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Assessment of the sustainability of water management system in the Sultanate of Oman: a case study of Al-Batha basin

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ABSTRACT

Natural water resources sector in the Sultanate of Oman is one of the sectors that faces many challenges due to the increasing demand for water to meet the various development requirements. In the Sultanate there is an imbalance between water demand and supply, and thus the Sultanate of Oman is working on building many desalination plants to cover the in order to cover this deficit, the Sultanate is building desalination plants and dams, in addition to reusing treated wastewater which contributes in a relatively little to meeting the water deficit. However, this approach, i.e., supply management and maximizing water resources, the Sultanate is currently pursuing has not helped reduce the water deficit, which is estimated at 316 million m^3 (Mm^3). Moreover, seawater desalination is considered very expensive for the government and has negative environmental impacts on the surrounding marine and air environments. This study aims to evaluate the water resources management system in the Sultanate of Oman by using one of the water basins, the Al-Batha basin as a case study, and identify the most important challenges facing the management of water resources in this basin, and propose possible solutions and future scenarios that can contribute to reducing the water deficit in the Al-Batha basin, estimated at about 54.6 Mm^3. The WEAP software was used to build a dynamic mathematical model that simulates the water management system in the Al-Batha basin at the present time in terms of water resources and uses, and then to make future scenarios for future options to reduce the basin deficit during the period from 2020–2040, which is the period of implementation of the Oman 2040 vision. The results showed that if the leakage in the network was reduced by 10%, sewage collection rate was increased, and the irrigation efficiency was raised to 70%, water demands would be considerably decreased. In 2040, the total municipal water demands are calculated at 294 Mm^3 compared to about 317 Mm^3 under the reference scenario. The amount of collected wastewater was about 270,779 m^3 in 2020 and would reach about 318,744 m^3 in 2040. In the agricultural sector, the amount used could be reduced from 6,236 Mm^3 in the reference scenario during to a quantity of 118.3 Mm^3 by the year 2040 if irrigation efficiency measures are implemented. It is recommended that

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water management priorities be focused on reducing the leakages in the municipal distribution network, increasing the collection of wastewater, and raising the irrigation efficiency in the agricutlrual sector to enhance the sustainability of the water management system in the Sultanate of Oman.

Keywords: WEAP; Integrated management of water resources; Aflaj