



The effectiveness of urban water conservation and desalination for water resources management in Jeddah city

Ahmed E.M. Al-Juaidi

*Civil and Environmental Engineering Department, King Abdulaziz University, Jeddah 21589, Saudi Arabia,
Tel. +966 555 959 725; emails: aealjuaidi@gmail.com/ahmed.aljuaidi@gmail.com (A.E.M. Al-Juaidi)*

Received 23 March 2020; Accepted 11 August 2020

ABSTRACT

Jeddah city is anticipated to face water supply shortages due to the expansion of urban development and economic activities. This work aims to investigate the effectiveness of water-demand alternatives with existing desalination on Jeddah's water developments using the Water Evaluation and Planning System (WEAP) model. The analyses of trends in water supply and demand between 2017 and 2030 are considered. Furthermore, vulnerability analysis of the water supply system is examined after identifying the years of unmet demand. Model results show that Jeddah will have a shortage of 504 MCM in 2030 if the existing water supply remains the same. Introducing water conservation and leakage reduction measures to the existing desalination decreased the unmet demands by 66% and 21%, respectively. The implementation of water conservation with the current desalination decreased the unmet demands to 172 MCM which is lower than 504 MCM which occurred in the 2030 baseline. The water conservation measure generates a total vulnerability of 10.27×10^6 MCM which is lower than those happened in the baseline and reduce leakage ones. Moreover, water conservation and desalination are not sufficient to completely eliminate future unmet demand in all demand zones. Therefore, new water supply measures are required to meet future water shortages.

Keywords: Water conservation; Leakage; Desalination; Water resources; Demand; Supply; Jeddah
