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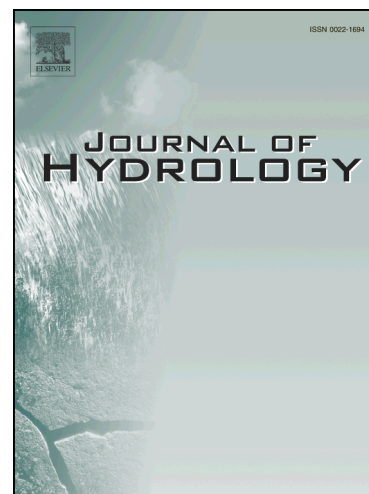
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**A comprehensive evaluation of groundwater vulnerability to saltwater up-coning and sea water intrusion in a coastal aquifer (case study: Ghaemshahr-juybar aquifer)**

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**Abstract**

Aquifer salinization has recently increased significantly due to human activity and has caused irreparable environmental and economic effects. In this research, a new method is proposed for modeling the vulnerability to salinity for the Ghaemshahr-juybar aquifer. Specifically, the GALDIT (Sea water intrusion) and TAWLBIC (Saltwater up-coning) indices were combined to produce a map of vulnerability to seawater intrusion of a region near the coast and saltwater up-coning away from the coast (Comprehensive Salinity Index or CSI), respectively. Single parameter and removal layer sensitivity analysis were performed in order to identify the sensitive parameters and achieve optimal weights (through the single-parameter method) of contributing factors in all three methods. The three optimized methods produced were GALDIT-Opt, TAWLBIC-Op and CSI-Opt. To assess the accuracy of the original maps and optimal ones, the Pearson correlation was used. Results indicated that the Pearson correlation of the optimized GALDIT, TAWLBIC and CSI model was better than GALDIT, TAWLBIC and CSI. The results show that the increase in correlation between EC (Electrical Conductivity), TDS (Total Dissolved Solids) and SAR (Sodium Adsorption Ratio) from the GALDIT model to the CSI-Opt model from values of 0.64, 0.56 and 0.68 has improved to values of 0.81, 0.88 and 0.91, respectively. The highest concentration of EC, with a value of 7050  $\mu\text{s}/\text{cm}$ , is sampled in the

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