

Waste Water Treatment by Reed Bed System

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Abstract- India is facing the worst water shortage in its history, according to a report by (National Institution for Transforming India is the premier policy 'Think Tank' of the Government of India, providing both directional and policy Niti ayog). People are suffering with high to extreme water shortage and around 2000000 lives of Indians are losing every year owing to the contamination of water. Now a days, rapid urbanization and industrialization has led to high intake of water and enormous generation of waste water. Rivers are getting polluted at an alarming rate of 80% due to untreated wastewater flowing into water bodies and this rate has doubled in recent years. To reduce the contamination level of water resources waste water treatment will play a predominant role. The aim of this study is to find a practical method for waste water treatment and compare its cost with conventional method. The conventional method is not suitable in rural areas due to high expenses incurred. The reed bed system is one of the alternative techniques for wastewater treatment.

In the present study it is proposed to implement the reed bed treatment method in the city of Chiplun for studying it's effectiveness. Social, environmental, economic factors had to be considered in the implementation of our reed bed system. The effluent characteristics like ph., color, odor, conductivity, DO, COD, BOD, oxygen are found out with the help of the site work. From an environmental standpoint the reed bed system is quite ideal. The choice of materials used for construction is quite flexible, and there is the advantage that the materials can be fashioned out of the local sources. Thus, it affects the surrounding minimally. This system is having soil for the detention period of five days, ten days, fifteen days, twenty days. Reed beds are an aquatic plant-

based system in which aquatic plants like reed allows bacteria in the root to feed on the organic matter contained in waste water. This research is therefore an investigation of performances of waste water treatment by reed bed method.

I. INTRODUCTION

A project especially from engineering field shall always be focused on solving a real-life problem and helping people in living their routine life smoothly. With this spirit Civil Engineering dept. of Dr D.Y Patil School of Engineering and Technology has always encouraged their students to solve civic problems of Ratnagiri as 80% of Civic amenities are related to Civil engineering. Pollution of natural water bodies due to waste water drainage in them is a serious issue of our times. The pollution of water bodies not only harms humans but it also destroys entire eco system flourished within and outside this flow. Moreover, the seepage of polluted water in adjacent lands makes them hard to utilize for agricultural or residential purposes. Just an example how serious this issue is. Indian government has approved a budget of Rs. 20,000 Crore to clean the holy Ganga River. Such an enormous loss of money due to ill managed waste water! Ganga has always been a popular river since ancient times. However, there are many such Gangas in every corner of our nation which are facing the same problem as Indian society in modern days has become very negligent towards health of aquatic bodies like wells, pools, rivers and sea. A prime reason behind this negligence is highly expensive modern waste water treatment in terms of construction and maintenance. A sewage treatment plant requires very complex sets of machinery, huge space and large number of staff and resources to operate on full scale.

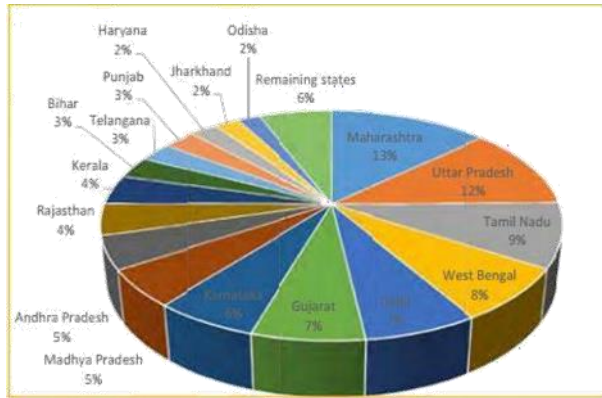


fig. Percentage of sewage waste generating state.

According to a recent report published by Ministry of Environment, Domestic human waste includes human excreta, urine and the associated sludge (collectively known as black water), and wastewater generated through bathing and kitchen (collectively known as grey water). In 1950 average daily output of human waste (i.e., excrement and urine) was estimated to be 3.2 million tonnes; in the year 2000, the estimated daily output was 8.5 million tonnes. It is estimated that 22,900 million litres per day (MLD) of domestic wastewater is generated from urban centres against 13,500 MLD industrial wastewater. The treatment capacity available for domestic wastewater is only for 5,900 MLD, against 8,000 MLD of industrial wastewater. Thus, there is a big gap in treatment of domestic wastewater. Govt. of India is assisting the local bodies to establish sewage treatment plants under the Ganga Action Plan and subsequently under the National River Action Plan. Since the task is massive, it may take long time to tackle the treatment of entire wastewater. It is estimated that the total cost for establishing treatment system for the entire domestic wastewater would be around Rs. 7,560 crores. Operation & maintenance cost would be in addition to this cost.

Our own Maharashtra state being the most urbanized and industrialized state tops the list of highest sewage generating states. With this speed of pollution spread through disposing waste water in natural water bodies, one day all of the sea and ocean will become dead pools of waste water, with no more sea food to eat, clouds raining waste water, no more water to drink. Though, this statement is overly inflated, it is not impossible at all. Is it really hard and high-cost

consuming activity to treat water? In fact, most of the domestic wastewater is a source of plant nutrients and organic matter.

