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A Review on Sewage Waste Water Treatment in Disarray of Madurai

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ABSTRACT: Waste water treatment is a process used to remove contaminants from waste water or sewage and convert it to an effluent that can be returned to the water cycle with acceptable impact on the environment, or reused for various purposes. The treatment process takes place in a waste water treatment plant (WWTP) also referred to as a Water Resource Recovery Facility (WRRF) or a sewage treatment plant (STP) in the case of domestic waste water. Pollutants in waste water are removed. Converted or broken down during the treatment process.

KEYWORDS: Sewage treatment plant, Ground water, Nanotechnology in waste water Management

I. INTRODUCTION

The sewage treatment plants constructed by the Madurai Corporation in 2011 in vellakal and sakkimangalam areas have not achieved their full capacity officials in the civic body here admitted.

At present, only one fourth of the total sewage water generated in the city is treated at these plants. The rest is released in to water bodies like channels tanks and the Vaigai River, posing health and environmental hazards. The capacity of the vellakal sewage water treatment plant is 125 million litres per day (MLD) where as he capacity of the sakkimangalam plant is 45.7 MLD. These plants were constructed considering the need for the next 30 years, through; the plants started functioning two – and – a half year's back, all the sewage water generated in the city can't be transferred to the treatment plants. The pipes carrying sewage water from various pumping stations to the treatment plants proportionate to the requirement have not been modified yet, said source from the engineering department of Madurai Corporation.

II. OBJECTIVE OF THE STUDY

The objective of municipal and industrial waste water treatment is to extract pollutants, remove toxicants, Neutralize coarse particles kill pathogens so that quality of discharged water is improved to reach the permissible level of water to be discharged in to water bodies or for agricultural land. The total sewage water generated from the city, excluding the newly – added areas, is more than MLD. However only 20 MLD is treated at both the plants. The treated water is released to the nearby agricultural lands instead of diverting it in to water short city. Around 60 MLD of untreated sewage water from the pumping stations is frequently let in to Vaigai River, near by tanks and channels. Environmentalist warns that the untreated water opened in to the water bodies can affect people in the long term.

III. SEWAGE GENERATION IN MADURAI

Madurai is one of districts of Tamilnadu in India, Madurai District population in 2022 is 3,210,442 (Estimates as per aadhar uidai.gov.in Dec 2020 date). The district has an total area of 3710, 317.45 sqkm is urban and 3392 sqkm is rural. Out of total population of Madurai 3,372,460 in the distric, 1,846,801 are in urban area and 1,191,451 are in rural area.479851 households are in urban,315036 are in rural area 1485340literate people in urban 788,090 in rural area. Due to such drastic growth in urban population of Madurai the quality and strength of sewage has also increased with time.

It was found that currently 125 MLD of sewage is being generated in Madurai. The Madurai Corporation approved the establishment of a sewage treatment plant (STP) with two million litres per day capacity at vaigai river to treat sewage water carried by the Pandhalkudi channel before entering the river course .It was approved during the special council meeting chaired by corporation commission.

IV. TREATMENT OF SEWAGE IN MADURAI UNDERGROUND SEWAGE SCHEME

The sewage system in Madurai was first established by the British to core city area between 1924 and 1959. It was further expanded in 1983 subsequently, the National river conservation project (NRCP) was implemented in Madurai to give Underground sewage system. The existing sewerage network has been laid for an approximate length of 797 kms including 80.34 kms of pumping mains to collect and convey the sewage to the main pumping stations. A total of 61 MLD of sewage is collected through the existing system. The raw sewage is pumped to the existing sewage treatment plant at 125 MLD STP at A vaniyapuram and 45.70 MLD STP at Sakkimangalam. While Madurai corporation is finding it difficult to present Pollution of water bodies, a Madurai based scientist clais her low- cost- nanotechnology could sewage water effectively .The benefit of the new technology is that water could be treated at the Pumping stations, themselves rather than being pumped to one point from all corners of the city.

Sewage water can be treated easily at pumping stations by using the solution. It will hardly consume 10 minutes compared to the present method which take about 90 minutes for every one lakh litre of sewage water just 30 litres nano solution is enough.

