

## Development of groundwater salinity in the Wadi Zerka Ma'in catchment area, Dead Sea, Jordan

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**Abstract** Wadi Zerka Ma'in catchment area is located in the northeast of the Dead Sea basin. It has two different types of aquifers: (1) an unconfined upper limestone aquifer with groundwater level ranges between 800 and 160 m above sea level (asl), and (2) a confined lower sandstone aquifer with groundwater level ranges between 340 and –260 m asl. The two aquifers are separated by a marly aquiclude. The salinity in the carbonate aquifer ranges from 500 to 1500  $\mu\text{S cm}^{-1}$ , while the salinity in the sandstone aquifer is between 1.7 and 4.1  $\text{mS cm}^{-1}$ . There is a major strike slip fault in the middle and lower part of the Wadi that passes perpendicularly through the two aquifers and the aquiclude layer with embedded normal faults. The aim of the study was to specify the origin, genesis, and development of the salinization of groundwaters, as a result of the major fault zone. It was found that the embedded normal form conduit connections produce a third groundwater type as a result of up-rising mixing. Therefore three groundwater types are generated in the flow as follows: (1) Alkaline – earth water predominantly bicarbonate (water group A) in the upper aquifer. (2) Alkaline – earth water predominantly sulphate (water group B) in the mixing zone. (3) Alkaline – earth water predominantly sulphate-chloride (water group C) in the lower aquifer.

**Key words** groundwater mixing; groundwater gneisses; saturation indices; trace elements; strike slip fault