During this project we worked on Reed bed systems or constructed a wet land which is a natural option for waste water treatment. There are some types of plants which purify waste water in their root zone with help of some certain type of microbes. Salient feature of a reed bed is it can be constructed on running flow and without engaging additional land, machinery and men for treatment. In terms of effectiveness, they are slower and less efficient than standard sewage treatment plant. But they are useful where budget and human resources are major issues. We have found out local plants which are capable of waste water purification under guidance of renowned botanist Dr. Umesh Mundalye. As well as we have studied every aspect of its construction like flow diagram, chemical properties of waste water, construction techniques and estimation plus budgeting. We visited places where reed bed is already in use. Also, we consulted many teachers of our college and experts from the field. Cherry on the cake is that, we have built a real model of reed bed on a live sewage water flow by their own efforts. We tested class room teaching on field and learnt many things by our own observation.

1.1 Aim & objective of study

The aim of the study is to find a practical method for waste water treatment & compare its cause with conventional method.

II. LITERATURE REVIEW

- Title: Reed bed for the treatment of tannery effluent,
Prepared by: K. V. Emmanuel, National Expert-Environmental engineering, Sept.2001.
- Title: Construction and performance evaluation of reed bed waste water treatment,
Prepared by: R. Subhalakshmi, C. Manikandan, P. Renganathan, Department of civil engineering vel tech engineering college, Chennai, Tamilnadu, Oct.2015.

- Title: Waste water treatment using reed bed system - An experimental study,
Prepared by: Chandrasekaran, Jan.2009.
- Title: The reed bed sewage system,
Prepared by: Vong, waste busters, 2009.
- Title: Waste water treatment by root zone technology,
Prepared by: Shinde Shakuntala Gunwant, Shitole Shila Shrimant, Waghmare A. Ijare Shweta Sharnappa-Department of civil engineering Sandipani technical campus, Latur, India. May 2019.

III. CASE STUDY

1) REED BED ATSABANISWADA

- Location: Sabaniswada Cluster, Sawantwadi, Sindhudurg
- General: This plant shall be constructed for sewage treatment. Treatment has involved the removal of these pollutants, but removal is usually conversion to another product, usually sludge. The disposal of sewage sludge is a major consideration, and it is often seen as an offensive product which is either dumped or burned. This plant for all area of Sabaniswada about 3000-4000 peoples.

There are different pretended technologies available in market which are called as decentralized natural waste water treatment technologies as follows:

1. Phytoid
2. Decentralized wastewater treatment system
3. Soil immobilized bio filter
4. Soil bio technology

Here for Sabaniswada cluster as a case Phytoid technology is proposed for the waste water treatment system.

- Land Area Requirement:

The total area required for sewage treatment plant for a typical capacity of 260 cu.m/day is approximately 260 sq.m. The area does not include amenities, approach and other needs for maintenance, which could be an additional 20-30%. Based on the land availability and shape of the land, design can also be

changed.

- Operation and Maintenance:

This technology is natural system as result operation is mostly passive and requires little operator intervention requirement for area can change on various factor such as load (kg BOD/day), ambient temperature, topography of the region, flow characteristics etc. Maintaining uniform flow across the phytoid system through inlet and outlet adjustment is extremely important to achieve the expected treatment performance.

2) REED BED PLANT AT KARIM RESIDENCY



- Location: Karim Residency, Sawantwadi, Sindhudurg.

- General: This plant was constructed for domestic wastewater treatment. In this residency 25 flats in it. All the wastewater is collected in a tank.

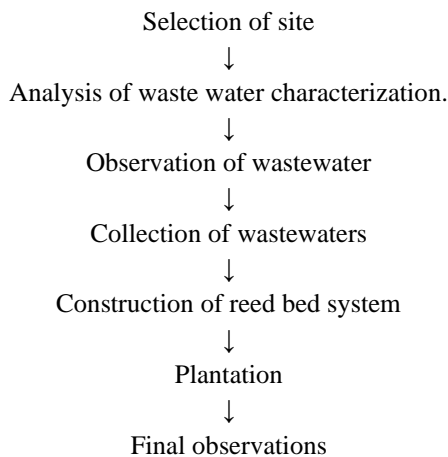
As per 5 persons in each flat approximately 11,875 litre/day greywater was generated in this residency. So, for the reusing of this water and also reed bed plant is environmental healthy plant which does not cause any affects on nature or human health reed bed plant is constructed

- Uses:
 - Flushing of toilets
 - Gardening

- Plants: Palm, Kardal, and other Ornamental plant

Construction Area: The total area of this reed bed plant is approximately 18 sq.m. it was divided into three compartments. Each compartment is 2m in length, and the width of plant is 3m. height is approximately 1.5m. there was three layers in each compartment first was large gravel second was small gravel and third was sand. Waste water is released in each compartment by a pipeline. Water which purifies after treatment is collects in tank which constructed in corner of this plant. Clear water from this tank is pumped out and used for many purposes like gardening, flushing of toilets and floor washing etc.

IV. METHODOLOGY



V. OBSERVATIONS

- They do not produce sludge's, a significant problem in operation of conventional biological system
- Due to low take nature of reed bed, there is no requirement of highly train operators
- As the degradation of organic contain of the effluent occurs within solid matrix, it should be free from odor.

CONCLUSION

- Studying various types of waste water treatments to compare them with respect to their suitability, construction and maintenance, working method.
- Case studies for understanding various methods for finding their application on field.

- Building model treatment plant to taste reality of theories s related to waste water treatment.
- Creating data base in form of test results and preparing reposrt.

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