

CONTAMINATION OF WATER DURING PUSHKARA AND ITS MEASURES

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ABSTRACT

During pushkara i.e, 12th to 23rd august 2016 an attempt was made to assess the Krishna river water. Water Samples were collected for all the 12 days from seven ghats of Krishna River where pilgrims took holy bath for the assessment of water. This water samples were analysed in the research laboratories for the parameters like pH, chlorides, alkalinity, total hardness, total dissolved solids, total suspended solids, electrical conductivity, biochemical oxygen demand, chemical oxygen demand, dissolved oxygen, t-coli. The observed results were compared with the standards of PCB. It was found that most of the parameters are within the permissible limits from the results obtained. Excess total Coliform was found in the water samples which can influence the human health. The following study suggests proper chlorination and monitoring hygienic conditions at pushakra ghats which needs to be managed by concerned authorities.

INTRODUCTION

Krishna Pushkaralu occurs once in every 12 years and is celebrated with much glory. This is a festival of river Krishna. From the time of entry of Jupiter into Virgo, the pushkaram is observed for a period of 12 days. Though the festival is theoretically observed for all the 12 months that the planet remains in that Sign, only the first 12 days are considered to be most sacred as per the beliefs of Indians. In southern states like Andhra Pradesh, Karnataka and Telangana pushkaram has been an age old practise. This celebration was started on 12th august and ended on 23rd august in 2016.

LITERATURE

- From the article published by IJRSR (International Journal of Recent Scientific

Research) the water samples were collected from different ghats (bathing places) of Krishna River where the maximum pilgrims have taken bath/holy dip are Alampur ghat, beechpally, Jurala, Pasupula, Nettempadu, Jetprolu, Somashila & Gummadam ghats on 12th day of Pushkaralu i.e., 23rd august 2016.

- For this study water samples were collected from various pushkar ghats of Krishna river where maximum pilgrims took holy bath/pushkara snanam. The ghats are *Gadwal(Nadi Agraharam), Beechpally, Alampur, Srishailam at Pathala Ganga, Nagarjuna Sagar Dam, Wadapally Mattapally(Nalgonda)* on all the 12 days of pushkaralu i.e., from 12th august 2016 to 23rd august 2016 with some more detailed tests like pH, Alkalinity, Chlorides, Total Hardness, TSS, COD, BOD, DO, E-coli and conductivity.

DETERMINATION OF pH

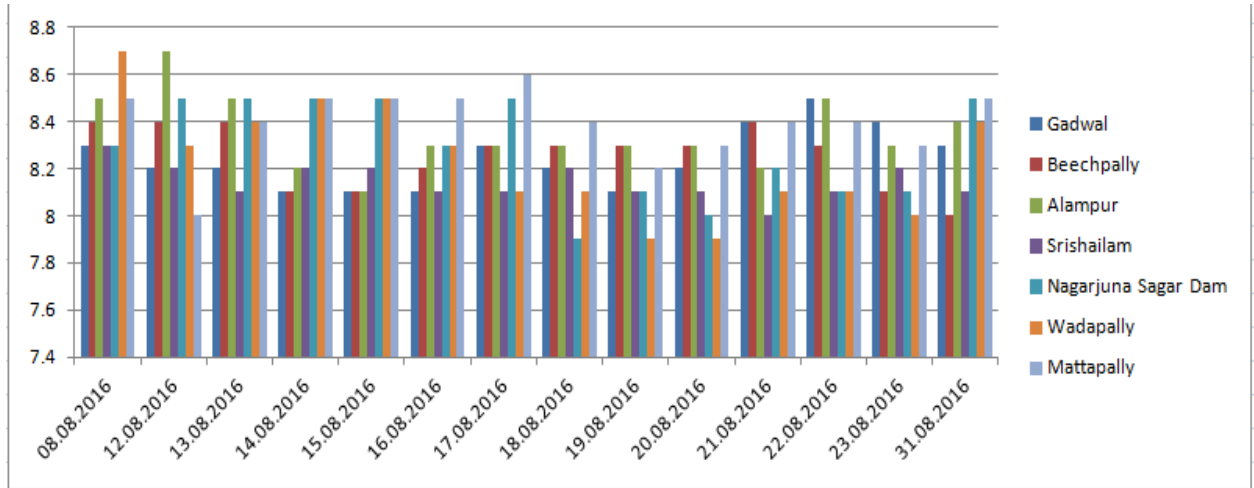
- The term pH refers to the measure of hydrogen ion concentration in solution and is defined as “ the negative logarithm of [H⁺] ion concentration in water and waste water.
- The pH value ranges from 8.0 to 8.7 in all the studied locations. The acceptable pH of portable water is 6.5 to 8.5 according to IS standards.
- pH is determined by using pH meter.

