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The Tisza-project – challenges and perspectives

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The goal of the national project entitled Hydroecology of River Tisza and Upper Tisza-Region (NKFP-3B/0019/2002) is to provide scientific foundation of the hydroecological state assessing, monitoring and databank organising program of River Tisza and Upper Tisza-Region supplementing with pilot-projects of practical realisation. In the first phase of this project our task was the investigation of the origin and mixing of water in the catchment area of Main-channel Lónyai. For this aim stable isotope ratios (δD, $\delta^{18}O$, $\delta^{15}N$, $\delta^{34}S$, $\delta^{13}C$) were measured in water and sediment samples taken from the catchment area of Lónyai. Three samples were taken from the main channel, and two side channels were represented by 2-2 samples.

Special emphasis was placed to the water isotopes tritium and ^{18}O because of their specific potential in addressing water balance, dynamics and interrelationships between surface and groundwater in river basins and catchment areas. The most negative $\delta^{18}O$ values were measured near the sources of the two side channels: both of them had $\delta^{18}O$ = -9.7‰. This value is characteristic for the deep groundwater in Nyírség. In a distance of several kilometers from the sources the water in both of the channels had less negative delta values than at their origin. It means that the channels were fed by direct overland runoff during their route and no subsurface water was added.

Main-channel Lónyai carries large amount of communal wastewater to River Tisza. The measured delta-values showed a large inflow from subsurface water body between Kék and Ibrány. The $\delta^{15}N$ value of the dissolved ammonium measured at Ibrány indicated presence of manure, so the water came from communal wastewater. The $\delta^{18}O$ value of the water sample taken near the channel-mouth showed that the water was mainly of subsurface origin with a small contribution of overland runoff, and the effect of evaporation was insignificant. The tritium content of this water was ~0.1 Bq/l. The annual average of tritium concentration in precipitation in Debrecen, as well as the tritium concentration meas-

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ured in River Tisza at Tiszabecs is about ten times higher: ~1 Bq/l. It supports the conclusion drawn from the stable isotope results: the water used for communal purposes originates from old, deep subsurface water body. C, O and S isotope ratios measured in the sediment samples were similar to each other, mixing of organic and inorganic compounds could be observed.

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