

HUNGARIAN GROUNDWATER BODIES AND PROPOSALS FOR COMMON MANAGEMENT PLANS OF TRANSBOUNDARY GROUNDWATERS IN THE WESTERN PART OF THE PANNONIAN BASIN

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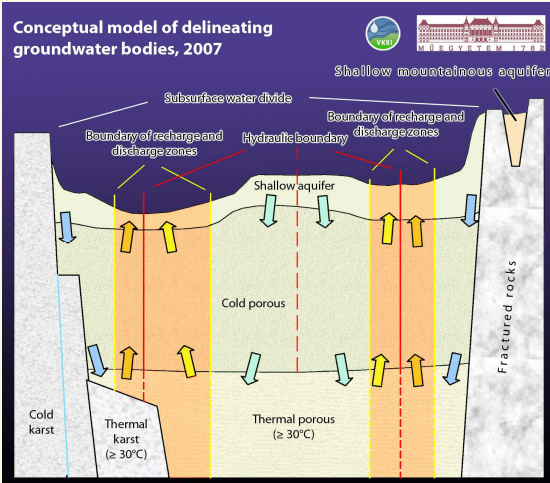


Fig.1. Conceptual model of Hungarian GWB delineation

The WFD is implemented by the Ministry of Rural Development in collaboration with the Central Directorate for Water and Environment and the Geological Institute of Hungary.

Thick lacustrine (Pannonian) and fluvio-colian (Quaternary) deposits can be found in the large basin-type regions. These layers are the main porous aquifers. They provide drinking water, and at greater depth, thermal water, too. The hilly areas are built up of karstic and fissured rocks. The karstic regions are good aquifers with cold and thermal karst water.

Geological and hydrogeological conditions, recharge and discharge areas, and the temperature of the groundwater were used as the main criteria to delineate the boundaries of the groundwater bodies (Fig. 1.).

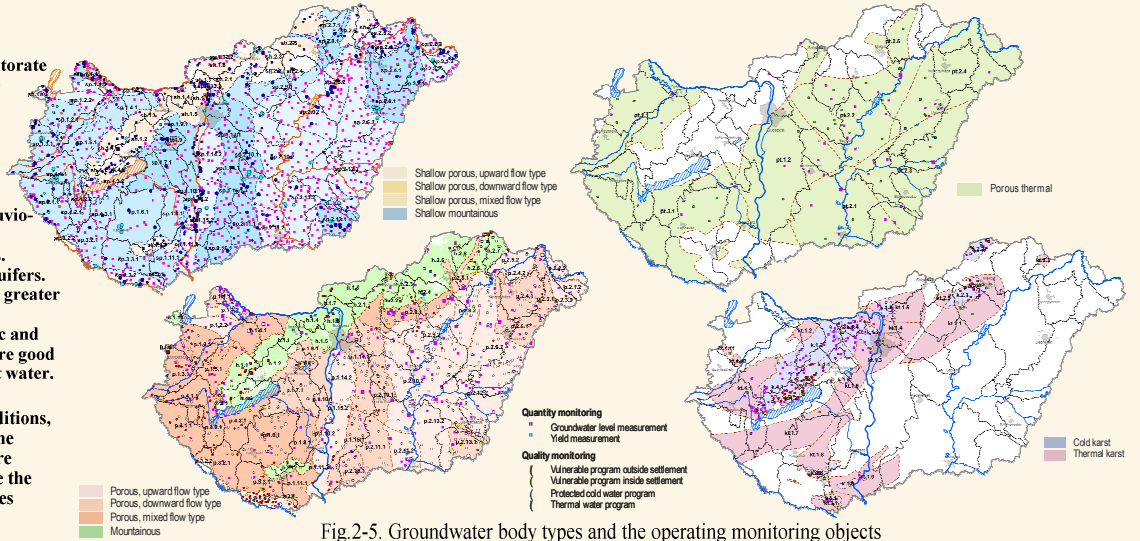


Fig.2-5. Groundwater body types and the operating monitoring objects

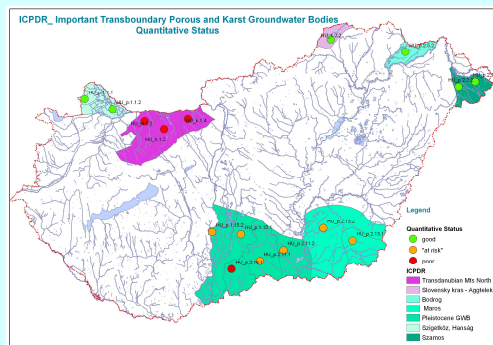


Fig.6-7. Quantitative and qualitative status of important transboundary GWB aggregates (ICPDR)

Hungary is divided into 185 groundwater bodies; 55 shallow porous, 48 porous, 8 thermal porous, 22 shallow mountainous, 23 mountainous, 14 karst and 15 thermal karst waterbodies (see Figures 2-5, and Table 1).

