

Experimental Analysis of Wastewater in Shahu Campus of Pune City

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Abstract - Water pollution of surface water bodies is a major environmental issue in India. The largest source of water pollution in India is untreated sewage, originating from domestic, commercial and institutional activities. There is a large gap between generation of waste water and treatment facilities available to treat that water, due to lack of funds and space. In today's scenario, waste water treatment is a challenging task. Technically as well as economically the present study will base on developing modification in conventional Root Zone technology system. The aim of the study was to study cost effective treatment of wastewater i.e. by Root Zone Technology. The study is done on Jedhe More Hostel situated in "ABMSP'S" Campus, Pune. The study investigated effectiveness and feasibility for treatment of wastewater in Hostel. Some physio-chemical parameters such as Biological oxygen demand (BOD), Chemical oxygen demand (COD), Dissolve oxygen (DO), Where analyzed by standard methods. After treatment and analysis the treated water can be used for recreational activities. The result indicates that Root Zone system works effectively for wastewater treatment.

"ABMSP'S" campus according to per capita demand 135 lpcd is supplied by corporation and out of this 48,6000 lit/year is wastewater is generated. Due to high cost of conventional treatment processes, this wastewater generated result in cause of pollution. This will help to reduce cost of wastewater treatment and reduce increase in water demand. Information gain from these project work and continuation of it should allow APCOER to make changes that will have significant effects on its water uses in future. It is hope that the information gathered through these project may be used to take information decisions regarding wastewater treatment in Hostel campus. These project is important to guarantee adequate supply for future needs. These project will helps to reduce the cost of and time spends on changes that will have minimum effects on water uses in campus. Therefore cost effective treatment process such as Root Zone treatment process is beneficial in both parameters i.e. economy and environmental friendly

Key Words: Waste Water, Root zone, Low Cost Treatment, BOD, COD, DO, PH, Ferrocement

1. INTRODUCTION

Water is one of our basic need. While water covers about 71% of earth's surface, but it is not evenly distributed. Also only 2.5% of water is fresh. Water scarcity is one of the severe crises faced by most of the countries. Many laws are thus made in order to use water efficiently. In India the Central Pollution Control Board and the State Pollution Control Board have made many laws for Reuse and Recycling of water. Setup such as Sewage Treatment plants and Effluent Treatment Plants are used for such purposes. Urban settlements are the main source of the point source pollution. Now a days water is used for various purposes for domestic as well as industrial purpose. Due to rapid growth of population, industrialization and urbanization water becomes impure with many insoluble materials and ingredients it becomes as wastewater. Hence wastewater can be reutilized after doing certain activities by suitable treatments. These increase in urbanization and human activities exploits and affect quantity as well as water resources. Fresh water is becoming is one of the most limited source available for us. Nearly about 80% of water supplied to the society returns as municipal wastewater as sewage drainage system. Wastewater carries hazardous chemicals carries chemicals and high loading of organic matter, solids both dissolved and suspended solids. There are total 150 students living in hostel situated in

2. OBJECTIVES

- To study waste water treatment.
- To examine characteristics of wastewater in campus.
- To suggest suitable treatment for above study.
- Compare the wastewater and treated water and find out the efficiency.
- High level of bacterial and viral removal.

3. MATERIAL USED

An untreated wastewater was collected from hostel campus.. Palm Trees is choosen for using it in the present study of wastewater treatment. The Soil in these study used is black cotton soil which provides a table surface area for microbial attachment, a solid substrate for plant growth. These helps in the purification of wastewater by way of physical and chemical process. Soil plays effective role in removing suspended solids, pathogenic bacteria and viruses by filtration.

In these study, there is various filter media used as a bed layers in tank no. 2 and tank no. 3. In tank no. 2, upto 40 mm brick layers at bottom and above it 10 mm aggregate and at the top soil media is filled. The tank no.3 consist 40 mm brick layer at bottom, above it 20mm and 10mm aggregate layer and small soil media layer is used.

