

To Study on Quality Analysis of Sewage Water in Northern Zone of Davanagere City

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ABSTRACT: The quality analysis of wastewater is an important factor to find out the surface water pollution and ground water pollution. This study has made a sincere attempt to analyze the quality of sewage in North zone of Davanagere city. This study involves collection of sample, sewage testing and finding out the various parameter values. And the physical parameter and chemical parameters such as pH, BOD, DO etc are tested in the laboratory. And these parameters are compared with CPCB standard values. Then it is found that some values of pH, BOD, DO exceed the standards given by CPCB. The values of the parameters at few wards show exceeds acidity where few wards show excessive alkalinity. The BOD values at all wards are substantially high, suggesting higher organic loading. From these all above testing's it can say that the sewage from North zone of Davanagere city is heterogeneous and many of the selected sampling wards exceeds the permissible limits. Therefore the primary and secondary treatment for sewage is provided. From this analysis some suggestions are provided which is useful for sewage treatment.

KEYWORDS: Sewage, physical and chemical characteristics of wastewater, BOD, DO.

I. INTRODUCTION

The Sewage/Waste water is essentially the community water supply after a variety of uses have fouled it up, From a generational resource point of view, wastewater can be defined as a combination of residential, corporations, institutions, commercials establishments as well as liquid water extracted from groundwater, surface waters and storm water. The wastewater collected from residential premises such as homes, schools and industrial premises is commonly referred to as "sewage/Community waste water". This contains about 99% water and 0.1% natural and is organic as it contains human waste, paper, vegetable, etc. In addition to the public wastewater, there are industrial wastewaters in the city. Many industrial wastes are also environmentally sensitive are also organic in nature and can be treated in the same way as sewage physico-chemically and/or by microorganisms (*Topare et.al, 2011*).

Residences, schools, hospitals and commercial and industrial areas produce waste. These can be treated in close proximity (in septic tanks, bio filters or in aerobic treatment programs), or collected through a municipal treatment plant through a network of pipes and pump stations.

A wastewater treatment plant is a facility where waste water is treated until it is disposed of into the atmosphere. The sequence and types of mechanical, chemical and biological properties that comprise the wastewater treatment plant. Usually wastewater can be characterised in three categories like physical, chemical, Biological characteristics. So for provision of appropriate treatment and to understand the quality of sewage the analysis of sewage is been done. The various parameters like temperature, colour, odour, ph, BOD, DO, total hardness c etc has been tested in the laboratory and the corresponding observations are interpreted in the result section.

II.OBJECTIVE OF THE STUDY

- Analysis of physical and chemical characteristics of wastewater in Northern zone of Davanagere city.
- To compare the wastewater quality property according to ward wise in north zone of Davanagere city.
- To analyse the effects of wastewater on vegetation and human beings.

III.STUDY AREA DESCRIPTION

Davanagere is a city in the centre of the southern Indian state of Karnataka. It is the seventh largest city in the state, having population 435,125 according to the 2011 census. Davanagere is partially covered with underground sewerage system. And it is divided into three major districts 1, 2, &3 and a smaller sub-district-1A. According to Municipality board, the Davanagere city consists of 45 wards, our project is to analyse wastewater quality of 21 wards in North zone of Davanagere city.