Type of GWB	Number of GWBs	Bordering GWBs	Transboundary GWBs	ICPDR GWBs
Shallow mountainous	22	8	-	-
Mountainous	23	10	-	-
Shallow porous	55	31	18	12
Porous	48	29	18	12
Thermal porous	8	7	-	-
Karst	14	3	3	3
Thermal karst	15	7	1	1
Total	185	95	40	28

Out of the 185 GWBs 95 are bordering GWBs, but only 40 GWBs are considered transboundary so only these fall under the bilateral agreements. At present none of the thermal GWBs are declared to be transboundary.

The International Commission for the Protection of the Danube River (ICPDR) defined 11 important groundwater body aggregates on the whole Danube River Basin District. Out of these 11 aggregates 7 consist of Hungarian surface and subsurface water bodies, involving 28 GBWs.

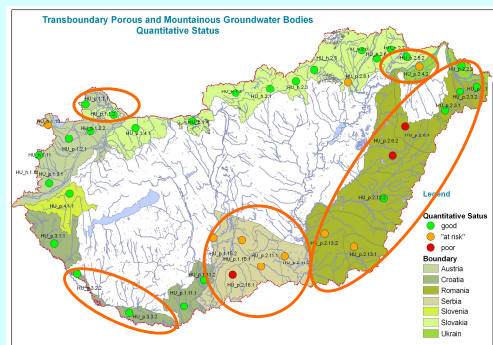


Fig.8-9. Quantitative and qualitative status of porous and mountainous bordering GWBs

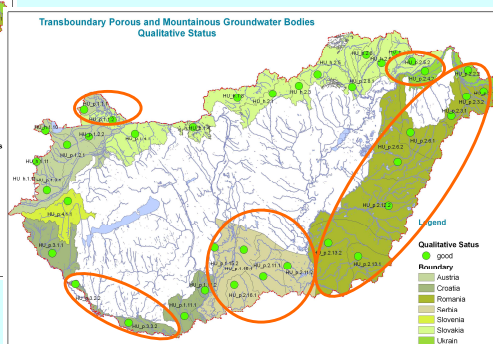


Fig.10-11. Quantitative and qualitative status of cold karst and thermal karst bordering GWBs

T-JAM project

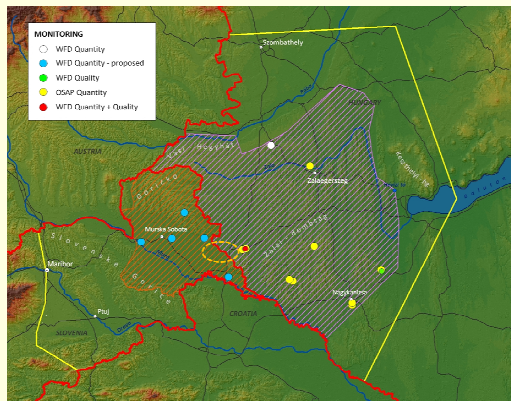


Fig.12. The T-JAM project area, with the delineated transboundary GWB and the proposed monitoring

The extent of the TTGW Mura-Zala is greater than 4,000 km² which means that this transboundary groundwater body is certainly significant also at the scale of the Danube River Basin Management.

The final goal of the T-JAM project was to establish a common, harmonized thermal water management strategy for the area of the Mura-Zala basin.

The report on "Cross-border management recommendations" summarises the suggestions to officially determine the joint thermal groundwater body Mura-Zala, which was delineated on the basis of the geological, hydrogeochemical and hydrogeological models, followed by a hydrogeological numerical modelling, and to implement the proposed measures to reach the environmental and geothermal energy objectives.

Cooperation of 2 geological surveys: Geological Survey of Slovenia (GeoZS) Geological Institute of Hungary (MÁFI)

TRANSENERGY project



Fig.13. The TRANSENERGY project area

A user friendly web-based decision supporting tool (interactive web portal), which transfers expert know-how about hydrogeothermal utilization and sustainable reservoir management to stakeholders (decision makers, water- and mining authorities, present and potential investors, scientific associations and wider public interested), such as:

- complex assessment of thermal groundwater bodies
- scenario models for different water extractions: predictable quality and quantity changes
- complex evaluation of thermal groundwater bodies (quality and quantity; in line with WFD-RBMP-s)
- experiences of present (cross-border!) interactions, best practice recommendations
- sustainable utilization

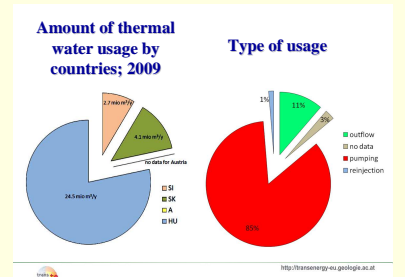


Fig.14. Thermal water utilization in the Western part of the Pannonian basin