UNDP/GEF Danube Regional Project

2nd Groundwater Workshop on the Implementation of WFD in the Danube River Basin

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Final Draft Synthesis Report

Federal Environment
Agency Austria

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Content

1 EXECUTIVE SUMMARY

BACKGROUND

The Danube River Basin covers territories of 18 countries wherefrom 13 countries are joined in the activities of the ICPDR. According to the WFD a River Basin Management Plan has to be established. Therefore the ICPDR serves as a platform for the coordination necessary for a basin-wide implementation of the WFD. Participating countries are AT, BA, BG, CZ, DE, HR, HU, MD (not represented at the Workshop), SI, SK, RO, UA and YU. The contracting Parties ensure to make all efforts to arrive at a coordinated RBMP for the DRB. The Report form which is identical with RBMP consists of two levels: Part A the so called Roof Report with issues of basin wide importance and Part B with national information.

The 2nd Groundwater Workshop is a follow-up workshop of the 1st one held in 2002 where the continuation of work on status review, the identification of transboundary GW-bodies, the distribution of a questionnaire and the arrangement of a further workshop were declared. The UNDP/GEF Danube Regional Project (DRP) provides support to ICPDR in the implementation of WFD. DRP has contracted the Austrian Federal Environmental Agency to prepare and conduct this workshop.

PARTICIPANTS

In the 2nd Groundwater Workshop representatives of the ICPDR and UNDP/GEF DRP, groundwater experts of the Contracting Parties and consultants of the Federal Environment Agency Austria participated.

OBJECTIVES

Main objectives of the workshop were the definition of core elements concerning groundwater to be subject of the Roof Report, support for harmonisation amongst DRB countries, discussion platform for experts and identification of highlights and open issues.

The replies to the former distributed questionnaires were evaluated and the countries were asked to report about their progress with the implementation of the WFD with main emphasis on transboundary GW-bodies. Both was carried out with regard to gain an overview of the countries' current state of work and of the used kind of methodologies and different approaches concerning the implementation of WFD in the DRB. Additional the presentations about case studies of transboundary GW-bodies and about the treatment of contaminated sites laid the basis for the exchange of experiences.

The determination of objectives which should be in the Roof Report and the harmonisation needs for elements of the national reports were the main tasks of the closing discussion which was a very lively and intensive one.

RECOMMENDATIONS

The Workshop ended up with the following recommendations agreed upon by the groundwater experts of the participating DRB countries.

Roof Report

GW-bodies subject of Roof Report – it was agreed that "important" transboundary GW-bodies shall be subject to the roof report. The criteria for "important" were defined as follows:

- Big transboundary GW-bodies (> 4,000 km² and smaller but very important), however, the "importance" has to be agreed bilaterally upon according to various criteria e.g. socio-economic importance, uses, impacts, pressures, interaction with aquatic eco-systems.

The information on the important transboundary GW-bodies to be delivered for Part A shall comprise:

- GIS information (maps) – scale 1:4.5 mill., medium term 1:1 mill.
  (GW experts will give guidance on content of Roof Report to GIS expert sub-group)
- Summary on initial/further characterisation / review of human activity on GW

Timeline

Since the WFD has a rather tight schedule, the timeline for the further procedure and delivery of information was discussed and agreed as follows:

- Identification of GW-bodies and report to ICPDR
  End of November 2003
- Data for map preparation (GIS layer)
  End of December 2003
- Data delivery for summary
  End of January 2004
- First draft April 2004
- First draft to standing WG June 2004
  - Recommendations for changes
- Ordinary meeting November 2004

The second part of the workshop discussion focused on **Harmonisation needs for the elaboration of Part B,** the national part of the report.

The topics on which the discussion concentrated were:

- Delineation of GW-bodies
- Characterisation of GW-bodies
- Definition of "significance" of the risk (Annex II, 2.2)

Participants of the 2nd GW-Workshop agreed that at the moment there is no need for harmonisation. However, the further process might show some need.

It was reported by Mrs. Mihaela Popovici, representative of the EMIS Expert Group that pressure from diffuse pollution (nutrients and partly pesticides) is handled by MONERIS, results will be available very soon (distributed to workshop participants).

Project web-site

All findings of the project and documents are available on the project web-site http://www.icpdr.org/undp-drp

2 INTRODUCTION

The 2nd Groundwater Workshop on the Implementation of WFD in the DRB, organised by the UNDP/GEF Danube Regional Project, was held in Budapest/Hungary, 12 to 13 May 2003. It was attended by experts from all countries of the DRB apart from Moldova.

2.1 BACKGROUND

The basis for the 2nd Groundwater Workshop was laid on the 1st Groundwater Workshop in February 2002 where following conclusions were reached:

- start/continue work on status review,
- identify transboundary GW bodies,
- prepare and send out a questionnaire, concerning the implementation of the WFD
- arrange a follow-up workshop in 2003.

The UNDP/GEF Danube Regional Project (DRP) within its objectives (e.g. to develop and implement policy guidelines for river basin and water resources management) provides support to ICPDR and DRB countries in the implementation of EU WFD. Therefore DRP has contracted the Austrian Federal Environmental Agency to prepare and conduct this workshop.

Art. 3.1 WFD and Art. 3.3 WFD require the establishment of RBMP. Since the river Danube establishes an international catchment a procedure has to be developed according to Article 13.3:

> *"In the case of an international river basin district extending beyond the boundaries of the Community, Member States shall endeavour to produce a single river basin management plan, and, where this is not possible, the plan shall at least cover the portion of the international river basin district lying within the territory of the Member State concerned."*

In 2000 the ICPDR decided to provide the platform for the coordination necessary to develop and establish the RBMP for the DRB. Additionally the ICPDR has installed the RBM EG to prepare and coordinate the necessary measures for basin-wide implementation of the WFD. Competent authorities are the Danube countries themselves. They cooperate in the framework of ICPDR to achieve a single, basin-wide coordinated DRBMP. Contracting Parties ensure to make all efforts to arrive at a coordinated international RBMP for the DRB.

Participating countries have to deliver two different reports complementing each other. Part A is coordinated by the ICPDR and is the so called Roof Report which gives relevant information of multilateral or basin-wide importance. Part B is the National Report which gives all relevant further information on national level as well as information coordinated on bilateral level.

In January 2003 the questionnaires were distributed by the ICPDR to all participating countries in the DRB. Aim was to get an overview of countries' activities concerning the implementation of the Water Framework Directive (WFD) concerning GW. As Workshops are a useful tool for training and information exchange the 2nd Groundwater Workshop then should provide a platform for harmonising national tasks and for discussion and coordination which elements should go into the Roof Report. Workshops deal with technical issues especially where harmonisation of methods is required to ensure comparability of results.

2.2 OBJECTIVES

Main objectives of the workshop were

- definition of core elements of the Roof Report,
- support for harmonisation amongst DRB countries concerning,
  - identification of GW-bodies
  - initial and further characterisation
  - pressure and impact analysis
  - monitoring of GW
  - transboundary and important GW-bodies
- discussion platform for experts,
- identify highlights and open issues.

To achieve these aims case studies of transboundary GW-bodies and a presentation concerning contaminated sites as a fact of pressure and impact analysis were presented. Unfortunately the foreseen presentation of the GIS oriented model MONERIS (Modelling of Nutrient Emissions In River Systems), a programme which was developed for the estimation of nutrient inputs by various point and diffuse sources could not be given. Furthermore the countries gave account about their state of work concerning the implementation of WFD. A summary of the answers of the questionnaire informed about the broad range of methods and different approaches to the identification and characterisation of groundwater bodies, about the monitoring network and the availability of data. A lively and intensive discussion about the objectives of the workshop ended with important statements which serve as final recommendations with regard to the DRBMP.

3 METHODOLOGY

In order to meet the provisions of the WFD the DRB countries should carry out identification and characterisation of all their groundwater bodies according to the specifications of the Directive. Characterisation shall identify pressures and assessment of impact of human activities on the status of groundwater and as a consequence the preliminary risk assessment of failing to achieve good status. In the case of transboundary GW-bodies bilateral or multilateral agreements are necessary.

Until 2004 the WFD requires according to

Art. 5: Characteristics of the river basin district, review of the environmental impact of human activity and economic analysis of water use

(1) Each Member State shall ensure that for each river basin district or for the portion of an international river basin district falling within its territory:

- *an analysis of its characterisation*
- *a review of the impact of human activity on the status of surface waters and on groundwater, and*
- *an economic analysis of water use is undertaken according to the technical specifications set out in Annexes II and III …*

Art. 6: Register of protected areas.

To provide support and to detect problems or gaps in achieving the requirements of WFD case studies on transboundary GW-bodies and the way of dealing with contaminated sites were presented.

3.1 CASE STUDIES OF TRANSBOUNDARY GW-BODIES WITHIN DANUBE RIVER BASIN

3.1.1 The UN/ECE pilot project on the Aggtelek (HU) – Slovak karst aquifer (presentations see annex 4 and 5)

The UN/ECE pilot project on the Aggtelek (HU) – Slovak Karst (SK) Aquifer with special regard to the WFD was jointly presented by Eszter Havas-Szilágyi, Ministry of Environment and Water (Hungary) and Katarina Moziesikova, Slovak Hydrometeorological Institute (Slovakia)

3.1.1.1 Background of the project

An overview showed the organisational structure of the Helsinki Convention and the Protocol linked with different Working groups. One of these groups is the working group on monitoring and assessment and further on the core group on groundwater which establishes guidelines on monitoring and assessment of transboundary bodies. The guidelines which are more strategic than technical should strengthen the harmonisation amongst countries in setting up and operating transboundary bodies. For the implementation of these principles pilot projects are set up to get a feed back about the practicability.

The Aggtelek – Slovak karst aquifer was selected as a groundwater body of manageable size with groundwater problems and an existing monitoring network. Furthermore the participation of two or more countries and existing bi- or multilateral agreements as well as willingness of the countries to implement the guidelines were important criteria for its selection.

In 2001 the preparatory phase started with a Memorandum which was not easy to realise. Afterwards the organisation took place till 2002. Time was used to organise, nominate project leaders and to assemble and inform participants in the concerning countries. The first meeting could then be held in March 2002. Main objectives were introduction and testing of the UN/ECE guidelines,

characterisation of the GW-body according to the WFD and vulnerability mapping of the pilot aquifer applying the European approach. In addition a work-plan for 2002-2003 and the content of the inception report were determined.

A second expert meeting was held in Bratislava in March 2003 to define the next activities. Major aim is to decide whether the GW-body is likely to be at risk of failing good status or not.

According to the still missing data on pressures and impacts it may be necessary to divide the body into sub-bodies to establish a practical monitoring programme. Furthermore vulnerability of the groundwater has to be assessed regarding to recorded pollution pressures and a conceptual model of groundwater body flow will be developed.

3.1.1.2 Project information, results

On the top end of the organisational structure of the project is the UN/ECE Core group on Monitoring and Assessment followed by the Hungary – Slovak Joint Committee on transboundary waters. Attached to them is the Steering Committee followed by country project leaders, concerned institutes and staff involved.

The pilot project area consisting of two hydrological adjacent areas is situated in the north eastern part of Hungary and south eastern part of Slovakia. Thereof a test area is designated where vulnerability mapping should be established later on. Problems occurred in creating a common geological map of the pilot area as the methodical approach differs in Hungary and Slovakia. After slight corrections a final draft of a GIS map could be made.

Land protection started in the 1970s and was highlighted in 1978 when the area was declared as prevention zone under terms of UNESCO Biosphere Reserves. The altitude of the area ranges between 150 m and 1225 m. Plateaus and caves dominate the area's geomorphology. Four hydrogeological zones structure the area whereas its geological system consisting mainly of limestone and dolomite is more complex. Determined by geology and humid-continental climate hydrology is characterised by the absence of surface runoff and rapid percolation of precipitation in fissures and faulted zones. The whole pilot project area lies within the National Parks Aggtelek and Slovensky kras. Therefore agricultural and forestal landuse predominate. Compared with the usable amount of groundwater about 10 % are abstracted for drinking water supply. Monitoring practices differ in Hungary and Slovakia.

