

A Constructed Wetland as a Reliable Method for Grey Wastewater Treatment in Rwanda

Authors : Hussein Bizimana, Osman Sönmez

Abstract : Constructed wetlands are current the most widely recognized waste water treatment option, especially in developing countries where they have the potential for improving water quality and creating valuable wildlife habitat in ecosystem with treatment requirement relatively simple for operation and maintenance cost. Lack of grey waste water treatment facilities in Kigali Institute of Science and Technology in Rwanda, causes pollution in the surrounding localities of Rugunga sector, where already a problem of poor sanitation is found. In order to treat grey water produced at Kigali Institute of Science and Technology, with high BOD concentration, high nutrients concentration and high alkalinity; a Horizontal Sub-surface Flow pilot-scale constructed wetland was designed and can operate in Kigali Institute of Science and Technology. The study was carried out in a sedimentation tank of 5.5 m x 1.42 m x 1.2 m deep and a Horizontal Sub-surface constructed wetland of 4.5 m x 2.5 m x 1.42 m deep. The grey waste water flow rate of 2.5 m³/d flew through vegetated wetland and sandy pilot plant. The filter media consisted of 0.6 to 2 mm of coarse sand, 0.00003472 m/s of hydraulic conductivity and cattails (*Typha latifolia* spp) were used as plants species. The effluent flow rate of the plant is designed to be 1.5 m³/ day and the retention time will be 24 hrs. 72% to 79% of BOD, COD, and TSS removals are estimated to be achieved, while the nutrients (Nitrogen and Phosphate) removal is estimated to be in the range of 34% to 53%. Every effluent characteristic will meet exactly the Rwanda Utility Regulatory Agency guidelines primarily because the retention time allowed is enough to make the reduction of contaminants within effluent raw waste water. Treated water reuse system was developed where water will be used in the campus irrigation system again.

Keywords : constructed wetlands, hydraulic conductivity, grey waste water, cattails

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