

THE NATIONAL AND INTERNATIONAL PROJECT TIBREG (TISZA — BODROG — REGION)

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Abstract: At present a huge environmental TIBREG project, located in the eastern part of the Carpathian basin in border zone of Slovakia, Hungary and Ukraine, has been terminated. The area of interest represents a specific natural environment unit of high natural, cultural and touristic value. The project area is important from the point of view of agriculture, water economics and energy (geothermal energy and natural gas) too. The results demonstrate new information on environment, geological units, structure and pollution of this area.

Key words :environment, geological and geophysical data restoration

Introduction

In 1993 a project TIBREG started. It was financed by Ministry of Environment of the Slovak Republic. The international cooperation between Slovak and Hungarian partners started in 1997. Coordinating company : Geocomplex a. s. Bratislava, Project Manager : Margita Puchnerová.

On the basis of geomorphological classification of the area in interest, it is possible to divide the region into several units. In the Slovak part they are: Slánske vrchy Mts., Vihorlat Mts. and Nízke Beskydy Mts. in the north. In south - western part, the Zemplinske vrchy Mts are situated. The Slánske vrchy Mts. continue to Hungary as Zempleni Hegység. The Východoslovenská nížina lowland continues to Hungary as Hayduság.

The aim of the project was to contribute to the ecological restoration and development of the area.

The major sub-projects are as follows :

- Remote sensing maps
- Geological maps: first map with Quaternary cover and second map stripped one
- Map of thickness of the Quaternary sediments
- Hydrogeological map
- Map of ground and surface waters quality
- Geochemical – ecological map of stream sediments
- Pedological and pedogeochemical maps
- Lithogeochemical map
- Engineeringgeological maps
- Map of seismic hazard
- Map of radioactivity pollution and radon risk.

These maps were realized on national level in Slovak part of project in scale of 1:50 000. According to the international agreement between Slovak and Hungarian partners, the geophysical maps were realized in scale of 1:100 000.

The geophysical maps from Slovak and Hungarian parts represents unified ones. The activities started with unifying gravity map. Next activity was unifying magnetic map. The quantitative analysis has been done along four profiles. Next step was compilation of stripped gravity map, map of thickness of Pre-Tertiary basement and structural - tectonic map. The map of perspective areas for oil and gas occurrences has been constructed, too.

New results and conclusions

By satellite images interpretation, following maps have been constructed: temperature map, maps of wetness, brightness and greenness of surface. These maps can be used in urban planning, water economy and agriculture management.

The geological maps give new information on geological units and stratigraphy. The map with Quaternary cover shows characteristic of sediments and neotectonic faults. These sediments are the most important aquifers of the groundwater.

The map of the thickness of the Quaternary sediments has also been constructed. The data of vertical electrical sounding (VES) were used. Besides VES results the all available drilling data have been utilized for construction of the thickness map. The Quaternary sediments are characteristic by frequent lithological – facial changes in horizontal as well as vertical directions.

The hydrogeological map. From hydrogeological point of view the Michalovce-Sliepkovce Quaternary depression is very important for groundwater accumulation. The Quaternary sediments with 70 m thick layers of gravels exist there.

Very important research for environment represents hydrogeochemical survey and the natural waters quality map. The indiscriminate use of mineral fertilisers has resulted in ammonia, nitrate and phosphate contamination of surface and groundwaters. The pollution can be seen as anomalies in geochemical-ecological map of stream sediments.

The engineering-geological map is represented by two maps: map of engineering-geological zoning and map of important geological factors of the environment. These maps can be use in planning the rational use of the territory.

The pedological and pedogeochemical maps give information on soil. The monoelemental maps have been compiled which represent base for knowing the spatial distribution of chemical elements in soil and contamination of area. The Východoslovenská nížina lowlands are important for soil protection.

The deterministic method of seismic hazard assessment was applied. Magnitude, epicentral intensity and local expected earthquake intensity is computed for every engineering geological zone and subzone and for each fault in the TIBREG region.

The results show that the Vihorlat and Ondava faults are the most hazardous in the Tibreg region. The effects of shallow surface soil on the macroseismic intensity and its changes were investigated too. Significant amplification of the macroseismic intensity in the Tibreg region is in the zones and subzones containing cohesionless soils, soft clay and sands. The increment of the maximum expected earthquake intensity is to 7° EMS-92.

The orientation survey of radioactive pollution of TIBREG area by natural (U, Th, K) radionuclides, realized by gamma spectrometry, has shown favourable radiation. For the radon content determination, the measuring of the volume radon (²²²Rn) activity in soil air have been realized. The observation of radon risk gives following results: the 75 % of the area lies in low and 25 % in medium radon risk.

The geophysical activities started with unifying gravity maps (Bouguer anomaly map, residual map and lineament map-Blackely method). Next activity was unifying the magnetic map along Slovak-Hungarian border.

The Bouguer anomaly map reflects the gravity effect of all subsurface bodies. The anomalies are sharper and more variable and have high gradients in those parts of the area, where the older rocks forming the basement are on or near the surface. In the part of Trebišov basin (Slovak Republic), Transcarpathian basin (Ukraine) and Tisza basin (Hungary) the basement deepens to 7000 – 8000 m. The anomalies are flat and have low gradients due to the masking effect of the thick sedimentary cover.

The quantitative analysis have been done along four profiles. It's direction is NE-SW, from Slovakia to Hungary. The interpretation of profiles gives new results about structure of East Slovakian Neogene basin, which is one of the most complicated area in the West Carpathians.

The area of Východoslovenská nížina lowland is very important for occurrences of natural gas. New information about it are included in map of perspectives for oil and gas.

The task of the international project TIBREG, which could be realized only in a close cooperation of geoscientific and environmental institutions of Slovakia, Hungary and Ukraine, in the framework of the ecological strategy of the ministries of environment, was to contribute to a general revitalization of the environment. The revitalization of the environment will influence on the state of health of the population.

References

Puchnerová M., Baňacký V., Elečko M., Vass D., Jetel J., Kordík J., Slaninka I., Pramuka S., Marsina K., Čurlík J., Grman D., Cambel B., Husák L., Viskup J. Janotka V., Hojnoš M., Kandřík M., Zeman I., Szalaiová V., Medo S., Šefara J., Rudinec R., Tkáčová H., Halmešová S., Piovarči M., Gretschek J., 2001 : Research of natural sources with connection to environment in TIBREG (Tisza – Bodrog region). A) Geofactors of environment. Archives of the Geological survey of Slovak Republic-Department of informatics, Bratislava, 140 p.