The pilot project represents an international cooperation within Danube Basin, of bilateral contacts on transboundary groundwater and of multilateral participation of the UN in water management. At the end of the work plan for the Preparatory Phase recommendations for improvement, an evaluation workshop and a final report are awaited. Thereafter the implementation phase is to start which is issue of a second project.

Discussion

Questions for clarification were raised concerning availability of data with regard to groundwater quality problems. It was stated that the area is well investigated and hence sufficient data are available. Vulnerability mapping is not linked to NO_3-sensitive areas, it was implemented under the COST 620 project for karst areas. It was expressed that data for vulnerability mapping show the need of harmonisation. Problems concerning characterisation of GW-bodies according to the requirements of WFD are coordination along borders, delineation of hydrogeological structure and collection of appropriate data for pressures and impacts.

3.1.2 DE-AT thermal groundwater body (presentation see annex 6)

Transboundary Groundwater Bodies, German-Austrian-Cooperation in Modelling and Managing a Transboundary Thermal Groundwater Aquifer presented by Jens Jedlitschka, Bavarian Ministry for Regional Development and Environmental Affairs (Germany)

Deep groundwater usually seems well protected by nature but that does not apply for groundwater used as thermal water. In the case study it is the Lower Bavarian-Upper Austrian Molasse basin thermal water which is intensively used for spa purposes and as source for geothermal energy. The groundwater resource is not dependent on the upper groundwater layer and shows large extension. Therefore it is identified as a separate groundwater body. Austria and Germany started to protect this GW-body to ensure a sustainable use.

The GW-body covers the area between Regensburg in Lower Bavaria in the west and Linz in Upper Austria in the east. Its size is about 6000 km² with a length of 150 km and a width of 55 km. The thermal water flows within the carbonate Malm aquifer, sometimes at a depth of 2000 m. While the recharge area lies in the northwest, the southeast is the main usage area. Investigations showed a decreasing closing pressure of the thermal water wells in Bad Füssing from 3.5 bars in former time to 1.5 bars in 1998. Above all previous researches confirmed that there was an overuse caused by the increasing abstractions of thermal water. Therefore a sophisticated groundwater model was needed for support to give a more detailed groundwater balance for the basin.

Since 1987 the "Regensburger Vertrag" rules the water management cooperation between Austria and Germany in the catchment area of the Danube. Under the commission of the "Ständige Gewässerkommission" two permanent working groups are established.

From 1995 to 1998 the ad-hoc-expert group developed a groundwater model for the thermal-water aquifer. The model was needed for characterisation and as instrument for the authorities to evaluate the required water abstractions and the potential yield. It allows the simulation of different water abstraction and reinjection configurations. The results were important for Germany and Austria to judge the abstractions in the right way. As conclusion it can be stressed that a further use of the thermal water will only be possible if it is used rationally and if the hydrostatic conditions will be preserved.

Joint protection and utilizations strategies on a bilateral level were set down in Keynote Papers. They provide principles to manage thermal water resources in a sustainable way according to the best available technology.

Conclusion of the work done is the knowledge that reinjection of thermal water for geothermal use is mandatory. Since 1999 closing pressure is again increasing and was 2.5 bars in 2001. Before 1995 the body was at risk but with the implementation of remediation measures it can be predicted that the body will be in good status in 2015.

Discussion

Questions of clarification were raised concerning travel time of groundwater and delineation of the GW-body. It was stated that flow direction and travel time are part of the groundwater model for the thermal aquifer. Delineation and separation of this GW-body was done by a numerical model in a pragmatic way.

3.2 PRESSURE AND IMPACT ANALYSIS

According to WFD Annex II 2.1

> *Member States shall carry out an initial characterization of all groundwater bodies to assess their uses and the degree to which they are at risk of failing to meet the objectives for each groundwater body under article 4. Member States may group groundwater bodies together for the purposes of this initial characterization. This analysis may employ existing hydrological, geological, pedological, land use, discharge, abstraction and other data but shall identify …*
>
> *the pressures to which the groundwater body or bodies are liable to be subject including:*
>
> *diffuse sources of pollution*
>
> *point sources of pollution*
>
> *abstraction*
>
> *artificial recharge, …*

Contaminated sites represent a main part of point sources of pollution.

3.2.1 How to deal with contaminated sites (presentation see annex 7)

How to deal with contaminated sites. Pressure and impact analysis presented by Dietmar Müller, Umweltbundesamt (Austria)

Protection Strategies

National Groundwater Protection Strategies differ in a wide range as all European countries had specific policies and laws to protect water resources before the WFD. Additionally the strategic importance of groundwater for water supply varies within Europe. Strategies focus either on different level of protection or on a principal precautionary approach and site specific risk assessment. Principles of the approaches are definition of sustainability of the resource, prevention of new pollution and remediation of past pollution where necessary. A point of compliance for groundwater protection concerning point sources is defined in relation to new activities as well as in relation to historical activities. This one differs from nation to nation.

WFD and GWD

Legal instruments treat groundwater pollution by point sources in different ways. The Groundwater Directive EC 80/68 focuses on point sources but does not consider pollution on historical ones whereas the WFD shows the “no deterioration clause”. As thesis of the WFD and the GW Daughter Directive (GWD) it can be said that the focus is put on diffuse sources and may neglect point sources. Groundwater pollution by old point sources could cause major problems in achieving good status of a groundwater body.

Developed from the expert advisory forum with its five drafting groups the Common Forum on Contaminated Land has been a GWD-Supporting Task Force since May 2002. The forum comes forward with proposals concerning pressures, impacts, definition of point sources, risk zones, plume behaviour and strategies for point sources. Finally key principles for management concepts and a successive management framework will be laid down.

Case study

An integrated concept for groundwater remediation (INCORE) was applied in a case study in Linz (Upper Austria). The project area was selected as it offers public water supply in an industrial area. In the northern part mainly industry concentrates whereas the southern part is a more agricultural area. Inventories, pressure analysis, impact analysis, investigation of “risk zones” and risk management and restoration were the main parts of the project. Integrated pumping tests along cross sections and water sampling provided information for mathematical analysis, calculation of pollutant mass flux and for

the analytical interpretation. The results showed a real problem with PCE and Nitrate. As a consequence remediation will start next year.

Discussion

Questions of clarification were raised concerning treatment of different point sources, definition for new and historical contamination and the parameters for the good status.

It was expressed that many different point sources seem to be a diffuse source. The capacity of treatment plants should be built up and for detecting missing load pumping tests are useful. Treating settlement areas as risk zones would bring an aggregation and is not in the sense of WFD as this approach evades the good status. Current parameters for the assessment of good status (NO_3 and pesticides) are not sufficient to cover contaminated sites. Further parameters are needed to install risk zones. Discussion on the introduction of further parameters is going on in Brussels but there it seems not needed to wait for the Daughter Directive. Risk zones could be defined although there is currently no quality standard. Definition for new and historical contamination is due to legislation, will be different years for the accession countries.

4 WFD-IMPLEMENTATION: CURRENT STATE OF WORK IN COUNTRIES

Better understanding of GW-issues is essential to implement the WFD in the DRB-countries. A broad variety of size, pressures, hydrogeological conditions, level of pollution, monitoring network design and monitoring frequency in the countries concerned is basis for implementation.

Therefore, participating countries were asked to provide general information about the progress with the implementation of the WFD. Main emphasis should have been placed on transboundary GW-bodies and it was asked for detected problems and gaps.

This section gives a brief summary for each of the general information provided on the state of work of implementing WFD.

4.1 COUNTRY PRESENTATIONS (PRESENTATIONS SEE ANNEX 8 TO 18)

4.1.1 AT

River Basin Management Plan Danube, Groundwater – Austrian way forward presented by Harald Marent, Federal Ministry of Agriculture, Forestry, Environment & Water (Austria)

In Austria lots of information and data is available but main problem is the missing information about the loads into groundwater and the compilation of multitude of existing data. The assessment of risk of failing good chemical status is done in steps but more detailed background information is necessary. Concerning the River Basin Management Plan Danube the goal for the Roof Report (Part A) as well as missing definitions and problems with the scale for the National Report (Part B) were listed. There is a lot of information but the method of their aggregation is not defined. Also missing is the definition for multilateral or basin wide importance and it is not stated by whom the Roof Report will be made and to whom it should be submitted. As there is a reporting obligation for all countries there is no guidance in case that any country is missing.

4.1.2 BA

Progress with the implementation of the WFD – with main emphasis on transboundary GW-bodies presented by Aleksandar Trifkovic, Institute for Urbanism of Republic of Srpska (Bosnia and Herzegovina)

Bosnia Herzegovina has access to a wide range of information from hydrological data to land use which are all already available as GIS-maps. Although BA is struggling with war heritage the importance of groundwater is recognized. Therefore different nationwide activities are initialised towards an integrated water management and priorities are set up for groundwater protection.

4.1.3 BG

Progress with the implementation of the WFD on groundwater in the Bulgarian Danube River Basin presented by Rossitza Gorova, Executive Environment Agency and Boriana Georgieva, Ministry of Environment and Water (Bulgaria)

Based on a broad variety of existing environmental legislation additional laws according to the River Basin Management structure will be established. The current state of delimitation of GW-bodies according to the WFD is available as GIS-map. For the description of GW-bodies Eurowaternet demands were used. During the next two years the monitoring system will be strengthened to fulfill the requirements of the WFD. Description of pressures on GW-bodies due to diffuse and point sources is already available as GIS-maps. Within a project the assessment of different risk levels is prepared.

Some transboundary GW-bodies in the DRB are already identified and bilateral cooperation already exists or is additionally planned. Problems occur in data compatibility and as a need for criteria for preliminary classification.

4.1.4 CZ

Implementation of WFD in the field of groundwater – CR presented by Hana Prchalova, TGM Water Research Institute (Czech Republic)

Basis for the delineation of GW-bodies are hydrogeological zones. The boundaries of these zones will be adapted according to the kind of groundwater flow (continuous or discontinuous). This is the basis for grouping of GW-bodies and provides information whether pollution or abstraction has an influence on the whole structure or just on part of it. Two or more layers within the same body-boundaries are possible. Aim of the initial characterisation is the collection of selected data and further the decision whether a body is at risk or not. Identification of transboundary GW-bodies is in progress. Different cooperation exists as CZ belongs to three important international river basins: Elbe, Danube and Odra. Additional there is a transboundary working group. The aim is the development of one methodology which should be used for the different basins, consistent GIS layers are made and one small team works. Gaps detected are the missing cooperation for transboundary GW-bodies and a lack of time.

4.1.5 DE

Current State Implementation of the WFD: Groundwater Germany/Bavaria presented by Jens Jedlitschka, Bavarian Ministry for Regional Development and Environmental Affairs (Germany)

In the Bavarian Danube basin 31 GW-bodies and one deep GW-body are delimitated. Description of the bodies and description of the pressures are on the way. One deep transboundary GW-body shared with Austria as well as other bodies at the border to Austria are identified and work is coordinated. The mentioned deep GW-body could serve as WFD pilot implementation for transboundary GW-bodies. A project on it has already started in 1995. This body should be included in the Roof Report. Bilateral cooperation between Austria and Germany already exists in the frame of the "Regensburger Vertrag". Detailed information is available in the presentation "DE-AT thermal groundwater body".

4.1.6 HR

Progress with the implementation of the WFD, Croatia presented by Želimir Pekaš, Croatian Water – Institute of Water Management (Croatia)

In Croatia the DRB is divided into three sub-basins and nine water districts. The initial characterisation of the GW-bodies is based on the properties of the aquifers. Delimitation of GW-bodies is made at regional level due to a lack of data while monitoring is organized at national level. Data from 1000 boreholes are used for describing water quantity while monitoring of quality is based on 250 pumping sites of public water supply. The inventory of point sources includes industry, urban wastewater sites and landfills bigger than 1000 m². As diffuse source of groundwater pollution only agriculture is taken into account. Results originating from the assessment of impacts on groundwater quality should serve as base for the development of a quality monitoring network according to WFD. Twelve potential transboundary aquifers with four countries are identified. In the DRB no cooperation with neighbour countries yet exists but will be established on bilateral agreements.

