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STUDY AND ANALYSIS OF GOREWADA LAKE WATERBY CONSTRUCTED WETLAND METHOD

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Abstract

Constructed wetlands have gained much importance for treating domestic, industrial and agricultural wastes and are considered as an effective secondary or tertiary treatment method. The main characteristics affect the removal efficiency of constructed wetland are the vegetation type, hydraulic residence time and substrate. The role of materials, plants and composition microorganisms have shown as an indication of a better rate of degradation. Constructed Wetlands (CW) are engineered wastewater treatment systems filled with porous media and planted with emergent wetland plants. Water contamination is a major problem world is facing today and the kitchen waste is one of the important factors. It is found that phytoremediation is one of the effective methods for the removal of pollutants from water and soil. Phytoremediation consist of media beds, plants, micro-organisms which is mainly depends on physical, chemical and biological activity to remove the contaminants. Wastewater treatment by constructed wetland granted in a developing country. It is performed for the removal of biochemical oxygen demand, chemical oxygen demand, suspended solid, ammonia and nitrogen from pre-treated domestic wastewater, the treatment of wetland carry under two hydraulic loading i.e. 3 cm d^{-1} and 6 cm d^{-1} the treatment of wastewater by constructed wetland reduce COD by 41 - 73% for inlet organic loading and 1602kg $ha^{-1}d^{-1}$ and the BOD reduce by 41 - 58% in organic loading. Phragnites Australis, Canna, Typha,Reed, lotifolia are the plant used successfully in CW.

***Key words**: Constructed Wet land, Phyto-remediation, cana-indica, seasonal variation, Artificial wetland.*

1. INTRODUCTION

Modern societies have constructed large centralized waste water treatment facilities that treat large volumes of water using both chemical and biological processes. this process consists of low cost treatments and constructed by locally available material. as compare to conventional waste water treatments the cost of such treatments are very less. Constructed wetland was one of the waste water treatment systems that had been built in many places in the world to handle waste water from settlement, industrial, agricultural and many other water pollutant sources. performance of a constructed wetland was influenced by the design, substrate, plant and retention time. The constructed wetland method used for the primary, secondary and tertiary treatment of domestic wastewater and industrial wastewater, by using CW method we can treat industrial waste contain high Chromium concentration and deep colour content, that cause the sever environmental problem . the important purpose of this technology to treat stabilised pH wastewater in the long path. the constructed wetland method having to show the good control on organic materials contains nutrient and pathogen, treated wastewater by CW used to irrigate crop, ground and construction work.

2. LITERATURE REVIEW

Performance Studies on Wastewater Treatment Efficiency of an Artificial Wetland S. Ramakrishna Rao1,*, S. Bala Prasad, P. S. Raja Sekhar, S.A. Rahiman(VOL.2 NO.3, DECEMBER 2013 ISSN: 2165-8315)

In this paper constructed wetland process is used to treat kolleru lake water at Andhrapradesh , this water was polluted by in flow through small stream of untreated sewage water from nearby town and human activity. to treat this water economically they used artificial constructed wetland method, this water is treated in three different seasons.

The artificial wetland laboratory model has been constructed using Perspex sheet, design dimension is 1.5 m length, 0.3 m width and 0.6 m depth. the model was filled with soil, flora and fauna brought from Kollaru lake, constant flow rate is approx. 1 litre/hour. the inlet

and outlet wastewater sample collected from artificial wetland during Winter, Summer and Monsoon and analyzed in laboratory for checking parameter such as pH, EC, TDS, TSS, DO, BOD, COD, PO, NO_3 described in standard method.

Constructed Wetland with Vertical Flow: A Sustainable Approach to Treat Dairy Effluent by Phytoremedeation Patel Pratik A., Dharaiya Nishith A.(Volume 3, Issue 1, January 2014)

constructed wetland is engineering wastewater system by emergent plant wastewater, it is a combination of liquid or water carried waste from residance, institutional and industrial . the aim of the study was to analyzed the dairy waste by Phyto-remediapion method using Typha Angustata and Phragmit Esaustralis. in present study subsurface flow system are used to treat dairy effluents in batch process using two species of hydrophytes and removal various pollutants from dairywaste. Constructed wetland was constructed by department of life sciences, HNG University. in this system T. Angustata and P. Australis with vegetation from lake in Baspa Village of Patan. the model was made up of plastic had dimension 0.82m x 0.54m x 0.73m. volume of bed is $0.32m^3$,surface area of bed is $0.44m^2$. porosity of sub strata is 100. sample was taken daily after 24 hour and analysis done as per APHA standard method.

Comparison Of Treatment Performance Between Constructed Wetlands With Different Plants G.Baskar1, V.T.Deeptha, R.Annadurai(Volume 3, Issue 1, January 2014)

The used constructed wetland has proved to be a reliable solution in developed country, in this paper study site is located in SRM University campus Kattankulathur. In reactor the substrata layer of gravel, sand, and plant species of Phragmites and Typha Latifolia was used and HRT is 2468 days. the inlet chamber size 0.41 x 0.21 x 0.27m. in outlet chamber 0.12 x 0.41 x 0.27m.

in this study pre-treated wastewater of sewage plant was analysed, parameter check for analysis was differs both in quality and quantity.

