



University of Zabol
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**The Thesis Submitted for the Degree of MSc (in the field of Water Resources
Management)**

**Simulation and optimization of underpressure network of agricultural
distribution, the second Hirmand line of Sistan 46000 hectares plan**

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Abstract; Sistan has little rainfall and suffers from a lot of evaporation due to its hot and dry climate. Indiscriminate and increasing exploitation of Hirmand water upstream of the Hirmand river (in Afghanistan) has resulted in the decrease of Hirmand river water and drought in the region. The construction of control dams in Afghanistan aggravates the region's water shortage crisis and the phenomenon of desertification. The water crisis requires more comprehensive planning in the field of water resources management. In this regard, the water supply network to the fields and gardens of the region was implemented at the level of 46,000 hectares, which is called the 46,000 hectares plan of the Sistan region. In this research, the Second Hirmand network was simulated by WaterGEMS software and the issue of optimization of this network was investigated by applying different scenarios. The results show that considering a wide range of the discharge between 8 and 27 liters for the 20-hectare banks cannot meet the target cultivation pattern for the duration of the irrigation plan. Furthermore, the existing pumping station cannot provide a flow rate of 20 liters per second in all 20-hectare banks simultaneously. In order to supply the required water at the location of the 20-hectare banks in each irrigation period, it is necessary to divide the sub-network of Hirmand 2 into two areas having 78 and 79 banks.

Keywords: Simulation, Optimization, Agricultural distribution network, Sistan 46000-hectares plan, WaterGEMS.