

Abstract

In the new global attitude, water is an economic - social commodity and is known as the primary requirements of human. Human need for water includes a wide range that agricultural water requirement, drinking, industry and power generation could be mentioned as the most important usages. Among these, dams and water reservoirs have an important role in providing consumers' water and allocation to different parts. Mahabad dam is considered as one of the 10 ripest dams of country that satisfies targets such as agricultural sector water requirement, drinking, power generation, flood control and recreational deals. In this study, the priority of water allocation and satisfaction of the targets was determined using combined analytic fuzzy hierarchy and goal programming methods. Hierarchical structure was designed with three criteria and six sub criteria for five alternatives to determine the priority of dam water allocation to user alternatives. Then, the goal programming structure was founded on the basis of the local and global weights of criteria, sub criteria and alternatives for determination of water allocation amount. Results showed that the economic criteria with the local weight of 0.45 was more important than social and environmental criteria and the providing water of agriculture sector with the global weight of 0.36 is the most preferred choice relative to urban drinking, power generation, recreation - environmental and flood control alternatives. In the combined fuzzy analytic hierarchy and lexicographic goal programming model, 12 priorities including 7 priorities from the fuzzy hierarchical structure and 5 priorities from goal programming structure were considered. Optimal planting pattern showed that wheat' cultivation areas were entitled the largest area in all priorities. In agricultural gross margin priorities, the highest agricultural cultivation areas and gross margins were obtained. In drinking priority, the allocated drinking water to drinking sector was the highest amount in different months. Electricity production had the highest production value in April. Reservoir volume had the highest amount for spring months. The volume of empty space for flood control was the same in all priorities. Thus the greatest empty space should be kept in March month, due to downpour.

Keywords:

Goal Programming, Fuzzy Analytic Hierarchy Process, Water Allocation, Mahabad Dam



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