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Groundwater and dependent ecosystems

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Interactions of surface and ground waters

title: **Groundwater-lake interaction in a saline wetland area,
Duna-Tisza Interfluve, Hungary**

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The preservation of wetland areas is an imperative question nowadays. The understanding of the interaction between groundwater and the wetland systems are essential for their appropriate management in the changing climatic circumstances. The subject of the present study is an ephemeral saline lake, the Lake Kelemenszék which is surrounded by a saline wetland area. The area is part of the Kiskunság National Park and it is under protection because of its unique flora and fauna. The preservation of the natural conditions for sustaining the ecological diversity, the knowledge of the hydrogeological conditions of the area is crucial.

The lake is situated in the lowland area of the Hungarian Great Plain, Pannonian Basin, in a special hydraulic position. In the area two groundwater flow systems interact: a deep overpressured, uprising saline water system, originating from the Pre Neogene basement and a fresh water regime driven by the topography i.e. water table differences. In the study area these groundwater flow systems discharge based on regional hydraulic, hydrostratigraphic and seismic investigations (Mádl-Szőnyi and Tóth, 2009). According to these results it was supposed that the ascending deep saline water can contribute to the water budget of the lake and formation of the salinization phenomena around it. The qualitative and quantitative influence of groundwater on the Kelemenszék wetland area was evaluated based on detailed hydraulic, hydrological and chemical investigations. The hydraulic and chemical data arise from regular sampling of channels, lake water and shallow groundwater wells, settled around the lake. Near the lake shore a meteorological station was established, for precipitation and evaporation measurements. Based on these data the water budget was set up for the lake. According to the water level data, the seasonal and spatial variation of the interaction between groundwater and the lake could be observed.

Although regionally the lake situated in a discharge area, but in local scale throughflow conditions could be observed during a year period. The artificial hydraulic effect of channels operating from the 1970's in the eastern and western side of the lake can be responsible for this throughflow situation. It was pointed out that the vertical hydraulic gradient that is responsible for inflow or outflow of groundwater to or from the lake varies seasonally. According to the water budget calculation, the amount of the groundwater recharge and discharge to the lake is negligible, the water budget of the lake is governed mainly by the evaporation and the precipitation. Nevertheless the contribution of the deep saline groundwater in the lake water chemistry and the surrounding salinization is relevant.

The results of the study indicate, that the interaction between the groundwater and the lake is controlled not only by hydrologic conditions but also by the flow regimes. The deep ascending saline water quantitatively is not decisive in the water budget but qualitatively it is significant and modulate the chemical character of the lake and responsible for the surface salinization around it.

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