Geophysical Research Abstracts
Vol. 18, EGU2016-4646, 2016
EGU General Assembly 2016

Source detection in the Lower Jordan River - How to monitor the impossible

Noa Hillel (1), Christian Siebert (2), Tobias Licha (3), and Jonathan B Laronne (1)

(1) Ben-Gurion University of the Negev, Be'er Sheva, Israel, (2) Helmholtz Center for Environmental Research- UFZ, Halle, Germany, (3) Georg-August-University, Göttingen, Germany

The Lower Jordan River (LJR) is a major ecosystem in the semi-arid to arid Jordan-Dead Sea Graben, the backbone of abundant farming activities in the Lower Jordan Valley and the major inflow to the dying Dead Sea. During the 1960's the Sea of Galilee and the Yarmouk River, the main sources of the river, were dammed, decreasing its annual flow from $\sim 1.2 \times 10^9$ m^3 to less than 0.2×10^9 m^3, leaving a mix of point and non-point sources composing its base flow. Beside natural saline springs along its course, current day anthropogenic sources (e.g. sewage, agricultural return flow and fishpond effluents) have a negative impact on the water quality and the ecosystem, contributing high salinity and causing overall pollution. To enable an environmental assessment of the river and to satisfy the regulations of LJR international treaties, the temporal dynamics of water quantity and quality must be observed on a regular basis.

As the LJR forms the highly secured border between Jordan, Israel and the Palestinian Authority, nearly the entire river course is physically inaccessible. To overcome that situation, considerable efforts have been made to install a network of 7 sampling stations along the LJR to identify and separate the different contributing sources. Automatic water samplers in three of the stations collect water daily in addition to continuous measurement of stage, EC, pH and temperature. Sensors at all locations transmit online real-time data. During monthly campaigns a total of 14 sites are manually sampled along the river and some tributaries. Water samples are analyzed for major ions, trace elements and stable isotopes. While the sensor network allows separating events occurring in different reaches along the river course and calculating travel time between stations, water sample analyses enable fingerprinting and separating the actual sources. By doing so, an unusual and very local event was recorded by the most southern station (5.5 km north of the Dead Sea). Here, the water level rose by $\sim$3 m for nearly 20 minutes. Dubious enough, there was no sign of that event at the closest station 6.5 km upstream. This example clearly stresses the necessity of the station network. Furthermore, it demonstrates that previous discharge estimations to the Dead Sea are only vague and based on random measurements at very few locations, providing meagre understanding of the river system.