❖ CONTROL MEASURES:

- First step to be done is to identify parameters i.e., pollutants or impurities that are in waste water.
- Once the pollutants are identified, we should determine the starting and ending

pH values , along with a specific treatment procedure; then you have to select the appropriate chemicals best suited for treatment.

pH graph:-



DETERMINATION OF CHLORIDES

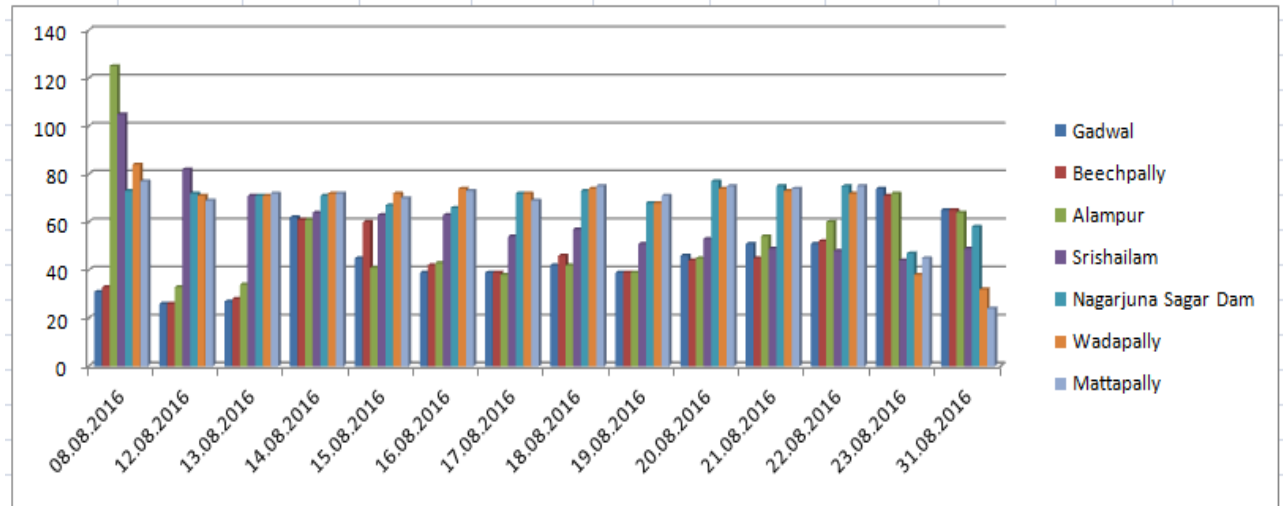
- Chlorides are widely distributed as salts of calcium, sodium and potassium and salt water. In potable water the salty taste produced by chloride concentration is variable and dependent on chemical composition of water.
- Since almost all chloride salts are highly soluble in water, the chloride content ranges from 10 to 100mg/lit.

- The permissible limits according to IS standards is 250mg/lit.

❖ **CONTROL MEASURES:**

- Reverse osmosis will remove 90-95% of chlorides because of its salt rejection capabilities.
- Electrodialysis and distillation are two more processes that can be used to reduce the chloride content of water.

