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# Wastewater Treatment Option: Vertical Flow Constructed Wetland

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**Abstract:** Increment in the human population, urbanization, and change in way of life has expanded the Wastewater load and there by contamination load on nature to unmanageable and disturbing extents. The current wastewater treatment units and destinations are full past limit and under unsanitary conditions prompting contamination of water sources and spreading transmittable infections, foul smell and scents, the arrival of lethal metabolites, unaesthetic mood. Vertical stream wetland is the alternative for wastewater treatment and toxic soil remediation microbiological choices and non-contaminating safe strategies for treatment, recycling and transfer of wastewater. Wastewater get changed over into natural emanating. During these treatment procedures get connected blended microbial populaces convert wastewater into natural profluent and humus, which has critical incentive in horticulture. It improves the physical characteristics of waste emanating and humus making them simple to handle and utilize. During these treatment forms micro-organisms advance biodegradation of toxic mixes and pollutants. Mindfulness age at all levels - network, inns, local locations, institutes, domestic areas and bear 1/3 rd of the treatment processes. It will encourage the reusing of humus, soil, wastewater and nutrients present in it.

**Keywords:** Wastewater, Wastewater treatment option, Vertical flow constructed wetland

## I. INTRODUCTION

The size and limit of wastewater treatment frameworks are controlled by the evaluated volume of sewage produced from homes, organizations, and ventures associated with sewer frameworks just as the foreseen inflows and invasion.

Innovation and treatment here we are going to apply for wastewater treatment are as following:- vertical stream wetland :

One of the major ecological worry in urban zones today is the issue of wastewater management. In India, the accumulation, movement and treatment and disposal of Wastewater are ordinarily done in an informal and turbulent way. Uncontrolled disposal of wastewater on edges of towns and urban communities has made flooding channels and treatment units which isn't just difficult to recover in light of erratic way of transfer yet in addition have genuine natural ramifications regarding ground water contamination and commitment to an earth-wide temperature boost. A powerful arrangement of wastewater management is the need of hour and ought to be ecologically and monetarily feasible. Vertical stream wetland treatment alternative and process is simplest yet best procedures for Wastewater management for our condition. Wastewater is the result of human movement which is created since people started living in littler and bigger social orders. In current occasions the size of the town and urban areas are expanding at an exceptionally quick rate and consequently wastewater produced every day has an extremely high extent and in this way its accumulation, convenience, treatment and transfer is important, to keep up a decent clean condition in the general public. Wastewater by and large is a slanderous term which suggests something undesirable, futile, derogatory and squalid. The term wastewater is convoluted to characterize as ideas, perspectives or frames of mind towards wastewater are normally emotional and frequently exceedingly unmistakable and clashing. Wastewater the executive's frameworks exist in the greater part of the urban focuses since most recent couple of decades. Anyway these frameworks still can't seem to develop as an efficient practice.

Despite the fact that the wastewater qualities in various urban focuses shift altogether, there is a pitiful exertion to tailor the framework design to the wastewater characteristics. These procedures connected are rich wellsprings of Wastewater gushing with supplements with high natural issue substance and utilization of this can be advantageous to improve natural issue status. Physical and chemical properties of soil can be improved by utilizing these strategies and technologies which may at last increment harvest yield. The dirt which was dangerous is after treatment moves toward becoming nourished. The best and earth safe technique to dispose of natural waste is to make Wastewater profluent by these procedures. Normally happening treatments and processes yet it tends to be improved and accelerate by the streamlining of numerous parameters. These significant parameters are appropriate looking after pH, oxygen, temperature of treatment forms. So the utilization of treatment technologies and procedures are the need of the time and advantageous to improve natural issue status.

