Constructed Wetland Low Cost Treatment Method For Domestic Waste water Treatment

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Abstract- *Population escalation & industrialization in the past decades has caused a considerable rise in amount of wastewater generated globally. The conventional wastewater treatment methods are the common solution adopted worldwide.*

However, then need to preserve natural environment has led to provide natural environment being self-contained wastewater treatment methods. This study deals with application of subsurface flow constructed wetland for wastewater treatment.

Constructed wetland has been used widely for the treatment of municipal, industrial & agricultutre wastewater, as well as for urban storm water. This is owing to their high nutrient absorption capacity, simplicity, low energy demand, process stability, low excess sludge production & potential for creating biodiversity. Properly designed & constructed man-made wetland ecosystems are extremely efficient at utilizing & cleaning nutrient rich water.

In general, there are two basic types of constructed wetlands, the free water surface wetland & subsurface flow wetland. Both type utilize emergent aquatic vegetation & are similar in appearance to a marsh.

Keywords- Wetland

I. INTRODUCTION

The Free water surface wetland typically consist of a basin or channels with some type of barrier to prevent seepage, soil to support the roots of the emergent vegetation & water at a relatively shallow depth flowing through the system. The water surface is exposed to the atmosphere, & the intended flow path through the system is horizontal.

The subsurface flow wetland consists of a basin with a barrier to prevent seepage, but the bed contains a suitable depth of porous media. Rock or gravel is the most commonly used media types. The media support the root structure of the emergent vegetation. The design of these system assume that the water level in the rock gravel media. The free water surface has the advantage of requiring less land area foe wastewater treatment. Moreever, they have the ability to filter, absorb & retain particulate matters.

Subsurface flow constructed wetland are most appropriate for treating primary wasyewater, because there is no direct contact between the water column & the atmosphere. There is no opportunity for vermin to breed & the system is safer from a public health perspective. The system is particularly useful for treating septic tank effluent or grey water, landfill leachate & other waste that require removal of solids, nitrates, pathogens & other pollutants.

The environment within the SFCW bed is mostly either anaerobic. Oxygen is supplied by the roots of the emergent plants & is used up in the biofilm growing directly on the roots & rhizomes being unlikely to penetrate very far into the water column itself. SFCW system are good for nitrate removal (denitrification), but not for ammonia oxidation (nitrification). Since oxygen availability is the limiting step in nitrification.

Generally there are two types of SFCW-1 Horizontal flow
2 Vertical flow

The most common problem with horizontal flow is blockage, particularly around the inlet zone, leading either to short circuiting surface flow or both. This occurs because of poor hydraulic design, insufficient flow distribution at the inlet & inappropriate choice of porous media for the inlet zone.

Constructed treatment wetlands are engineered systems, designed & constructed to utilize the natural function of wetland vegetation soil and their microbial populations to treat contaminants in surface water, groundwater or waste stream.

II. LITRETURE REVIEW

1. G.Baskar, V.T.et.al. (2014)

The wetland is constructed in shallow pits installed with a drain pipe in a bed of pebbles or gravels and sand layers planted with native vegetation. An impermeable membrane is provided at the bottom to prevent percolation of wastewater into the soil or aquifer below. The vegetation may be emergent macrophyte, floating plant or submerged plant species. The main characteristics affect the removal efficiency of constructed wetland are the vegetation type, hydraulic residence time and substrate. The aim of the present study is to examine effect of vegetation type on organic and nutrient removal under varying hydraulic residence time in constructed wetlands. A 6-day hydraulic residence time is suggested for an acceptable level of treatment in these systems.

2. Kavya S Kallimani, et.al. (2015)

The constructed wetlands have gained significance for treatment of wastewater and is considered as successful optional for treatment system. The major components of the constructed wetland are vegetation type, hydraulic retention time (HRT) and bed media. The main aim of the present study was treatment of untreated wastewater from campus through horizontal subsurface flow constructed wetland and compare the efficiency of two different plants. Sand and gravels were used as bed media and plants were used for experiment were Phragmites Austrails (CW1) and Canna Indica (CW2). In this paper we are evaluated performance of Pharagmites Austrails and Canna Indica in subsurface flow systems for removal percentage of pollutants such as Chemical oxygen demand(COD), Biochemical oxygen demand (BOD3) ,Total solids (TS) , Total suspended solids (TSS) , Total dissolved solids (TDS) and Phosphate at different Hydraulic retention time.

