

## **Abstract**

Allocating and managing the surface water resources as an important supplier the domestic, environmental, industrial and agricultural stakeholders, is a challenger problem of water resources of our country. Recent droughts and improper management of water resources and wetlands is due to drying of lakes. We discovered importance of planning and managing water resources and environmental demand of water area more than ever in this regard. Conflict resolution methodology is an appropriate method of allocating water resources between stakeholders. In this study we used the simulation model named WEAP and optimization algorithms named ACO<sub>R</sub> and GA for optimal allocating surface water resources of mahabad river basin between stakeholders. The Nash Bargaining Theory (NBT) is one of the more commonly used methods for conflict resolution. Nash theory can incorporate the utility functions of the decision makers and the stakeholders, as well as their relative authorities over the water allocation process. Tenant method was used for environmental flow calculation. Mahabad Dam operation was performed in an eight-year period from 1384 to 1391 under three scenarios: using current conditions, using optimal cropping pattern for agricultural crops and changing irrigation method. . The results showed that Nash theory can increase the utility of the different stakeholders up to 99 percent simultaneously. Also assessment of performance criteria showed that WEAP vulnerability of four stakeholders in all three scenarios is the maximum amount that could have been. While the reliability criteria of optimization algorithms was less than WEAP in the first scenario, but in the second and third scenarios was in a position equal or higher than the WEAP.

**Key Words:** Mahabad reservoir dam, WEAP simulation model, ACO for continuous domains, Genetic algorithms, Nash Bargaining Theory



University of Zabol

Management of Graduate Studies

Faculty of Soil and Water

Watershed Management Department

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**Extraction of Optimal Operation Rules for Water Resources System  
in Mahabad River Basin Considering Environmental Assesment**

Under Supervision of:

**Nasrollah Basirani**

Consulting Advisor:

**Salman Sharif Azari**

By

**Habibeh Rahimi**

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