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Hydrogeological Investigations for a Sustainable Use of the Deep Groundwater Resources in the Styrian and Pannonian Basin

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General project information

The NANUTIWA-project was designed to investigate the most important aspects concerning deep groundwater systems in the Neogene sediments. The complete title of NANUTIWA is: "Hydrogeological investigations for a sustainable use of the deep groundwater resources in the Styrian and Pannonian Basin".

The content of the project was the new compilation and reinterpretation of hydrogeological and water resource data and reports with modern scientific methods. The project tasks were splitted into the work groups geology, aquifer system analyses, groundwater recharge and water resource management. The project was partly financed by the governments of Styria and Burgenland, as well as the Ministry of Life and the Ministry of Economy and Work. The total project's costs were about 1,08 million Euro. The project organisation was done by the Institute of WaterResourcesManagement of Joanneum Research. The 3 year project (2002–2006) was performed by Joanneum Research, the engineering offices Niederbacher, Meyer and Erhart-Schippek, the company Geoteam and the Technical University of Graz.

Project area

The area between the rivers Pinka and Raab and between the Eastern Alps and the border to Hungary and Slovenia forms the investigation area of the project "NANUTIWA".

Low precipitation, high evaporisation and the subsurface conditions formed the landscape and forced the inhabitants of this region to use deep groundwater systems. This was the reason why the deep groundwater exploration starts in this eastern part of Austria. From the hydrological point of view the project area of NANUTIWA covers the total catchment area of the Raab river within Austria, splitted into the counties Weiz, Hartberg, Feldbach, Fürstenfeld, Güssing, Oberwart und Jennersdorf. The eastern border of the investigation area is the border between Hungary and Austria (Fig. 1).

The project area has a dimension of 82×84 km and a total area of 4290 km^2. The central part of the investigation area, where deep groundwaters exist, covers 2870 km^2.

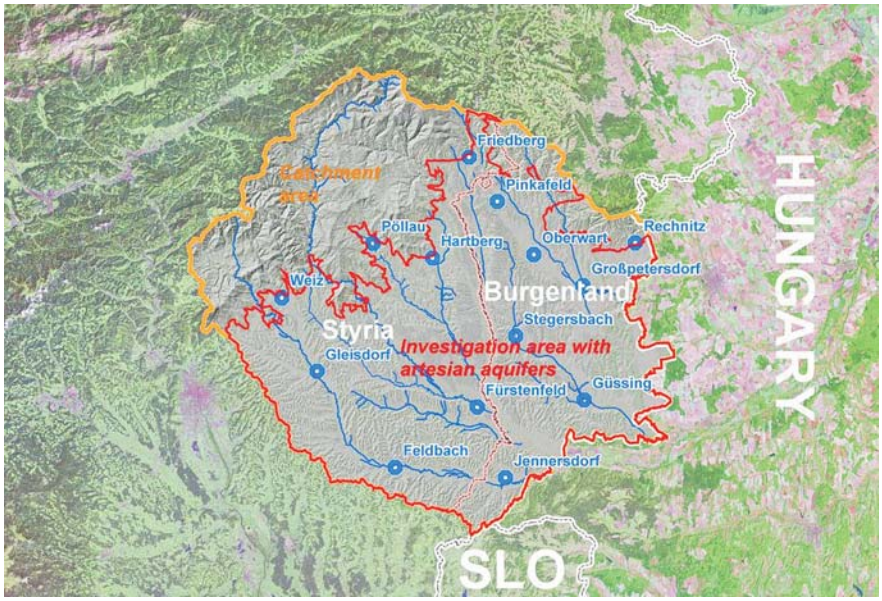

Fig. 1: Project area.

Methods and results

The database and the GIS-base, which was set up within the project, provide a decision support system and a tool to plan sustainable use of deep groundwater in the future. With this database it was also possible to visualize the geological (Fig. 2), hydrogeological and water resource relevant data and facts in a modern way. Further it was possible to calculate water production rates for each well, for each community, for each county and for the whole investigation area. The water production is splitted into production out of private free flowing artesian wells and water production out of wells, which are driven according to the real water demand.

The complexity of the geological framework enabled a successful reinterpretation of hydrogeological questions only with interdisciplinary cooperation and an intense combination of a wide spectrum of geological, hydrogeological and geophysical methods.

Deep groundwater in this area means mostly confined groundwater in a depth of about 50 up to 400 m. In those depths the deep groundwater resources are used for drink water supply. In greater depths the temperature increases and deep groundwater systems are in use as thermal waters for therapeutic and tourism purposes.

Most deep groundwaters in this region have been flowing in the subsurface for thousands of years, up to 50,000 years. This fact leads to special hydrochemical and physical conditions of the water.

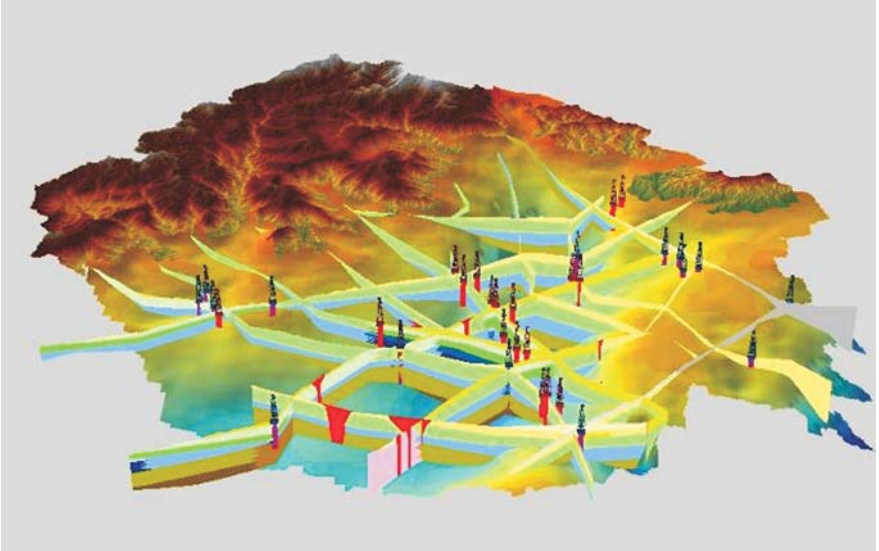

Fig. 2: Visualization of the pre-Neogene basement relief and cross sections.

These special conditions require very often water treatment to get sufficient drink water quality. These facts also include very important facts concerning water pollution and emergency water supply.

The use of deep groundwater started historically with private wells. The high and increasing number of private artesian wells led to an uncontrolled waste of deep groundwater resources of high quality. Caused by these facts, the water supply out of deep groundwater systems is getting more and more centralized and is managed by local water companies and water communities.

The NANUTIWA project provided the base and decision support system for the future use and management of the deep groundwater resources in this part of Austria.

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