Chlorides graph:-



DETERMINATION OF ALKALINITY

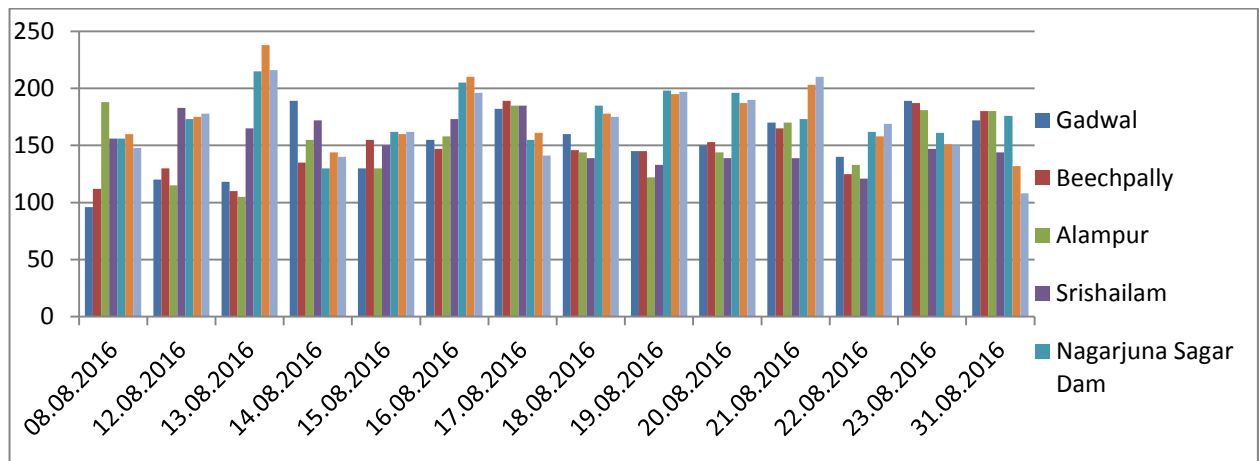
- Alkalinity refers to the capability of water to neutralize acid.
- The possibility to maintain constant pH is due to hydroxyl, carbonate and bicarbonate ions present in water.

❖ CONTROL MEASURES:

- Anaerobic process generally increase alkalinity. Conversely, aerobic degradation can decrease it.
- An increase in [H⁺] ions clearly decreases alkalinity.

Alkalinity

Graph:



DETERMINATION OF TOTAL HARDNESS

- Hard water contains bicarbonates, chlorides & sulphates of calcium & magnesium.

- When treated hard water with soap it gets precipitated in the form of insoluble salts of calcium & magnesium.
- There are two types of hardness.

1. Temporary Hardness

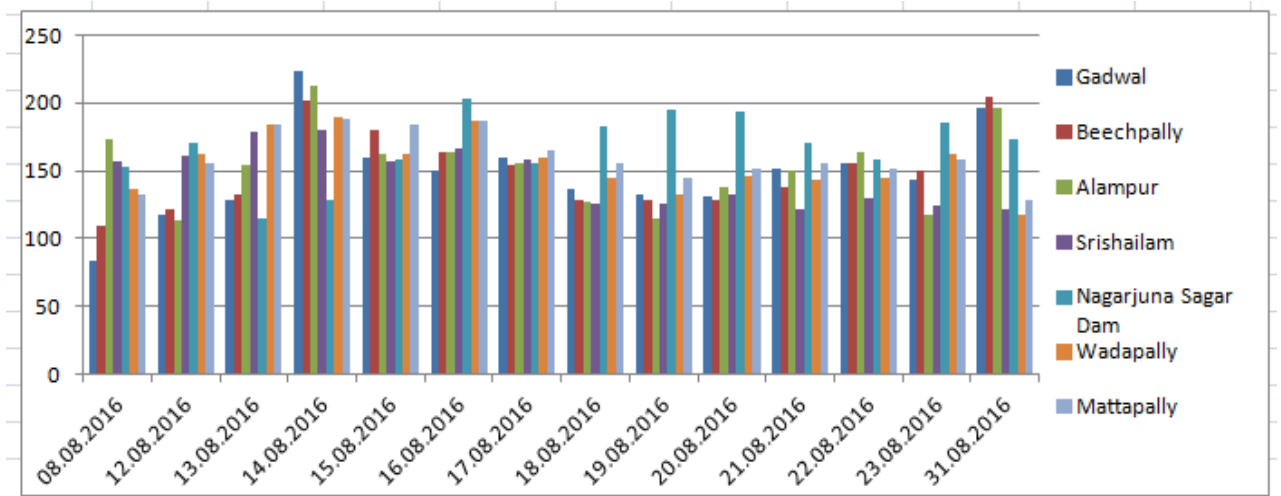
2. Permanent Hardness

- Temporary Hardness is due to the presence of bicarbonates of calcium & magnesium. It can be easily removed by boiling.
- Permanent Hardness is due to the presence of chlorides & sulphates of calcium & magnesium. This type of hardness cannot be removed by boiling.

- To reduce the total hardness of water, certain processes such as water softening can help.
- With softening, the adverse effects of hard water can be reduced significantly.
- In order to test for total hardness, various measures & kits can be used to measure the magnesium and calcium present in water.