4.1.7 HU

Progress in the implementation of the WFD in the field of groundwater in Hungary presented by László Balashazi, Ministry of Environment and Water (Hungary)

The fact that all groundwaters are part of any water body serves as preliminary approach to the identification of water bodies. According to the type of aquifer water bodies are subject to different kind of separations. Almost half of the GW-bodies can be referred to as transboundary water bodies.

The assessment of pressures as part of the characterisation of water bodies includes point sources of pollution expressed by discharges and polluted sites, diffuse sources of pollution represented by CORINE data, data on agriculture and on population not connected to sewer systems and data for groundwater abstractions from a GIS database. Further on the assessment of impacts based on the quantitative and the chemical status considers vulnerability to different pollution sources. A map of sensitive areas is then the conclusion of the assessment.

4.1.8 RO

Progress with the implementation of the WFD – with main emphasis on transboundary GW-bodies presented by Ruxandra Balaet, Ministry of Water and Environmental Protection (Romania)

Romania presented the answers to the formerly sent questionnaire. The Tisa-Somes basin acts as experimental area where the requirements of the WFD are implemented first. Identification and delineation of bodies of groundwater and the associated specifications were done for four GW-bodies in the Tisa-Somes basin. Romania already has identified transboundary bodies of groundwater. For the identification of pressures the reorganisation of the inventory in a computerised database is in progress. The assessment of impact of human activities on the status of groundwater and the preliminary risk assessment of failing to achieve good status is based on threshold values, monitoring data and estimation of available water resources. To avoid uncertain classification the existing monitoring system will be adapted. More than 3500 wells are yet used for monitoring water levels and about 1600 wells are used for monitoring groundwater quality. A wide range of information is available in a computerised database and can be accessed by internet with password.

4.1.9 SI

Progress with implementation of WFD with main emphasis on transboundaries GWB presented by Joerg Prestor, Geological Survey of Slovenia (Slovenia)

Delineation of GW-bodies is separated into three phases. Phase one from 2001-2002 identified bodies based on data of groundwater abstraction, pressures and protection and existing monitoring. Six main bodies at state level, 23 at river basin level and 168 at local level are listed. In the second phase in 2003 additional data at local level for use, abstraction, pressures and load resulted in the production of a map of aquifers, the bodies' boundaries can be verified and the monitoring program can be optimised. Phase three from 2003-2004 concentrates on modeling. As there are many transboundary bodies intensive cooperation is going on with HR and AT, while less cooperation is done with HU and IT. Three steps characterise the intensive bilateral investigation for transboundary aquifers. Example for a common aquifer system with transboundary groundwater flow is the cooperation with HR where the evaluation of common monitoring sites has been carried out. Detected problem in general are karst water-divides, delineation of bodies in vertical direction and representativeness of monitoring sites.

4.1.10 SK

Progress with the WFD implementation – Slovak Republic. Working Group 2.8 – Classification and evaluation of groundwater presented by Eugen Kullmann, Slovak Hydrometeorological Institute (Slovakia)

In 1980 140 hydrogeological units by the criteria of stratigraphy were established. This should give an overview of the potential of groundwater under the aspect of quantity. The present status is dominated by a lack of qualitative data. For the WFD implementation classes of GW-bodies are foreseen which means about 70 different GW-bodies. These still could be subdivided according to quality data. At the moment three main transboundary bodies are recorded, two in the southeast, one of them the Aggtelek – Slovak karst pilot project, and one in the southwest. As a second layer 27 geothermal areas are defined.

4.1.11 YU

Current state of delimitation of GW-bodies in Serbia and Monte Negro presented by Nada Lazic, Provincial Secretariat for Environmental Protection & Sustainable Development (Serbia and Montenegro)

Characterisation of GW-bodies is applied/operated for the territory of Vojvodina. Main aquifers are the "basic water-bearing formation" and the "Pliocene" aquifer. Both are exposed to pollution due to waste water. Therefore wastewater treatment is needed to ensure protection of layers and surface bodies. Groundwater monitoring is unsatisfactory as it is performed mostly for local needs. Concerning transboundary cooperation no implementation according to WFD has yet been started. Funding and the unclear legal status of the water sector are main obstacles for the implementation of the WFD. But recently an initiative for a new Water Law and for a national Water program as well as for the implementation of WFD has been set in the Vojvodina.

As Ukraine did not give a presentation and Moldavia was not represented on the workshop for these two countries from the DRB no state of work can be provided.

4.2 QUESTIONNAIRES

Implementation of the EU Water Framework Directive. Questionnaire for an overview of countries' activities in the field of groundwater.

The questionnaire was prepared by Mr. Zoltán Simonffy in cooperation with Mr. Jens Jedlitschka and Mr. László Balásházy. In January 2003 the questionnaires were distributed by the ICPDR to all participating countries to get an overview of countries' activities in the field of groundwater.

4.2.1 Background of the questionnaire (presentation see Annex 19)

Questionnaire on the implementation of WFD in the field of Groundwater, Background presented by Zoltán Simonffy, Budapest University of Technology (Hungary)

Aim of the questionnaire was to collect information on applied methodology and available information to exchange experiences and to harmonise the methodology. The structure of the questionnaire consists of three parts: identification of water bodies, characterisation of water bodies and preparation of the monitoring. Aspects considered were the Horizontal Guidance on Water Bodies and the IMPRESS Guidelines. The issues of the questionnaire were more detailed to force certain aspects and to localise the weak points or gaps. Unfortunately the question about transboundary monitoring was not included in the questionnaire. As a conclusion it can be stated that the implementation of the WFD in the countries is mainly a task of adaptation of existing structure, knowledge and information whereas new requirements have to be considered. Applied methodologies are not that important as long the requirements of the WFD can be satisfied. Identification at transboundary level should be prioritized and good examples of approaches or methodologies would be a useful help.

4.2.2 GW-Questionnaire – presentation of replies (presentation see Annex 21)

GW-Questionnaire – presentation of replies presented by Andreas Scheidleder, Federal Environment Agency (Austria)

Nine out of 13 DRB countries replied (69 %). Missing are BA, YU, MD and UA which represent about 25 % of the DRB area. Romania presented its questionnaire at the workshop in Budapest. Provided information is included in the assessment below. Answers to the questionnaire give a good overview of progress and state in the countries regarding WFD groundwater implementation. They also provide a good basis for exchange of experience.

Answers to the questionnaire are often given with limiting remarks what makes the comparison difficult. Often it is unclear whether the answers refer to the whole country or to the DRB part only.

4.2.2.1 Identification of groundwater bodies

Is a map of groundwater bodies available?

Six countries submitted a map of GW-bodies but BG, HR and RO did that with limitations.

What levels of hierarchical approach (Horizontal Guidance on "Water Bodies") have been applied:

Geological boundaries:

All countries except SI use geological boundaries, often in connection with hydrogeological approach.

Hydraulic boundaries:

Hydraulic boundaries are used with restrictions, DE uses them in connection with surface water system, SK only partially in basin sediment structure, RO uses GW highs for shallow aquifers

Is the shallow aquifer separated:

All countries but DE and SI separate them

Are aquifers of a strata identified separately or merged together with aquitards in one water body?

AT identifies the aquifers separately, other countries merge with aquitards.

Are the thermal aquifers separated?

All countries except CZ and SI separate thermal aquifers.

How will the parts of water bodies in critical conditions be treated (i.e. where achievement of the good quantitative and/or qualitative status is risk)?

They will be separated by all countries as sub-bodies or similar but not by AT.

Is all groundwater attached to a groundwater body?

In all countries it is but AT includes deep GW only when used and BG has excluded part of fissured GW.

How large are groundwater bodies?

The size ranges from 17 km² to 26700 km².

How is the connection of bodies of groundwater with surface water bodies treated?

There is no consistent answer given, level of treatment ranges from river basin level to sub basin and sub catchment level.

Are bodies of groundwater grouped?

Grouping of GW-bodies is done in all countries but not in RO.

Are transboundary bodies of groundwater selected and identified?

Work is done only partially or even not done yet.

4.2.2.2 Characterisation of groundwater bodies

Identification of pressures

Is information available for the characterisation of diffuse sources?

In most countries information is available although it either concentrates on chemical status (N-data, acidification) or on land use data (CORINE).

Does the inventory of point sources of pollution exist (incl. inventory of contaminated sites)?

Although all countries except SI answer with "Yes" the focus is only on contaminated sites, HR is monitoring all point sources. Other information is on regional scale, not completed or in progress.

Does the inventory of groundwater abstraction exist?

Each country has an inventory of abstraction but with lots of limitations e.g. only for abstractions > 500 m³/month or no abstraction data for irrigation or industry or the inventory is just in progress.

Does the inventory of human activity modifying recharge conditions exist (drainage, artificial recharge, injection, land sealing, damming …)?

It is mostly a collection of raw data where different aspects are taken in account e.g. only damming, drain system.

When are surface water ecosystems or terrestrial ecosystems directly dependent of groundwater bodies?

Less information is given about and when it shows a range of methodologies, from a climatic approach to an intersection with protected areas.

Assessment of impact of human activities on the status of groundwater. Preliminary risk assessment of failing to achieve good status.

How will the significance of the impact of a pollution source (human activity) be determined, by threshold values or other?

AT and SK will determine the significance based on monitoring data while CZ, HR and RO are on the way of elaborating a methodology.

Point sources: Determination varies from experts' knowledge or monitoring data to threshold values.

Diffuse sources: Their determination is based on threshold values.

Does vulnerability mapping exist for the country?

The existing mapping in five countries differs in its methodology. It ranges from being based on geophysical determinants to the specification of nature conservation areas.

How will water bodies (or parts of water bodies) be classified at risk of failing good chemical status, Based on monitoring data and/or using other information?

Classification is mainly based on monitoring data. Some countries combine them with information about impacts and pressures.

How will water bodies (or parts of water bodies) be classified at risk of failing good quantitative status, by or without estimating available water resource, by evaluation of changes in groundwater levels?

Three countries classify by evaluation of changes in groundwater levels, three countries are estimating the available water resource.

Is additional monitoring planned if the available information allows only very uncertain classification?

In six countries additional monitoring is planned. Kind of measures depends on national circumstances, e.g. CZ plans to monitor significant pollution sources and important

abstraction sites. DE won't exercise additional monitoring while HR is just establishing a quality monitoring network.

4.2.2.3 Monitoring

It was asked for the Element of monitoring, the current situation concerning number of wells, the frequency, components and the operational costs and the same for the necessary development. Most information was submitted about the number of monitoring sites, a few countries defined the costs and less information was given about the frequency and the components, perhaps due to their complexity.

Available maps of existing networks:

Maps were submitted by BG, HU and SK.

Observation wells for water levels and springs for discharge:

Number of sites ranges from 264 (SI) to 3528 (RO) with costs between 0.024 and 1.78 million Euro.

Observation wells for quality:

There are fewer sites than for quantity. Number ranges from 160 (SI) to 2050 (AT) with costs between 0.08 and 1.5 million Euro. HR has no surveillance monitoring yet.

Drinking water wells:

They are often included in the above mentioned programs.

Additional:

HU displays wells in safeguarding zones of vulnerable groundwater resources.

Necessary development:

Few information is given about the necessary development from 2006 – 2012. Except HU which provides costs and number of wells for each element of monitoring and SK which informs about the planned number of sites.

4.2.2.4 Data availability

Which data are available in a computerised database?

At least all quality data are available in computerised databases.

How are the databases accessible?

Access is mainly restricted. Different authorities are providing data on request.

What kind of processed results are available?

A wide range of results from reports, maps, time series and statistics is available except in HR. A problem perhaps will be the language and the comparability of data.

4.2.2.5 Missing question

Is there transboundary monitoring in place?

