



# Evaluation of municipal water supply system options using water evaluation and planning system (WEAP): Jeddah case study

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## ABSTRACT

Jeddah City is expected to experience water supply stress due to rapid population growth and expansion of urban developments. This paper aims to assess the impact of possible water demand on Jeddah water resources in 2030. To facilitate the analyses, a scenario-based modeling is used in conjunction with WEAP to find the best combination of scenarios that meet future water demands. For each scenario, the water resource implications were compared with a 2017 baseline. The model enabled analyses of unmet water demands, water demand, water delivered, and supply requirement for each scenario. The study identifies the year of unmet demand and calculates the reliability, resiliency, and vulnerability of the supply system. Results show that the gap between demand and supply will grow dramatically if current supply condition continues. An additional quantity of more than 504 MCM is needed in 2030 to satisfy water needs and development. The unmet water demand varies through years significantly according to the proposed scenario. The implementation of the leakage reduction measures proposed by the National Water Company (NWC), in conjunction with the application of reuse of treated wastewater and water conservation practices, can decrease the unmet demands and deficits to levels lower than, or similar to, those occurred in the 2017 baseline. However, in all cases, these involvements will be insufficient to completely meet the demands of all demand zones. A careful control of the population growth rate in future demands is necessary, although this may be difficult in a rapidly developing region such as Jeddah of Saudi Arabia.

*Keywords:* Demand management; Integrated water resources management (IWRM); Desalinated water; TWW; Water allocation; WEAP model; Jeddah

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