

Salinization in the Coastal Aquifers of Arid Zones: The Case of Santo Domingo, Baja California Sur

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Abstract

Groundwater quality in the Santo Domingo area in Baja California Sur, Mexico indicates the presence of various salinization phenomena, in that i) the geological matter of marine origin comprising the aquifer suffers diagenetic effects due to its interaction with groundwater of low salinity, ii) the extraction of groundwater causes modifications in the natural flow system and iii) the effects of intensive agriculture produce effluents that leach into the saturated zone.

The groundwater extracted consists of a mixture of i) groundwater of relatively low salinity that circulates in the aquifer and ii) an extreme member of salinity similar to seawater, contained mainly in the formations of low permeability underlying the aquifer. The geochemistry of carbonates and cation exchange reactions (both direct and inverse) control the concentration of Ca^{2+} , Mg^{2+} , Na^+ and HCO_3^- , as well as pH values. The concentrations of dissolved trace elements (F, Li, Ba, Sr), suggest that the extreme saline member does not correspond to the average composition of modern seawater. NO_3^- concentrations enable one to distinguish between the salinization caused by farming practices and that caused by saline waters.

Keywords: Direct and inverse ion exchange, Trace elements, Baja California, Saline intrusion

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