## II. LITERATURE REVIEW

1.	Stewart Dallas et al., (2004) raised worries for a minimal effort reedbed framework for the treatment of residential greywater planned upon environmental sanitation standards. A locally accessible plant, Coixlacryma- jobi, has demonstrated to be a versatile and reasonable rising macrophyte in reedbed frameworks and is as far as anyone is concerned the first run through this species has been utilized for wastewater treatment and pathogen expulsion.
2.	Chris Derry et al., (2015) investigated and survey the consecutive treatment execution of a business, household scale secluded reedbed framework expected to give safe green water system water. Already just mechanical treatment frameworks including constrained air circulation with consequent sanitization, for the most part by tablet-chlorination, had been certify in Australia. .
3.	Andrew Dixon et al., (2003) Compared an investigation of the existence cycle effects of two alternatives for smallscale wastewater treatment which are an even stream reedbed framework and a bundle bio-filtration plant. The examination is constrained to impacts during the development and activity stages. Vitality use, CO <sub>2</sub> emanation and strong outflows were picked as the natural viewpoints.
4.	L. Gustavsson et al., (2011) Studied to pursue decrease of natural carbon, BOD and supplements in a modern ooze containing nitro-fragrant mixes going through developed little scale wetlands, and to research any harmful impact, for eg. development hindrance of the basic reed phragmitesaustralis. The outcome indicated high decrease of every tried parameter in all the active water tests, which demonstrates that developed wetlands are reasonable for carbon and supplement expulsion.
5.	G. Sun*, K. R. Gray* et al., (1999) Stated In this investigation, the productivity of a full-scale joined tidal stream downflow reed bed framework was tried for the treatment of farming wastewater with normal BOD, of 1100 mg/l and NH <sub>3</sub> .- N of 329.5 mg/l. The most noteworthy BOD" COD and NH <sub>3</sub> .- N evacuations and oxygen utilization rate were accomplished in the tidal stream phase of the joined framework; this proposes the rhythmical air/water development in the grid of the tidal stream beds can profit the treatment by giving higher oxygen motion and increasingly effective use of the accessible bed volume. Better outcomes for BOD" COD and NH <sub>4</sub> - N expulsions were gotten in downflow beds with water distribution than in those without this reuse. In this way the distribution of emanating around every treatment stage is a reasonable procedure for improving the exhibition of downflow reed beds.
6.	D. Michael Revitt et al., (2010) highlighted an expanding overall enthusiasm for water reusing advances, for eg. greywater treatment and reuse proposes that extra research to explain the destiny of xenobiotics during such practices would be gainful. In this paper, situation examinations bolstered by exact information are utilized for featuring the potential destiny of a choice of xenobiotic micropollutants in decentralized greywater treatment frameworks, and for examination of the potential ramifications of greywater reusing for the more extensive urban water cycle.
7.	Andrew Wood et al., (1995) reported constructed wetlands plan to control methodically and upgrade the capacity of a wetland framework to expel or change wastewater poisons. what's more, as a rule to likewise make a tasteful situation for the advancement of untamed life and social targets. The built wetland can either copy normal frameworks in that the water streams over the bed surface and is sifted through the thick remain of amphibian plants; or the framework can advance subsurface course through the shallow, penetrable substratum in which the plants are set up.
8.	Haiming Wu et al., (2014) studied the removal rates of pollutants, toxic components, nitrogenous compounds in VFCW method with aeration applied and with non aeration method run up. For TN removal and ammonium nitrogen removal air circulation method combined with VFCW method proves technically effective and efficient. It is noticed to be decentralized treatment technology in northern China part of treatment of wastewater technique is get used and ruined effectively with desired characteristics and output.



9.	Huiyu Dong et al., (2011) compared three types of VFCW lab scale model for research oriented experimental study work differentiating HL are rates at various levels to calculate feasibility he compared three types of innovation technologies in VFCW as IA (Intermittent aeration), CA (continuous aeration), NA (Non aerated) etc. From this three types of different aeration technologies he studied DO levels, TP removal rates, NH <sub>4</sub> +n content reduction etc. He calculated optimum technique method to run aeration technology combined with VFCW.
10.	C.A. Prochaska et al., (2006) did this examination assesses the presentation of a blend of waterway sand and dolomite (10:1, w/w) utilized as substrate in vertical-stream built wetlands in expulsion of phosphates. Two copy pilot-scale counterfeit wetlands (complete 4 units) were set up outside, planted with Phragmites australis and encouraged with a manufactured sewage arrangement, relating to medium quality civil wastewater.
11.	Shubiao Wu et al., (2011) raised what is about treatments of wastewater to treat wastewater in a sustainable and economic technique and methodology paper suggest best appropriate and suitable technology as VFCW integrated household constructed wetland planted with Salix babylonica plant (willows) and sedimentation tank as a pretreatment. This treatment proves to be economical, safe, easy, affordable, sustainable, easy to operate and reduce toxics and pollutants from wastewater.

