Cost-Benefit Analysis of Beneficial Uses of Reclaimed Water: Three Case Studies from Palestine

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Abstract: Beneficial uses of reclaimed water have been considered as an integral part of available water resource in arid and semi-arid regions, like Palestine. Diverse wastewater treatment technologies installed in Palestinian urban centers, availability of land, administrative, socio-economic and environmental issues have impediments on launching sustainable effluent reuse schemes. Existing literature underlined the economic issues of using reclaimed water but ignored the real value of diverse treated water quality, quantity and the non-monetary costs and benefits. This research aimed at studying the cost/benefit (CB) analysis (CBA) of selective beneficial uses of reclaimed water. Three wastewater treatment plants (WWTPs) serving Alteereh-Ramallah (MBR facility), Al-Taybeh and Rammun (RBC system) and Anza (Activated sludge) form case studies for the CB analysis of diverse reclaimed water quality. The 10 years net present values of CBA for reclaimed water reuse projects in irrigation for three case studies were 5,172,963 (NIS) for Alteereh, 1,150,380 (NIS) for Anza and 1,294,206 (NIS) for Al-Taybeh and Rammun reclaimed water reuse projects in irrigation. The C/B ratio for the reclaimed water reuse projects were 5.04 for Alteereh, 2.55 for Anza and 1.94 for Al-Taybeh and Rammun. For Al-Taybeh and Rammun reclaimed water reuse project in concrete mixing industry, it showed low NPV and C/B ratio, which indicates that the reuse of reclaimed water in irrigation have more benefits due to the socio-political and environmental benefits involved in the agriculture projects in Palestine. From the results obtained, it was noted that the reuse project associated with high-reclaimed water quality, has higher NPV and B/C ratio, which indicates that choosing higher WWTP technologies is more justified. To ensure the sustainability of reclaimed water reuse projects, public consultation, awareness raising campaigns and governmental subsidization should accompany the reuse projects, further studies are needed to explore costs minimization and benefits maximization, using renewable energy and choosing the high value crops.

Key words: C/B ratio, wastewater reuse, irrigation, MBR, wastewater treatment