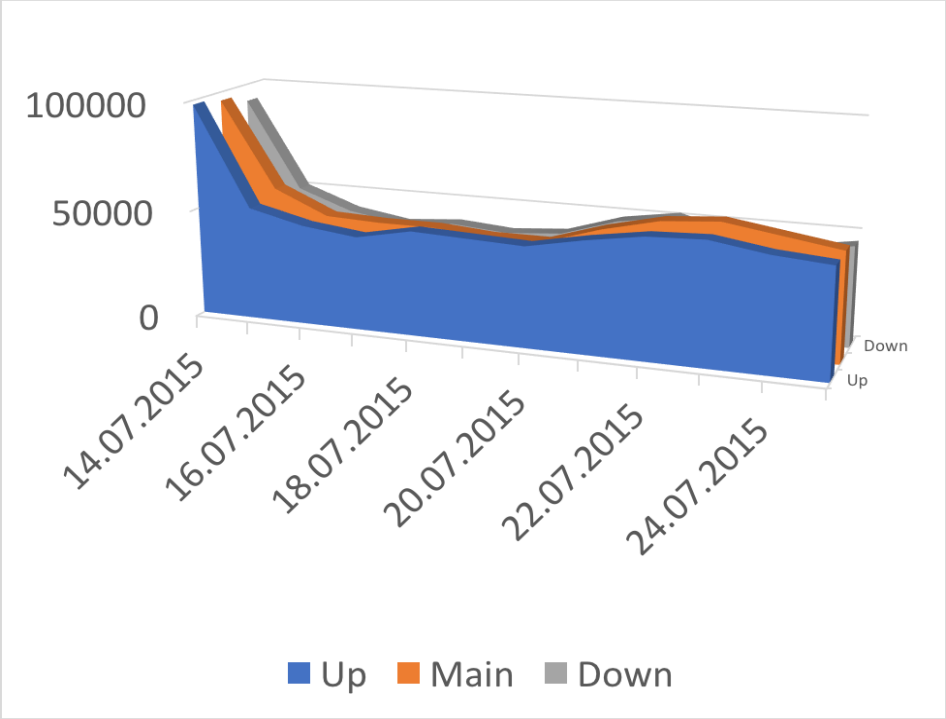

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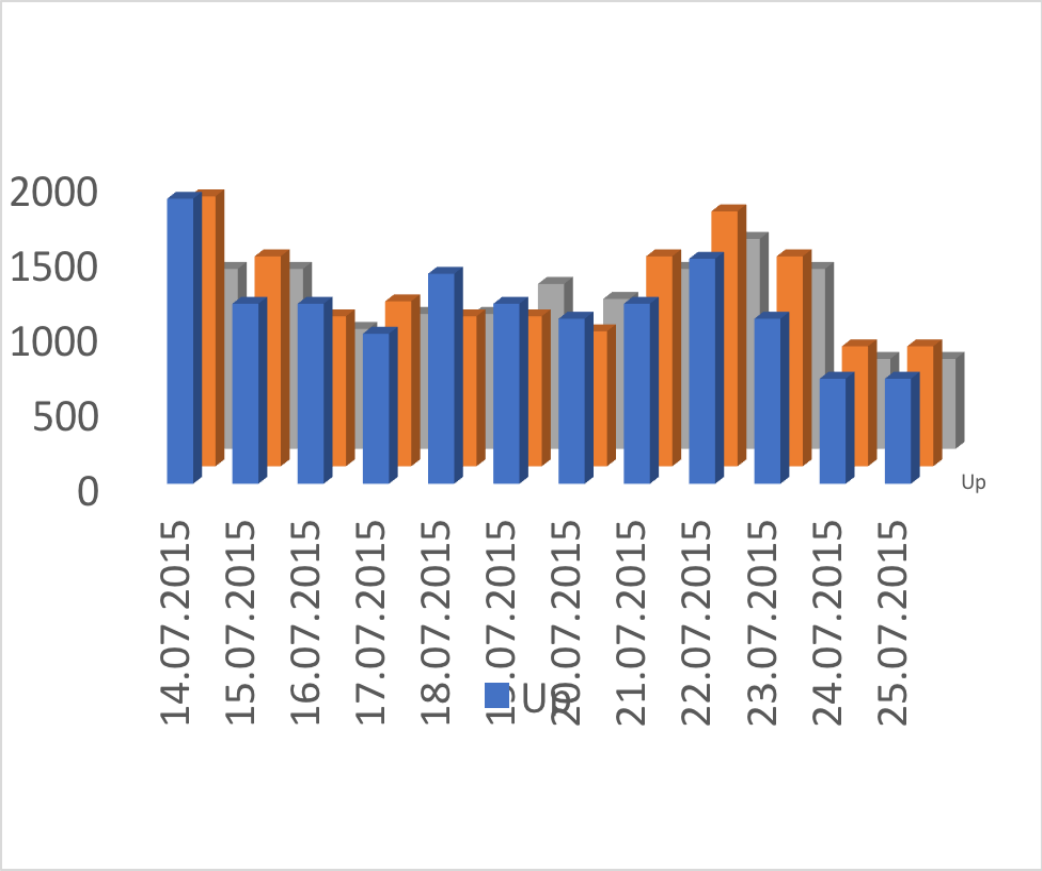
Fig 7. Comparison of E. Coli count at Up, Main and Down stream during Pushkaram



