

**Groundwater salinisation in arid area hydrochemical and isotopic evidence, an
exemple from Bahira plain central Morocco
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Groundwater salinization resources pose one of the major pressures for sustainable utilization of groundwater in arid and semi-arid regions. Hydrogeochemical investigation of groundwater samples collected in the Bahira aquifer highlighted that the aquifer is characterized by three kinds of water- (i) freshwater, separated from the whole system and located at the Ganntour plateau which is the recharge area+ (ii)+ Waters had moderate salinity highlighting the influence of Ganntour water, and suggesting the occurrence of mixing processes. (iii) High groundwater mineralization acquiring salinity from different sources. This latter, is located especially in Zima lack and Sed Elmajnoun depression and at ridgeline in east part of the plain. Upon integration of multiple geochemical and isotopic techniques, it was shown that the original dissolved salts in the Bahira plain were derived from dissolution of Triassic evaporites in the plain. Also, it is proposed that leaching of Jurassic formation salts in Mouissate Mountain through natural flows and agricultural water irrigation under arid conditions has resulted in accumulation of salts in the unsaturated zone within the Bahira basin. Cl/Br ratios increase gradually with Cl concentration from dissolution of natural halite. When groundwater is affected by extreme evaporation Cl/Br ratios may increase up to 1900. High-fluoride concentrations in groundwater are identified in phosphatic plateau of Ganntour (recharge area) linked to dissolution of fluoro-apatite ($\text{Ca}_5(\text{PO}_4)_3\text{F}$). The high concentration in the rest of plain is explained by the spreader of fluoride over the area following the flow path. The overwhelming contribution of evaporitic rock weathering processes and evaporation to the groundwater salinity is an important finding for decisions regarding how to manage groundwater resources in Bahira region under arid climate.

