# Phytorid System for Urban Wastewater Treatment

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***Abstract-*** **A huge quantity of sewage is generated in rural and urban areas. With limited installed capacity of treatment in centralised manner, a large portion of this sewage remains untreated and left as it is to water bodies. Currently there is a growing awareness of the impact of sewage contamination on rivers and lakes. To rejuvenate the rivers and lakes it is extremely necessary to stop the flow of untreated waste from river basin to the rivers. A large portion of the wastewater is domestic sewage.**

## INTRODUCTION

There are various types of wastewater treatment process are available. Every process has its unique quality, advantages, importance procedure, disadvantages, and type of treatment Phytorid system also has its unique qualities of treating wastewater at its own level. Phytorid system is developed, and it'sbased onwastewater treatment by wetland which is artificially make by engineers. In the big world there are various types of plants are available which has a capability of cleaning the streams, rivers, wastewater, by them themselves. In India Phytorid system or it is also known as Reed Beeds introduce by NEERI (NATIONAL ENVIRONMENTAL ENGINEERING RESURCH INSTITUTE).

To make the method feasible selection of technology for sewage treatment should be on ceria such as plant which works without electricity, require minimum maintenance and most importantly, the technology should be self-sustainable. In order to use the technology in rural areas these criteria become more important due to lack of skilled manpower and challenges on electrical supply. This necessitates use of natural methods, which are highly efficient and structured. Using this concept, natural wetland functioning has been used to design technology wherein wetlands plants and combined working of their root system have been integrated to get a designer ecosystem.

## AIM&OBJECTIVES

The main aim of this project is to compare AQI (2020 & 2021) in few places in Pune City.

ThePrimaryobjectivesare:

- Feasible solution to treat increasing sewage.
- Decentralized method so releases pressure from other treatment plants
- Cost efficient
- Serves general objectives that is removal of suspended and floating material, treatment of biodegradable waste.

## LITERATUREREVIEW

1] KomallemantMalpani (2012) Phytorid uses natural mechanisms to treat the wastewater and is a low cost, natural and efficient alternative to the conventional energy intensive options. Earlier, this technology been tested and used to treat the lakes, nallahs, domestic wastewater, industrial effluents but has not been tested for its application on tall residential buildings making this research The study included the application and feasibility of Phytorid system and its integration into one of the tall residential buildings in Mumbai, a growing urban centre of India. Phytorid systems are a low cost, energy efficient, natural, and low maintenance systems compared to the conventional treatment systems and could be potentially used in the design of treatment of wastewater in Tall Residential building.

2] Sanjay MurlidharKarodpati, Alka Sunil Kote (2013)The process of design, construction and operation of sewage treatment plant (STP) quires multi-disciplinary approach. Numerous conventional methods are available for design of sewage treatment plants. The process involved in these treatments is either aerobic, anaerobic or combination requiring number of mechanical and electrical items thereby requiring substantial energy. The ever-growing need of energy makes the design, operation, and maintenance of STP a challenging task. The conventional method of sewage treatment can be made efficient by advanced technologies and intelligent supervision but this in turn increases the total cost. The cost of construction of STPs of various technologies is almost same.

3] Binita Desai and Pratibha Desai. (2014) The process of design, construction and operation of sewage treatment plant (STP)res multi-disciplinary approach. Numerous conventional methods are available for design of sewage treatment plants. The process involved in these treatments is either aerobic, anaerobic or combination requiring number of mechanical and electrical items thereby requiring substantial energy. The ever-growing need of energy makes the design, operation, and maintenance of STP a challenging task. The conventional method of sewage treatment can be made efficient by advanced technologies and intelligent supervision. However, root zone technology developed by National Environmental Engineering Research Institute treats the sewage. It is found from the study carried out on nine STPs at various locations, it uses only 20% of energy as compared to conventional sewage treatment plants. The low cost natural and energy saving technologies are a lot of attention these days due to their low on cost their one or maintenance and less dependence on external inputs like power, their potentially longer cycle and their ability to recover a variety of resources fir irrigation rate homes for soil amendment etc. However, intensive research is needed in this area especially in developing comes to perfect the design factors and test the technologies at pilot and field level.

