

Study on Quality Analysis of Sewage Water for Southern Zone of Davanagere City

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ABSTRACT: The objective of sewage treatment is to produce a disposable effluent without causing harm to the surrounding environment, and also prevent pollution. Industries produce large volumes of wastes that may include a wide variety of chemicals containing most toxic pollutants. Some of the industrial wastes can be treated jointly in municipal wastewater treatment plants, but others must be pretreated at the source. The present paper presents the analysis of the wastewater by finding out the values of various target parameters i.e. pH, alkalinity, hardness, chloride, COD and BOD so that wastewater characteristics of the area can be found out with the purpose of modifying the existing treatment scheme for the wastewater treatment being presently used. Waste water, is any water that has been adversely affected in quality by anthropogenic influence. The sewage from colonies as well effluent from industrial units has been identified as main cause for water pollution across our country. Sewage is a water-carried waste, in solution or suspension that is intended to be removed from a community. In reality about 90% of waste water produced globally remains untreated causing wide spread water pollution, especially in developing countries. The study of some physico-chemical parameters of this untreated sewage disposal of the region reveals that amounts of some of the pollutants are present much above the prescribed limits. The present study shows that the treatment of untreated sewage disposal is necessary otherwise the entry of this polluted water in ground water shall be highly harmful to the flora and fauna of the region.

KEYWORDS: Sewage, Analysis, wastewater, Total suspended solids, Permanent Hardness.

I. INTRODUCTION

Wastewater is a liquid waste that is discharged from the households, manufacturing, forestry and commercial property. That also includes the certain pollutants that are the result of mixing wastewater from the different sources. Wastewater can be categorized as sanitary, commercial, manufacturing, agricultural but also surface runoff depending on its sources. The word wastewater must be distinguished from the word wastewater. Sometimes they interchange the terms "sewage" and "sewerage".

Sewage is tainted with feces or urine. Residence, hospitals, office, industries etc, produce sewage. Sewage includes disposed off products of domestic, municipal, or industrial liquid waste, usually via pipe or sewer. Domestic sewage contains a wide variety of dissolved and suspended impurities, and is the primary source for pathogen and putrescible organic substances. Since pathogens are excreted in feces. It is possible that all sewage from town and cities will contain pathogens of some sort, potentially posing a direct threat to public health. Over recent years, putrescible organic matters has posed a different kind of challenge to water quality; there has been a rising consciousness and concern about water conservation around the world. Therefore a new approach to achieving sustainable water resource development has been developed internationally.

Micro-industries (such as laundries, hotels, hospitals, etc.), macroindustries (industrial wastewater), and household activities (domestic wastewater) are the sources of wastewater in the selected zone. Wastewater is collected to one or more consolidated sewage treatment plants (STPs) by sewer systems (underground drainage pipes) where the waste water is preferably treated. Nevertheless, treatment stations often simply do not operate in cities and towns with old sewage systems or, whether they do, they may not be sufficiently prepared for an efficient treatment. Even if all facilities are connected to the sewage network, the built capacity is frequently surpassed, leading to less effective sewage system and occasional leaks.

Each community produces solid as well as liquid wastes. The liquid portion wastewater essentially is the community's water supply after a variety of uses have fouled it. From the point of view of generation sources, wastewater can be described as a combination of liquid or water carried waste collected from households, organizations, commercial and industrial premises along with such groundwater, surface water and storm water as may be present. If it is allowed to accumulate untreated wastewater, the decomposition of the organic materials it contains may lead to the production of large quantities of malodorous gases. Additionally, untreated wastewater usually contains numerous pathogenic or disease-causing microorganisms that reside in the human intestinal tract or that may be present in some industrial waste. Wastewater includes toxic compounds, too. For these reasons, in an industrialized society the immediate and nuisance-free removal of wastewater from its generation sources, followed by treatment and disposal, is not only desirable but also necessary.

II. STUDY AREA DESCRIPTION

The city Davanagere is the district head quarter, It is located in middle part of Karnataka state, covers an area of about 15645 sq.km. For this work samples from different wards of south zone of Davanagere city sewage have been selected. In this project samples were collected from ward-1 to ward-24 for the analysis of physico-chemical characteristics of wastewater. Here water is used for bathing, drinking, and irrigation etc.

