



Current situation of reclaimed wastewater reuse in golf courses in Marrakech (Morocco): problems and solutions

H. Benlouali^{a,*}, M.C. Harrouni^a, M. Fallah^b, A. Hirich^c, R. Choukr-Allah^{a,c}

^aHassan II Institute of Agronomy and Veterinary Medicine, Complex of Horticulture, Agadir, Morocco, emails: h.benlouali@gmail.com (H. Benlouali), c.harrouni@gmail.com (M.C. Harrouni), redouane53@yahoo.fr (R. Choukr-Allah)

^bIbn Zohr University Faculty of Science, Laboratory of Biotechnology and Valuation of Natural Resources, B.P. 8106, Agadir, Morocco, email: m.fallah@uiz.ac.ma

^cInternational Centre for Biosaline Agriculture, P.O. Box 14660, Dubai, UAE, email: hirich_aziz@yahoo.fr

Received 23 December 2016; Accepted 19 October 2017

ABSTRACT

Marrakech region is facing a strong growth in population, urbanization and tourism, inducing more demand for water. Therefore, a partnership between the Moroccan Government, the local agency dealing with wastewater reclamation in Marrakech (RADEEMA), the golf courses developers and the municipality, launched a joint wastewater treatment and reuse project. This project was implemented with the aim of protecting the environment, sustaining tourism and urban development of the city and satisfying water requirements (24,000 m³/d) of 18 golf courses and city landscaping. However, so far only eight golf courses are using reclaimed wastewater. The absence of surveys related to golf courses irrigation with reclaimed wastewater and the lack of data on the constraints limiting the use of reclaimed wastewater to irrigate golf courses was one of the reasons to conduct this study. This paper presents the results of a survey carried out in 2015 in six golf courses out of the eight using reclaimed wastewater in Marrakech. It covers the political, regulatory and financial frameworks implemented to involve private stakeholders in water resources preservation and achieve the National Sanitation Plan goals. Moreover, an analysis of data about the golf courses is reported. It includes golf course area, water consumption, water storage structures, soil type, irrigation systems, turfgrass varieties and hygienic measures taken to protect users and employees. The survey showed a reluctance of golf courses managers toward the use of reclaimed wastewater for irrigation, because it causes problems which are mostly related to the clogging of the irrigation system affecting irrigation distribution, salinity, homogeneity and grass growth. Based on these results, we suggested some practical solutions to promote reclaimed wastewater reuse such as the use of efficient storage and irrigation water filtration systems. In addition, some special amendments are recommended to alleviate salinity damage to the turfgrass of these golf courses.

Keywords: Reclaimed wastewater; Marrakech; Golf course; Irrigation; Turfgrass

* Corresponding author.

Presented at the 13th IWA Specialized Conference on Small Water and Wastewater Systems & 5th IWA Specialized Conference on Resources-Oriented Sanitation, 14–16 September, 2016, Athens, Greece.