4] AR MHASKE (2014) To study the efficacy of the Phytorid sewage treatment plant in turbidity removal from sewage water and to determine the optimum condition using the response on this methodology. A Box Behnken model has been employed as an experimental design. The effect of three independent variables namely hydraulic loading i.e., flow (50 - 150 m3 d-1) dilution (10-80%) and spatial length (16-100%) has been studied on the turbidity removal from the sewage water in bench mode of the experiment. The optimal conditions of the turbidity removal were found to be flow: 150 m3 d - dilution 65.13 per cent and spatial length: 87.65 per cent. Under these experimental conditions, the experimental turbidity removal was obtained 7 mg L - 1. The proposed model equation using the RSM has shown good agreement with the experimental data, with a correlation coefficient (R2) or 0.9743. The result showed that optimized condition could be used for the efficient removal of turbidity from the sewage water.

5] Amol B. Mankoskarl, Prof.Sagar M. Gawande (2016) The foundation and improvement of healthy life water is one of the most important fundamentals. The reed bed system is one of the alternative techniques for wastewater treatment. Reed bed system has been proven to be an efficient and low-cost alternative for conventional wastewater treatment technologies. Constructed wetland system for wastewater treatment has been proven to be effective and sustainable alternative for conventional wastewater treatment technologies. In the laboratory for study purpose wastewater was collected from different location of ambegaon area. By using as per different standard procedure of the testing method of wastewater the various tests were conducted like pH, Colour, Odour, DO, BOD, COD, Conductivity, Alkalinity, and it is found that these systems are effective to pass all the test.

6]Swapnil S. Navaghare, et al. (2016) Insufficient or non-existing management of municipal and wastewater results in environmental problems and increasing hygiene risks for the growing urban population thereby hampering poverty alleviation and a sustainable development of the Indian society. A treatment system that provides a sustainable, closed - loop system, which closes the ne sanitation and agriculture.

## METHODOLOGY

Phytorid Model

A tank of glass of 2ft. length, 1 ft width and 1 ft, height has been taken into consideration as a filter media which the waste wastewater collected from dairy is passed through it to remove turbidity as well as small particles present in water. Equal layers of aggregates, sand and coal would act as a basic filter,

After filtration a second tank is taken as a sedimentation tank of 1 ft. 6inch.length, 1 ft. width and 1 ft. height, including baffle walls.

After it a final stage of phytoremediation is done in Phytorid bed which is 3ft. length, 2ft. width and 2f. height, the layers are this bed is of equal layers of pebbles, aggregate and soil with cow dung. Above all Phytorid bed plants such as CannanIndica (kardali)., Colosia plant (Alu) would be used as the major purifying factors in this Phytorid process.

As these plants survive and flourish on nutrients in sewage, they absorb oxygen from atmosphere and send down content eventually purifying sewage in clean water. An opening would be given glass tank to a container where clean water would be discharged after specific de- tension time of 1 hours. Plants which act as a purifier in this topic are able in our surroundings such as "Indian Shot" etc. but its incomplete know how such useful plants are wasted.

One of the most important aspects regarding implementation of this project is not a single labour was used for any of the works. Considering right from sewage handling to laying of aggregates or preparation of semi portable Phytorid be pouring layer of cow dung over soil on the bed which acts as a filter media

## OBSERVATION&RESULTS

Different analysis of wastewater sample was done an inlet and outlet to understand the chemical and biological characteristic following tests were conducted i.e., pH, TSS, TDS, COD, BOD, Chlorides and Sulphates.

