

A Review of Constructed Wetlands for Water Quality Management in India

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Abstract

Constructed wetlands (CW) are artificially developed wetlands that are used to control water pollution. In central India, the field application of CW started on the late 1990s but are mostly focused on wastewater treatment. In this paper, different existing and experimental studies on constructed wetlands were reviewed to be able to determine the current status of wetlands in India to identify the type of CW that is more suitable in managing a specific target pollutant and type of wastewater. Wetlands were categorized into three types: vertical flow, horizontal flow, and hybrid while the wastewater were classified as domestic and industrial.

Based on the review, 80% of constructed wetlands are used for treating domestic wastewater while 20% are treating industrial wastewater. Inflow analysis showed that industrial wastewater in hybrid constructed wetland produced the highest average concentration for parameters like COD (2851 mg/L) and BOD (5715 mg/L) while the lowest concentration was TN (13.97 mg/L) found in municipal wastewater. In terms of removing nonpoint source pollutants, it was revealed that vertical flow constructed wetlands (VFCW) are more effective at removing TSS and BOD as compared to horizontal flow constructed wetlands (HFCW) and hybrid constructed wetlands (HCW). HCW were found to be capable of efficiently removing COD and TN. Meanwhile, HFCW showed the highest TP removal among all the types of wetlands. In addition, VFCW were more effective for domestic wastewater while HCW are more effective for treating industrial wastewater. Lastly, there is currently a need to conduct further research on constructed wetlands for industrial wastewater as well as stormwater treatment to be able to gather more data and improve wetland design, performance, and maintenance.

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