3. Mr. Rajnikant Prasad, et.al.(2016)

The municipal treatment plant generally treats the wastewater of cities and disposes off safely nearby in the developing and the developed countries. The condition of the rural areas remains a problem where the treatments are not given to the wastewater in such areas the constructed wetland is option for the treatment of wastewater. Constructed wetlands are engineering systems which are designed to treat wastewater from various sources. The aim of this study is to find out the economical method of treatment of domestic wastewater and to compare the efficiency of naturally aerated and artificially aerated constructed wetland. study was done for the mundhwa area by constructing lab scale model. The parameter like colour, odour, pH, COD and DO was checked.

4. Chethana S. L, et.al. (2016)

The natural method of refining the problem has been a suitable method in comparison to other refinery methods. Natural method is applied by means of Phragmites and Persicaria amphibia. This method has good advantages such as, easy management, low cost, low technology required, and finally yet importantly, low energy consumption. Enhancing the Phragmites refinement efficiency, other kind of weeds has been used, persicaria has unique morphological, genetic, and physiological features. a comparison between the refinability of Karanji lake water by persicaria and phragmites was made. The results were based on the findings obtained from this research the removal rate of nutrients.

5. Urmila M. Bhanuse1, et.al. (2017)

Horizontal sub-surface flow constructed wetland have been used from 30 years. The classification of constructed wetland is based on the vegetation of constructed wetland is based on the vegetation type, hydrology & subsurface flow can be further classified according to the flow direction. The consumption of large volumes of water and the generation of organic compounds as liquid effluents are major environmental problems in milk processing industry.

6. Suma, et.al. (2017)

Due to rapid urbanization, mining activities, industrialization, etc. the water resources both surface and subsurface are getting polluted which is difficult to treat, recycle and the treatment requires high cost. The present study deals with the Phytoremediation for the domestic sewage treatment by Hibiscus Rosa and Catharanthus Roseus plant species. two plastic crates were used to plant the Hibiscus Rosa and Catharanthus Roseus in each separate crate. The vertical subsurface flow has been adopted in this study with two beds of aggregates and red soil. The bed consist bottom layer of coarse aggregate with 12 mm size and 6 cm depth, middle layer of fine aggregate with 2.36 mm size and 6 cm depth, Top layer was filled with red soil of size 0.6 mm and 6 cm depth. Then the physico-chemical characteristics of domestic sewage such as Turbidity, pH, TSS, BOD, COD, Nitrates and Sulphates were done before treatment and after the treatment and compared with the CPCB standard.

7. Swathy M R, et.al. (2017)

Food industry produces large quantities of wastewater from processing, making and cleaning processes. Improper treatment and disposal of wastewater cause many environmental issues. In this study a cost effective method for treatment of food industry wastewater using locally available plants was used. The plants used for this study was cyperus

rotundus and pennisetum perpureim which is known as nut grass and Napier grass respectively. Two reed beds and one reed less bed were prepared and wastewater was allowed to pass through it. The effectiveness of these plants in pollutant removal from wastewater was analyzed by varying hydraulic retention time 1,2,3,4,5,6 days. The characteristics of water samples before and after treatment were compared and discussed.

III. OBJECTIVE

The objective of the project are mentioned as below

- To construct low cost & ecofriendly waste water treatment plant
- To reduce the TDS, TSS , COD, BOD, Turbidity , present in waste water.
- To improve the Soil fertility property.
- To balance the PH of the waste water by this project.
- To treat the waste water by using rezophers & roots of plants.
- To provide effective quantity of water without creating problem to trees.
- To avoid ill effect of discharge untreated waste water on environment

IV. METHODOLOGY

For this project work it is proposed to carry out the work in the following phase

Phase- I	Comprehensive review of literature to understand wetland concept
Phase –II	Collection data through visiting wetland site near Islampur.
Phase-III	Analysis the data and determining the parametric standards
Phase -IV	Developing a model
Phase V	Validation of propose model through case study of NMCE Canteen

Month	Phase-I	Phase-II	Phase-III	Phase-IV	Phase-V
September					
October					
November					
December					
January					
February					
March					

V. EXPECTED OUT COMES

Ecofriendly development

VI. RESULTS AND CONCLUSION

1. Construction of wetland is low cost construction work compare to other waste water treatment plant
2. Due to less environmental disturb and use of plant it is eco friendly work
3. It reduces reduce the TDS, TSS , COD, BOD, Turbidity , present in waste water
4. This wetland increases the soil fertility property due to planitation of nitrogen production plant
5. Due to this wetland aesthetics view increases

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