

Reducing groundwater overexploitation within the irrigation districts through improved canal operational management

Maryam morady (1), Saman Javadi (2), Mehdi Hashemy (3), and Babak Ebrahimi (4)

(1) Department of Civil Engineering, Tehran, Iran (m.morady1210@gmail.com), (2) Department of Irrigation and drainage Engineering, College of Abouraihan, University of Tehran, Tehran, Iran (Javadis@ut.ac.ir), (3) Department of Irrigation and drainage Engineering, College of Abouraihan, University of Tehran, Tehran, Iran (Mehdi.hashemy@ut.ac.ir), (4) Head of Planning and Economic analysis office, Isfahan regional water company, Ministry of Energy, Isfahan, Iran (mbeb50@yahoo.com)

This study meant to improve the operation of water distribution over an irrigation network in instruction to decrease the quantity of water extracted from the aquifer. The purpose of this study was to evaluate the ability of the Intelligent Automatic Intelligence Control System using Model Predictive Control (MPC) to irrigate the main channel. Nequabad Irrigation Network located at Najaf Abad Aquifer in the center of Iran was selected as the study area. Irrigation network has the task of transferring, delivering and distributing water to 60,000 hectares of agricultural land that is supplied from surface water resources. Due to the low operating efficiency of the present irrigation network, about 883 million cubic meters of water are reaped annually by 8975 deep and semi-deep wells within the network's range from the aquifer. This research determines to investigate the reduction of water withdrawal from aquifer using the automation of the transmission and distribution system for the study area. Improvement of the utility of the operation of the main agricultural transmission and distribution system after automation was assessed upon the basis of water delivery adequacy index for this purpose, the effect level of automatic control system performance in improving the network performance in normal and dehydrated utilization scenarios was determined. Based on these effect's levels, the number of wells that have been thoroughly closed due to this improvement or reduced since the operation of pumping was reduced. Further reduction of water withdrawal from the aquifer was determined by reducing groundwater harvesting from the plain. The results indicated that 25% and 11% improvement in water distribution among farmers was improved in the research scenarios, which

reduced the significant volume of water withdrawal from the aquifer. Based on this, using the automation system in the agricultural water distribution system under normal operating conditions, a total of 2300 deep wells and 4120 semi-deep wells will completely be closed. The results on this research point out the necessity of placing the projects of modernization and automation of irrigation networks in the priority of resource management plans in such a way that it is possible to identify the potential of solutions for improving the performance of surface water distribution systems in Reducing energy consumption and protecting the environment.