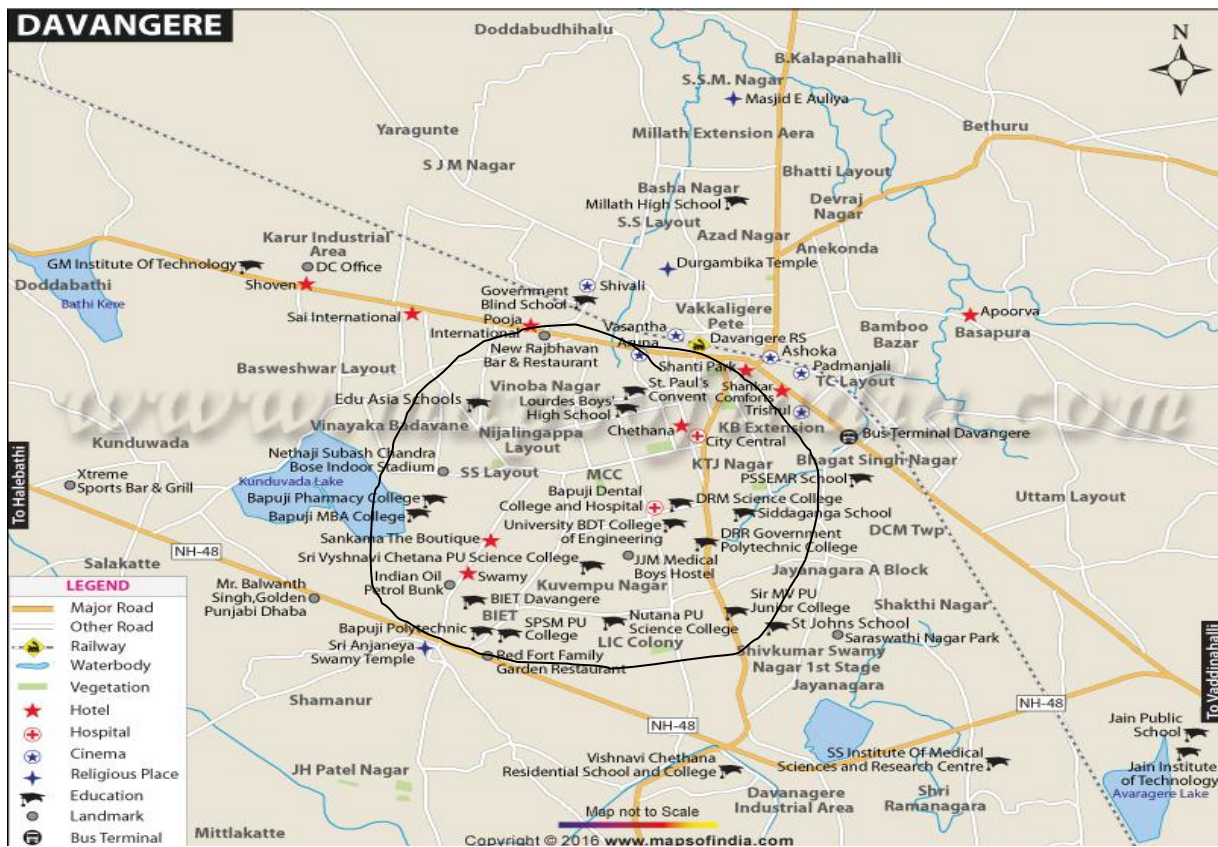


FIGURE:1 Comprehensive plan of sewerage system in Davanagere city.

KEYFEATURES:

- Name of the Place: Davanagere northern region
- Global location : 14.478324,75.908582
- Water Supply Rate : 135lpcd
- Sewage generation rate : 85% of water supply rate
- System of sewerage : Combined type
- Average annual Rain fall data : 610mm

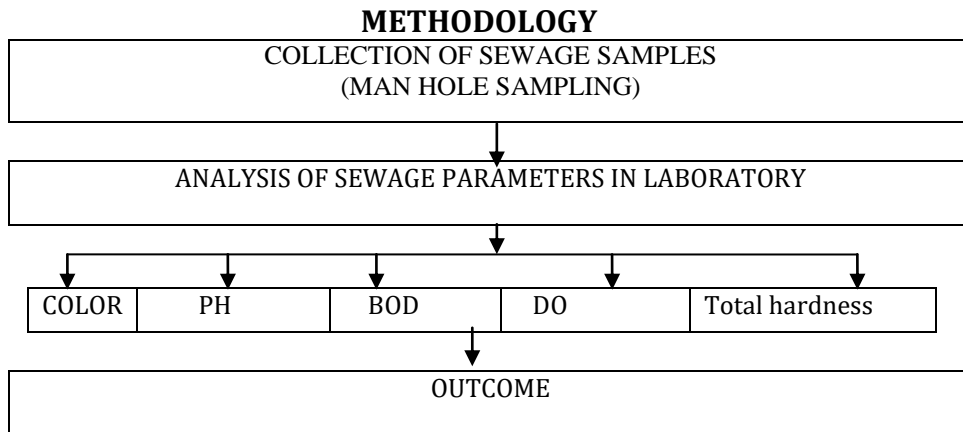


II. MATERIALS AND METHODOLOGY

Wastewater: The present study is undertaken to analyse the physico-chemical parameters of wastewater sample from different wards of north zone of Davanagere city. The domestic wastewater samples will be collected from manhole from different wards of south zone of Davanagere city according to the procedure. Domestic wastewater is collected 40-45cm below the surface to avoid the collection surface impurities. The samples are planned to collect in 2 litres Polyethene bottles.

The methodology involved in the analysis of the samples includes:

1. Collection of sewage samples from the manhole.
2. Analysis of sewage parameters in Laboratory are as follows
 - PH.
 - Total hardness..
 - Biological oxygen demand.
 - Dissolved oxygen
 - Total hardness
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III. EXPERIMENTAL RESULTS AND DISCUSSIONS

The samples of the wastewater from North zone of Davanagere city were collected and tested in the laboratory. It is characterized by a number of tests to ascertain the quality of the sewage. The results of these studies provide an indication of water quality degradation. They compared the various physico-chemical parameters studied with the standards.



Table -1: Physico-chemical parameters of ward number 25, 26, 27, 28, 29, 30, 31, and 32.

No	Parameter	Ward 25	Ward 26	Ward 27	Ward 28	Ward 29	Ward 30	Ward 31	Ward 32
1	Colour	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
2	pH	6.03	7.15	6.85	6.03	5.95	7.14	6.84	7.04
3	BOD 5 days 20°C mg/L	370	345.2	375.25	390	340	345	385	390
4	DO mg/L	0.012	0.014	0	0.012	0.014	0.012	0.016	0.012
5	Total hardness (PPM)	187	176	149	88	165	220	190	156.58

Table -2: Physico-chemical parameters of ward number 33, 34, 35, 36, 37, 38, 39, and 40.

