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Analysis of the hydrochemical, hydrophysical, and water level of groundwater of the Karstic Miocene Limestone aquifer in the North of Lebanon

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The increasing population in Tripoli and its surroundings has placed an increase in the demand of groundwater and the random drilling of wells. This situation has resulted in a higher demand of groundwater and thus endangered the Miocene limestone aquifer that will cause problems unless serious steps for the management of water resources are implemented. These steps should include defining stringent characterization of the properties of the aquifer in order to properly manage the quality and quantity of pumped water. Our aim in this study is to analyze the hydrochemical, hydrophysical quality, and water level of groundwater of the Miocene aquifer in the North of Lebanon. The results have shown that the dominant type of groundwater in the area is highly chlorinated with sulfated calcium and magnesiumwith heavily charged Nitrate and Nitrite. The spatial distributions of anions and cations as well as electrical conductivity obey an increasing pattern westwards towards the Mediterranean Sea. Due to the high concentrations of SO_4^{2-}, Cl^-, Mg^+ and Ca^{2+}, NO_2^-, and the presence of bacteriological contamination (*E. Coli, Coliform, Salmonella*) and some ions with higher concentration than the maximum allowable levels and, not all of the 65 water sampled in wet and dry seasons are categorized in suitable ranges for drinking use. During the last decades, illegal groundwater pumping mainly fordomestic and agricultural usehascaused groundwater quality degradation due to saline water intrusion from western areas (Tripoli and Mina area). In order to study the origin and the hydrochemical aspect of groundwater, Phreeq C and Diagram software were used todetermine the properties of all chemical parameters; as for the static and dynamic water level, Aquitest software was used. GIS and Surfer software were used to generate maps locating the spatial distribution of all parameters. The end result was the determination of anthropogenic and naturogenic sources of water contamination and pollution in North of Lebanon. This is considered as one of the main concerns of the area, but due to the low utilities, budgets, political situation, and awareness of people, the analysis and sampling were done in very crucial conditions in addition to the lack of studies and information on the Koura\Zgharta\Tripoli Miocene aquifer.

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