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A Study on Wastewater Management

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Abstract: *Water is abstracted for a number of uses that inherently affect the quality and subsequent usability of the water. Some of the anthropogenic contaminants are not necessarily linked to use but rather management of wastewater and sewage. The quality of surface and ground water is affected by aspects such as mining activities like effluent discharge, water treatment works; water abstraction for agricultural uses, agricultural activities, and coal combustion and high density urban areas. Water and wastewater management in India is almost reaching a crisis level and for this reason there is an increasing need for collaboration among different stakeholders. The aim of the government is to address the problem of skills development and water management by local government in India. The first step in this journey was to initiate a project that, among other issues, can provide an engagement platform for academic institutions and local government to seek solutions to water and wastewater management problems.*

Keywords: *Wastewater, Stakeholders, Sewage, Abstraction.*

I. Introduction

Wastewater or sewage is the by product of many uses of water. There are the household uses such as showering, dishwashing, laundry and, of course flushing the toilet. Additionally, companies are use water for many purposes including processes, products, and cleaning or rinsing of parts. After the water has been used, it enters into waste water stream, and it flow to the wastewater treatment plant. When people visit a they perceived it would be. These wastewater plants are complex facilities and provide a high quality end product.

Treatment of wastewater is aimed at removing compounds that have negative impact on life and environment. Such compounds find their ways into water bodies mainly as a result of human activities at small and large scales. At small scale, wastewater is generated from different house hold units. The characteristics of the wastes from different households are generally similar; however, the precise composition and quantity depend on the life styles of the individual units. In particular, the relatively affluent households produce higher quantity of wastes with varying characteristics than the less affluent homes. At large scale industrial and agricultural activities are the main sources of waste. There are different agricultural and industrial activities in different parts of the country, and for this reason wastewater characteristics may be region dependent.

II. Need For Treat Of Wastewater

We need to remove the wastewater pollutants to protect the environment and protect public health. When water is used by our society, the water becomes contaminated with pollutants. If left untreated, these pollutants would negatively affect our water environment. For example, organic matter can cause oxygen depletion in lakes, rivers, and streams. This biological decomposition of organics could result in fish kills and/or foul odors. Waterborne diseases are also eliminated through proper wastewater treatment. Additionally, there are many pollutants that could exhibit toxic effects on aquatic life and the public.

III. Collection System

The purpose of a sewage collection system is to remove wastewater from points of origin to a treatment facility or place of disposal. The collection system consists of the sewers (pipes and conduits) and plumbing necessary to convey sewage from the point(s) of origin to the treatment system or place of disposal. It is necessary that the collection system be designed so that the sewage will reach the treatment system as soon as possible after entering the sewer. If the length of time in the sewers is too long, the sewage will be anaerobic when it reaches the treatment facilities.

Sanitary sewage collection systems should be designed to remove domestic sewage only. Surface drainage is excluded to avoid constructing large sewers and treating large volumes of sewage diluted by rainwater during storms. Sewers which exclude surface drainage are called sanitary sewers, and those which collect surface drainage in combination with sanitary sewage are called combined sewers.

Except for force mains, sewers are laid to permit gravity flow of their contents. Unlike water in a water distribution system, the contents of a sewer do not flow under pressure. Usually the slope is such that a flow rate of 0.03 metre (m) per second or more is maintained when the line is flowing half full to full. This is a self-cleansing velocity and prevents solids from settling in the sewer pipes. To the maximum extent practical, sewers

are laid in straight lines. Corners and sharp bends slow the flow rate, permit clogging, and make line cleaning difficult.

Pumping is necessary where the slope of the sewer does not produce the required minimum velocity of 0.03 m or where sewage must be lifted to a higher elevation. Sewage can be pumped from pumping stations through pressure lines (force mains) regardless of their slope, or it can be raised to a higher elevation at pumping stations (lift stations), so that gravity flow will again produce the required velocity.

For gravity flow lines, sewer pipes of vitrified clay tile, concrete, cement-asbestos, or bituminous-impregnated fibre may be used. For force mains and stream crossings, cast iron or cement-asbestos pipes are used.

