Zabol University
Faculty of Natural Resources
Department of Environment

Thesis for obtaining a master's degree in environmental science and engineering

Field: Environmental Science and Engineering - Land Assessment and Planning

Title: Temporal monitoring of groundwater quality in Zahedan region and quantification of the relationship between groundwater quality parameters and land use/land cover

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Abstract

Quality monitoring and protection of limited and vulnerable water resources, which guarantees the sustainable development of any country, is very important. Meanwhile, the need for sustainability protection, in other words, water resources management, which are the most important and limited resources, is felt more than ever. In order to monitor the groundwater quality of Zahedan region (capital of the province), EC, pH, TDS parameters, some water cations and anions in the period 1389-1392 and 1393-1398 as well as heavy metals cadmium, copper, nickel, antimony and lead in 1396 study Took To study the trend of time changes in water quality parameters, at least for a period of five years, the annual data of wells that had continuous statistics (90 wells and aqueducts) were used. Also, using the concentration of each variable, the water quality index (WQI) and also the modified heavy metal pollution index (mHPI) were determined. By entering and recording data in Geographic Information System (GIS), zoning maps of water quality indicators (WQI) and modified heavy metal pollution index (mHPI) for groundwater were prepared. The lowest and highest levels of WQI in the period of 1389-1398 were 30.1 (for Gorband well) and 674 (for well. 39 in Zahedan, respectively). The lowest and highest rates of modified heavy metal pollution index (mHPI) were 47.17 (station 3) and 671.55 (station 14), respectively. The results of the analysis of the modified heavy metal contamination index in the study area showed that 35.3% of the studied wells are free of contamination, 5.9% are on the verge of contamination and 58.8% are contaminated with heavy metals. The values of electrical conductivity of groundwater in Zahedan region show that the quality of groundwater in this region is unsuitable for agriculture. Examination of anisotropy status for variograms related to groundwater quality indices of Zahedan region showed that chlorine, potassium, magnesium, bicarbonate quality indices have the highest correlation in north-south, east and west directions and total hardness and sodium indices have the lowest correlation in They have north-south. The structure of perceptron artificial neural network presented with 9 neurons or middle layer (hidden) and educational data equal to 80% (Train), test data equal to 10% (Test) and validation data equal to 10% (Validation) were considered. The help of perceptron artificial neural network showed that for WQI groundwater quality index, the most important land uses include urban land use (91%), barren land land use (86%), shrub land use (50%) and agricultural land use (47%). Considering the quality characteristics of groundwater in Zahedan region, it can be acknowledged that proper water management in this region is very important.

Keywords: Geographic Information System, Groundwater, Land use/land cover, Zahedan, Water Quality Index