CONTROL MEASURES:

TOTAL HARDNESS GRAPH:-



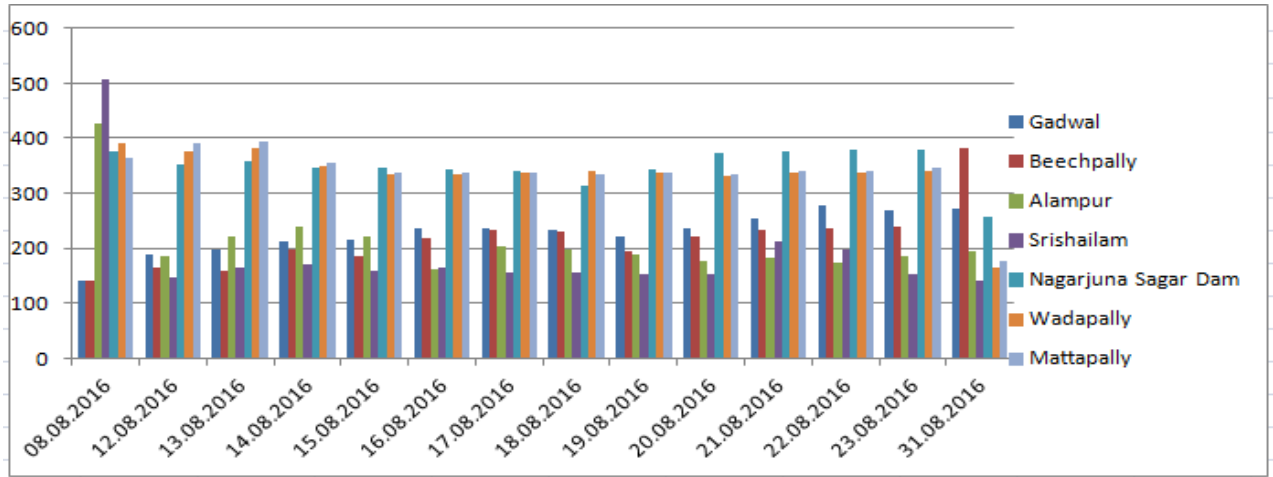
DETERMINATION OF TOTAL DISSOLVED SOLIDS (TDS)

- TDS is a measure of the combined content of all inorganic and organic substances contained in a liquid in molecular, ionized or micro-granular suspended form.
- TDS are normally discussed only for freshwater systems, as salinity includes some of the ions constituting the definition of TDS.
- CONTROL MEASURES:
- If the elevated total dissolved solids are due to actions like calcium, magnesium, and

iron, it may be possible to remove these ions using a water softener.

- This process may not reduce the total dissolved solids concentration, but reduce the aesthetic problems with the water.
- If the problem is associated with an elevated concentration of sodium, chloride, or potassium, the primary recommendations would include a [reverse osmosis system](#) or distillation unit.

TDS GRAPH:-



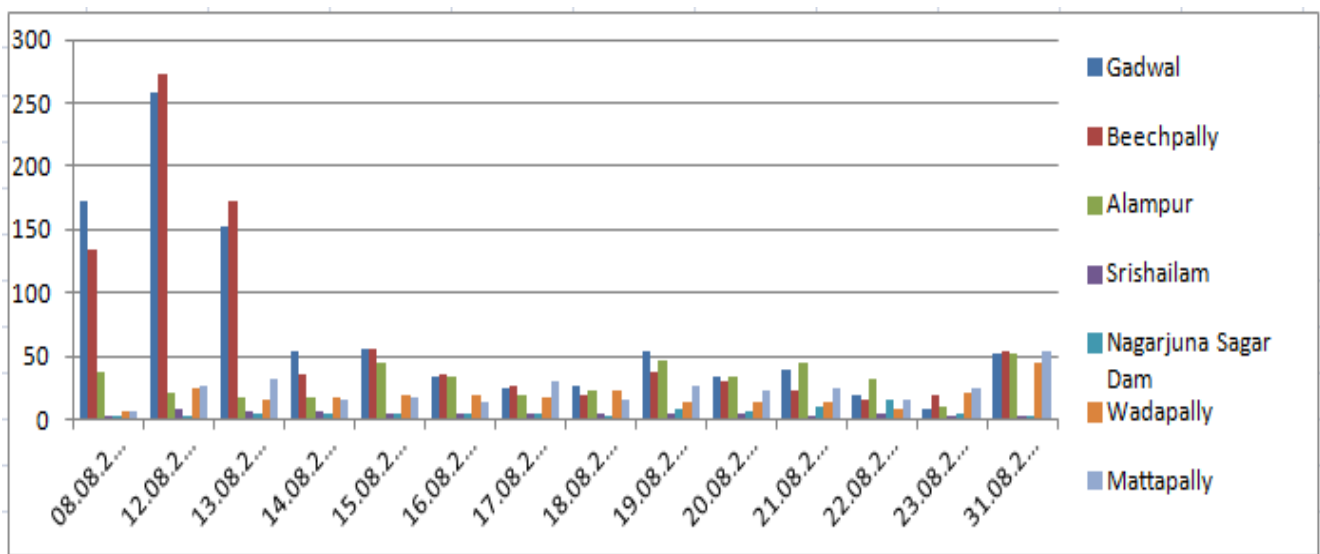
DETERMINATION OF TOTAL SUSPENDED SOLIDS (TSS)

