

EGU2020-629

<https://doi.org/10.5194/egusphere-egu2020-629>

EGU General Assembly 2020

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Sediments of the Wala catchment and reservoir, Jordan: Geochemical analysis

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This study reports data from field sampling of catchment and reservoir bed sediments undertaken in October 2013 in the Wala catchment, Jordan, and findings of geochemical analysis of the sediments. The primary aim of this study is to investigate the relationship between sediments from different locations within the catchment and those deposited within the reservoir. This is set within the overall context of an attempt to rationalise the use of modelling in a data-poor environment. Can targeted, limited acquisition of geochemical information within a logistically challenging environment add value to existing datasets in respect of ground truth for model predictions of sediment provenance within the catchment? Channel bed sediments were collected from sub-catchment outlets throughout the Wala catchment and shallow cores (c. 500 mm) extracted from three locations around the Wala reservoir. XRF and particle size analysis were performed on all samples and the data analysed in respect of mineralogical and pollutant geochemical signatures. Contrary to evidence from temperate lake studies, there was no strong record of discrete event-driven deposition at the Wala, likely due to reworking of sediments during high-flow recharge events following complete draw-down of the reservoir in the highly intermittent hydrological setting. Pollutant geochemistry shows variations consistent with patterns of land-use in the catchment, with levels of Pb, Co, Cu and Cr associated with urbanised regions in the north and west of the region. Sampled concentrations, particularly those of the reservoir sediments, are typically below thresholds for environmental health concern. However, combined with the modelled bias in flow and sediment inputs from this region (driven by asymmetric rainfall distribution), this emphasises a potential concern for future management of water quality and protection of groundwater during aquifer recharge.