



Springs as telltales of flow systems: hydrogeological study of the city Esztergom (Hungary)

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Springs are discharge features of groundwater flow at the terminal area of flow systems. Temporal changes of the springs' parameters (e.g. temperature, dissolved solid content, discharge amount) provide important information about groundwater flow systems and rock-water interactions along the flow path.

The aim of the present research is to examine the hydrogeological environment of the city Esztergom (Hungary) with the help of the springs in that area. During the work particular attention was given to the karst springs situated in the target area through a retrospective research. Since Esztergom was the first capital of Hungary, significant number of historical sources were written about the utilization of the karst springs during the centuries. These documents contain very important information about the natural, undisturbed hydrogeological conditions of the area. Based on the analysis and comparison of the retrospective research and the current data of the karst springs in the target area, additional information about the vulnerability and the hydrogeological characteristics of the karst system were concluded. This area was significantly influenced by karst water extraction because of coal mining during the 20th century. Due to the high volume water extraction (100 million cubic meter/year) the flow system was disturbed, but after the closure of the mining activities at the end of the century, the regeneration of the flow system has started. This process is traceable in the variation of the discharge amount and other parameters of the springs from the beginning of the 20th century to the present.

During the field work the springs appeared in the registers were looked up and their characteristics were recorded including the springs' environment and the field parameters of the water (temperature, pH, ORP, dissolved oxygen, electric conductivity, discharge, CO₂ content). Water samples were collected and analysed in laboratory for the main components. With the actually measured data and the literature study the database of the Hungarian spring register was complemented and actualized.

The research is supported by the ÚNKP-18-1-I New National Excellence Program of the Ministry of Human Capacities.