



Optimization of Integrated Management to use Surface Water and Groundwater Resources by Using Imperialist Competitive Algorithm and Genetic Algorithm (Tehran Plain)

Vahidreza Amiresmaeili ^{a*}, Hossein Jahantigh ^b

^a Department of Civil Engineering, Higher educational complex of Saravan, Saravan, Iran.

^b Assistant professor, Department of Natural Resources, Higher Educational Complex of Saravan, Iran.

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Abstract

The extensive development of activities in different areas of surface and underground water resources and the lack of sufficient attention to integrated planning and management necessitates research in this regard. Due to the imbalance in the distribution of water resources and the constraints on water resources and the constraints on the use of surface water, it is necessary to combine the use of surface water and underground water resources. In this study, the modelling is done in such a way that maximum use of surface water is achieved and the rate of utilization of groundwater reaches its minimum. In this study, imperialist and genetic competition algorithms are used for optimization. In this study, the extent of utilization of groundwater resources is limited and it has tried to use all of the surface water resources of Tehran Plain. The results of this study showed that the amount of water needed from the beginning of the year begins to decrease and then increases, and this increase is related to the warm seasons of the year. Surface water levels increase in cold seasons. In the cold seasons, the supply of water requirements was complete, but in the warm seasons, some water requirements were not met. The results of this study indicate that if the amount of groundwater resources is kept to an optimum level within 10 years, the problem of groundwater resources in Tehran plain will be solved.

Keywords: Integrated Use; Genetic Algorithm; Water Resources; Optimization; Imperialist Competitive Algorithm; Tehran Plain.

1. Introduction

Increasing population growth has increased the need for water in drinking, industry and agriculture. For this reason, optimal utilization of surface and underground water resources has been more and more considered and accepted. Separate use of resources can lead to problems such as water shortages in droughts due to the lack of surface water resources, unsustainable impacts on production and environment, dropping of stagnant levels and the mixing of salty and sweet water in coastal areas and increasing pumping costs in the result of the wasteful use. The conjunctive use of surface and underground resources can increase available water resources, and minimize the negative effects of separate use of resources, and efficient and optimal water management. Conjunctive use is in fact the exploitation of surface and underground water resources to increase water use and the sustainable use of water resources. In general, when resources are used (reservoir, river, underground water, etc.) in conjunctive manner, better effects than separate operation are obtained. With regard to conjunctive planning, in the high-water periods in which high rainfall is used, surface resources

* Corresponding author: v.amiresmaeili@saravan.ac.ir

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