In HU there are monitoring points but not negotiated with the riparian countries. In DE bilateral monitoring for quantity concerning the thermal aquifers already exists, quality will follow. RO and SI also identified wells and springs near the boundary but have no agreement with their neighbours.

5 DISCUSSION & RECOMMENDATION

The objective of the Groundwater Workshop was to develop a core set of information (minimum requirements) to be subject of the overall DRBMP-Roof Report with special emphasis on transboundary or important GW-bodies. Additionally a proposal of solutions to support the harmonisation amongst River Basin Countries should be made.

5.1 DISCUSSION

To provide a basis for the discussion the coordination requirements of the WFD were presented to keep them in mind. To gain comparable information Mr. Jedlitschka was requested to give a short summary about the current state of discussion of the Rhine Commission, another international River Basin.

5.1.1 Discussion Session

Structure of the discussion was oriented towards the two main objectives:

- transboundary GW-bodies subject of Roof Report
    - definition of important transboundary GW-bodies (Criteria)
    - elements of characterization of important transboundary GW-bodies
    - timeline
- harmonisation needs for elements of Part B (national reports)

It was reported by Mrs. Mihaela Popovici, representative of the EMIS Expert Group, that pressure from diffuse pollution (nutrients and partly pesticides) is handled by MONERIS, results will be available very soon (distributed to workshop participants).

5.1.2 Coordination requirements of the WFD (presentation see annex 23)

presented by Ursula Schmedtje, ICPDR Secretariat (Austria)

WFD calls for coordination where a river basin district extends beyond the territory of the Community. Eighteen countries are lying within the DRB. As five of them hold only very small territories, areas less than 2000 km² other countries care for their belongings. In fact 13 countries are the main group of the DRB. AT and DE are member states while CZ, SK, HU, SI, BG and RO are Accession countries. ICPDR plays a decisive role for the coordination mechanisms in the DRB as it serves as a platform for the coordination of the countries with their bilateral agreements and cooperation. Further on ICPDR including RBM EG serves as facilitator and provides information exchange, develops strategy for producing the RBM Plan and supports harmonisation of methods and mechanisms. As levels of coordination can be cited the DRB level with limit to the absolutely necessary, the bi-/multilateral level and the national level which both need a lot of coordination and where generally coordination should take place. The Report form which is identical with RBMP consists of two levels: Part A the so called Roof Report with issues of basin wide importance and Part B with national information. Reporting mechanism will be based on templates provided by the ICPDR. The Danube countries deliver completed templates to the ICPDR which sends a compiled DRB roof plan back to them. The complete report to the European Commission has to be sent by the EU-Member States and accession countries since this is a national task.

5.1.3 Groundwater – excerpt from Rhine Committee

Presented by Jens Jedlitschka, Bavarian Ministry for Regional Development and Environmental Affairs (Germany). Additional information can be found under www.iksr.org

The Rhine Committee is a coordination platform consisting of several groups. One of them the preparation group elaborated a document, which is still a "living document", for the reporting according to WFD Annex II and V. Part A of the report concerning groundwater includes the following elements:

- GW-bodies: shown as a map with all GW-bodies of international importance that means GW-bodies which belong to different river basin units or are transboundary ones, therefore no bagatelle limit exists. Very large GW-bodies with an area > 1000 km² at a national level have to be added. A short description is included.
- GW-bodies which are directly dependent on surface ecosystems or terrestrial ecosystems: has to be clarified
- Pressures: are not figure to Part A, but pressures on international GW-bodies have to be clarified
- Risk assessment: just the results have to be given e.g. in a map
- Protection zones (according to Art. 6 and Annex IV): protection zones which follow community law e.g. Habitat Directive, NO_3-Directive and so on. Protection zones with international importance should be listed in Part A, not the national ones. Text-part is given as a list in form of a table.

5.2 RECOMMENDATIONS OF THE WORKSHOP

After a long and intensive discussion about the main topics the experts for groundwater from the DRB countries have agreed upon following conclusions and recommendations.

5.2.1 Roof Report

The working group has agreed on the following core set of information being subject of the overall DRBMP-Roof Report.

GW-bodies subject to Roof Report – it was agreed that "important" transboundary GW-bodies shall be subject to the Roof Report. The criteria for "important" were defined as follows:

- big transboundary GW-bodies (>4,000 km² and smaller but very important) however, the "importance has to be agreed bilaterally upon according to various criteria e.g. socio-economic importance, uses, impacts, pressures, interaction with aquatic eco-systems.

The information on the important transboundary GW-bodies to be delivered for Part A shall comprise:

- GIS information (maps) – scale 1:4.5 mill., medium term 1:1 mill.

  (GW experts will give guidance on content of Roof Report to GIS expert sub-group)
- Summary on initial/further characterisation / review of human activity on GW

5.2.2 Timeline

Since the WFD has a rather tight schedule, the timeline for the further procedure and delivery of information was discussed and agreed as follows:

- Identification of GW-bodies and report to ICPDR

  End of November 2003
- Data for map preparation (GIS layer)

End of December 2003

- Data delivery for summary

  End of January 2004

- First draft April 2004
- First draft to standing WG June 2004
  - Recommendations for changes
- Ordinary meeting November 2004

5.2.3 Harmonisation needs for elements of Part B

The second part of the workshop discussion focused on harmonisation needs for the elaboration of Part B, the national part of the report.

The topics on which the discussion concentrated were:

- Delineation of GW-bodies
- Characterisation of GW-bodies
- Definition of "significance" of the risk (Annex II, 2.2)

Participants of the 2nd GW-Workshop agreed that at the moment there is no need for harmonisation. However, the further process might show some need.

Representatives of the ICPDR and the UNDP bade farewell to the delegations and to the host, the Hungarian Ministry of Environment and Water. They thanked for all the efforts undertaken, the hospitality and good organization of the Workshop and the excursion to the thermal springs.

6 ANNEX

The following Annex comprehends all presentations and necessary information of the 2nd Groundwater Workshop.

Annex 1: List of participants

Annex 2: Program of the Workshop

Annex 3: Objectives of the workshop

Annex 4: The UN/ECE pilot project on the Aggtelek (HU) – Slovak karst aquifer with special regard to WFD. Hungarian part.

Annex 5: The UN/ECE pilot project on the Aggtelek (HU) – Slovak karst aquifer with special regard to WFD. Slovakian part.

Annex 6: DE-AT thermal groundwater body

Annex 7: How to deal with contaminated sites

Country presentations

Annex 8: AT

Annex 9: BA

Annex 10: BG

Annex 11: CZ

Annex 12: DE

Annex 13: HR

Annex 14: HU

Annex 15: RO

Annex 16: SI

Annex 17: SK

Annex 18: YU

Annex 19: GW-Questionnaire - background

Annex 20: GW-Questionnaire – original template

Annex 21: GW-Questionnaire – presentation of replies

Annex 22: GW-Questionnaire – all replies

Annex 23: Coordination requirements of the WFD

Annex 24: Discussion Session

Annex 1: List of participants

2nd Groundwater Workshop on WFD Implementation

May 12-13, 2003
Budapest, Hungary

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Annex 2: Program of the Workshop

2nd Groundwater Workshop on the Implementation of WFD in the DRB

May 12-13, 2003 in Budapest, Hungary

Agenda

First day: Monday 12th May 2003

09:30–09:50	Welcome address	Mr Gyula Holló (Ministry of Environment and Water, Head of Department River Basin Management)
	Introductory remarks	Mr Ivan Zavadsky, Ms Ursula Schmedtje
09:50–10:00	Introduction of participants	all

I INTRODUCTION

10:00–10:25	**Objectives of the workshop**
	Brief summary of the WFD-requirements until 2004 and further time scale. Presentation of the objectives of the workshop, which are:
	- Define information needs for the Danube River Basin Management Plan (DRBMP) Roof Report
	- Support the harmonisation amongst Danube River Basin Countries, especially regarding:
	  - Identification of GW-bodies,
	  - Initial and further characterisation of GW-bodies,
	  - Pressure and impact analysis,
	  - Monitoring of groundwater,
	  - Consideration of transboundary or important GW-bodies
		Mr. Johannes Grath and Mr. Andreas Scheidleder

II DEALING WITH GROUNDWATER IN THE DANUBE RIVER BASIN - CASE STUDIES

Presentation of case studies of transboundary GW-bodies within the Danube river basin - Current state, - Procedure with regard to harmonisation, - Lessons learned, - Gaps detected on the bi-(multi-)lateral level		
10:25–10:45	The UN/ECE pilot project on the Aggtelek (HU) - Slovak karst aquifer with special regard to WFD Hungarian part	Ms. Eszter Havas-Szilàgyi
10:45–11:05	Break for refreshments	
11:05–11:25	The UN/ECE pilot project on the Aggtelek (HU) - Slovak karst aquifer with special regard to WFD	Ms. Katarina Moziesikova

	Slovakian part	
11:25–11:45	DE-AT thermal groundwater body	Mr. Jens Jedlitschka
11:45–13:15	Lunch	

III PRESSURE AND IMPACT ANALYSIS

13:15–13:45	**Presentation of MONERIS**	Mr. Horst Behrendts
13:45–14:05	**How to deal with contaminated sites - pressure and impact analysis** - Concept of the GWD and the Risk Management Zones (RMZ) - National approach, available information, inventories, assessment	Mr. Dietmar Müller
14:05–14:20	Discussion	

IV DEALING WITH GROUNDWATER IN THE DANUBE RIVER BASIN - CURRENT STATE IN COUNTRIES

10 minutes each	**Progress with the implementation of the WFD - with main emphasis on transboundary GW-bodies** As the programme is very dense and in order to allow each country to present its progress in the implementation of the WFD with regard to transboundary GW-bodies following technical guidance to national presentations is proposed: As the key elements of the WFD implementation are already laid down in the questionnaire, the presentations should focus on the CURRENT STATE. Main emphasis shall be put on following topics: - Current state of the delimitation of GW-bodies - Current state of the description of GW-bodies and pressures - Current state of the identification and delimitation of transboundary GW bodies - present a map indicating these GW-bodies and bring a list with info on size, involved country, GW-type - Is there a WFD pilot implementation in transboundary GW bodies - which?, state? - Existing/planned bi- (multi)lateral co-operation - Summary: detected problems and gaps. presented in key words	Country representatives
14:20–14:55	**Part 1**	3 Countries
14:55–15:10	Break for refreshments	
15:10–16:15	**Part 2**	5 Countries
16:15–16:30	Break for refreshments	
16:30–17:30	**Part 3**	5 Countries
17:30–18:00	Discussion	

19:30 Dinner in the Hotel Gellért, by invitation of the Ministry of Environment and Water

Second day: Tuesday 13th May 2003

08:00–10:30	Excursion	
10:30–10:45	Break for refreshment	

V IMPLEMENTATION OF THE WFD IN THE DANUBE RIVER BASIN CONCERNING THE IDENTIFICATION AND DESCRIPTION OF GW-BODIES UNTIL 2004

10:45–11:15	**GW-Questionnaire –background, content and goals** - What was the intention of the questionnaire - Explanation of structure and desired input from the countries	Mr. Zoltan Simonffy
11:15–11:45	**GW-Questionnaire - presentation of replies** - Summary and overview of received information - Identification of crucial differences between countries (harmonisation needed) - Summary of open questions and gaps	Mr. Andreas Scheidleder
11:45–12:15	Discussion	
12:15–13:30	Lunch	

13:30–16:00	**DRBMP Roof Report - Core information on Groundwater**
	The objective of the Groundwater Workshop is to develop a core set of information (minimum requirements) to be subject of the overall DRBMP-Roof Report with special emphasis on transboundary or important GW-bodies. This goal should be reached within a discussion. Basis for discussion could be the draft lists of transboundary and important GW-bodies provided by participants.
	- Define core information relevant for the Roof Report regarding:
	  - identification of GW-bodies,
	  - initial and further characterisation of GW-bodies,
	  - pressure and impact analysis,
	  - monitoring of groundwater.
	- Detection of national gaps with regard to needed information
	- Incompatibilities in the methodology avoiding harmonised data
	- Most important open questions where guidance is needed
	- How could problems be solved on bi-(multi)lateral level
	- Proposal of solutions to support the harmonisation amongst Danube River Basin Countries
	- Time scale and responsibilities for the delivery of information needed for the Roof Report
		all

16:00–16:30	**Summary, way forward, recommendations**	

Annex 3: Objectives of the workshop

Implementation of the WFD in the Danube River Basin

Inroduction & Objectives

2nd Groundwater Workshop

Budapest, May 12-13, 2003

Grath, Scheidleder – Federal Environment Agency - Austria

Umweltbundesamt

History

Umweltbundesamt

- **Conclusions of 1st Workshop in Feb, 2002**
  (on identification, characterisation, monitoring)
  - Start/continue work on status review
  - identify transboundary GW bodies
  - prepare and send out a questionnaire
  - Follow-up Workshop 2003
    - Present experiences on the status review of GW
    - Results achieved in bilateral co-operation with transboundary groundwater bodies

Objectives of 2nd GW workshop

- Define core elements (GW) of Roof Report
- Support harmonisation amongst DRB countries
  - Identification of GW-bodies
  - Initial and further characterisation
  - Pressure and impact analysis
  - Monitoring of GW
  - Consider transboundary and important GW-bodies
- Serve as support to DRB countries to discuss and exchange experience and information

WFD-requirements until 2004

Art. 5: Characteristics of the river basin district, review of the environmental impact of human activity and economic analysis of water use

(1) Each Member State shall ensure that for each river basin district or for the portion of an international river basin district falling within its territory:

- an analysis of its characterisation
- a review of the impact of human activity on the status of surface waters and on groundwater, and
- an economic analysis of water use

is undertaken according to the technical specifications set out in Annexes II and III ….

