



## REVIEW ON : "CONSTRUCTED WETLAND SYSTEM"

Onkar R. Misal<sup>1</sup>, Prof. Umesh L. Deshpande<sup>2</sup>,

<sup>1</sup>Student (M.Tech- Construction Management), Government College of Engineering, Karad.

<sup>2</sup>Assistant Professor, Government College of Engineering, Karad.

### ABSTRACT

Constructed wetland treatment system (CWTS) is a engineered system, which is used as a advanced secondary treatment for wastewater. It involves physical, chemical and biological process for treatment of wastewater. Planted vegetation with its supporting media (soil and rock) plays an important role in contaminant removal. CWTS is low cost, sustainable and effective alternative in comparison with conventional wastewater treatments like Activated Sludge Treatment, Bio-tower, etc... CWTS is used to purify the wastewater and helps to improve the vegetation. There are several methods of treatment of water but due to lack of awareness most of the time such a treatment methods are fails to fulfil the practical need of reuse of water. As the various researchers carried out the study and it is found that Constructed Wetland (CW) System is more efficient and effective to solve the problem of wastewater. This system is applicable for the agricultural field as it performs the function of irrigation system for the crop.

**Keywords :** Constructed Wetland Treatment System (CWTS), Vegetation, Reuse of wastewater, Liner, Inlet, Outlet, Distribution media.

### I INTRODUCTION

Wastewater is the by product which is arises from the different domestic, commercial, and industrial activities. As the water arises from these sources contained some impurities due to this reason, we can't use such a wastewater directly for any other purpose such as drinking, washing etc. So the treatment of wastewater is the today's modern need in order to convert the wastewater by using constructed wetland system so that it is beneficial to ecosystem, environment as well as human beings. The treated water by using constructed wetland system can also fulfil the need of irrigation in agricultural field so that it saves the additional quantity of water which is needed for crop. The treatment of wastewater or storm water by constructed wetlands can be a low-cost, low energy process requiring minimal operation.

### II TYPES OF CWTS

#### 2.1 Surface flow wetland system

In this system water level is above the ground surface and vegetation is rooted and emerges above the water surface. It is the system which includes the water flow above the ground. It s also called as Free Surface



Wetland. This system is advantages because of their low capital and operating cost. The construction operation and maintenance of this system is not too much complicated. But the only disadvantage of this system is that it require larger land area as compare to sub-surface flow system.

## 2.2 Sub-surface flow wetland system

This system is reversal to that of the surface flow system in which water level is bellow the ground and flow of water is maintained through a sand or gravel bed & roots penetrate to the bottom of the bed. This system consist of sealed basin with a porous rock or gravel bed. This systems are called by the several names according to type or pattern of flow such as vegetated submerged bed, root zone method, microbial rock reed filter, and plant rock filter system. This system is advantageous as it provides greater surface area for the treatment of water. It involves the faster treatment of water due to greater surface area as compared with surface flow wetland system. But the only disadvantage of this system is that it is more expensive to construct and operate. It also cause a problem of clogging and non-uniform surface flow which unnecessarily increase the repairing cost of the system.

## 2.3 Hybrid system

It is combination of surface and subsurface flow wetland system.

## III GENERAL DESIGN OF CONSTRUCTED WETLAND TREATMENT SYSTEM

Design of CWTS is quite complex from the technological point of view, as the numerous research and publication gives the actual design of constructed wetland but its applications has not yet been determined.

Design criteria involves the following steps :

- Planning
- Site selection
- Land use and access
- Land availability
- Topography

Examples: Agricultural wastewater, domestic wastewater, Coal mine drainage, storm water runoff etc.

### 3.1 Construction

CWS involve following parts

#### 3.1.1 Liner

It helps in preventing the percolation of wastewater into the ground water. It is water tight component of wetland system generally made up with the most common and reliable material such as Polyvinylchloride (PVC). PVC liner is advantageous over the clay liner as it prevents the cracking and does not allow the wastewater to seeps through it.