For achieving cost effective treatment of wastewater, we constructed Three Ferro-cement tanks which are more

durable and cost effective than RCC tanks. The materials used in construction of Ferro-cement tank are Welded mesh, Chicken mesh and cement mortar of 1:3 proportion.

For easy circulation and collection of wastewater from tanks PVC pipes are used.

3. EXPERIMENTAL SETUP

The below fig shows the Experimental Setup for the treatment of Wastewater is collected from Hostel which is situated in Shahu campus. Three ferrocement are installed near the Outlet of wastewater generated from hostel. After the calculation of discharge of wastewater from hostel we calculated the capacity of Three tanks i.e 60 liters. Then it is constructed with help of Chicken mesh, weld mesh and cement mortar. The Height of tank is 3m and Diameter is 2m. For inlet and outlet flow of wastewater PVC pipes are connected within three tanks.



Fig.1 Experimental Setup

4. METHODOLOGY

The wastewater was collected from the Jedhe More Hostel which is located in Shahu Campus. The wastewater was collected with help of Plastic Jar of 20 liter from outlet pipes in the chamber of wastewater in the Hostel. These wastewater collected in the Plastic jar was filled in Tank no. 1 which is primary or sedimentation tank. After complete collection of wastewater in Primary tank, we provided Aeration at the bottom of tank. The Aeration was provided for settling of impurities and particles at bottom of tank which are present in wastewater. At the top of primary tank the outlet is provided from where wastewater flows in Tank no. 2 i.e Filtration tank with the help of PVC pipes joint with each other. In between these PVC pipes, we provided a Knob which helps to control the flow of wastewater from primary tank to Filtration tank for primary process.

The tank no. 2 is the Filtration tank which is filled with various bed layers of Brick layers upto 40mm at the bottom, 10mm aggregate layer above it and layer of soil media at the top. The palm trees are planted in the soil media

for aerobically oxidation of organic matter present in wastewater. The characteristics of palm tree is absorbing oxygen through their leaves and passing it down to roots through their stems which are utilized as Bio-pump. In these there are PVC pipe placed horizontally at the top of tank with 3mm diameter holes drilled at particular distance in it. The wastewater flowing from primary tank flows to filtration tank with help of PVC pipe and the wastewater drips on soil media through holes. These wastewater percolates through soil media and Brick layer. At bottom of the tank outlet is provided for collection and supply of these percolated water to final outlet.

The remaining wastewater flowing from primary tank through PVC pipe is collected in Tank no.3 which is also used for Filtration with various filter media filled in it. The layers are filled with 40mm brick layers at the bottom of tank, above it 20mm and 10mm aggregate layers and at the top Soil media is provide with plants i.e Palm trees planted in it. After collection of remaining wastewater the water percolates through these provided filter media. The filter media removes all the impurities and suspended solids present in wastewater. After completion of these process the water flows from the outlet provided at the bottom where treated water from tank 2 is also collected which is treated water.



Fig 2. Different Filter media used in Experimental Setup

5. RESULTS

The treated wastewater which is collected from outlet of setup are interference for each samples are as follows :

- Biological Oxygen Demand (BOD) (mg O₂ per lit) (5days@ 27 degree C), Chemical Oxygen Demand (COD) (mg O₂ per lit) (5days@ 27 degree C), Total Dissolved Solids (ppm), Total suspended Solids (ppm).

Table no. 1 Shows all inlet characteristics of treated water.

Sample No.	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	TDS (mg/l)
1	55.00	189.00	119	275
2	40.00	152.00	123	208
3	13.00	60.00	13.49	85
4	32	119.00	54.02	157
5	18.00	77.00	12.44	70
6	45.00	160.00	27.10	160
7	16.00	70.00	15.60	90
8	19.00	84.00	43.00	113
9	41.00	154.00	19.38	85
10	23.00	97.00	80.00	90