Art. 6: Register of protected areas

WFD CIS documents (guidelines) - 1

WG	Acronym	Name	GW
	Water bodies	Horizontal guidance document on the application of the term "water body" in the context of the Water Framework Directive	yes
2.1	IMPRESS	Analysis of pressures and impacts	yes
2.6	WATECO	Economic analysis in the context of the Water Framework Directive	partly
2.7	Monitoring	Monitoring of surface and groundwaters	yes
2.8	GW Tools	Tools for assessments of groundwater trends	yes
2.9	PROCLAN	Best practices in river basin planning (including the work packages on river basin districts, planning process and public participation)	yes
3.1	GIS	Development of a Geographical Information system	yes
4.1	Pilot Testing	Integrated testing of Guidelines in pilot river basins	yes

WFD CIS documents (guidelines) - 2

WG	Acronym	Name	GW
2.2	HMWB	Heavily modified water bodies	No
2.3	REFCOND	Reference conditions in inland waters	No
2.4	COAST	Typology, reference conditions and classification of transitional and coastal waters	No
2.5	IC	Intercalibration	No

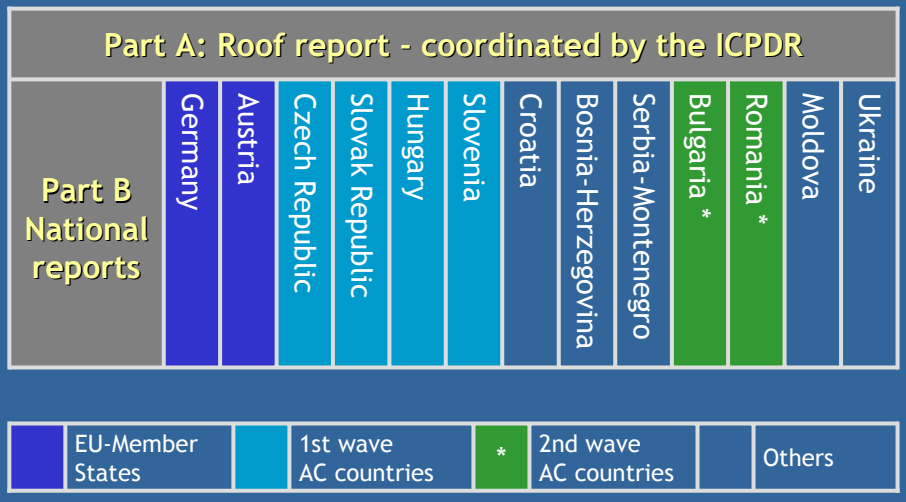
Documents are available at public CIRCA server:

http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents

DRB Management Plan

- **Part A (roof of the DRBMP)** gives relevant information of multilateral or basin-wide importance
- **Part B (national input to DRBMP)** gives all relevant further information on the national level as well as information coordinated on the bilateral level
- ICPDR has coordinating and supporting function
- ICPDR does not report on its own
- Each country will deliver the roof report (Part A) **AND** its own national report (Part B)

Structure of Reports



Structure of 2nd GW workshop

May 12, 2003

- Case studies of transboundary GW bodies
  - HU-SK karst aquifer / DE-AT thermal GW body
- Pressure and impact analysis
  - MONERIS / How to deal with contaminated sites
- WFD implementation – current state in countries

May 13, 2003

- Excursion
- Groundwater questionnaire
  - Background, content & goals / Presentation of replies
- **Discussion**
  - **Content of Roof Report / Discussion platform**

Objectives & character of workshop

- Define core elements (GW) of Roof Report
- Support harmonisation amongst DRB countries
- Discussion platform for experts
  - Serve as support to DRB countries to discuss and exchange experience and information
- Identify highlights and open issues

Lively discussion / Interrupt for clarification

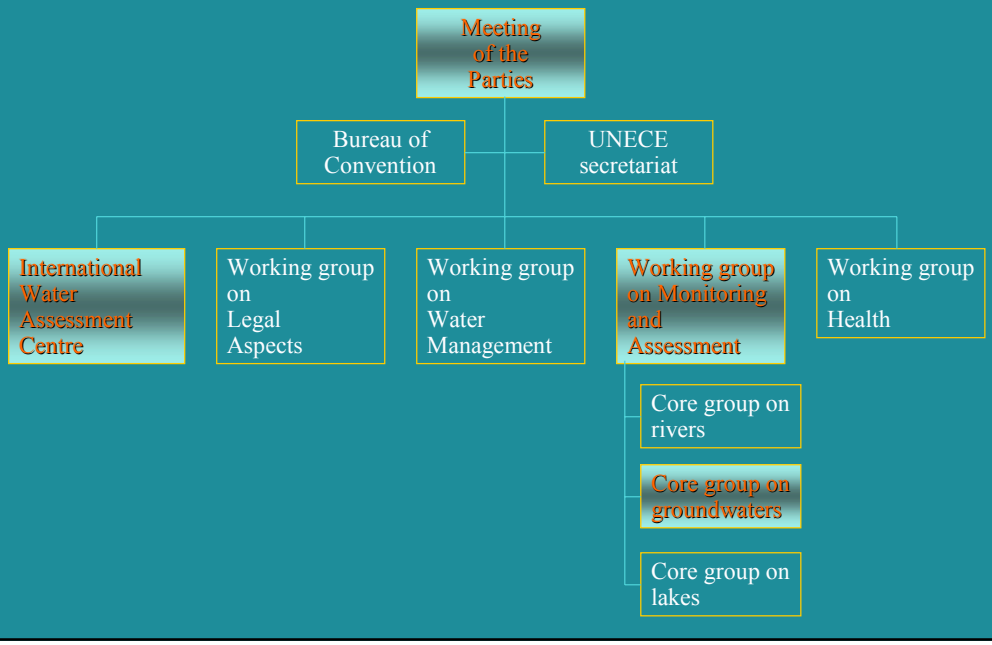
Annex 4: The UN/ECE pilot project on the Aggtelek (HU) – Slovak karst aquifer with special regard to WFD. Hungarian part.

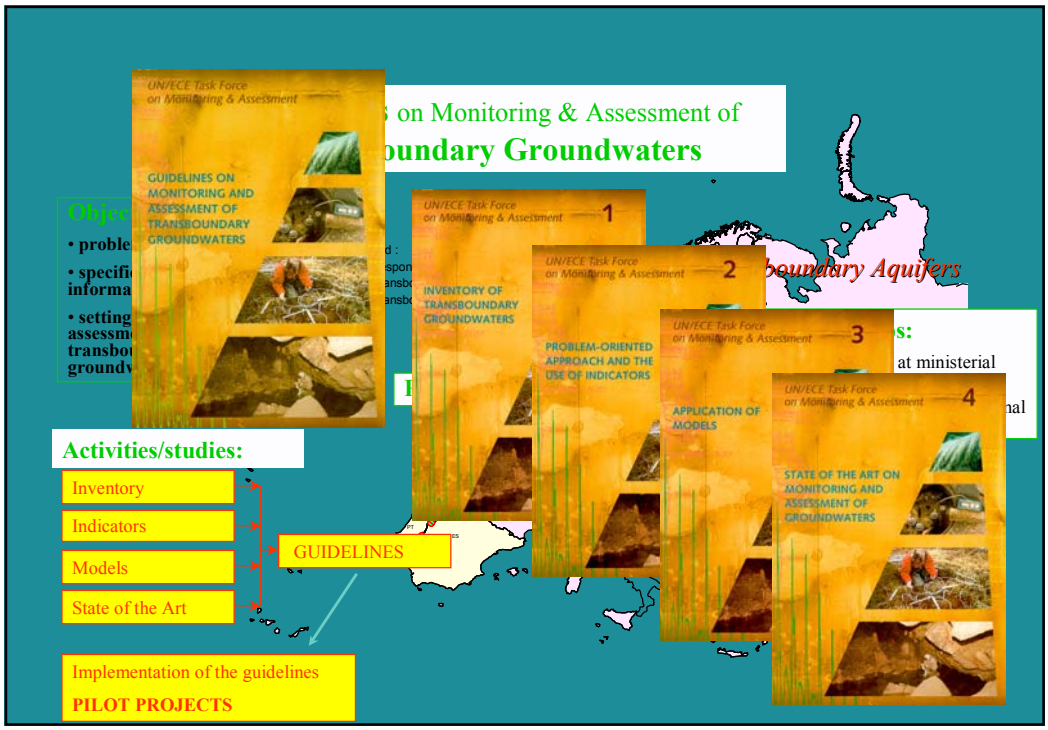
The UN/ECE pilot project on the Aggtelek (HU) - Slovak Karst (SK) Aquifer with special regard to the WFD

UN/ECE
Convention on the Protection and Use of Transboundary Watercourses and International Lakes
Working Group on Monitoring and Assessment
Core Group on Transboundary Groundwaters

E. Havas-Szilágyi, Hungary
Min. of Environment and Water,
12.May 2003

Organisation structure of WGMA and link with Helsinki Convention and Protocol





Groundwater guidelines

objectives

to assist governments and joint bodies in developing harmonised rules for the setting up and operation of systems for transboundary groundwater monitoring and assessment

character

the guidelines are more strategic than technical

structure

monitoring cycle

Definitions, specific aspects of groundwater monitoring (characterisation of aquifers), integrated approach

pilot projects

implementation of the guidelines

Objectives:

- to demonstrate application and to illustrate from experiences the process and difficulties of implementation
- to assist countries in implementation
- to identify gaps and incompleteness and to propose improvements

