RESEARCH ON SALINIZATION AND NATURAL DESALINIZATION BY THE ”BFK” METHOD DEVELOPED FOR THE ANALYSIS OF THE SUPERFICIAL FORMATIONS ON THE GREAT HUNGARIAN PLAIN

L. Kuti, U. Fügedi, B. Kerék, J. Vatai
Geological Institute of Hungary, H-1143, Budapest, Stefánia út 14., Hungary
kerek@mafi.hu

The BFK method was developed for agricultural geological research at the beginning of the 1980s, and this sampling method is still in use. The main point of the method is that from the drilled material samples are taken in certain depths: from the upper and lower level of the soil, from the parent material, from the unsaturated zone, from the saturated zone and from the groundwater. The samples go through detailed sedimentological, mineralogical and geochemical analyses, and the agrogeological regularities are established based on those results.

The method was originally developed for searching geochemical patterns, but it is also applicable to the research of the geological factors of different soil degradation processes, like salinization. This kind of analysis was completed at the Danube Valley, Hungary, one of the most typical saline area, situated in the middle part of the country. This kind of research was also taken in the saline depressions between the loess and sand dunes at Danube–Tisza Interfluwe.

In the Danube Valley, above the unsaturated zone, often quite thick lime mud accumulations appear. At the bottom of the saline lakes, situated in the depressions between the loess and sand dunes at Danube–Tisza Interfluwe, carbonate mud precipitate. In the glacial periods of the Ice Age, wind blew the different sediments at the actual places: sand building up the hills from the alluvial deposit of the Danube, loess from the boundary of the inland ice, and carbonates from the moulding carbonate rocks of the Transdanubian Mountains.

Accumulation of most elements in the consolidated sediments is determined by three processes: soil formation, the development of small, temporal, drainless ponds and the capillary water movement (composition of the sediment, precipitation and the state of the groundwater level). Anion and cation transport by capillary water increases with their solubility: $Cl^- > SO_4^{2-} > HCO_3^-$, and $Na^+ > Mg^{2+} > Ca^{2+}$.

Salinization is strongly connected to a certain groundwater level (1-2 m), and it appears where the water, coming from upper areas, is trapped and cannot move forward from this trap except evaporation. Caused by evaporation, salts precipitate from the water based on their solubility, and sodium finally causes the salinization of the upper sediments.

Descending groundwater causes natural desalinization: certain ions, according to their typical levels of their capillary mobility are leached. The new balance (and zonality), similar to the one above, sets on the basics of the new level of the groundwater.