- **Total Suspended Solids (TSS)** are **solids** in water that can be trapped by a filter.
- TSS can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage.
- Concentrations of **suspended solids** can cause many problems for stream health and aquatic life.
- Suspended solids can result from erosion from urban runoff and agricultural land, industrial wastes, bank erosion, bottom

feeders (such as carp), algae growth or wastewater discharges.

- **CONTROL MEASURES:**
- Solid materials in wastewater can consist of organic and/or inorganic materials and organisms. The solids must be significantly reduced by separation methods or they run the risk of causing disease or detrimental environmental effects.
- ALAR's absolute microfiltration technology is capable of reducing TSS to levels less than 100 mg/l (ppm).

TSSGRAPH:-



DETERMINATION OF CONDUCTIVITY

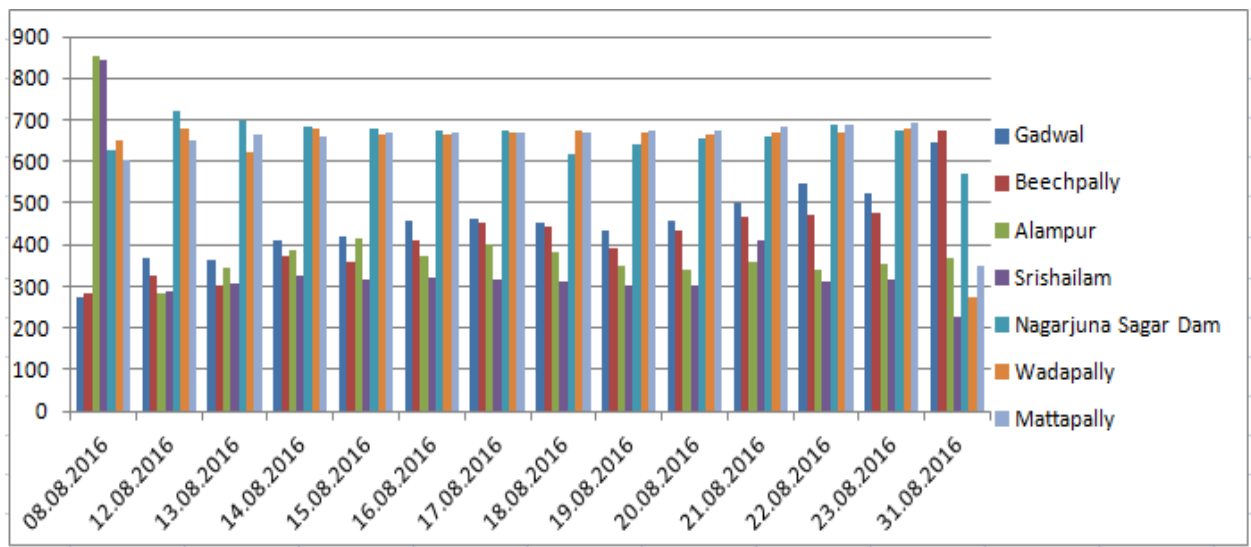
- Conductivity of a substance is defined as the ability or power to conduct or transmit heat, electricity, or sound. When an electrical potential difference is placed across a conductor, it's movable charges flow ,giving rise to an electric current. This property is known as conductivity.

