

## Wastewater Management in Qatar

**Nasser Ghaith AlKuvari**  
Public Work Authority, Qatar  
e-mail: ngkuwari@ashghal.gov.qa

Supervised by  
**Prof. Waleed AlZubari**



Qatar is a peninsula with an area of 11,000 km<sup>2</sup> with a moderate relief and an elevation that does not exceed 110 meter above sea level. Most of its area is covered by limestone, sand dunes and sabkhas, and limited annual rainfall ranging between 40 and 80 mm. The main water sources are desalinated water, groundwater from the shallow alluvial, Um Radhuma, and Dammam aquifers, treated wastewater, and very limited intermittent runoff. Desalinated water is the main water supply sources supplemented by a small amount from groundwater. Qatar population increased from 0.1, 0.55, 0.825 and 1.8 millions in the years 1978, 1995, 2005 and 2010, respectively. In the last 5 years the population growth rate was at 5.3%, and the country population is expected to reach 2.03 million in 2013 and 3 million in 2026. High domestic water demand is being experienced due to the improved standards of living, high population growth rates estimated currently at 7% mainly from the influx of large number of expatriates due to accelerated economic development activities, high urbanization rates and the availability of water free of charge to the Qatari nationals. The domestic per capita water consumption reached 740 liter per day in 2007 with significant increase in the generated wastewater volumes. Desalinated water production increased from 85 Mcm in 1990 to 163 Mcm in 2000 and reached 340 Mcm in 2009. The domestic water demand increased from 85 Mcm in 1990 to 158 Mmcm in 2004 and reached 302 Mcm in 2009. In 2009, the high water consumption generated an estimated wastewater volumes of 73 Mcm with 16.5 Mcm treated to a tertiary level.

The large volumes of generated wastewater presents a management challenge to decision makers as the treatment facilities are operating at a rate in excess of their capacity and forcing the wastewater authority to dispose of untreated wastewater to remote areas outside Doha city. The research objective focused on assessing the current wastewater management practice, identify major constraints and challenges, and to suggest management measures to reduce the impact on the environment. The methodology consisted assessing the current water consumption, identify the wastewater components specially plant capacity and collection network, estimate the amount of wastewater generated and received treatment, and evaluate the manner being used to handle excess wastewater.

The analysis indicated that wastewater facilities consisted of two treatment plants (Saliyah and Nauija) that were operated continuously around the clock, 12 packaged treatment units, 176 pumping stations and 1,723 km gravity network serving 44,800 houses. The wastewater generated was estimated at 47 Mcm in 2004, and reached 73 Mcm in 2008, which is in excess of the existing treatment capacity of 32 Mcm. The additional wastewater made necessary to transfer untreated wastewater to two large lagoons at AbuNakhla lagoon located 15 km and Kraana located 85 km from the capital. The leakage from the sewer network and storage of untreated wastewater in the two lagoons represents a major environmental risk contributing to soil and groundwater pollution around the disposal areas. The un-sewer parts of the city are being served by tankers to transport effluent to the two lagoons. The management plan calls for the expansion of the existing two treatment facilities as well as construction of new plant north of Doha, along with the expansion of the

network. The excess treated wastewater to be reused in landscaping and groundwater recharge after meeting the strict Supreme Council and Natural Reserve standards.

The study recommends the formulation and implementation of a wastewater master plan that can enhance coordination mechanism among water supply and wastewater authorities, increasing reuse volumes of treated effluent in urban landscaping, implementation of demand management measures and increase awareness through media and educational programs to reduce the generated wastewater volumes, involvement of private sector in the financing, operation and maintenance of wastewater facilities, and enforcement of strict environmental standards as well as evaluating the option to invest in new treatment technology appropriate for arid environment.