

Hydro chemical analysis and evaluation of drinking groundwater resources using GIS functions A case study: Zarand Plain in Kerman Province

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Abstract

Population growth and the need for supplying healthy and quality drinking water are considered as the most important concerns of today's societies. Due to locating on arid and semi-arid belt of the world and lack of precipitation, Kerman Province is faced with severe restrictions on access to surface water resources, which has led to uncontrolled exploitation of groundwater resources, which in turn has a negative effect on the mentioned resources. The present study focused on hydro chemical analysis of drinking water in Zarand Plain of Kerman Province. In order to examine the distribution method of groundwater quality in this plain, the data collected from 55 wells, including the level of soluble solids, total hardness, chloride, sodium, and sulfate, were utilized, and geographical information system (GIS) was employed for zonation of these parameter by Kriging method. In order to carry out multivariate analysis, these parameters were homogenized using fuzzy logic and based on Schoeller diagram. Afterwards, in order to value the mentioned parameters, homogenized map of each parameter was multiplied by the weight obtained by Analytic Hierarchy Process (AHP) method. Fuzzy Gama operation was used to evaluate and determine the integrated model. The result of this integration showed that only 1.67% of the regions of the Zarand Plain are at a good and acceptable level in terms of drinking water.

Key words: quality of groundwater, Zarand Plain, fuzzy-analytic hierarchy process, GIS

1. Introduction

Groundwater flow paths in the hydrological cycle pass from the ground surface, which makes pollution by human possible, and the groundwater quality declines. Therefore, the consequences of pollution and protection of groundwater against pollution are other important reasons for studying groundwater. In Kerman Province, due to drought in almost all parts of the province, surface water resources like rivers and springs have dried out, and using groundwater is the only way to supply water. High level of exploitation from