



Hydrogeology and Contamination of the Basin of Tripoli

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Hydrogeologically, the basin of Tripoli can be divided into two adjacent basins which are not firmly separated by the fault of Tripoli with a throw of about 100 m. The west basin is lowered and forms the plain of Tripoli in the form of a small peninsula on the coast. The Miocene aquifer with a thickness of 150 to 220 m of limestone, marl and sandy marl is covered by 10–20 m of quaternary conglomerates, fossil soil and sand dunes. The Miocene is superposing the chalky marl of upper cretaceous and lower marine tertiary formation labeled with C6 on the geological map of Lebanon, which is an excellent ground for the aquifer.

Tripoli lies on the middle of a trough called Zgharta-Amioun syncline which is limited by the Tourbol anticline in the north and Qalhat anticline in the south, eastward is the aquifer limited by the so called Lebanese flexure. The limestone layers are karstified and highly fractured. The main sources of recharge to the aquifer are precipitation (800 mm/year) and the infiltration from rivers, mainly from Quadisha River. The main sources of discharge are natural outflow to the sea and withdrawal of groundwater by pumping wells.

In order to preserve the groundwater of Tripoli, 38 representative private wells, and distributed in the new residential "Dam & Farz" were selected. The extent of seawater intrusion was followed for over two years through the analysis of parameters: hardness, alkalinity, conductivity, Cl, Na, Mg, Ca and K. A division of the region in terms of these parameters into 4 was carried out which clearly shows the seriousness of the situation. In addition, the exploitation of groundwater has been studied for the first time in Lebanon through meters installed on the wells. Monthly consumption per building was regularly sampled for 2 years, which was determined by a statistical study daily consumption per capita in the area.

The evolution of the parameters shows a continuing trend of the phenomenon of saltwater intrusion in groundwater due to overexploitation of the latter due to the uncontrolled growth of private wells and pumping without any constraint of water for the purposes daily. This exploitation has led to the lowering of the piezometric level of groundwater, causing the intrusion of salty sea water; the average daily amount of water consumed per capita is 255 liters / days. This value is two times larger than the value commonly used by the Ministry of Water (120 liters / day).

Although the Ministry of Water is no longer issuing permits to drill private wells where there is public water system, we found that the construction of each new building is preceded by a private drilling. And it is clear that the continuity of such practice will lead to worsening of salinization. A formal ban on new drilling and a 5-year moratorium on the use of existing wells are necessary to allow the water to find its water balance. During this period, water will be provided only by public network.

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