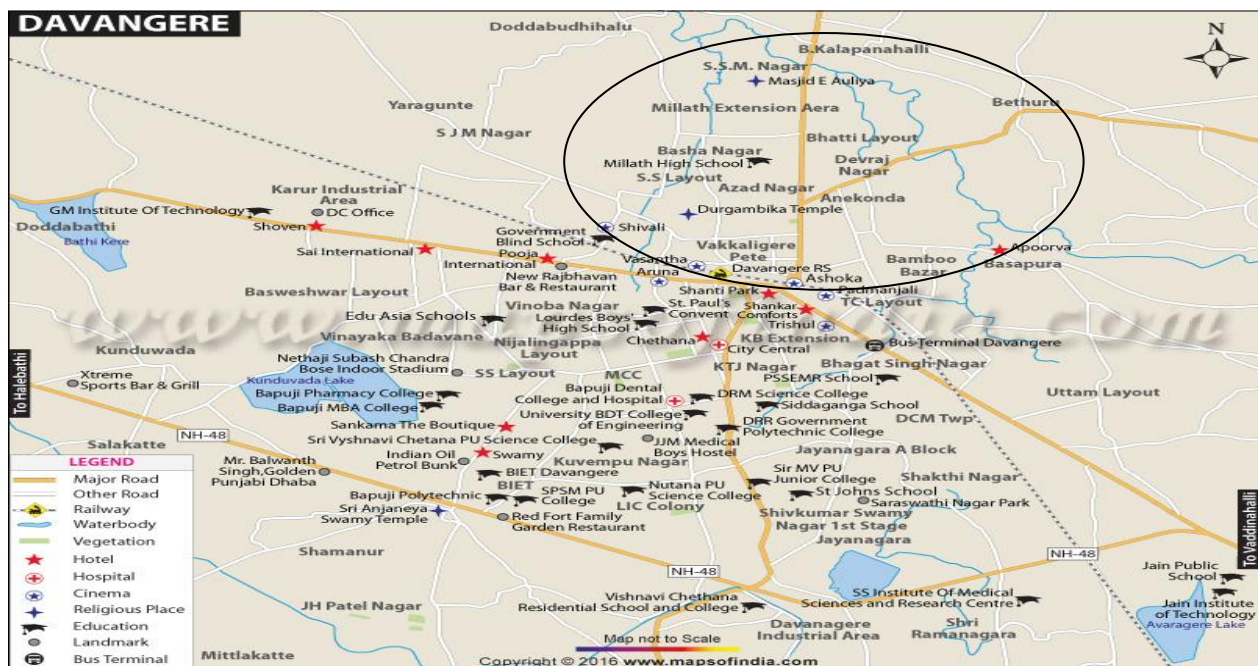


FIGURE:1 Comprehensive plan of sewerage system in Davanagere city.

KEY FEATURES:

- 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

III. MATERIALS AND METHODOLOGY

Wastewater: The present study is undertaken to analyse the physico-chemical parameters of wastewater sample from different wards of south 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 Polyethylene 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
 - Colour.
 - CO₂ content.
 - P^H.
 - Total suspended solids.
 - Biological oxygen demand.
 - Permanent hardness.

IV. EXPERIMENTAL RESULTS AND DISCUSSIONS

The samples of the wastewater from south 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 1,2,3,4,5,6,7&8.

No	Parameter	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
1	Colour	Black	Brown	Brown	Green	Brown	Brown	Brown	Green
2	CO ₂ content (ppm)	93.20	96.70	95.20	93.50	92.30	91.20	93.10	94.80
3	BOD (ppm)	312	370	340	365	390	363	318	389
4	P ^H	6.20	5.90	5.60	6.20	6.8	6.60	5.85	5.6
5	Total suspended solids (ppm)	412	530	443	512	467	489	418	573
6	Permanent Hardness (ppm)	95	104	102	98	94	97	108	112

Table -2: Physico-chemical parameters of ward 9,10,11,12,13,14,15&16.

No	Parameter	Ward 9	Ward 10	Ward 11	Ward 12	Ward 13	Ward 14	Ward 15	Ward 16
1	Colour	Brown	Brown	Brown	Green	Brown	Green	Brown	Green
2	CO ₂ content (ppm)	95.30	92.10	93.20	96.00	93.20	92.40	90.20	91.70
3	BOD(ppm)	348	470	358	350	390	320	367	380
4	P ^H	6.4	6.76	6.8	6.18	6.85	5.70	6.20	6.30
5	Total suspended solids(ppm)	340	523	426	393	568	426	473	417
6	Permanent Hardness(ppm)	98	97	93	104	96	109	97	102

Table -3: Physico-chemical parameters of ward 17,18,19,20,21,22,23&24.