No	Parameter	Ward 33	Ward 34	Ward 35	Ward 36	Ward 37	Ward 38	Ward 39	Ward 40
1	Colour	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
2	pH	6.96	6.8	5.98	7.02	6.95	6.36	7.18	7.05
3	BOD 5 days 20°C mg/L	367	477.5	380.9	360	345.00	380	290.52	367
4	DO mg/L	0	0.012	0.012	0.014	0.014	0.014	0.012	0.012
5	Total hardness (PPM)	198	210	208	154	189	203	65	160



Table - 3: Physico-chemical parameters of ward 41, 42, 43, 44, 45.

No	Parameter	Ward 41	Ward 42	Ward 43	Ward 44	Ward 45
1	Colour	Grey	Grey	Grey	Grey	Grey
2	pH	6.24	5.9	6.85	7.03	6.83
3	BOD 5 days 20°C mg/L	356.56	250.40	445.40	356.45	357.56
4	DO mg/L	0.00	0.012	0.016	0.012	0.012
5	Total hardness (PPM)	159	168	204	208	168

PHYSICAL CHARACTERISTICS AND CHEMICAL CHARACTERISTICS:

- 1. Colour:** Sewage colour at all wards is “slightly grey” is a sign of fresh sewage.
- 2. PH:** The average PH values for wastewater samples collected from different sites vary between 5.9 to 7.18. The PH value less than 7 is referred to as acidity and PH value greater than 7 is referred to as alkalinity. According to the CPCB standards the PH values for inland surface water and for public sewers is 5.5 to 9.0.
- 3. BOD:** Under CPCB guidelines, the five days BOD values at 20°C should be below 350 for public sewer, higher values of BOD shows more organic matter load. The ward number 34 and 43 exceeds the required standards given by CPCB, the BOD values 477.50 and 445.40 mg/L respectively and minimum BOD value shows in the ward number 42 is 250.40mg/L. According to the CPCB standards, the BOD values for inland surface water are 30 mg/L and for public sewers is 350mg/L.
- 4. Dissolved oxygen:** DO is a measure of amount of oxygen dissolved in the water, and the minimum quality of oxygen required for aquatic organisms. The minimum DO showed in ward number 27 and 41 is 0.00 mg/L and maximum DO showed in ward number 31 and 43 is 0.016mg/L.
- 5. Total hardness:** Total hardness ranges from 65 to 220 mg/L. the ward number 31, 34, 35, 38, 43, 44 shows more hard water, total hardness at these wards is 220mg/L, 210mg/L, 208mg/L, 203mg/L, 204mg/L, 208mg/L respectively. Ward number 28 and 39 shows less hard water such as 65mg/L and 88mg/L respectively.

IV. EFFECTS OF WASTE WATER

- **Water pollution:** Fresh water and seawater can contaminate waste water and are not safe for human consumption. Depending on the discharge that occurs, aquatic life can also be harmed.
- **Water scarcity:** water shortages in many parts of the world. Wastewater discharged from fields can enter underground tables and contaminate rivers and groundwater. If released into a body of fresh water, it can provide water sources that are not suitable for use.
- **Ecosystem Services:** All ecosystems are interconnected and ultimately dependent on water. Similarly, all water (surface and underground) is connected. This means that untreated wastewater can have a very bad effect. One common consequence of wastewater is the introduction of freshwater sediments and seawater. If one part of the ecosystem is broken, it can disrupt the rest of its food chain.
- **Agriculture/Fisheries/ Tourism:** The effluents for irrigation can contain improper chemicals and high concentrations of nutrients needed by plants. This may be delayed and subject to withdrawal. Polluted water used for farming can also contain harmful substances and chemicals that dissolve them, animals can die, and there is a chance that people who eat such animals could also be harmed. In some areas,

proper sewage is released directly into the sea. The contaminants contain pathogens and soluble chemicals that can disrupt fishing in the area. Such unpleasant odour and behaviour do not encourage tourism in the area.

- **Health of urban and rural populations:** Wastewater is a major health problem, as it carries and carries a host of diseases and illnesses. It was estimated that 2.2 million people die each year (worldwide) from diarrheal. (WHO). At least 1.8 million children under the age of 5 die annually from water-related diseases or one every 20 seconds (WHO, 2008).

V. CONCLUSIONS

- With the above analysis/review, we can come to the conclusion that the values of various parameters of different wards in the North zone of Davanagere city surpass/exceeds that of standard values are expected.
- The values of BOD at all wards are considerably high, which shows the higher amount of organic matter is present.
- This is with those results it can be assumed that the towns/city sewage is heterogeneous features /characteristics & also does not meet certain standard values given by CPCB, because the growth of the city is high so city required an efficient sewage treatment plant for waste water management, therefore, primary & secondary treatments can be provide before releasing into river or land. There by protecting our future and sustainable business growth.

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