

Analysis of Wastewater Scenario for Mehsana City

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Abstract

After the industrialization revolution and with revolution in technology, the problem of degradation of environment has also increasing simultaneously. With increasing in the population usage of natural resource like water is increasing rapidly day by day. The generation of waste water has increased tremendously. The infrastructures are not sufficient to collect and treat urban wastewater and that is a critical problem in a developing country like India. The study area is Mehsana city. The quality of wastewater has been examined by taking samples. This research paper shows the present wastewater scenario of the city. The suggestions and recommendations could be made for treating the wastewater for disposing and reusing.

Keywords: Environment, wastewater treatment, Mehsana

INTRODUCTION

Development of water resources is taking place all over the world. With the development, there is also big responsibility of protecting and conserving the water resources in the country. Population explosion has created many problems now a days. In this situation the scarcity of food, fresh water is the disturbing facts of developing country. This situations arises because of the global warming, greenhouse effects, this factors caused the rivers to dry and the capacity of natural resources to serve the people of the country is decreasing day by day. The only solution of this emerging problem is to use minimum water for the daily activity, revive the rivers, and recycle the wastewater. The development of any country depends on how they are dealing with the pollution caused by waste water, solid waste, and plastic waste. Waste water is defined as the water which had affected by human activity and various usage. Waste water is combination of domestic water, industrial effluents, commercial, or coming from agriculture activity. The problem of pollution by the waste water is because of the insufficient infrastructure for management of the waste water. In our country only approximately 30% of the water is treated and 70% of the water is disposed without treatment ^[2]. Environmental pollution and health problems of people are arising because of the untreated disposal of wastewater into the surface water resources. Especially in the city areas, the pollution because of domestic waste water has created many problem for the public. There are many methods of disposing of wastewater safely into water bodies. When waste water is discharged into the sources or dry lands, it can seep into the underground water tables and well sources. This is leading us to the problem of contamination of the ground water sources with harmful elements. Urbanization is increasing at a very fast rate. The development of industries, economy of city and population of Mehsana city has doubled into nearly last decade. Due to this the problem of providing fresh water and capacity to manage the wastewater with such an increasing rate of development has occurred. In this city, due to disposal of the waste water from domestic and industrial sources, the pollution of ground water table and water streams has occurred and it is leading us into high pollution of ground and natural surroundings. Hence, it is necessary to treat the waste water and then disposal and reuse in different works if the quality allows.

OBJECTIVE OF THE STUDY

- To study the existing waste water scenario and network in Mehsana city.
- To check the condition of waste water quality
- To recommend strategies for waste water disposing and recycling

STUDY AREA

Mehsana district occupies 4371sq. Km area in the northern part of Gujrat. Total population of the district as per 2011 census is 20, 27,727. Mehsana city occupies 32 sq. km area. The population in the city is 184,991 in the year 2011. The city is divided into 15 wards. It is surrounded by Banaskantha district and Patan district in north, Patan and Surendranagar in west, Ahmedabad and Gandhinagar in south and by Sabarkantha in west. Rupen and Khari are the two main rivers of the district. Both these rivers are non-perennial in nature and only have water during rainy years. The Sabarmati River is capturing the eastern boundary of the Mehsana district with limited catchment area. The available water resources are in a very limited quantity. Groundwater bore well is the main source of the agriculture activity, about 93% of the area is irrigated by groundwater.

NEED OF THE STUDY

Mehsana city is facing water scarcity since many times. After the last decade due to the migrations from the nearby cities and villages like Unjha, Visnagar, Vijapur, Bhandu etc. The water demand is fulfilled by Sabarmati canal and bore Wells. Rupen River is nearby city and had completely dried up. Due to urbanization the populations has very much increased so that there is so much increment in the demand of the water supply in nearby future. The disposed water is harming the soil, natural environments and groundwater table. The place has become the birth of many dangerous diseases. The waste water treatment plant is not available so the sewage waste water is disposed directly. So if supply is to be fulfilled in the nearby future according to the population forecasts, waste water should be treated and reused in to different activities or should be disposed after some suitable treatments

POULATION FORECAST

The factors which affects the need and supply of water is population and industrialization. The present population and population forecasts to the year 2041 are presented in the fig.1