Table No. 1

| parameter | TSS | TDS | COD | pH | EC | N | P | BOD |
|---|---|---|---|---|---|---|---|---|
| Oct | 11.75 | 321.85 | 233.155 | 7.12 | 0.29 | 2.87 | 1.03 | 60.45 |
| Nov | 12.59 | 287.57 | 58.68 | 7.08 | 0.42 | 3.16 | 1.09 | 15.15 |
| Dec | 13.8 | 309.44 | 212.12 | 7.09 | 0.45 | 3.30 | 1.01 | 52.98 |
| Jan | 13.6 | 275.69 | 26.44 | 7.10 | 0.65 | 2.46 | 0.34 | 55.17 |
| Feb | 16.69 | 290.82 | 242.699 | 7.23 | 0.59 | 2.09 | 0.44 | 71.97 |
| March | 17.42 | 305.51 | 280.45 | 7.32 | 0.48 | 1.92 | 0.46 | 70.81 |
| April | 23.66 | 237.55 | 285.69 | 7.36 | 0.7 | 2.06 | 0.44 | 81.64 |
| Mean | 15.64 | 289.78 | 191.319 | 7.19 | 0.51 | 2.55 | 0.69 | 58.31 |

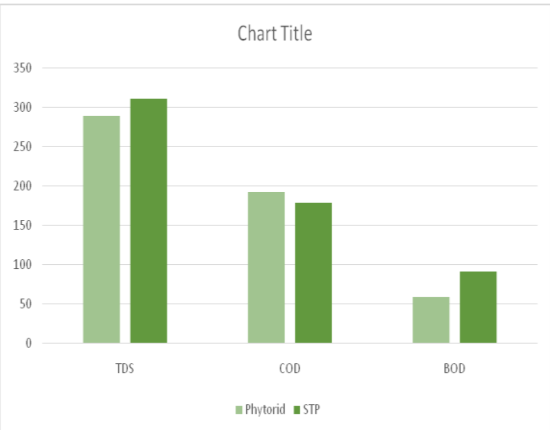
Table no. 2 Results of Phytorid Outlet

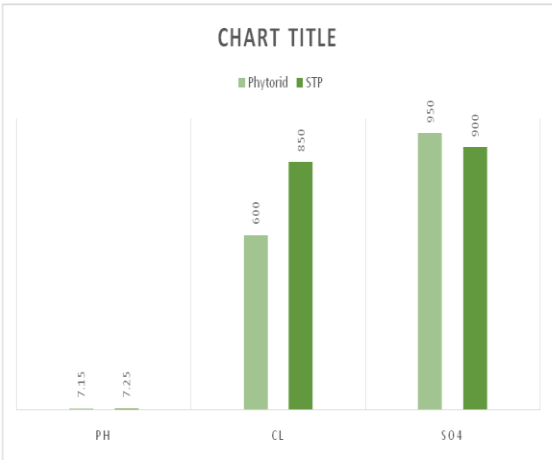
| Sr No. | Characteristics | Unit | Inlet Value | Outlet Value | MPCB Limits |
|---|---|---|---|---|---|
| 1 | pH | | 7.30 | 7.19 | 7.8 |
| 2 | Total Suspended Solids | mg/lit | 50 | 15.64 | Less 30 Than |
| 3 | Chemical Oxygen Demand (COD) | mg/lit | 60 | 19.319 | Less 30 Than |
| 4 | Biological Oxygen Demand (BOD) | mg/lit | 200 | 58.31 | Less 100 Than |
| 5 | Total Dissolved Solids | mg/lit | 350 | 289 | Less Than 330 |
| 6 | Chlorides (Cl) | ppm | 1500 | 670 | Less Than 1000 ppm |
| 7 | Sulphates ($SO_4$) | ppm | 1200 | 950 | Less Than 1000 ppm |

Table no. 3 Comparison Between Phytorid and STP Treatment

| Sr No. | Characteristics | Unit | Phytorid Value (Outlet) | STP value (Outlet) |
|---|---|---|---|---|
| 1 | pH | | 7.15 | 7.25 |
| 2 | Total Suspended Solids | mg/lit | 15.64 | 20 |
| 3 | Chemical Oxygen Demand (COD) | mg/lit | 19.319 | 24.5 |
| 4 | Biological Oxygen Demand (BOD) | mg/lit | 58.31 | 90 |
| 5 | Total Dissolved Solids | mg/lit | 289 | 310 |
| 6 | Chlorides (Cl) | ppm | 600 | 850 |
| 7 | Sulphates ($SO_4$) | ppm | 950 | 900 |

Chart 1: Comparison Between Phytorid and STP Treatment



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