GRAPHICAL REPRESENTATION OF BOD

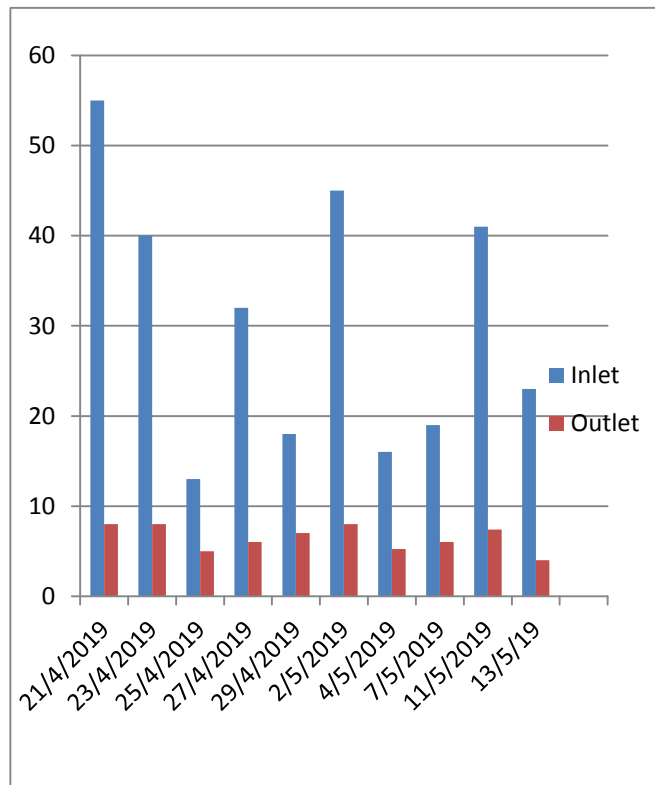
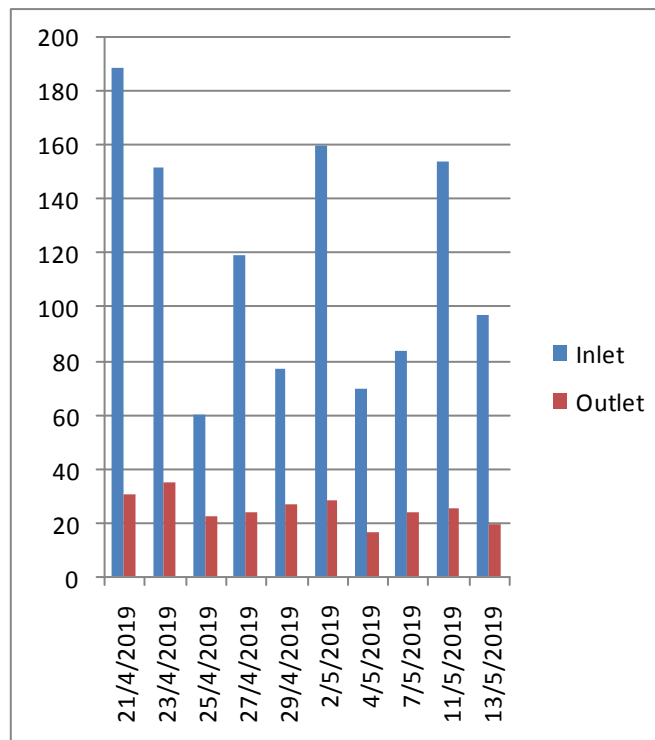


