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Database compilation: hydrology of Lake Tiberias (Jordan Valley)

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A long-term series of water balance data over the last 50 years is compiled to gain insights into the hydrology of the Lake Tiberias (LT) and surrounding aquifers. This database is used within the framework of a German-Israeli-Jordanian project (DFG Ma4450-2) in which numerical modeling is applied to study the mechanisms of deep fluid transport processes affecting the Tiberias basin.

The LT is the largest natural freshwater lake in Israel. It is located in the northern part of the Dead Sea Rift. The behavior of the lake level is a result of the regional water balance caused mainly by interaction of two factors: (i) fluctuations of water inflow to the Lake, (ii) water exploitation in the adjacent aquifers and consumptions from the lake (pumping, diversion, etc).

The replenishment of the lake occurs through drainage from surrounding mountains (Galilee, Golan Heights), entering the lake through the Jordan River and secondary streams (85%), direct precipitation (11%), fresh-saline springs discharging along the shoreline, divertion from Yarmouk river and internal springs and seeps. The major losses occur through the National Water Carrier (ca. 44%), evaporation (38%), local consumption and compensation to Jordan (in sum 12%). In spite of the increasing role of water exploitation, the natural inflow to the Lake remains the dominant factor of hydrological regime of the Tiberias Lake.

Additionally, series of natural yield to the LT are reconstructed with precipitation data measured in the Tiberias basin (1922-2012). The earlier period (1877-1921) is evaluated considering long rainfall records at Beirut and Nazareth stations (Middle East Region). This data enables to use the LT yield as a complex indicator of the regional climate change.

Though the data applies to the LT, this example shows the importance of large database. Their compilation defines the correct set-up of joint methodologies such as numerical modeling and hydrochemical analyses aimed to understand large-scale hydrological processes.