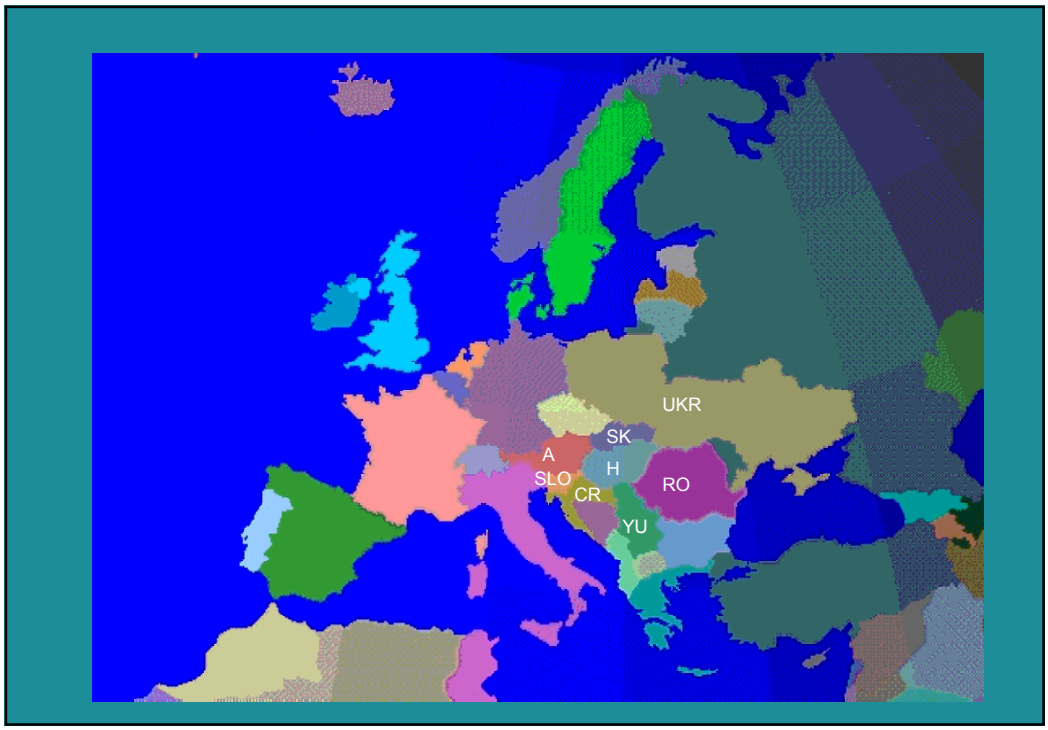
Preferences (for selection):

different types of aquifers

- groundwater and surface water interaction
- cases both in Western and Eastern European countries

Phasing and time schedule pilots

- Preparatory phase (project 1)
  - *inception study*
  - *monitoring and assessment needs analysis*
- Implementation phase (project 2)
  - *evaluation*
  - *implementation*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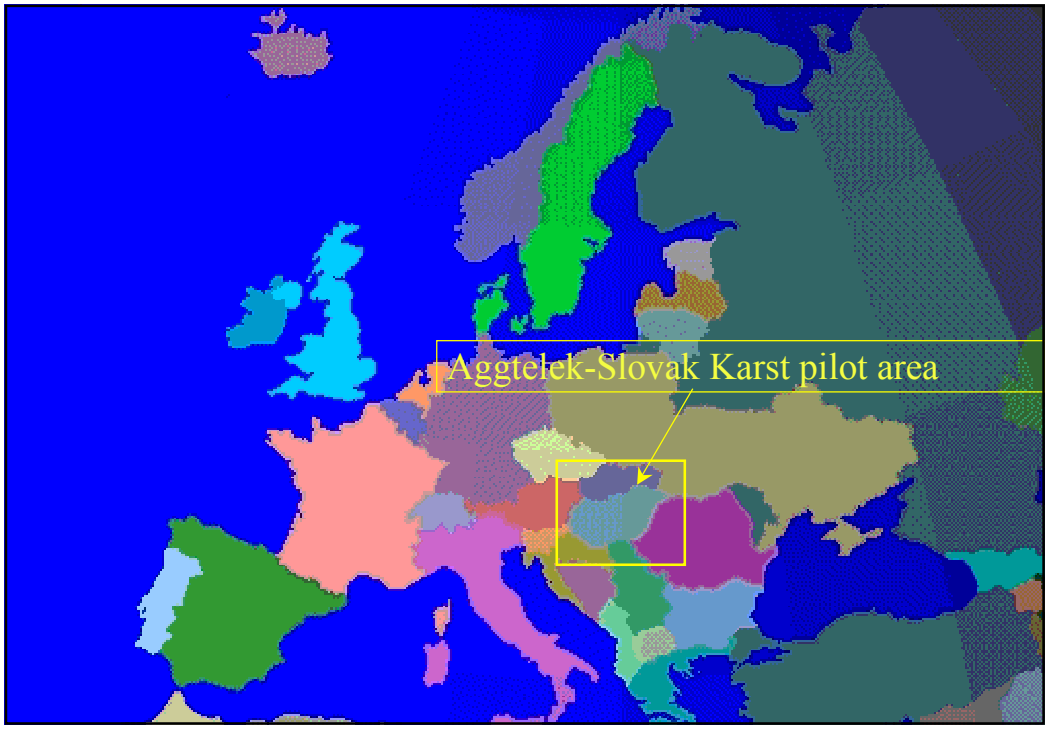
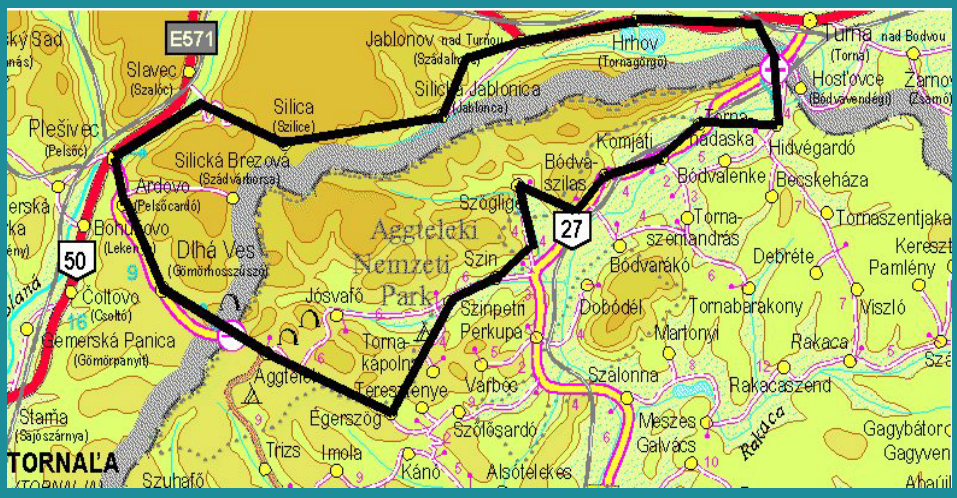

Aggtelek-Slovak Karst pilot area



Pilot project Aggtelek-Slovak Karst

Criteria for selection (1):

- groundwater body of a "manageable" size - cca 600 km^2

- existence of groundwater problem - National Parks

- monitoring network should exist - yes

Criteria for selection (2):

- participation of 2 or 3 countries
  - Hungarian Republic, Slovak Republic
- existing (i.e. signed or ratified) bilateral or multi lateral agreements, joint body yes since 1950 s

Criteria for selection (3):

willingness of countries
to implement the guidelines

- workload should be reasonable
- workload has to be borne

by riparian countries
with financial/scientific support of possible donors

Preparatory phase
1.) inception
2) monitoring and assessment needs analysis

2001. MoU

2001-2002. - organization
-nomination of project leaders
-collecting and informing the participants in both countries

1st Meeting March 2002.

Participants:

UN/ECE WGMA Core Group on Groundwater
Slovakia:
- Ministry of the Environment
- Slovak Hydrometeorological Institute
- Slovak Geological Survey
- Water Works, City of Kosice
- Slovensky Kras National Park

Hungary:
- Ministry of Environment and Water
- National Water Authority
- District Environment Inspectorate
- District Water Authority
- Aggtelek National Park
- Water Resources Research Centre Plc.
- Hungarian Geological Survey

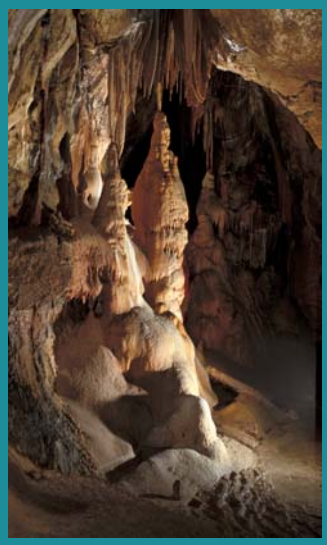
- **Objectives**
- **Workplan for 2002-2003**
- **Content of the inception report**

1. Objectives:

- **Introduction and testing of the UN/ECE guidelines**
  - Analyses of monitoring and assessment needs (report No.1.)
  - Tasks in water management (report No.2.)
  - Proposal to the development of monitoring and assessment (report No.3.)
- **Characterisation of the pilot aquifer as a groundwater body according to the WFD**
- **Vulnerability mapping of the pilot aquifer applying the European approach (COST 620 Action)**

Content of the inception report:

- objectives
- project description
- assignment of the pilot area
- general overview of the area
(geology, geomorphology,
climate, hydrology,
hydrogeology, caves, settlements,
water uses, land use, etc.)
- present monitoring activities
- database
- institutional background
- overview of the international co-operation
concerning groundwater (bilateral level,
Danube river basin level, internat. prgs, etc.)
- EU WFD implementation
- vulnerability mapping (COST 620 Action)



Activities:

meeting of the Geological Surveys
data collection
compilation of the Inception report
(Hung. - Slo.)
translation

Second Expert meeting: Bratislava, March 3-4. 2003.

Next activities - (WFD, ICPDR RBM EG):

data collection on pressures of the gw. body

information on impact

review existing groundwater monitoring data (chemical and water level) and data on dependent surface waters and ecosystems;

assess the water balance of gw. body;

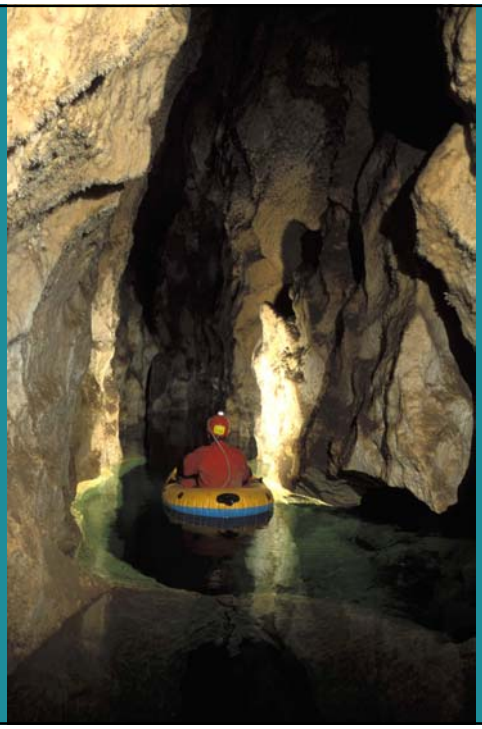
relationships between the groundwater body and connected wetlands;

Consider both chemical and quantitative status to decide whether the groundwater body is likely to be at risk…...

A review of the delineation of the groundwater body may be undertaken if the data on pressures and impacts indicates that it may be helpful to subdivide bodies for the purpose of developing a practical programme of measures;

Assess vulnerability of groundwater to pollution from recorded pollution pressure – *at present no possibility to realise exists;*

The development of a conceptual model of the groundwater flow – *at present no possibility to realise exists*



Annex 5: The UN/ECE pilot project on the Aggtelek (HU) – Slovak karst aquifer with special regard to WFD. Slovakian part.