Removing grease from sewage is essential to the proper functioning of sewage systems. At fixed installations, grease is collected by ceramic or cast iron grease interceptors installed at kitchens and other facilities that generate grease and by concrete or brick grease traps outside the building. Approximately 90 per cent of the grease will be removed from greasy wastes by properly maintained grease interceptors and traps.

Petrol and oil separators are installed in sewer lines from garages and shops where petrol and oil might be accidentally spilled. Separators are also installed under washing facilities to contain the oil in water. In areas where large amounts of volatile material are produced as waste, some other method must be provided. Volatile liquids accumulating in sewers can cause explosions and destroy sewer lines or the treatment plant.

IV. Challenges And Approach

Non-revenue water

Non-revenue water may be considered as the cost of providing the water service. It consists of mains leak and bursts, unbilled low cost houses, metering inaccuracies, theft, unbilled standpipes, reservoir overflows.

Aging infrastructure

Aging infrastructure including leaking pipes contribute a high proportion of non-revenue water. In many municipalities there is a backlog build-ups and inadequate maintenance of infrastructure. This kind of backlog is likely to lead to "dry up "similar to the Eskom blackouts. The issue of aging infrastructure can be attributed to the following problems (Hosking and Jacoby 2013):

- Lack of political will at the local government level
- Low budget priority
- Lack of capacity and skills
- Flawed water service tariff and accounting structuring
- Insufficient capital
- Loss of institutional memory.

Among these factors, the one that needs urgent attention is skills development. Skilled staff will be able to lay down strategies that will address the rest of the other problems.

Growing demand and changing life style

There is an increasing trend in rural-urban migration, which has resulted in an increase in demand for services including water and sanitation. Additionally, the lifestyle of the people living in the urban areas is changing very fast. These changes include the chemical products used at home and food preference. An increase in meat consumption, for example, leads to an increase in the number of animals slaughtered and consequently an increase in the volume in abattoir wastewater discharged into the municipal wastewater treatment plants.

An expanding Indian population growth has created a growing demand for recycled water in agriculture. Urban communities in particular perceive treated wastewater effluent as an accessible water and fertiliser source for food production. Optimal use as well as control of recycling of treated wastewater has become critical in order to protect public health. Seeking solution to these problems requires the participation of the local communities, industries, government institutions and water bodies.

Sanitation and legislation

The interrelation between water and sanitation is well captured by the slogan of the Water affairs:

"Water is life and sanitation is dignity". The availability of water determines the quality of life in general and most importantly sanitation. Poor sanitation is a major cause of diseases through contamination of water bodies from which raw water is abstracted for subsequent treatment and use. Sanitation systems such as latrine are known to contaminate ground water. This can be a serious problem if a borehole is in close proximity. In Asia, small scale systems referred to as Eco –tanks have been used in the rural areas. These are small scale sewage treatment systems that use anaerobic bacteria to transform waste into non contaminated effluent. Eco-tanks do not use electricity and can treat sewage from up to 508 people/day.

Matters relating to municipal by-laws are captured by section 21 of the water service Act 108, 1997. A municipality must adopt by-laws that contain terms and conditions for water service delivery. The conditions provide for: the standard of service, the technical condition for supply and the determination of tariffs.

V. Conclusions

It was reported that there are factors that obstruct the establishment of the benefit sharing and service delivery at the national level, and these include:

(a) Working in silos;
(b) Weak administrative capacities of the service providers;
(c) Lack of public awareness of their responsibilities and high volumes of non-revenue water;
(d) Lack of futuristic approach to water management as well as inability to spend;
(e) Lack of skills and competencies in science, engineering and technology (SET);
(f) Wrong priorities, especially concerning maintenance and capital investment;
(g) Lack of information on the location of some water distribution lines and
(h) Emerging contaminants and pollution loads into water treatment plants

VI. Way Forward

It was recommended that there is a need to form a multi-sectorial team that will provide leadership and skills development platform (to create opportunities for re-skilling) and information sharing among the stakeholders. The stakeholders include industries, municipalities, water management organs and academic institutions. There should be a continuous process to consolidate the ideas of the stakeholders as captured in the RTD and integrate them with the planned activities to identify technology and skill gaps.

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