

## Locating of Watershed Management Operations with MCDM Approach and AHP and ANP Methods (case study: Saqezchi-Chay Watershed in Ardabil Province)

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### Abstract

Today, the management of watersheds and sustainable development requires the most appropriate and fastest method of information preparation and integration for optimal management and planning. In this context, the use of geographic information system can play an important role. On the other, one of the challenges of watershed management in the stage of planning and implementation of remedial and rehabilitation operations is to choose the appropriate and correct place for each of the managerial, biological, biomechanical and mechanical operations, so that they have the necessary maximum efficiency and effectiveness.

And due to the high cost of mechanical operations and the lack of financial resources, locating the right place to build mechanical corrective dams is of particular importance. Suitable ecological factors, high plant and animal production, the existence of a soil reservoir dam in the outlet part of the Saqezchi-Chay watershed, are heavily used and degraded natural areas.

Therefore, the purpose of this research was to locate different watershed management operations with a multi-criteria approach and using AHP and ANP decision support methods and comparison of two methods together in the geographic information system environment at the level of Saqezchi-Chay watershed. The research criteria and sub-criteria 14 variable include: soil (depth and texture), climate (climate type and precipitation amount), land use and Normalized Difference Vegetation Index (NDVI), hydrological factors and soil protection (flow accumulation, sedimentation rate and curve number), topography (elevation and slope), and economic and social (distance from the village, distance from martial sources and distance from the road) were selected. Expert judgments for weighting were collected through a questionnaire in the field with a statistical population of 29 experts and academic staff members. The results of this research showed 9 variable include: flow accumulation, sedimentation rate, distance from martial sources, distance from the road, slope, distance from the village, curve number, precipitation amount and soil texture is the highest and variables climate type, soil depth and elevation have the least influence in locating of watershed improvement dams. Also, in the spatial prioritization of Masonry Check Dams operation according to pearson correlation test, method ANP has a significant correlation with method AHP at the 95% level and intensity of 0.839, and by comparing the prioritization of the two methods with Masonry Check Dams implemented in the Saqezchi-Chay watershed, it was found that the ANP method has prioritized with more accuracy and resolution due to its network nature and increasing the range of changes. In this research, an attempt has been made to develop a new operational framework for extracting and introducing different watershed projects based on information-based methods and mapping and using the AHP and ANP frameworks by removing expert opinions (which can vary greatly from expert to expert) in order to choose the best project in the best place.

**Keywords:** Spatial evaluation, Prioritization, MCDM, Watershed management

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