V. NANOTECHNOLOGY IN WASTE WATER MANAGEMENT

Adsorption is an exothermic process and a surface phenomenon which involves the process of the transfer of a phase (a molecule or ion present in either liquid or gaseous bulk) called adsorbate, onto a solid, rarely liquid surface called an adsorbent to form a monomolecular layer on the surface via physicochemical or chemical interactions under specific conditions biosorption is a kind of adsorption in which biological materials such as certain type of bacteria, algae or fungi act as adsorbents due to their intrinsic property to bind and mount up heavy metals, even from a very dilute aqueous solution or via metabolically mediated (by making use of atp) or spontaneous physicochemical pathways of uptake (not at the cost of atp). The process of biosorption principally involves micro precipitation, ion exchange and cell-surface complexation . Yang et al. Investigated the biosorption of chromium (cr) (vi) from synthetic wastewater using algal-bacterial aerobic granular sludge. They found that biosorption of cr(vi) was highly depended on ph, and observed that maximum cr(vi) biosorption capacity of algal-bacterial aerobic granular sludge was 51.0 mg g^{-1} at ph 2. Cr(vi). Removal was predominated by biosorption accompanied with bioreduction. Desorption with nahco_3 could recover 64–73% of the adsorbed cr and most of this was in the form of cr(iii). Compared to the conventional bacterial aerobic granular sludge, algal-bacterial aerobic granular sludge demonstrated a higher biosorption capacity and a better granular stability .similarly, ding et al. Prepared alginate-immobilized *aspergillus niger* microsphere (aam) biosorbent for removal of thorium (th) ions, particularly th(iv), from radioactive wastewater. Aam exhibited a superior ($303.95 \text{ mg} \cdot \text{g}^{-1}$) biosorption performance at ph 6 and 40°c . Rapid th(iv) enrichment can be achieved in less than 100 min .

VI. A WASTE WATER TREATMENT SYSTEM THAT PROTECTED THE VAIGAI

“Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such.”For Madurai, water is yet another component of its heritage paradigm. Like its culture and heritage, its water management also has a hoary past. One of the well-planned cities in the world, Madurai had a system that denied waste water the right to flow on the streets. Some researchers describe it as “one of the oldest, systematic waste water collection and disposal systems in the world.” Like its waterbodies, the waste water disposal system is now bursting at its seams. People have to share as much blame as the civic body for the present state of affairs.

The origin of Madurai’s waste water disposal system goes back to 1865 when the First Royal Commission on Sewage Disposal in England gave its approval to the practice of waste water irrigation. In its report, it said, “The right way to dispose of town sewage is to apply it continuously to the land and it is by such application that the pollution of rivers can be avoided.” Madurai, which became a municipality in 1867, adopted this principle and put in place a sewage treatment system that did not allow waste water to pollute the Vaigai.

The first sewage treatment system was established to collect waste water from seven sub-stations to the Santhaipeitai pumping station through gravity and pumped to Avaniapuram, 7 km away, for treatment. This ensured that sewage generated by a population of 1.52 lakh was pumped away from the city daily, thus protecting the Vaigai from pollution, Even the canal system was such that overflow from the Vaigai was carried by a set of canals and excess sewage was let into canals like Chottathatti in the south.The Santhaipeitai pumping station is located on Kadar Khan Butler Street, which has an interesting, unverified anecdote associated with it. It was named after the butler of a British officer who lived beyond Santhaipeitai, which was perhaps the boundary of Madurai. Footprints of the old sewage system can be seen on this street.



The civic body has been keeping pace with population explosion by devising new strategies to supply water and treat waste water. It is estimated that 80% of water supplied will be discharged as waste water. To protect our water bodies and to tide over water crises it is essential to re-orient the popular outlook.

For him, waste water is a misnomer as used water is a resource. Used water can be reused in agriculture, aquaculture, industry and at home. He emphasises the need for a waste water policy for the State and the city. The Jharkhand waste water policy says that it will “ensure increased use of recycled water for other purposes, apart from drinking.”

VII. CONCLUSION

The project deals with design parameters of sewage treatment plant. The design has been done for predicted population of 30 years (2018-2048). The treated sewage water is further used for the irrigation, fire protection, and toilet flushing in public, commercial and industrial buildings and if it is sufficiently clean, it can be used for ground water recharge. Vermifiltration was found as one of the new, creative and sustainable innovation for treatment of sewage. STPs based on Vermifiltration technology involve all the three primary, secondary and tertiary forms of treatment.

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