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Abstract

The continuous discharge of untreated domestic, industrial, and agricultural wastewater into natural water bodies poses serious threats to aquatic ecosystems and public health. Constructed wetlands (CWs) are recognised as cost-effective and environmentally sustainable wastewater treatment technologies, particularly suitable for developing countries. In this study, the performance of a constructed wetland planted with ornamental plant species was evaluated for wastewater treatment. The system was constructed using graded filter media layers and operated at different hydraulic retention times (HRTs) to assess pollutant removal efficiency. Performance analysis revealed significant reductions in biochemical oxygen demand (BOD), chemical oxygen demand (COD), total nitrogen (TN), and total phosphorus (TP). The results demonstrate that ornamental plants exhibit high adaptability, rapid growth, and strong pollutant uptake capacity, indicating their suitability for application in constructed wetland systems. Overall, the findings confirm that constructed wetlands planted with ornamental vegetation offer a sustainable, low-maintenance, and effective solution for wastewater treatment, particularly in peri-urban and rural areas of tropical developing regions.

Keywords: Constructed wetlands; Ornamental plants; Wastewater treatment; Nutrient removal; BOD; COD; Hydraulic retention time

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