



## Comparison of methods of evaluating groundwater vulnerability to contamination in arid regions: a case study of Abarkooh plain

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Received: 22/2/2017

Accepted: 10/5/2017

### Abstract

The issue of protection of groundwater against pollution is of crucial significance. Groundwater vulnerability maps provide useful information to protect groundwater resources and evaluate the potential for water quality improvement with changes in agricultural practices and land use applications. In Yazd province, especially in Abarkooh, the majority of agricultural and drinking water is provided by groundwater; thus, the prevention of pollution and quality consistency is very important. The intrinsic vulnerability of the Abarkooh aquifer to contamination was assessed using the well-known SI, SINTACS, GODS, AVI and DRASTIC methods. The data from these models was first collected and entered into the software of a geographic information system (GIS) to provide the required layers. The use of overlapping techniques and weight coefficients for each layer provided the final plain of vulnerability. In the next step, the accuracy of the models was evaluated by fitting a regression line between the observations and estimated values in the sampling wells. The results showed that there was no significant relation between the  $\text{NO}_3$  values and pollution potential as shown by GODS, but there was a significant relation at the 1% level ( $R = 0.81$ ) between these values in DRASTIC. This model is introduced as suitable for classifying of the pollution potential in the study area. The aquifer of Barkooh plain was divided to three vulnerability classes based on the DRASTIC model. The vulnerability classes from this model showed that most of the plain is without risk and has very low vulnerability.

**Keywords:** Vulnerability, Abarkooh plain, DRASTIC, GODS, SI, SINTACS, AVI, Nitrate, Pollution.

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