



University of Zabol

Graduate School

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Department of Rangeland and Watershed Management

**Thesis for obtaining a master's degree in watershed
management**

**Investigation of spatial and temporal
changes in water quality of
underground wells in Zahedan using
WQI index**

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June 2022

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Today, quality water supply is one of the most important issues needed by human beings, which due to human development and the expansion of economic and social activities, human needs for water and various purposes have increased. Therefore, for agricultural, industrial and drinking purposes, determining the characteristics of water quality and evaluating the parameters that affect water quality changes are very important. Since the WQI index is one of the most appropriate indicators for assessing groundwater quality in this study to investigate the spatial and temporal changes in water quality of groundwater wells in Zahedan from 1390 to 1399, 7 wells with numbers 1, 3, 4, 20, 22, 41 and 44 were used for this index. The parameters measured in this index were: nitrate, biologically required oxygen, coliform bacteria, total soluble solids, sodium, calcium, magnesium, bicarbonate, chloride, sulfate, TH and acidity. To determine the quality of groundwater using layers of spatial information and the use of geographic information systems, the information was matched and evaluated and the combined effects of parameters affecting water quality were identified. Then the water was classified qualitatively. Finally, depending on the type of use in the region, their quality and effectiveness were measured. Statistical analysis of data was performed using SPSS software. The results showed that in well number 1, the amount of hardness (TDS) was higher than 10,000 mg / liter (minimum allowed for drinking) except in the years 1391 to 1397. However, in the first 6 months of 1390 to the second 6 months of 1398, the total hardness had an increasing and decreasing trend, respectively. For this well during the last 10 years from 1390 to 1399, constant values including Mn, Mg, K and Na were reported, which is less than 5000 (permissible for drinking). In well number 3, except for 1392 and 1397, the amount of Fe was less than 5000 mg (maximum allowed for drinking) and the amount of calcium and magnesium was the lowest (0.5000 mg / l). The amount of EC in 1390 had (maximum permissible drinking) but in 1396 had the highest. In well number 4, the amount of PO₄ in 1390, 91 and 97 compared to previous years had an increasing trend, but in the period 91 to 92, which is a constant trend was within the allowable range. Concentrations of Ca and Mg which were the highest in 1390, 91 and 97 years. In well number 20, the total hardness (TDS) had the maximum allowable amount for drinking according to the two parameters Ca and Mg. While in well number 22, the TDS value was relatively good. But due to the high pH, water quality was relatively poor. In wells 41 and 44, water hardness was higher than standard. In general, well number 44 was in an unfavorable condition due to the excessive concentration of elements. Wells 22 were in good condition and wells 20, 4, 3, 1 and 40 were in relatively good condition.

Keywords: Quality, well, Zahedan, location, time, WQI index.