

Efficiency Comparison of Three Types of Constructed Wetlands for Treating Reverse Osmosis Rejects

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Reverse osmosis is a water purification technology that uses a semipermeable membrane under pressure to remove particulate and dissolved contaminants mainly pathogenic microorganisms, organic compounds, hardness and heavy metals. Use of this technology has increased tremendously to treat ground water in the Chronic kidney disease of unknown etiology prevalent areas in Sri Lanka in recent years. However, the need to treat reverse osmosis rejects (concentrated residue stream of reverse osmosis process) before releasing to the environment has not received much concern yet. Constructed wetland is one economical technique to treat reverse osmosis rejects. In this study efficiency of three different types of constructed wetlands were analysed. Three constructed wetlands were prepared, first one (CW1) only with soil, second one (CW2) with plantation of *Schcenoplectus grossus* (Thunhiriya) on the same soil and the third one (CW3) without soil with *Water Hyacinth* (Japan Jabara), an aquatic plant. The wetlands were created at a hydraulic retention time of 4 days with dimensions of 0.6 m x 0.3 m x 0.2 m. Removal efficiency of eleven parameters including concentration of nitrate, total alkalinity, total dissolved solids, total hardness, electrical conductivity, pH and heavy metals such as calcium, copper, manganese, magnesium, and cadmium were evaluated in all three wetlands. Results showed that all three types of wetlands have considerable efficiency in removing selected parameters, but CW2 was more prominent in removing the selected parameters except for magnesium, nitrate and electrical conductivity. Removal efficiencies of those three parameters were slightly lower in CW2 than CW1, and the reason could be carrying of nutrients to the CW2 at the plantation step. According to the results, it is, possible to conclude that a constructed wetland including soil and a plant is more efficient in the treatment of wastewater than a wetland which contains only soil or an aquatic plant.

Keywords: Reverse osmosis reject, Constructed wetlands, Chronic kidney disease, Wastewater treatment