



## **Multicriteria optimisation of the management for a coupled groundwater-agriculture hydrosystem**

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For ensuring an optimal sustainable water resources management in arid coastal environments, we develop a new simulation based integrated water management system. It aims at achieving best possible solutions for groundwater withdrawals for agricultural and municipal water use including saline water management together with a substantial increase of the water use efficiency employing novel optimisation strategies for irrigation control and scheduling. To achieve a robust and fast operation of the management system, it unites process modelling with artificial intelligence tools and evolutionary optimisation techniques for managing both, water quality and water quantity. We demonstrate our methodology by an exemplary application at the south Batinah region in the Sultanate of Oman which is affected by saltwater intrusion into the coastal aquifer due to excessive groundwater withdrawal for irrigated agriculture. Based on a generated database of crop water production functions for several predominant crops in the Batinah region we show the effectiveness of our methodology for the evaluation and optimisation of different irrigation practices, crop pattern and resulting abstraction scenarios. Due to contradicting objectives like profit-oriented agriculture or aquifer sustainability a multi-objective optimisation is performed.