- The electrical conductivity can be expressed in terms as mohs(reciprocal of ohms) or Siemens.

❖ CONTROL MEASURES OF CONDUCTIVITY:

- The addition of fresh water (rain) lowers conductivity because rainwater has low conductivity and the increase in water levels dilutes mineral concentrations.

CONDUCTIVITY GRAPH:-



DETERMINATION OF DISSOLVED OXYGEN

The term dissolved oxygen is used to describe the amount of oxygen dissolved in a unit volume of water. Dissolved oxygen is essential for the maintenance of healthy lakes and rivers. Dissolved oxygen refers to the level of free, non-compound oxygen present in water or other liquids.

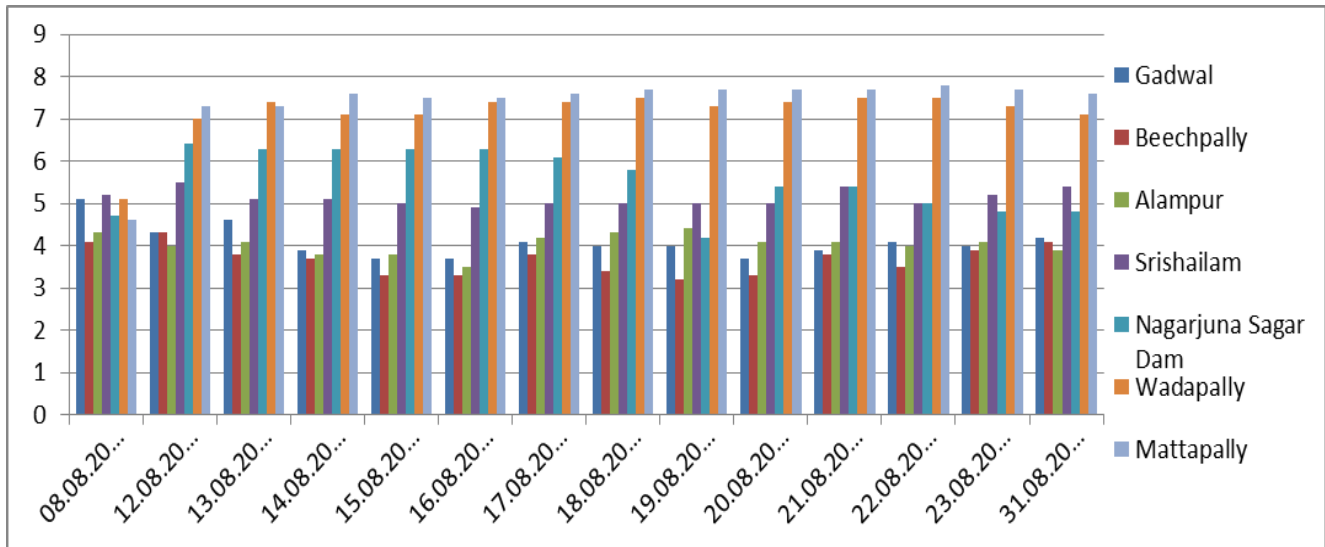
CONTROL MEASURES:-

- The amount of dissolved oxygen often determines the number and types of organisms living in that body of water. For example, fish like trout are sensitive to low DO

levels (less than eight parts per million) and cannot survive in warm, slow-moving streams or rivers.

- According to Henry's Law, the dissolved oxygen content of water is proportional to the percent of oxygen (partial pressure) in the air above it. . As oxygen in the atmosphere is about 20.3%, the partial pressure of oxygen at sea level (1 atm) is 0.203 atm.
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oxygen at sea level (1 atm) is 0.203 atm
DO GRAPH:



DETERMINATION OF BIOCHEMICAL OXYGEN DEMAND

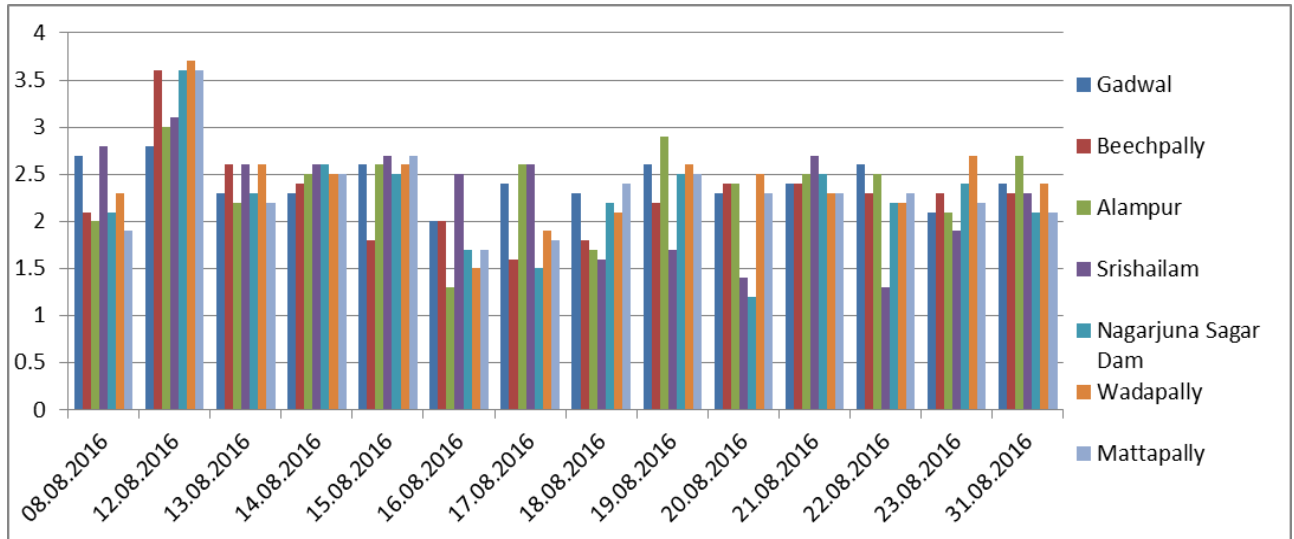
Biochemical oxygen demand (BOD, also called biological oxygen demand) is the amount of dissolved oxygen needed (i.e., demanded) by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period.

CONTROL MEASURES:

- If there is no organic waste present in the water, there won't be as many bacteria present to decompose it and thus the BOD will tend to be lower and the DO level will tend to be higher.

- Levels of BOD can be reduced by the introduction of low-BOD water from rain or snow melt.
- Additionally, when animals and plants die and settle on the bottom of the water body under conditions that permanently remove them from the water column, BOD levels can drop.
- Ultimately, river waters with high BOD discharge into the oceans where nutrients become highly diluted.
- The high BOD levels of untreated sewage are greatly reduced by wastewater treatment procedures

BOD GRAPH:



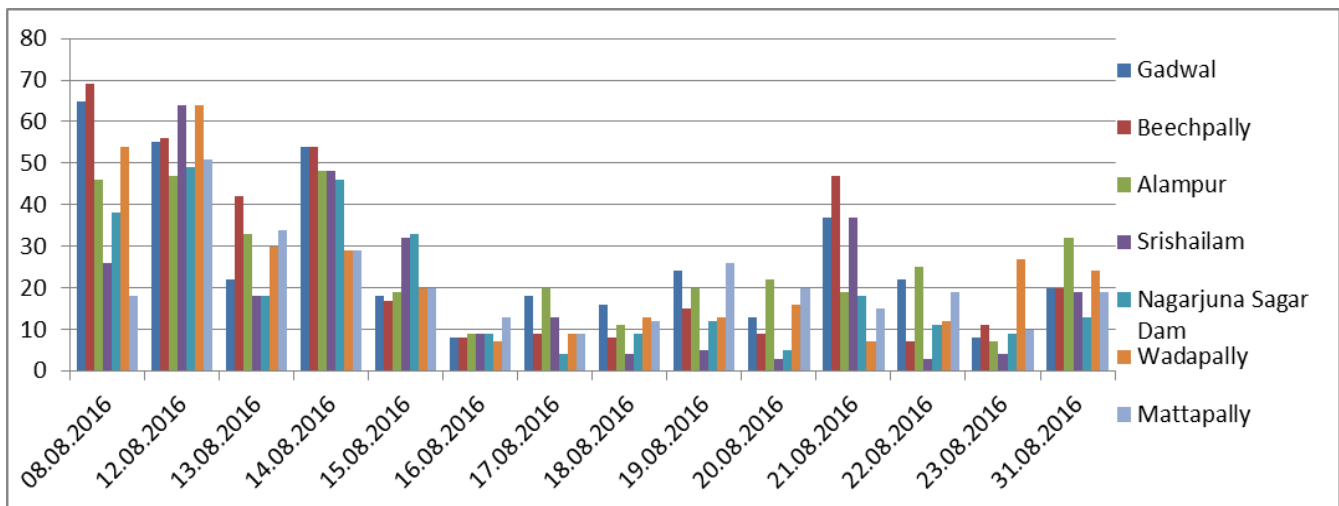
DETERMINATION OF CHEMICAL OXYGEN DEMAND

Chemical oxygen demand (COD) is a measure of the capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic chemicals such as ammonia and nitrite

