



## **Irrigation landscape and the evolution of irrigation systems in south Mesopotamia**

Dengxiao Lang and Maurits W. Ertsen

Department of Water Management, Delft University of Technology, Delft, Netherlands

It is crucial to study ancient irrigation when developing understanding of the co-evolution of social and water systems. Given the low precipitation in south Mesopotamia, the available water in its rivers for cultivation was limited. This prompted the establishment of irrigated agriculture in south Mesopotamia, and led to its sophisticated irrigation systems. The interactions between social activities and irrigation management, and the influence of physical process of rivers on irrigation system, are the main topics that researchers have been exploring for a long time. The study of natural channels and man-made canals in a long-term perspective may help to understand the evolution of irrigation systems under the joint influence of nature and human beings. The aim of this paper is to discuss the development of an agent-based model of the evolutionary process of these irrigation systems, including the physical attributes of channels and canals, water management strategies, and the changes of river courses, building on relationships between humans and their environment. Studying ancient irrigation systems also can allow us to develop a deeper insight into present irrigation management, thus providing strategies for better development. The irrigation landscape of south Mesopotamia will be reconstructed, by using archaeological records, remote sensing data, and hydraulic models. In order to investigate the behaviour of human, river regime, and irrigation organization, several scenarios will be considered, such as the changes of river layouts or inflows, irrigation regimes, and the development of settlements. The results will provide insights into how the configurations of irrigation changed according to the interactions between humans and nature.