Adonis vernalis

The UN/ECE Pilot Project on the Aggtelek – Slovak Karst Aquifer with Special Regard to WFD

part II

2nd Groundwater Workshop on the Implementation of WFD in the DRB

Budapest, Hungary

May 12 -13th 2003

Location of Pilot Project Area

Pilot Project

1. Step: Memorandum of Understanding: Co-operation endorsed by the Meeting of the Parties to the Convention in The Hague, The Netherlands, 23-25 March 2000
2. Step: 2002 March Meeting in Jósvafő, Hungary: proposal of Inception report content and chapters, responsibilities;
3. Step: 2003 March Meeting in Bratislava, Slovakia: evaluation of until meeting time activities, proposal of workplan, responsibilities

Inventory Report

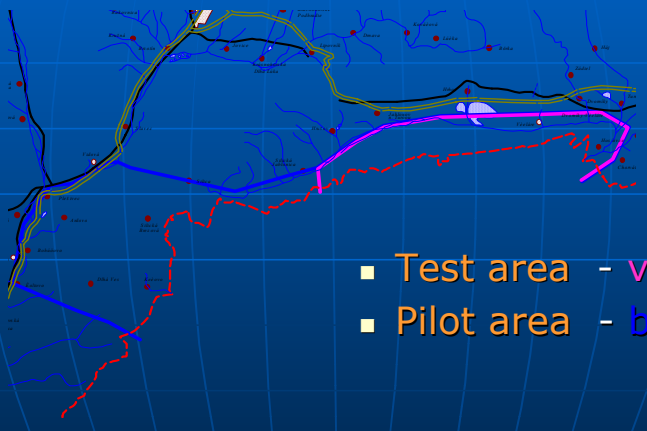
1. Objectives
2. Memorandum of Understanding
3. Establishment of project organization
4. Delineation of Pilot Area
5. General description
6. Function and Uses
7. Monitoring practices
8. Institutional background
9. International co-operation
10. Work Plan, Time Schedule, Responsibilities
11. Funding
12. Annexes

Objectives

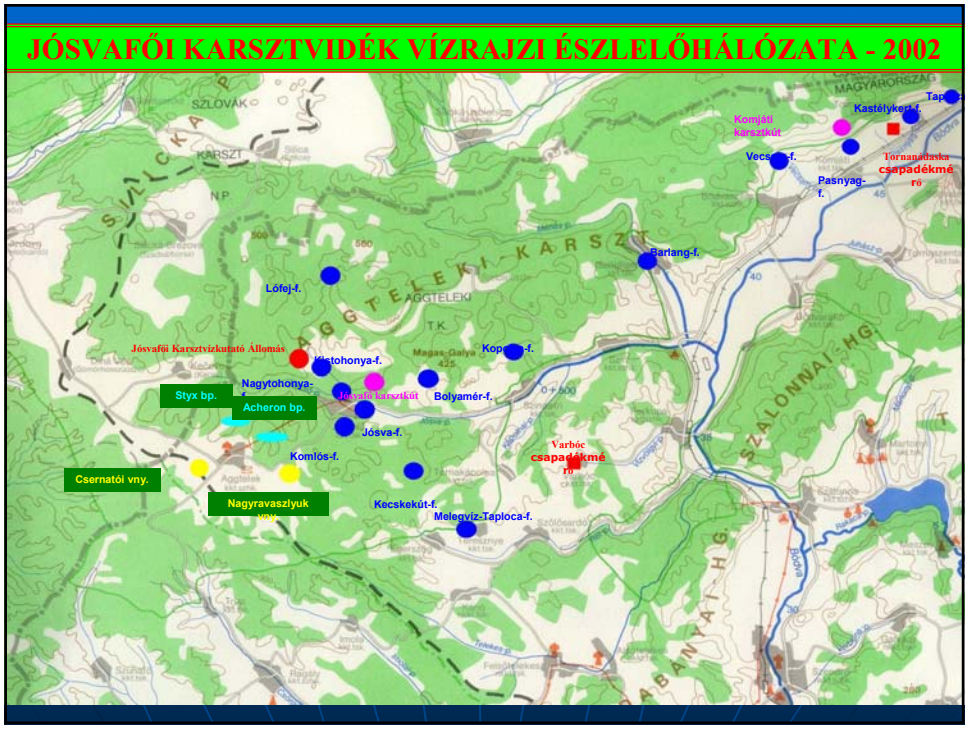
- Guidelines introduction on monitoring of transboundary groundwaters, testing the Guidelines
- Pilot area characterisation as subsurface water body according to the Water Directive of EU
- vulnerability mapping of the Aggtelek-Slovenský kras area applying the "European Method" elaborated by the EU COST 620 Action

Project Organizational Structure

Delineation of Project Area
Development of Maps Background



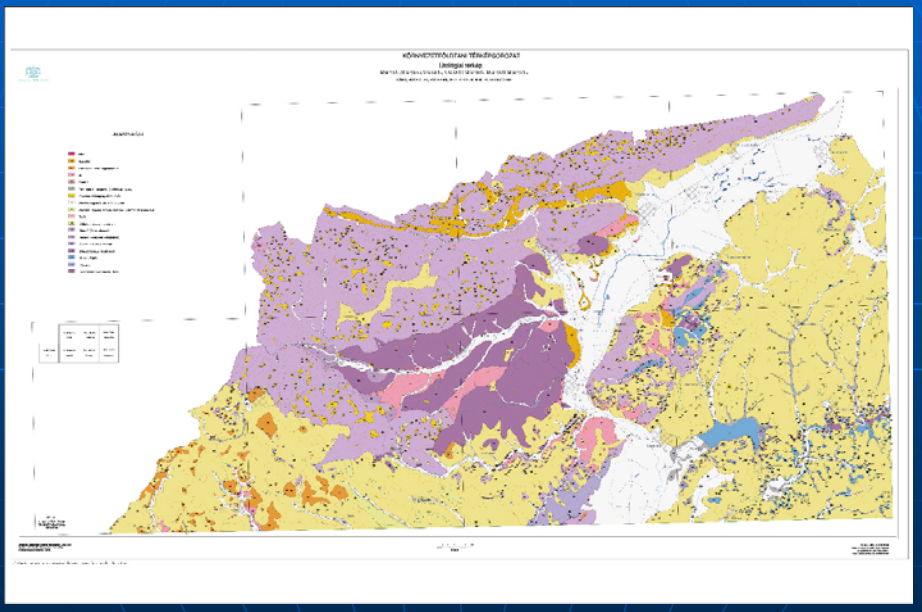
- Test area - violet
- Pilot area - blue



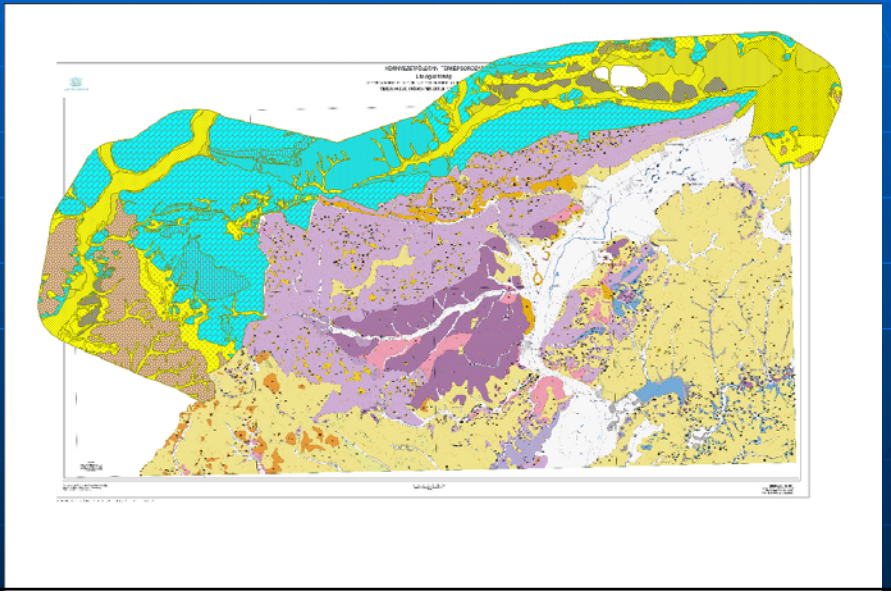
Problems of methodical approach on creating of geological maps (digitalised)

1. **Slovak Geological Survey (ŠGÚDŠ) map:**
   - tectonic units,
   - detailed stratigraphy, especially in Quaternary
2. **Hungarian Geological Survey (MÁFI) map:**
   - detailed Quaternary on the map (karst holes fillings)
   - not differenciated stratigraphy
   - tectonic units not easy to compare
3. **Result:**
   - common lithological map, slightly corrected on state boundaries
   - output in MapInfo / ArcView GIS

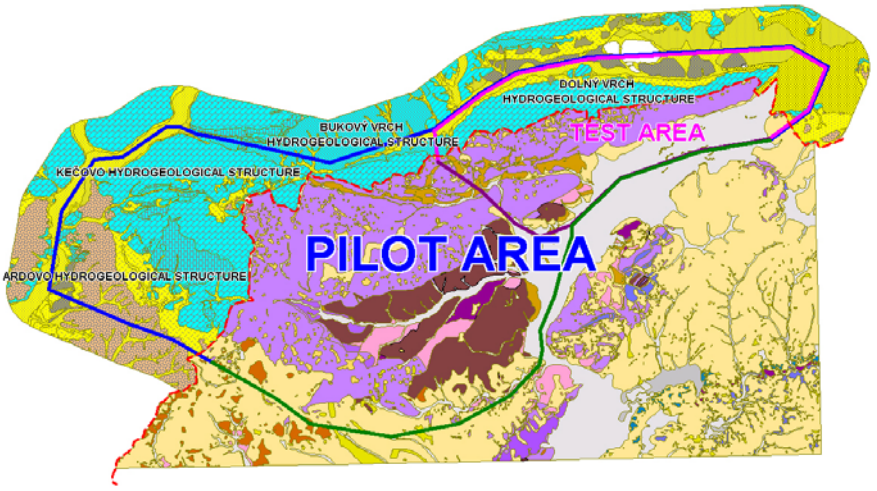
Hungarian geological map



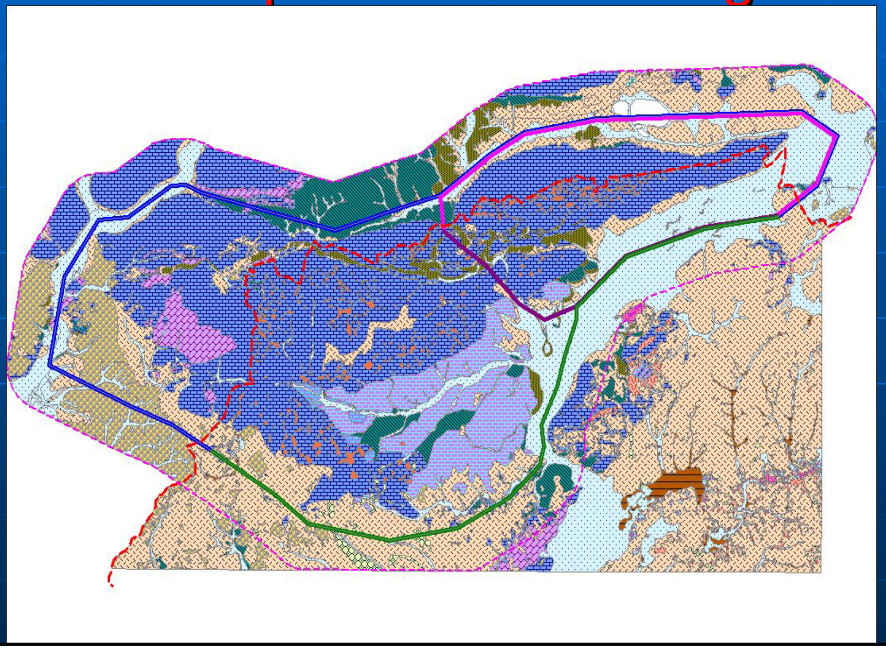
Problems of methodical approach on creating geological maps



Delineation of Project Area



Final map draft with unit legend



History of land protection

- National Park Slovenský kras declared as protected area from 1973 as a NP from 2002
- Aggtelek National Park established 1978 as NP Biosphere Reserve
- 1978 – area declared as prevention zone of UNESCO`s system of Biosphere Reserves

General description

- The most part of area are series of plateaux max. altitude ranges 400–900 m.
- Summit of Plešivecká Plateau reach 851 m, Silica Plateau 679 m.
- The highest elevation - Pipítka (1225m)
- The lowest point 150 m above see level is in the Valley of the Bodva River
- Caves: Baradla/Domica (longest 22 km), Jasov/Jászó, Gombasek/Gombaszők, Béke, deepest are 236m Vecsembukk, 203 Kunia…

Hydrogeology

- **Plešivec - Silická Brezová hydrogeological structure** that occupies southern part of the Plešivecká Planina Plateau and the Triassic karst to south from Silica, ranging from Plešivec on the west up to the Ardovo on the east.
- **Dolný vrch hydrogeological structure** as an eastward continuation of the Plešivec-Silická Brezová hydrogeological structure, separated by the anticlinal elevation of Lower Triassic slates This structure is a northern part of a structure, outcropping also in Hungary
- **Bukový vrch hydrogeological structure**, which is formed only by a smaller outcrop in Slovakia, separated also by Lower Triassic slates from the Plešivec - Silická Brezová hydrogeological structure on the east and Dolný vrch hydrogeological structure on the west
- **Kečovo hydrogeological structure**, defined in space by the line connecting Ardovo, Silica, Silická Brezová, Dlhá Ves and Domica. This structure is only a western part of a larger structure, outcropping mostly in Hungary

Geology

- Limestone complexes of territory have long been considered as autochthonous ones.
- Basement rocks are mainly of Triassic Age. Silica Nappe – comprised of Lower Triassic frustulent sediments, and Middle Upper Triassic dolomites and limestone – including coarse Wetterstein limestone
- Only carbonate sediments were deposite in the Middle Triassic – typical Gutenstein limestone, light grey limestone and dark grey dolomites were formed;
- Jurassic sediments occure in a number of sites in Silica Napp;
- There are also Cretaceous sediments on Jasovská Plateau
- Qaternary sediments – mainly accumulated at the base of plateau slopes, consolidated rock breccias, with calcareous cement mixed with terra-rossa soil, occur in many locations.