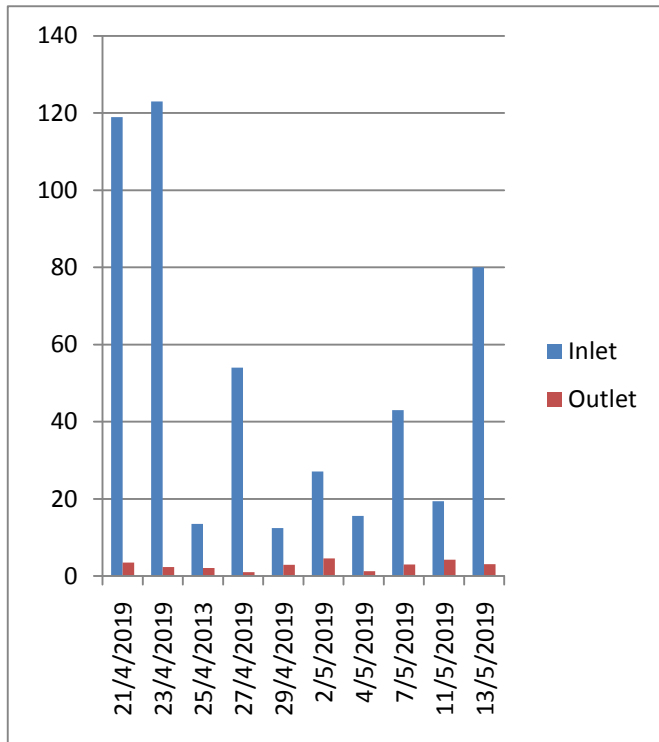
Table No. 2 Shows all characteristics of treated water.

Sample No.	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	TDS (mg/l)
1	8.00	30.00	3.44	260.00
2	5.02	24.03	2.28	199.00
3	5.00	12.00	2.11	77.03
4	4.20	16.39	1.03	118.00
5	7.00	27.00	2.89	170.00
6	8.00	28.09	4.55	219.00
7	5.23	16.12	1.23	77.01
8	6.00	24.00	3.01	120.00
9	7.38	25.03	4.20	67.07
10	4.00	19.00	3.06	88.00

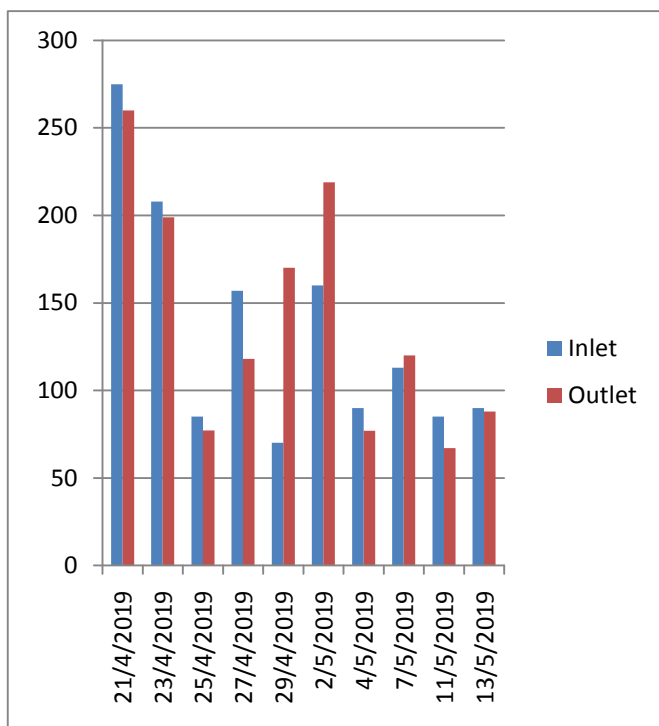
GRAPHICAL REPRESENTATION OF COD



GRAPHICAL REPRESENTATION OF TSS



GRAPHICAL REPRESENTATION OF TDS



6. CONCLUSIONS

From this study it is concluded that there is efficient reduction in parameter after treatment of wastewater generated from hostel building. The following conclusion were drawn from the present study:

- The reduction in BOD effluent concentration is found to be 70 to 80%.
- There was considerable higher reduction of high effluent COD concentration in treated wastewater generated from hostel at range 80 to 85%.
- There concentration of TDS present in wastewater generated from hostel building is reduced at high percentage upto 90 to 95%.
- But the concentration of TDS increased slightly in few 2-3 samples at low percentage and decreased in few samples.

So after overall completion and execution of project, it has concluded that this method is cost effective than the conventional treatment method of wastewater. Thus treated water can be reused for various purposes such as for Flushing, Gardening and can be used in Washing and service centre situated in campus.

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