



Using hydraulic modeling to simulate human interactions with water resources in an Omani irrigation system

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In the dry Southern Oman, more than a thousand years ago, a large water system that connected the mountain mass with the coastal region was constructed. Its length (up to 30 km) and the fact that the coastal region has a rich groundwater aquifer create confusion as to why the system was initially built. Nonetheless, it was abandoned a couple of centuries later only to be partially revived by small farming communities in the 17th to 18th century. The focus of our research is one of the irrigation systems that used the water conveyed from the large water system. Not much is known about these small irrigation systems functioning in the Wadi Al Jizzi of the greater Sohar region. There are no written records and we can only make guesses about the way the systems were managed based on ethnographical studies and the traditional Omani techniques. On the other hand, the good preservation state of the canals offers a great opportunity for hydraulic reconstruction of irrigation events. More than that, the material remains suggest and at the same time limit the ways in which humans interacted with the system and the water resources of the region. All irrigation activities and some daily activities had to be realized through the canal system and only if the canal system permits it these actions would have been feasible. We created a conceptual model of irrigation that includes the human agent and feedback mechanisms through hydraulics and then we simulated irrigation events using the Sobek software. Scenarios and sensibility analysis were used to address the unknown aspects of the system. Our research yielded insights about the way the farming community interacted with the larger water system, the levels of co-ordination and co-operation required for successful irrigation and the predisposition of conflict and power relations.