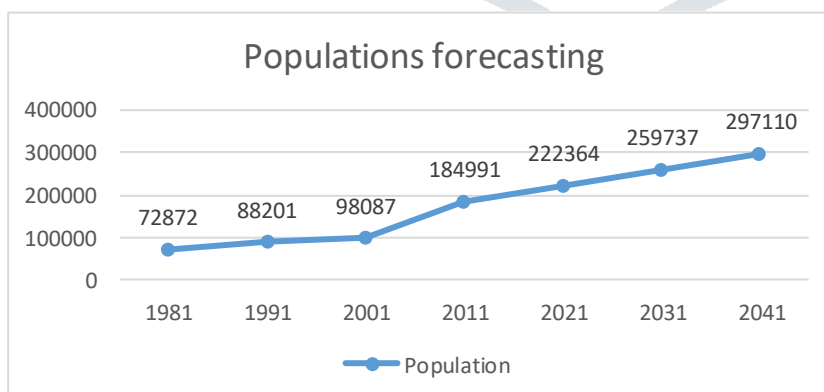


Figure 1 Population forecast

PRESENT WATER SUPPLY STATUS

The average per capita water supply in the city is around 110 lpcd with a daily supply for 45 minutes twice a day. Tube wells are an alternate source of water supply in the city. Depending upon the area, the tube wells work from 1 to 18 hours every day. Based on the capacity of pumps and working hours, the water supply is nearly around 06 MLD^[1] from about 30 tube wells. Filtration Plant is located at near the dediyasan with the capacity of 91 MLD is working under area at Present stage & also 50 MLD capacity Filter Plant Proposed at society area sub site on Radhanpur Road. Dediyaan pumping station is supplying total 30 MLD of water to Mehsana town. Due to the increasing demand from the people now the water demand from the Nagalpur area is also worked out to around 18 MLD of water, which is not then capable to supply to both Mehsana as well as Nagalpur area through the existing transmission pipeline, which will not be capable to carry this much volume of water. So the, GWSSB (Gujrat water supply and sewage board) has then suggested that Mehsana municipality should construct additional pumping station near Dediyaan plant. On an average, Mehsana city gets 24 MLD from Narmada canal and 6 MLD from bore well capable of providing 30 MLD of total discharge in city^[1].

WASTE WATER DATA COLLECTION

DRAINAGE SYSTEM DETAIL

Mehsana city had seen very big populations growth almost 50% growth in only 10 years. This is because of the migrations from the nearby villages and small towns. With increasing in populations the problem of water supply, water demand, sewage system and waste water disposal are challenging local authority day by day. 4 to 5 years ago only 20% people had sewage connection. Rest were using septic tanks. But after 2016-2016 almost 70 to 80% city is covered with proper sewage condition. The sewage disposal is nearly doubled from 2015.

WASTEWATER GENERATION

Mehsana city is divided in 2 zone. Mehsana 1 and Mehsana 2. In Mehsana 1 the total sewage disposal is nearly around 10.48 MLD. In Mehsana 2 the total sewage disposal is nearly around 13.67 MLD. After going through the population forecast of 2041 the waste water generation will be nearly around 36.225 MLD.

WASTE WATER SAMPLING



Figure 2- Disposal site

This place outside the city is where the waste water is being disposed. In this study, 3 waste water samples were collected in 3 weeks. The 3 samples were collected and tested for various parameters like pH, Total dissolved solids (TDS) and biochemical oxygen demands (BOD), Chemical oxygen demand (COD), Total suspended solids (TSS).

RESULT AND DISCUSSION

Table 1- Waste water quality parameters

No.	Sample	pH	TDS (mg/l)	BOD (mg/l)	COD (mg/l)	TSS (mg/l)
1	Sample 1	7.21	820	90.7	392	259
2	Sample 2	8.67	790	115	437	287
3	Sample 3	7.56	845	102.9	379	263

As in table-1, it could be observed that determination of the pH plays an important role in the wastewater analysis process. The pH value for disposal of waste water in inland surface waters or in public sewers is between 5.5 to 9.0^[4]. Extreme levels, presence of particular matters, accumulation of toxic chemicals and increasing alkalinity levels are common problems in waste water. Here in our sampling, the pH values are slightly higher than the usual values, it generally indicates the presence of algae in the waste water. Total dissolved solids in the 3 samples are higher than the standard values. These dissolved solids in the waste water are generally due to domestic sewage, organic matter like leaves, plankton. Other sources of dissolved solids are due to natural and artificial fertilizers, pesticides used in farms and gardens, water coming from urban area as a runoff. Water may also pick up metals such as lead or copper as they travel to distribute water to consumers. BOD in the three samples are higher than the usual BOD for disposal standard of waste water. The standard value of BOD for waste water disposal is 20mg/lit. The high values of BOD in the samples is mainly because of the microorganism^[5]. They are decomposing organic waste. As there is much amount of organic waste coming through the city so there is much amount of microorganism are present to decompose it. So the BOD value will simultaneously rise.

RECOMMENDATIONS & SUGGESTIONS

As per the results from the following samples, it is clear that the water management is not satisfied in the city and also the quality of waste water is in very bad condition. The data of different parameters clearly shows that the daily waste water is harming the city and creating the worse condition than before. Awareness around the people related to use of the water wisely should be spread so that they again use the water for different types of works before disposing in the sewer. Wastewater treatment plant should be constructed near the disposal point and it should be outside of the city so it cannot be harmful to the residential area. Sustainable and decentralized technique like Constructed wetlands should be optimized for relatively small amount of area like for one society and wastewater can be treated with the biological process. It requires minimum amount of electric power and men power. Membrane technology is also efficient because it is very effective than the conventional technique. The treated water can also be given to industry zone at a cheaper price so that the local government body of the city can also make revenue out of it.

CONCLUSION

After analyzing the population forecast and the way water demand increasing with day by day simultaneously in the near future the condition will get worse. It is necessary that the waste water need to be taken care of and used for different types of operations. After analyzing the waste water samples results and various parameters we can say that quality of waste water coming from the city is low and it is harmful to aquatic life and environment near the area. It is viable that the treatment plant should be developed and the waste water should be treated and used for different types of operations.

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