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A REVIEW PAPER ON LOW COST SEWAGE TREATMENT BY ROOTZONE TECHNOLOGY FOR RESIDENTIAL BUILDING AT HERLE DIST. KOLHAPUR,MAHARASHTRA

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Abstract:-

Human activities and urbanisation deplete water resources. Due to rising home waste, sewage, industrial waste, etc., freshwater bodies are polluted. Urban and semi-urban areas produce lots of sewage. Sewage treatment and disposal are global issues due to a lack of cost-effective methods. Aerobic and anaerobic therapy technology has improved. Low-cost rootzone sewage treatment. Conventional sewage treatment plants cost Rs 12 per 1000 litres to operate and maintain. Due to expensive treatment costs, sewage is directly dumped into rivers or surrounding water bodies, contaminating society's water sources. Small towns cannot use traditional methods. Sewage treatment must be cost-effective. Root Zone Technology (RZT), which uses plants to treat sewage, is a low-cost alternative. Root Zone Technology was tested for sewage treatment. Pilot reactors explore diverse plant species. Tap water irrigated reactor-planted species. India needs to fully exploit this technology for sustainable growth

1. Introduction:-

Rapid urbanisation in a growing country like India has led to a rise in the demand for water used in a wide range of human activities. The water supply and demand in many urban areas have been impacted by population growth. Domestic water supply, industrial production, irrigation, power generation, animal supply, recreation and leisure, breeding of aquatic species, dilution and transport of trash, etc. are all examples of developmental activities that rely on water (IWWA,2007). Water treatment is a common necessity in both residential and commercial settings. About 80% of the world's freshwater consumption is the result of residential wastewater. The lack of readily available clean water is one of India's most pressing environmental problems. India is experiencing a double whammy of inadequate infrastructure and rising urban populations as it attempts to make the leap from poor nation to developed power. This has resulted in two issues that feed off of each other: water scarcity and sewage overflow. By 2050, it is predicted that almost half of the country's population would reside in urban areas. As a result, the demands placed on the city's infrastructure and public services have increased at a faster rate than they have grown. Sewage is often discharged into nearby bodies of water or let to spread across open fields, making for poor wastewater treatment in rural areas. Class I cities and class II towns with populations over 50,000 are anticipated to generate 38,254 MLD (million litres per day) of wastewater. Only 31% of wastewater generation is treated, which amounts to 11,787 MLD of municipal wastewater treatment capacity (CPCB, 2009). For this constructed wetland uses natural treatment system with substrate materials like sand or gravel planted with vegetation[6]. Reed bed is the natural amd cheap method of treating domestic, industrial and liquid waste. Reed bed is considered as an effective and reliable secondary and tertiary treatment method where land area is not a major constraint [9].

1.1 Background:-

Approximately 99.9 percent of domestic sewage is water, with the remaining 0.1 percent being organic and inorganic materials, suspended and dissolved particles, and microorganisms. The remaining 0.01% is the source of the water contamination or pollution that requires purification. The characteristics of wastewater are dependent on the final destinations of the transported water. The composition of wastewater is affected by factors such as the local climate, the economy, and public hygiene practises. Smaller urban centres cannot afford to use the traditional approaches. Therefore, a reliable and inexpensive sewage treatment system is required.

1.2 Objective of study:-

1. To analize different characteristics of sewage water from study area.
2. To investigate the feasibility of applying the construction wetland system to treat the sewage wastewater
3. Selection analyze the wastewater treatment efficiency of rootzone system with conventional treatment plant.
4. To find optimum cost for constructed wetland based on number of occupants

1.3 Study area:-

The area selected for this project is A/P Herle, Dist. Kolhapur, Tal. Hathkngale. which is situated 558 meters/1831feet above mean sea level and 74.32 and latitude 16.74.

2. Literature Study:-

2.1 Mr. Rajnikant Prasad1, Prof. Rangari P J2, Asst. Prof. Dilendra Jasutkar3 "Constructed Wetland an Efficient Treatment Method for Domestic Wastewater Treatment" was published in International Research Journal of Engineering and Technology. Lab-scale Mundhwa model. Constructed wetlands treat diverse wastewater sources. This study compares naturally and artificially aerated created wetlands for home wastewater treatment. Filter media filled the lab model, and one unit was artificially aerated. Lab-scale models were used to study Mundhwa. Colour, odour, pH, COD, and DO were examined.

2.2 Kalpana Kumari Thakura, Avinash Bajpaib and Shailbala Singh Baghela This study examined the effectiveness and feasibility of EPCO's Horizontal surface flow created wetland/Root Zone Unit at Ekant Park, Bhopal. From June 2011 to May 2012, wastewater samples from the Root Zone System Inlet and Outlet at Ekant Park, Bhopal (M. P.) were collected quarterly. DO, BOD, COD, nitrate, and phosphate were measured using established procedures. The Root Zone System works well and cleaned water can be used for recreational activities like washing clothes, fishing, swimming, irrigation, etc.

