

# TREATMENT OF GREYWATER USING CONSTRUCTED WETLAND

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## ABSTRACT

This research paper focuses on building constructed wetland with a hydrophyte named water hyacinth to reduce the contamination of grey water due to indiscriminate discharge. Through this study, it was identified that the system is capable of removing organic and inorganic impurities such as Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Nitrates, COD, BOD and microbes. The results acquired from the analysis of treated grey water can be used for agriculture, planting, gardening, car wash or any other domestic purpose.

**KEYWORDS.** Constructed Wetland, Grey water, Water Hyacinth plant, Total Suspended Solids (TSS), Total Dissolved Solids (TDS)

## I. INTRODUCTION

The discharge of domestic sewage pollutes most of the water resources. Due to indiscriminate discharge of wastewater, most of our water bodies, surface as well as groundwater, are suffering from pollution. The contaminant load often exceeds the natural capability of that water body to dilute it to a harmless form. Sewage encourages the growth of phytoplankton, and due to extensive growth of which, the oxygen level of the water bodies gets depleted, causing an adverse effect on the faunal life. Organic and inorganic impurities, are present in the sewage, also there is very high concentration of bacterial growth, pathogens, viruses, causing waterborne diseases. So Instead, this domestic sewage/ greywater can be treated with the help of a constructed wetland with a view of reducing the pollutant load and also reusing it for activities such as gardening, car washing and other similar activities after the water is brought within safety parameters after treatment.

## II. LITERATURE REVIEW

**AUTHOR AND YEAR :-** Ram Bahadur Singh Maharajan (2012)

**TITLE:** - The Potential Role Of Water Hyacinth In Wastewater Treatment

**DESCRIPTION** This study examines the efficiency of water hyacinth plants in wastewater treatment. Reduction in concentration of BOD, TN, TP were observed and analysed for four weeks. Through this experiment it was observed that, there was clear reduction of the nutrients/pollutants in the treatment system having water hyacinth plant.

**AUTHOR AND YEAR :-** Atif Mustafa (2013)

**TITLE:** - Constructed Wetland For Wastewater Treatment And Reuse

**DESCRIPTION:** In this study, A pilot-scale constructed wetland was tested for removal efficiency of various physical and chemical parameters from pre-treated domestic wastewater.

**AUTHOR AND YEAR :-** P.M Diaz (2016)

**TITLE:** - Constructed Wetlands and Water Hyacinth Macrophyte as a Tool for Wastewater Treatment

**DESCRIPTION:** Through this Study, the efficiency of a bio-hedge based water hyacinth system is highlighted. The sand filtration method is also outlined. The different removable factors and the mechanisms used for their removal are also mentioned

### III. METHODOLOGY

- Characterization of waste water
- Study of amount of nutrients present in sewage
- Study of plants suitable for the wetland in the selected location
- Feasibility study of plant water hyacinth for treatment of domestic waste water
- Designing in flow and out flow discharge as per required detention period

The Test was carried out in Mumbai, India.

Water hyacinth plant was collected from Powai Lake, Mumbai, India. A 25 litre capacity vessel was used to carry out the experiment. 25 litre greywater was collected in another container (This water was tested, which is further referred as water before test).

On the first day the vessel was filled with 25 litre tap water and the water hyacinth plant was then placed in the vessel. On day two 5 litre greywater was substituted with the tap water in the vessel and on the third day again 5 litre greywater was substituted, this process was repeated till the vessel had 25 litre of the greywater.

(This process is done to make the plant familiar with the greywater)

The water hyacinth was now only in greywater (as 100% substitution was done)

For studying the retention time, samples were collected daily. Through observation it was found that the sample collected on day 6 was more transparent and this sample was tested.

The retention time thus obtained was 6 days.



Figure 1

*(Prototype Of Constructed Wetland)*



Figure 2

(Water Hyacinth Plant at Powai lake Mumbai, India)

#### IV. RESULTS

Sr. No	Parameters	Units	Results Before test	Results After test	Limits	Method
<b>(A) PHYSICAL PARAMETERS</b>						
1.	Turbidity	NTU	7	0	0	IS:3025 (Part 10)
2.	Total Dissolved Solids (TDS)	mg/Litre	685	92.1	500	IS:3025 (Part 16)
3.	Total Suspended Solids (TSS)	mg/Litre	296	10	100	IS:3025 (Part 17)
4.	pH Value	-	8.19	7.5	6.5-8.5	IS:3025 (Part 11)
<b>(B) CHEMICAL PARAMETERS</b>						
1.	Chemical Oxygen Demand (COD)	mg/Litre	218	25	250	IS:3025 (Part 58)
2.	Biochemical Oxygen Demand (BOD) (at 27°C for 3 Days)	mg/Litre	159	10	30	IS:3025 (Part 44)
3.	Dissolved Oxygen (DO)	mg/Litre	42.4	15	40	IS:3025 (Part 38)

(Table 1. Comparison of Nutrients present in grey water sample)

#### V. CONCLUSION

The water hyacinth hydrophyte based, constructed wetland is capable of removing pollutants.

It has shown its capability to withstand in high concentration of harmful nutrients.

Through the study, we came to know that this system can be used in the residential sector, as it is economical, energy efficient and requires low maintenance

At the end of the estimated detention period outflow characteristics were found to be within the limits specified by Central Pollution Control Board standards for inland surface water.

Although the system showed some limitations like higher detention time, but when comparison is made with respect to cost to benefit ratio, it find very advantageous.

The results acquired from the analysis of treated grey water can be used for agriculture, planting, gardening, car wash or any other domestic purpose.

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