

Assessment of current conventional and membrane technologies for wastewater treatment and effluent reclamation in Palestine

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Abstract

Palestine shared other arid and semi-arid Mediterranean countries with a looming water shortage issues but exacerbated with sanitation crises. This calls for endorsement of sustainable sanitation facilities with adequate effluent quality useful for different utilization purposes. Treated effluent of existing wastewater treatment systems is a valuable water source after adequate reclamation stages. Using field results over a three months period and compiled literature data, this study presents a comparative technical and financial analysis between two activated sludge systems (ASS) with different advanced reclamation stages. One ASS plant followed by slow sand filters (SF) and another by two membrane technologies (MT); an ultrafiltration (UF) and a reverse osmosis (RO) stage. Results obtained on effluent quality of both systems revealed that MT produced high quality water source suitable for unrestricted irrigation. SF showed removal efficiencies for TDS, COD, NH₄-N and FC (9.9%, 99.999%, 82.6%, and 64.8%, respectively) compared with MT (99.5%, 98.8%, 93.7%, and 100%, respectively). The annual capital and running costs for both reclamation options were calculated at 0.35 US\$/m³ (ASS) and 0.50 US\$/m³ (MT). This study pointed that MT can be a viable reclamation option with additional efforts to improve membrane performance and efficacy resulting in treatment costs reduction.

Keywords: Effluent reclamation; Agricultural reuse; Membrane technology, Effluent quality