Discussion

PH: The natural PH range of a river is largely determined by the geology and soils of the area. The fluctuations in PH value of river water can affect the aquatic life. In the present study the lowest value of PH is recorded in the month of July i.e., 6.02 at station S1. This is due to anthropogenic activities during Pushkaram in Godavari River. The variations in PH from Jan 2015– DEC 2015 are represented in table 2 and average monthly variations in all stations.

Electrical Conductivity (EC): The conductivity of water is an expression of its ability to conduct an electric current [EPA 2001]. Variations in temperature are greatly affected the conductivity of water. If there is change in chloride ion, sulphate ion, sodium, magnesium, calcium, iron affects the conductivity of water. In the present study the highest electrical conductivity is recorded in the month of July i.e., 561 µS/cm at station S1. This is because there lots of pollutants are discharged into the water during Pushkaram due to human activities. The variations in electrical conductivity from Jan 2015– DEC 2015 and average monthly variations in all stations.

Dissolved Oxygen (DO): the dissolved oxygen content of water is influenced by the source i.e., raw water temperature, treatment and chemical and biological processes taking place in the distribution system. Depletion of dissolved oxygen in water supplies can encourage the microbial

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reduction of nitrate to nitrite and sulphate to sulphide [WHO 2011]. In the present study the lowest value of D O is recorded in the month of July i.e., 4.5 mg/lit at S1. Because of human activities during Pushkaram, D O decreases and is below the permissible limit. This lower value of D O affects the aquatic life. The variations in D O from Jan 2015– DEC 2015 are represented in table 6 and average monthly variations in all stations.

Biological Oxygen Demand (BOD): if the D O of water decreases then consequently BOD of water increases. High value of BOD represents the water gets polluted. In the present study the highest value of BOD is recorded in the month of July i.e., 54.5 mg/lit at S1. This elevated BOD values represents lots of pollutants are discharged into the water by human activities during Pushkaram. The variations in BOD from Jan 2015– DEC 2015 are represented in table 7 and average monthly variations in all stations.

E-Coli: E-Coli provide conclusive evidence of recent faecal pollution and should not be present in drinking water [WHO 2011]. High number of E-Coli in water affects the human health. In the present study the highest number of E-Coli is recorded in the month of July i.e., 10,525 colonies/ml at station S1 during Pushkaram. This drastic increase is because lakhs of people took bath in the Godavari water during Pushkaram and discharge lot of pollutants into the water. The variations in EColi from Jan 2015– DEC 2015 are represented in table 17 and average monthly variations in all stations are represented.

Conclusion

There is a deviation of PH, Electrical Conductivity, Total Hardness, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Total Dissolved Solids (TDS), sulphate from standard values during Pushkaram. But there is a drastic change in E-Coli which causes health problems. Due to different anthropogenic activities during Pushkaram there is a disturbance created in the physico chemical and microbial aspects of Godavari water causes health problems and creates imbalance in water ecosystem.

Recommendation

1.Bathing Water Treatment needs to be given priority.
2.The Treatment of Water should be continuous.
3.Bathing Ghats can purified with Hypochlorite solution as a cheap alternative.
4.A separate Team for maintaining Water Quality Headed by a MHO need to established.

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