### **3.1.2 Distribution media**

Distribution medium is provided at the inlet and is usually made up with the coarse drained filled rock nearly about 2.5 inches in diameter. Distribution media is used to spread the wastewater evenly across the width of wetland.

### **3.1.3 Inlet**

It is a component which allows the entry of water in the storage basin of the constructed wetland. It is provided in the form of PVC pipe with the perforations at the entrance to allow the water to pass uniformly.

### **3.1.4 Outlet**

It continues with the line of inlet pipe provide with the perforations same as that of inlet pipe to allow the treated water to pass outside from the wetland system.

## **IV OPERATION, MAINTENANCE AND MONITORING**

### **4.1 Operation of CW**

Wastewater which is arises from any source whether it may be industrial or domestic is first of all settled in a settling tank so that sewage effluent is precipitated at the bottom of the settling tank and the wastewater at the top most surface is incorporated in the CW through the inlet and outlet arrangement. As the water pass through the inlet pipe through perforations is allow to flow uniformly so that continues flow of water is maintained and the microbes which are present in wastewater bring out the decomposition of organic matter which latter on after the completion of required design period gets completely vanished from the wastewater due to continuity of flow and gives treated water.

### **4.2 Maintenance and Monitoring of CWTS**

In CWTS it is important to set water depth to control structures. Schedule for cleaning and maintaining inlet and outlet structures, valving, and monitoring devices which helps to smooth running of the system. Proper Schedule for inspecting embankments and structures for damage. Maintenance and Monitoring plan of CWS should involves a sufficient depth of sediment accumulation before removal is required. Operating range of water levels, including acceptable ranges of fluctuation of water flow. The supplemental water source to be used to ensure adequate water levels during operation.

## **V CONCLUSION**

CWTS is sustainable, effective and productive approach to improve the present status of vegetation. CWTS is the best solution to remove contaminant and microbes from the wastewater. This system gives maximum efficiency when it is properly constructed, maintained and operated. It is cost effective system which does not require any external water pumping system as it works by gravity. CWTS is best alternative over the conventional wastewater treatment like activated sludge process, bio-tower, etc...



## **REFERENCES**

- [1] Y. M. Patil, G. R. Munavalli Performance Evaluation Of An Integrated On-Site Greywater Treatment System In A Tropical Region. *Ecological Engineering* 95 (2016) 492-500.
- [2] Atasi Patra Modeling And Simulation Of A Wetland Park: An Application To Keoladeo National Park, India Imacs.
- [3] P. G. Sonavane Potential Of Batch Constructed Wetland For Nitrogen Removal *Journal Of Indian Water Works Association* October - Desember 2007.
- [4] P. G. Sonavane Modeling Nitrogen Removal In A Constructed Wetland Treatment System *Wst* 2009.
- [5] Izharul Haq Farooqi Constructed Wetland System For Wastewater Treatment *The 12th World Lake Conference*: 1004-1009.
- [6] K. V. Jayakumar A Study On The Use Of Constructed Wetlands For Treatment Of Municipal Wastewater During Summer And Rainy Seasons In A Semi Arid City In India *Global Solutions For Urban Drainage* 2002.
- [7] Michael Trepel Models For Wetland Planning, Design And Management *Ecosys Bd.* 8, 2000, 93-137.
- [8] A. S. Juwarkar Domestic Wastewater Treatment Through Constructed Wetland In India *Wat. Sci.Tech.* Vol.32, No.3. Pp. 291-294.1995.
- [9] Abdel Razik A. Zidan Wastewater Treatment In Horizontal Subsurface Flow Constructedwetlands Using Different Media (Setup Stage) *National Water Research Center*.
- [10] Elzein. Z. Constructed Wetlands As A Sustainable Wastewater Treatment Method In Communities *Procedia Environmental Sciences* 34 ( 2016 ) 605 – 617.
- [11] Katarzyna Skrzypiec The Use Of Constructed Wetlands For The Treatment Of Industrial Wastewater *Journal Of Water And Land Development* 2017.
- [12] Jan Vymazal Constructed Wetlands For Treatment Of Industrial Wastewaters: A Review *J. Vymazal / Ecological Engineering* 73 (2014) 724–751.