No	Parameter	Ward 17	Ward 18	Ward 19	Ward 20	Ward 21	Ward 22	Ward 23	Ward 24
1	Colour	Brown	Brown	Brown	Green	Brown	Brown	Brown	Green
2	CO ₂ content (ppm)	97.50	94.10	92.60	95.00	93.90	91.00	94.30	95.60
3	BOD(ppm)	365	324	386	338	349	364	356	308
4	P ^H	6.3	6.67	5.9	6.03	6.7	6.02	5.3	6.5
5	Total suspended solids(ppm)	360	442	482	428	390	518	421	448
6	Permanent Hardness(ppm)	93	97	96	102	102	94	91	102

The pH values observed are within the permitted range ranging from 5.3 to 6.8.

The amount of the total suspended solids and the total dissolved solids depends on factors such as filter form and pore size, physical design and particle size of the suspended impurities etc. Most of the matter occurs in dissolved form in drinking water. With the level of contamination, the volume of suspended solids increases and is maximum in sludges where the dissolved fraction is less significant. The total total suspended solids differ between 340 ppm and 573 ppm. The lower values of these criteria are possibly due to the fact that there are no industrial effluents applied to this town's wastewater.

BOD values range from 308 ppm to 470 ppm above the BOD value of treated waste (< 20 ppm) and much higher than that of normal river water (2- 8 ppm).

The Permanent hardness parameter does not indicate much about the degree of contamination of sewage water samples. This parameter's values (102.00 ppm to 148.00ppm) are equivalent to those of relatively hard waters (75ppm to 150ppm). The other water-hardness parameters viz. Related findings indicate magnesium hardness, calcium hardness, temporary hardness and permanent hardness.

The sample CO₂ content is in the range between 90.20mg / l and 97.50mg / l. Most of the natural waters are dissolved with CO₂. It may enter water either through atmospheric absorption, or it may be produced through biological oxidation of organic matter in water contact. Typically, the CO₂ content of surface waters is much lower than 10 mg / l, but some groundwater may contain between 30 mg / l and 50 mg / l CO₂. When waters with high CO₂ concentration are exposed to the atmosphere, most CO₂ leaks out of the solution, as the partial CO₂ pressure in the atmosphere is normally lower. However, due to its corrosive nature and the unacceptable taste it imparts to water, CO₂ must be removed by aeration or lime neutralization from the municipal water supplies.

Waste water treatment plants (WWTP) are intended to make municipal sewage compatible for environmental disposal (surface and underground water or land), to minimize the environmental and health impacts of sewage, and to make sewage suitable for recycling and reuse (agricultural and aqua-cultural uses). Nevertheless, there are no wastewater treatment plants in most Indian towns and cities used to handle sewage disposal and kitchen waste.

The untreated waste is applied directly to the water bodies such as rivers, lakes, wetlands, reservoirs etc. which pollutes the region's fresh water and makes it unfit for usage. The above studies show the degree to which freshwater production deteriorates. Of most physico-chemical parameters, the calculated values are much higher than the standard values. Thus treatment of untreated waste is possible by the use of wastewater treatment plant. The waste water treatment plants complement the water bodies natural purification power / capacity and help maintain their utilities. Researchers have shown earlier in several articles related to sewage water contamination and its treatment that its intensity is decreased by treating waste / sewage water and it is safe to be disposed of satisfactorily.

It is concluded that the load on sewage systems has increased a lot due to the rapid and uncontrolled urbanization of Indian towns. The direct addition of untreated waste to water bodies in these towns is creating an alarming situation for the surface and underground water quality. Therefore the establishment of one or more treatment plants is necessary depending on the total population of a city.

V. CONCLUSION

- The standard of wastewater has been increased with pollution concentration due to the consequent transition and urbanization.
- It has been found that physico-chemical concentration was not so good in wastewater.
- Water quality and quantity are directly or indirectly affected by water bodies degradation.
- Increasing pollutant accumulation poses many problems for people and the environment around the water bodies due to unmanaged and unregulated waste disposal into the water bodies.
- The highest value of BOD was recorded as 470mg/l at Jalinagar Ward No.10.
- The lowest value of BOD was recorded as 308mg/l at Aruna Theater Ward No.24.
- The highest value of P^H was recorded as 6.8 at Bamboo bazar Ward No.5.
- The lowest value of P^H was recorded as 5.3 at Imam nagar Ward No.23.
- Strong odour, flora and fauna variability, atmospheric variability etc. Can be caused by pollution.
- The direct disposal waste water in to the water bodies leads to death of aquatic organisms like fishes etc due to sudden decrease of DO in water bodies due to the decomposition of the organic matter present in wastewater.
- From the above it is concluded that the waste water is not fit for industrial, domestic and irrigation purpose, without proper treatment.

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