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Extended Abstracts

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Evaluation and management of groundwater — sustainable exploitation

title: **Groundwater quality in Hungary — results of EU River Basin Management Plan**

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The assessment of the chemical status of Hungarian groundwater quality is based on the data from the Hungarian WFD monitoring wells as well as the medians of available and reliable national data sources. An evaluation of organic compounds is based on data from the Hungarian WFD monitoring wells, also taking into account data collected between 1996 and 2007 from local monitoring objects (wells, springs). Firstly the natural background levels were defined, and then different threshold values were established. The methodology to evaluate the status of the groundwater bodies is based on the Guidance on Groundwater Status and Trend Assessment of the WGC-2 workgroup (Grath, Ward, 2008), and involved 5 specific tests.

EVALUATION OF THE RISK OF EXCEEDING THE THRESHOLD VALUES

The exceedance was checked at the monitoring sites according to three standard criteria. Based on the evaluation of the results of this test — exceedance which may cause risk to any DWPA — 13 groundwater bodies were determined to have a poor chemical status. In most of the cases the pollutant is nitrate, but in some cases ammonia and chlorinated hydrocarbons can also result in poor status. Other pollutants such as sulphate or triazine, are minor compared to the above mentioned parameters, and would not result in water quality changes requiring technological intervention.

GENERAL ASSESSMENT OF THE CHEMICAL STATUS OF THE GROUNDWATER BODY AS A WHOLE; DIFFUSE POLLUTION

The diffuse pollution status of groundwater bodies was evaluated based mainly on the nitrate content data of 32000 wells and springs. Groundwater bodies where the percentage of objects exceeding the threshold value for nitrate was >20%, were defined as nitrate polluted, a total of 30 bodies of 185. All of them are shallow (less than 20–30 m deep), karst or hilly groundwater bodies. Nitrate pollution occurs in less than 20% of deeper groundwater bodies, since these groundwater resources are very old and well protected. Shallow groundwater on the Western part of Hungary (Transdanubia) is more polluted than in other areas due to more intensive agricultural activity. The agronomic type N balance (OECD) for 2007 of the arable and orchard lands of Transdanubia is +20 kgN/ha in contrast of the 6 kgN/ha for the Great Hungarian Plain. The ammonium content of groundwater is generally high (up to 10–20 mg/l), found predominantly in the old, well protected, deep groundwater. Conceptional models and environmental isotopes prove that the main part of ammonium originates from natural processes occurring in the aquifers.

Significant reduction in the chemical and ecological quality of associated surface waters due to transfer of pollutants from the groundwater body.

This test was carried out at those surface water bodies where the poor status of the surface water could not be explained by other pollution sources. In practice this meant the nitrate concentration had to be examined in detail. Out of a total number of 28 surface bodies, 22 showed the effects of water quality reduction which could possibly be attributed to the transfer of pollutants from the groundwater. Most of these cases are in the Trans-Danubian region. Based on this test, 10 groundwater bodies were assigned a poor chemical status.

The detailed evaluation of *significant damage to groundwater dependent terrestrial ecosystems* (GWDTE) due to transfer of pollutants from the groundwater body is in progress. A lack of

sufficient data meant that the chemical status of the groundwater bodies could not be evaluated by this test.

INTRUSION TEST

The intrusion test was carried out at those localities where it is considered that direct or indirect water exploitation may cause chemical or temperature changes in the groundwater regime, due to changes in the flow paths. Over-exploited parts of the deep groundwater in porous groundwater bodies show a slight intrusion of shallow groundwater, but this does not present problems on the level of the groundwater body. The chemical composition of thermal waters did not change to such an extent that they would have required technological intervention or that their usage should have been stopped. None of the groundwater bodies were shown to have poor chemical status on the basis of this test.

RESULTS OF THE CHEMICAL STATUS ASSESSMENT OF GROUNDWATER BODIES

Out of the 185 groundwater bodies evaluated in Hungary, 38 are shown to have poor chemical status, and based on a trend assessment, another 5 groundwater bodies are considered to be at risk. Most of the groundwater bodies with a poor status are shallow ones. Their poor chemical state is mainly the result of a diffuse pollution load from unregulated agricultural activity. Four karst, two porous, and one mountainous groundwater bodies have a poor chemical status. All of the karstic thermal and porous thermal groundwater bodies have a good chemical status.

REFERENCES

Grath J., Ward R., 2008: *Guidance on Groundwater Status and Trend Assessment.* V. 1.0 (final draft).

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