CONTROL MEASURES OF COD:

- Among all the reported methods, biosorption is considered as a most promising technique because it is rapid, economic and environmentally benign technology.
- At lower pH, the presence larger number of H⁺ ions neutralizes the negatively charged adsorbent surface and hence reduces COD removal by ion exchange.

COD GRAPH:



DETERMINATION OF E-COLI

E. coli (Escherichia coli) is one of several types of bacteria that normally inhabit the intestine of humans and animals

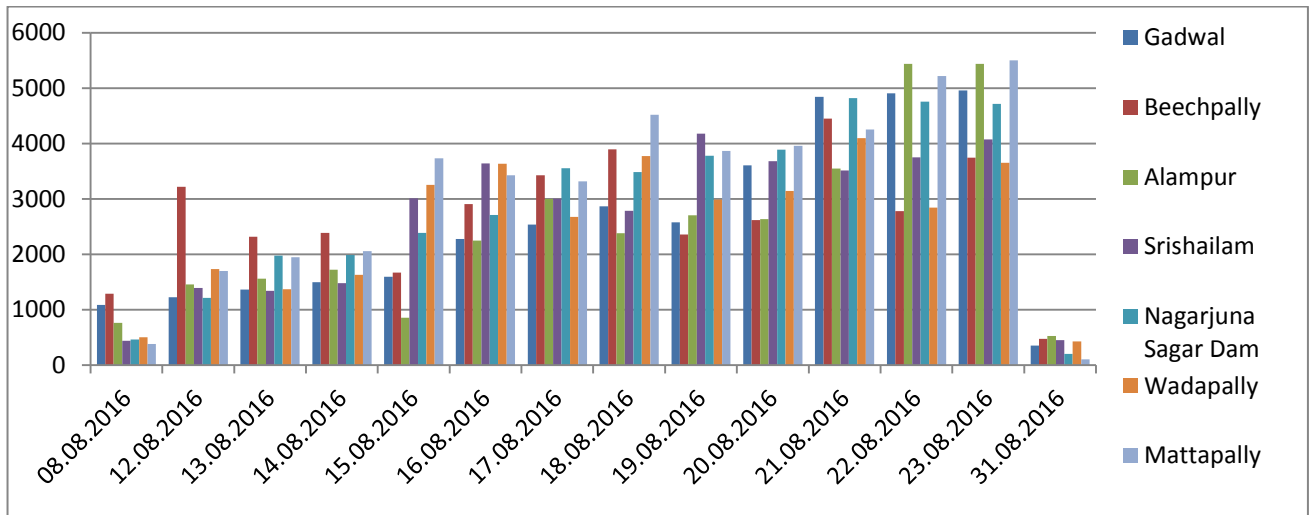
(commensal organism). Some strains of E. coli are capable of causing disease under certain conditions when the immune system is compromised or disease may result from an environmental exposure.

CONTROL MEASURES:

- The water can be treated using chlorine, ultra-violet light, or ozone, all of which act to kill or inactivate E. coli.
- Systems using surface water sources are required to disinfect to ensure that

all bacterial contamination is inactivated, such as E. coli. Systems using ground water sources are not required to disinfect, although many of them do.

E-COLI GRAPH:



CONCLUSIONS

This study concludes that the deterioration in Krishna river pushkar water quality is found. Dissolved oxygen content should be 4mg/l or more as prescribed by CPCB where as this study is concerned, except Gadwal, Beechpally, and Alampur 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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BIOGRAPHY

ASSISTANT PROF. N NARESH received his master degree in environment management from JNTUH in 2011. He joined Gurunanak Institute of Technology as a Assistant Professor 2012. He is guiding B.tech environment Engineering. He has papers published in National Conferences and International Journals