Full-Scale Experiment on Domestic Wastewater Treatment by Combining Artificial Aeration Vertical- and Horizontal-Flow Constructed Wetlands System Jizheng Pan & Houhu Zhang & Wenchao Li & Fan Ke.(2012) 223:5673–5683

In this study combine domestic wastewater treatment system constructed between Daqinghe river and Haihe river in Kunming city, china and filter material used for bed was available locally in nearby city. artificial aeration VFCW with depth 1.70 m having flow rate approx 1.60 m^3 day^{-1} m^{-2} and retention time is 11.3 h, HCW having depth 1.65 m and having flow rate 0.78 m^3 m^{-2} day^{-1} having retention time 18.7 h. The parameter include for analysis are ammonia, COD, BOD, SS and it is analysed by standard method.

Constructed Wetland for Wastewater Treatment and Rescue; A Case Study for Developing Country. Atif Mustafa(Vol. 4, No. 1, February 2013)

In this paperthe constructed wetland method treatment is situated in Karachi. The Max. temperatur is 36^0 C and minimum Min. 20^0 C , water collected from Staff Colony and Civil Colony. It contain domestic sewage and low flow from laboratories. The design of constructed wetland consist of filter bed having inlet and outlet pipe with plant species of Phragmite Karka. sample water is collected in plastic bottle and parameter such as BOD, COD, DO, Nitrogen and Ammonia were analysed.

3. METHODOLOGY

Sample collection:- For the analysis of waste water, the samples will collected from Gorewada Lake, Nagpur. These samples will studying in laboratory using plant species by phytoremediation technique.

Sampling Method:- Samples intended for chemical analysis must be collected during normal operating hours, 15 to 30 cm below the surface of the water or, where a reservoir is less than 30 cm deep, halfway between the surface of the water and bottom of the reservoir. Sample must be collected in an area that is not very frequented by bathers at the time of sampling. It is also important to collect the sample in an area between the filtration system intake. It is also essential that the hand of the person who is collecting the samples be extremely clean to prevent subsequent contamination when handling sample.

3.1 Sampling Equipment:- COD Analyzer, Conductivity Meter, pH Meter, Turbidity meter.

Studying Parameter:- Some test perform during water treatment process are as follows.

a. pH
b. Biological Oxygen Demand (BOD)
c. Nitrate
d. Conductivity
e. Turbidity

3.2 Methods Of Determination Of Parameter:-

3.2.1 pH:-pH indicates the sample's acidity but is actually a measurement of the potential activity of hydrogen ions (H+) in the sample. pH measurements run on a scale from 0 to 14, with 7.0 considered neutral. Solutions with a pH below 7.0 are considered acids. Solutions with a pH above 7.0, up to 14.0 are considered bases. All organisms are subject to the amount of acidity of stream water and function best within a given range.

The technical definition of pH is that it is a measure of the activity of the hydrogen ion (H+) and is reported as the reciprocal of the logarithm of the hydrogen ion activity. Therefore, a water with a pH of 7 has 10-7

moles per liter of hydrogen ions; whereas, a pH of 6 is 10-6 moles per liter. The pH scale ranges from 0 to 1

3.2.2Biological Oxygen Demand (BOD):-Standard method for indirect measurement of the amount of organic pollution (that can be oxidized biologically) in a sample of water. BOD test procedure is based on the activities of bacteria and other aerobic micro-organisum (microbes), which feed on organic matter in presence of oxygen. The result of a BOD test indicates the amount of water-dissolved oxygen (expressed as parts per million or milligram per liter of water) consumed by microbes incubated in darkness for five days at an ambient temperature of 20°C. Higher the BOD, higher the amount of pollution in the test sample.

3.2.3Turbidity:- Switch on the instrument and keep it on for some time. Select appropriate range depending on the expected turbidity of the sample. Set zero of the instrument with turbidity free water using a blank solution and adjust 000 with the set zero knob. Now in another test tube take standard suspension just prepare as above for 0 to 200 NTU solution as standard. Take it measurement and set the display of the value of the standard suspension with the calibrate knob.

3.2.4Conductivity:-

Rinse cell with one or more portion of sample. Adjust sample temperature about 25^0 . Immerse cell in sample: Sample level above vent holes. Read and note conductivity of sample. Measure temperature of sample and record to nearest 0.1^0 C. Calculate EC at 25^0 C.

3.2.5Nitrate:- Turn on spectrophotometer. Pipette an aliquot of extract or standard into a 50 ml Erlenmyer flask. Mix thoroughly with 0.8 ml of 5% salicylic acid in concentrated H_2SO_4. After 20 min at room temperature, add 19 ml of 2 N NaOH to rise the pH above 12. Cool sample to room temperature. Measure absorbance at 410 nm.

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