### III. CONCLUSIONS

Environmentally safe, sustainable, clean, pollution-free technology to treat wastewater and to minimise wastewater pollution is discussed. Simple, easy, cost feasible, innovative, scientific technology to treat waste- water and its literature survey is done in detail.

#### A. Acknowledgement

Declared None

#### B. Conflict of Interest

Declared None

### REFERENCES

- [1] Stewart Dallas a,b,\*, Brian Scheffe c, Goen Hob.et al., Short communication Reedbeds for greywater treatment - case study in Santa Elena Monteverde, Costa Rica, Central America. (Ecological Engineering)(2004)
- [2] Chris Derry, Basant Maheshwari et al., Wastewater treatment by a modular, domestic-scale reedbed system for safe horticultural irrigation, Science of the Total Environment journal homepage: [www.elsevier.com/locate/scitotenv](http://www.elsevier.com/locate/scitotenv)
- [3] Andrew Dixon a,\*, Matthew Simon a, Tom Burkitt et al., Assessing the environmental impact of two options for smallscale wastewater treatment: comparing a reedbed and an aerated biological filter using a life cycle approach( Ecological Engineering)(2003)
- [4] L. Gustavsson a,†, M. Engwalla, b a Karlskoga et al., Treatment of sludge containing nitro-aromatic compounds in reed-bed mesocosms – Water, BOD, carbon and nutrient removal (Waste Management) journal homepage: [www.elsevier.com/locate/wasman](http://www.elsevier.com/locate/wasman)
- [5] G. Sun\*, K. R. Gray\*, A. J. Biddlestone\* and D. J. Cooper\*\* et al., TREATMENT OF AGRICULTURAL WASTEWATER IN A COMBINED TIDAL FLOW-DOWNFLOW REED BED SYSTEM• .
- [6] D. Michael Revitt a,\*, Eva Eriksson b, Erica Donner et al., The implications of household greywater treatment and reuse for municipal wastewater flows and micropollutant loads.
- [7] Andrew Wood., CONSTRUCTED WETLANDS IN WATER POLLUTION CONTROL: FUNDAMENTALS TO THEIR UNDERSTANDING (September 1999) Manual-Constructed Wetlands treatment of Municipal Wastewaters National Risk Management Research Laboratory Office of Research and Development U.S. Environmental Protection Agency Cincinnati, Ohio 45268
- [8] Haiming Wua, Jinlin Fan, Jian Zhang, Huu Hao Ngo, Wenshan Guo, Zhen Hu, Shuang Liang. Decentralized domestic wastewater treatment using intermittently aerated vertical flow constructed wetlands: Impact of influent strengths. Bioresource Technology 176 (2015) 163–168
- [9] Huiyu Dong, Zhimin Qiang, Tinggang Li, Hui Jin, Weidong Chen. Effect of artificial aeration on the performance of vertical-flow constructed wetland treating heavily polluted river water. Journal of Environmental Sciences 2012, 24(4) 596–601
- [10] C.A. Prochaska, A.I. Zouboulis. Removal of phosphates by pilot vertical-flow constructed wetlands using a mixture of sand and dolomite as substrate. Ecological Engineering 26 (2006) 293–303
- [11] Shubiao Wu, David Austinb, Lin Liua, Renjie Dongc. Performance of integrated household constructed wetland for domestic wastewater treatment in rural areas. Ecological Engineering 37 (2011) 948–954



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