

HYDROGEOLOGY – WATER PROSPECTING AND MANAGEMENT SUPPORTED BY GIS

by

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The main tasks of this project carried out in an area of about 720 km², Eastern Austria, were

- o Hydrogeological investigations, placing strong emphasis on the availability of subsurface water, with special consideration for of renewal, dynamics and quality of waters

in connection with

- o Employment of a Geographic Information System (ArcView) for data management and to ensure uninterrupted collection of data to maintain up-to-date water conservation.

Brief background information concerning basic data, research methods, computer-drafted maps and graphics is shown on posters.

The project area is located about 120 km SSE of Vienna, Austria, east of the Central Alpine ridge, close to the Austrian/Hungarian border. Bounded by hills to the west, the area becomes rather flat open country to the east with a general discharge of water in this direction.

The regional geology is characterized by crystalline rocks mainly consisting of gneisses, quartzites etc., cropping out in the western part of the area, and a Tertiary sediments complex within the basin consisting of fine-grained sediments with intercalated sands and gravels acting as major ground-water reservoirs for this part of the country.

Changing sedimentary conditions as well as locally divergent tectonic evolutions limit availability of subsurface water. The large-scale groundwater renewal is restricted due to a very complicated hydrogeological situation, and also human activity becomes a criterion for restriction of ground-water resources development.

Based upon these data this research program has been created and carried out by the use of the following methods:

- o Hydrogeological reconnaissance of the area by mapping and data collection
- o Hydrogeochemical investigations of subsurface and surface water
- o Isotopic geophysical examinations of selected waters
- o Hydrological background information
- o Geophysical surveying by geoelectrics and seismic methods
- o Drilling activities, borehole geophysics and pumping tests
- o Sedimentary descriptive petrology

The great number of data obtained from these investigations were used afterwards to develop hydrodynamic pilot projections for drawing up an approximate groundwater balance model.

Furthermore, and this is the aim of this presentation, all data banks were transferred into a Geographic Information System (ArcView), and a group of people responsible for future use was entrusted with the entire project in digital form, in order to ensure an uninterrupted continuation of data collection and thus to maintain up-to-date water conservation data for the sustained and guaranteed drinking water supply of this area.

In order to make our system applicable in the most effective way, specific data banks, focusing on hydrological, hydrogeological or hydrogeochemical background information, should be available to access the Geographic Information System (ArcView) for successful and highly economic data management.

Data on hydrogeological research and water prospection data prepared and processed in this way have always attracted our customers who profit from this user-friendly method on account of its efficiency in linking even comprehensive databases in order to produce, compile, correlate, and print, without any delay, maps on varying subjects. A further advantage of this system is the possibility to insert and incorporate new data so as to update databases in a most efficient way – for instance, in the field of water supply, an uninterrupted collection of data on water quality, discharge and distribution requires an immediate digital data management to guarantee sustained water conservation and an uninterrupted supply of drinking water.

Development of strategic planning methodologies and scientific tools for the integrated management of water at catchment or river basin scale, taking into consideration the complex interaction between the natural and man made environments, the quality and quantity of water and the various uses of water.

The objectives are to support the development of integrated water management approaches at catchment or river basin scale.

The relation between the function and structure of aquatic ecosystems should be evaluated in order to distinguish between natural variability and anthropogenic impacts.

Development and demonstration of tools to determine socio-economic requirements for urban and suburban water management systems, and to evaluate the location and functioning of water supply. Assessment and auditing methods for water exchange between cities and their water supplying region.