

# *Surface and groundwater quantity and quality simulation by using system dynamics*

*(A case study: East of Tehran)*

**Abstract:** Since the measures set in relation to water supply for agriculture, industry and drinking is done mainly in the fields of production management and water supply, we have less attention to demand management. In this circumstance, management of water resources consumption, particularly in arid and semi-arid regions, will be important. In urban water management, providing solutions to problems, due to the dynamic and complex relationship between social, economic and environmental issues requires understanding the problem and developing a mathematical model. The system dynamics method is capable to determine cause-effect relationship with feedback loops. This study developed a model utilizing a combination of groundwater and surface water for urban and agricultural water management in the eastern part of Tehran and Varamin city, with a system dynamics approach. The main purpose of this study is presenting solutions for demand management and water conservation in various sectors and also improves the quality and quantity of water in the southeast of Tehran. Due to the importance of considering the reservoir operation of the conjunctive use of surface and groundwater resources, we use reservoir operation rules with groundwater extraction simultaneously. The results showed that by employing techniques such as demand management and increasing water use efficiency in agriculture and the use of fiscal policy to mitigate water shortage, we can greatly reduce water shortages and by less consume of groundwater, reduce damage caused by falling water level. The results of this model will help water managers in appropriate decisions and shows that which management practice is more effective to reduce the water shortage.

**Key Words:** conjunctive use of surface and groundwater, system dynamics, qualitative and quantitative simulation, hedging rule