3.3. Mahesh Mane1, Bhupen Patil2, Mohit Pawar3, Yatin Gohil4, Akshaya Ghalimath. This paper examines the Root Zone Treatment System, which consists of soil gravel, sand, and fine aggregate filtration beds. This technique effectively treats domestic and industrial effluents using a natural method. RZTS are well-known in temperate climates and are simple to operate due to their minimal installation, maintenance, and operational costs, as well as their incorporation of the self-regulating dynamics of an artificial soil eco-system. This technology has been implemented effectively in several nations. Use of constructed wetlands can now be recognized as an accepted low-cost Eco technology, especially beneficial as compared to costly conventional treatment systems. This technology must be utilised to its fullest extent in a developing nation like India in order to maximise its benefits and promote sustainable development.

3.4) B. L. Chavan1, V. P. Dhulap2, (Year 2012) Constructed wetland remediation of wastewater is cost-effective. In Asian nations, the wetland technology is highly applicable. Various varieties of aquatic weeds or macrophytes are treated. Phragmites karka is an aquatic shrub that emerges. Due to its rapid development, it is a promising macrophyte for sustainable use in wastewater treatment. This paper describes the use of Phragmites karka for wastewater (sewage) remediation in constructed wetlands with horizontal subsurface flow. The effluent was treated using phytoremediation or rootzone bed technology and Phragmites karka. Before and after treatment, the physicochemical parameters were analysed and evaluated for pollution burden reduction. Before treatment with Phragmites karka in a constructed wetland, wastewater was observed to be blackish-dark, foul-smelling, and highly offensive-smelling. However, after treatment with Phragmites karka, wastewater was observed to be clear and odourless. 96 hours of hydraulic residence time reduced the concentrations of TS by 61.64 percent, TDS by 60.37 percent, TSS by 63.19 percent, hardness by 57.15 percent, nitrate by 94.69%, phosphorus by 92.95%, BOD by 61.4 percent, and COD by 64.74 percent.The results indicate that root zone technology is beneficial for wastewater treatment in order to reduce surface and ground water pollution loads.

3.5) Sagar E. Shinde1, Suraj Phad2, Prashant Mishra3, Saurabh Gaikwad4, Shubham Bharade5 Both aerobic and anaerobic treatment technologies have seen significant advancements. However, enormous capital expenditures are required to construct treatment facilities, and the disposal of treated effluents is a significant issue. The estimated operation and maintenance cost per 1000 litres for a conventional sewage treatment facility is Rs 12. Due to the high cost of treatment, sewage is discharged directly into rivers and other local water bodies, contaminating the society's water sources. Small cities and communities are infeasible for conventional methods. Therefore, a cost-effective method for sewage remediation is required. Root Zone Technology (RZT) is emerging as an alternative, low-cost method for the remediation of waste water through the use of plant species. To evaluate the viability of Root Zone Technology for effluent treatment, studies were conducted. The research is conducted using pilot-scale reactors on various plant species. In the reactor, various plant species were planted and initially irrigated with potable water. After stabilising the reactor, various quantities of sewage were applied at regular intervals of three days while plant growth was monitored. After steady state is attained, it was determined that zero discharge would result from the hydraulic load. When the reactor was subjected to excessive hydraulic loading, the effluent water quality was evaluated.

4. Research Methodology:-

4.1 Water sampeling and analysis

The wetland unit's intake and discharge were characterised physically, chemically, and biologically.

Step two: treating sewage effluent using a built wetland while keeping an eye on its viability.

Third, compare the standard treatment facility to the rootzone system.

Fourth Determine the optimal budget for the man-made wetland by factoring in the expected number of visitors.

4.2) Construction and working or Reed bed

Plants will be placed in the unit after it has been made with separate layers of stone chips, sand, and stone dust.

Additionally, plant development will be tracked.

Third, only regular water will be used for sprinkling during the month-long growing phase.

After taking samples, the sewage water will be released into the root zone.

4.3 Action of reeds with waste water

To begin, the root zone system itself makes room for the water to circulate. Second, the roots provide an environment favourable to the growth of aerobic bacteria by bringing oxygen deep into the soil. The oxidation of ammonia to nitrate is the initial stage in the biological breakdown of nitro compounds, and it requires the presence of these organisms. Third, nitrification occurs, which means that the plants themselves absorb some of the nutrients from the effluent. Improved water quality is possible with the use of reed beds.

Extremely effective at killing germs and viruses Decreased amounts of suspended particulates and biological oxygen demand. Removing metals and lowering nitrogen levels.

5. Conclusion:-

Recycling of water from the bathroom. It is possible to use it as a polishing therapy for treatments if it is combined with particular or straightforward pretreatments first. It is possible to utilise it as a treatment that will polish any waste water. For example, breweries and sugar factories.

Treatment of the output of septic tanks is where this product shines. Streams, nalas, rivulets, and other bodies of water that have been polluted need to be treated (floating beds can be proposed). bodies of water (floating beds are a possible recommendation).

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