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Vulnerability of Hajiabad Plain Aquifer Based on DRASTIC and SINTACS Models

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1-Introduction

Groundwater pollution is one of the most serious and important issues in urban and agricultural areas due to land use. For this purpose, in order to obtain methods and garbage water from the pollutants that removes them, the use of methods for garbage water vulnerability assessment such as AVI, GODS, DRSTIC, SINTACS, etc. were developed. Intrinsic vulnerability is assessed according to the hydrological and hydrogeological characteristics of the region, such as the characteristics of the aquifer and the stresses imposed on it. Occurs with inherent vulnerability components. The most common methods of assessing vulnerability index include DRASTIC, GOD, SINTACS, SI and AVI rating methods. In this study, the vulnerability of the aquifer has been investigated using DRASTIC and SINTACS models, and in order to validate the results of the methods used, electrical conductivity concentration data were used.

2-Methodology

Hajiabad plain is located 160 km north of Bandar Abbas and between 35, 55 to 00 and 56 longitudes and latitudes 17, 28 to ۲۱ and 28 north, from the north to the heights of Bibi Dokhtaran mountain from the west to Sirjan-Bandar Abbas road from To the east to the heights of Anfuzeh mountain and from the south to the congomara hills and the average width is 4 km. The climate of the region is warm and the average temperature of the region is 19.8 degrees Celsius and the average annual evaporation of the plain is 2464.7 mm. In order to study the hydrochemical properties of groundwater in the region, 16 samples of water analyzed from groundwater study wells by the Regional Water Organization of West Azerbaijan Province for the water year 93 were used.

3- Results and Discussion

Vulnerability maps of Drastik and SINTACS models were prepared by applying weights related to each parameter and combining layers using the overlap function. According to

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the SINTACS map, the vulnerability of the plain is estimated from 115 to 156, the plain is in the range of medium, medium to high and high vulnerability. According to the vulnerability classification with SINTACS model, it shows that parts of the center of the plain (near Aliabad and Hajiabad villages) are in the upper floor and the northern slope of the Hajiabad plain basin has the middle floor. Most of the plain area was in the range of moderate to high vulnerability. The results showed that the Syntax model has more flexibility than the Drastic model and the probability of vulnerability is slightly higher than the Drastic model. The final map of Drastik model estimated the vulnerability of the plain from 94 to 128. The highest vulnerability is in parts of the center of the plain (near Aliabad and Hajiabad villages) and the lowest in the northern slope of Hajiabad plain basin and according to the range of Drastic vulnerability index provided by Aller Et al, (1987), vulnerability of the region is divided into 3 categories between low to medium risk. In order to study more closely and also to compare the classical methods used in this study, the method of calculating the correlation index (CI) in the aquifer and electrical conductivity data were used. For this purpose, electrical conductivity values were divided into three categories of low, medium and high electrical conductivity. Adaptation of wells with three levels of EC pollution and vulnerability categories predicted by DRASTIC and SINTACS methods was brought for Hajiabad aquifer. Based on the value of the correlation coefficient between the map produced using the drastic model with the electrical conductivity map, 39 and the same value was obtained for the Syntax model 35, which are slightly different from each other.

4-Conclusions

In this study, both drastic and syntactic methods predicted the potential risk in Hajiabad aquifer with almost equal accuracy. Having the correlation index between the electrical conduction point data and the vulnerability map, it showed that the Drastic model provided better vulnerability than the SINTACS model. Contamination potential in both studied models is low in the northern and southern regions. This can be due to high groundwater depth and low hydraulic conductivity. Comparing the models with the coefficient of determination between the electrical conductivity concentration and the vulnerability parameters showed that the highest correlation was in the slope layer, depth to the water table and the material of the unsaturated medium.

Keywords: Aquifer vulnerability, SINTACS Method, Groundwater, Hormozgan

5-References

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