

USE OF HYDROCHEMISTRY AND ENVIRONMENTAL ISOTOPES TO EVALUATE WATER QUALITY, LITANI RIVER, LEBANON

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ABSTRACT

The chemical and isotopic composition of water discharging from springs, surface and groundwater in the Litani river basin were studied. The data include field measurements of specific conductance, pH, total dissolved solids (TDS) and laboratory measurements of major element chemistry, stable $^2\text{H}/^1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$ isotope ratios ($\delta^2\text{H}$ and $\delta^{18}\text{O}$) of water. Water samples were collected during 2004 and 2005. Geochemical analysis indicates that sea spray influences the major ionic composition of the downstream river. Water quality changes over the course of the river in the central Bekaa plain near the Karaoun reservoir. This area drains percolated and infiltrated water that contains relatively elevated concentrations of nitrate originating from agricultural runoff. Isotopic results for $\delta^{18}\text{O}$ and $\delta^2\text{H}$ show that the river can be divided into three main parts relative to water quality. The upper part, near the headwaters, is directly influenced by precipitation input, while the mid course of the river is influenced by input from the Litani tributaries and the effluents from man's activities. The lower reaches of the river are exposed to high evaporation. In the Karaoun reservoir, isotope enrichment with respect to the Litani river is calculated to be more than 3‰ in $\delta^{18}\text{O}$ and 10‰ in $\delta^2\text{H}$. The groundwater in Karaoun basin is recharged by direct river infiltration and infiltration from the reservoir. The percentage of reservoir recharge varies from 28.5% to 20.7% in the groundwater system.

Reference: Saad, Z., V. Kazpard, A.G. El Samrani, K. Slim, and N. Ouaini. 2006. Use of hydrochemistry and environmental isotopes to evaluate water quality, Litani River, Lebanon. *Journal of Environmental Hydrology*, Vol. 14, Paper 16.

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