Hydrology, Climate

- Hydrology
  - ✓ Characterize by absence of surface runoff
  - ✓ Total infiltration of precipitation through numerous fissures and faulted zones into the karstic carbonate rocks
  - ✓ Water percolates rapidly and is accumulated inside carbonate massif
  - ✓ Karst spring originating from shallow circulation occur at the base of plateau and fluctuate greatly in yield
- Climate
  - ✓ situated in the humid-continental climatic zone
  - ✓ Warmest month July 16 – 20.3 °C
  - ✓ Coldest January -4 - -6 °C
  - ✓ Main annual temperature 5.7 – 9 °C
  - ✓ Mean annual precipitation 630 -990 mm

Function and Uses

Landuse

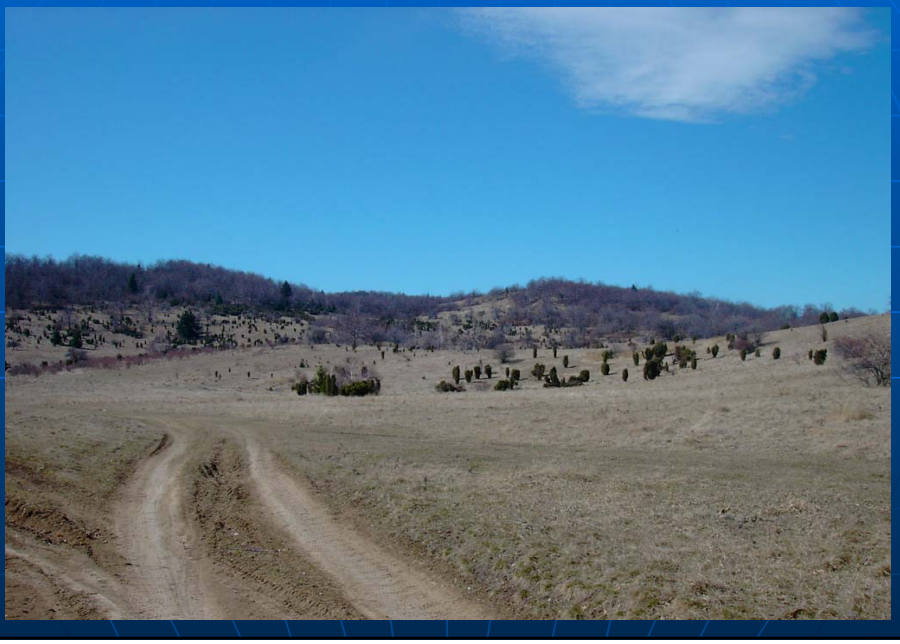
The whole pilot project area lies on the territory of National Parks Aggtelek and Slovenský kras. This is attractive due to its natural beauties, diversity of plants and wildlife. The natural conditions of the landscape determine its use. The pilot project area is agricultural or forested area with villages, without the industry.

Kečovo karren filed

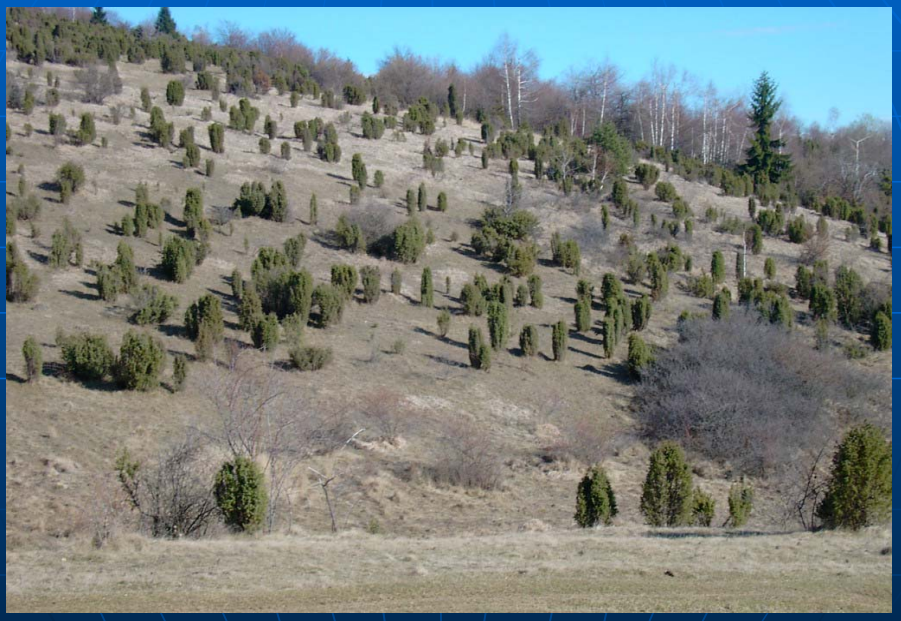
Kečovo meadow

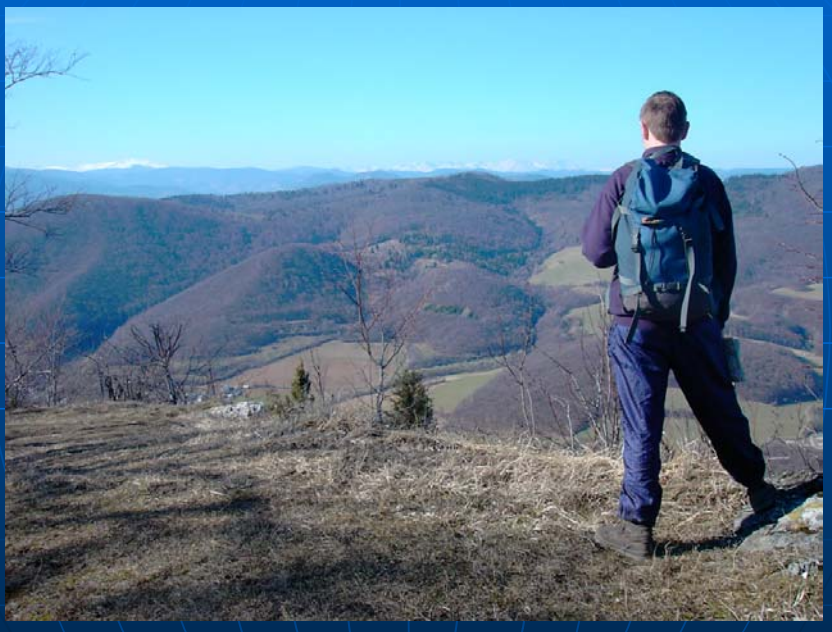
Kečovo meadow

Plešivecká Planina Plateau



Plešivecká Planina Plateau

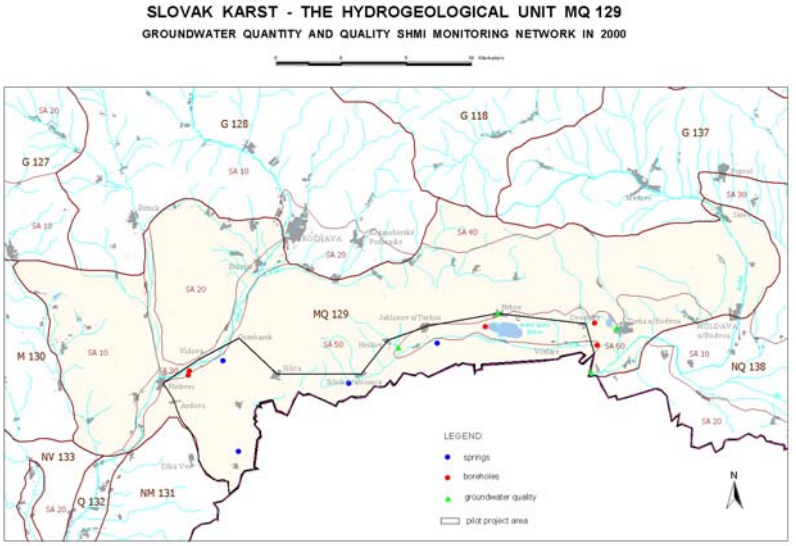




Usable groundwater amount – drinking water

- Silica–Silická Brezová struc.: 11 $l.s^{-1}$
  abstraction (2000) = 0.19 $l.s^{-1}$
- Kečovská structure: 18 $l.s^{-1}$
  abstraction (2000) = 2.65 $l.s^{-1}$
- Bukovský vrch: 8 $l.s^{-1}$
  abstraction (2000) = 0.41 $l.s^{-1}$
- Dolný vrch: 23 $l.s^{-1}$
  abstraction (2000) = 2.57 $l.s^{-1}$

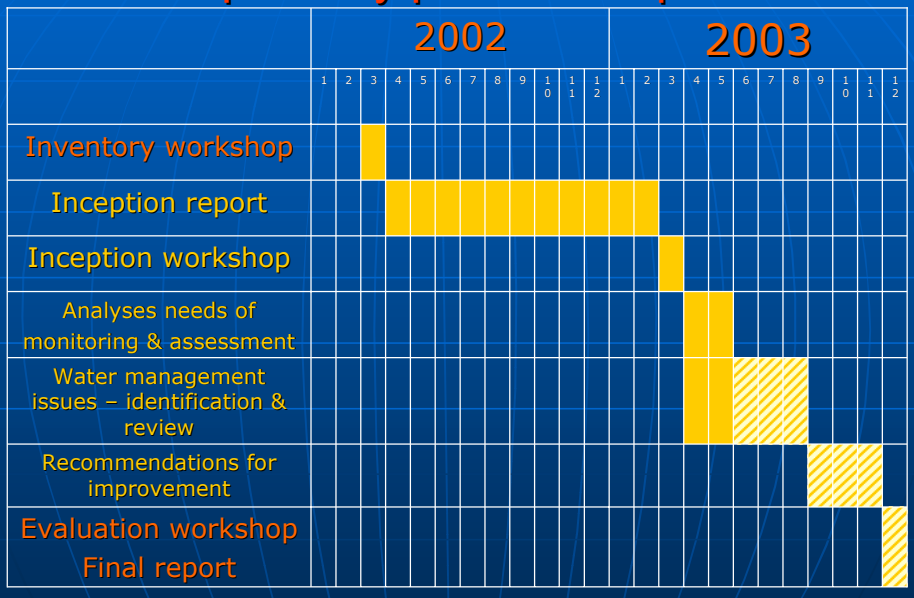
Monitoring practices



International co-operation

- Danube Basin
  - Convention on the Co-operation in the Protection and Use of the Danube River
  - Forum of the Danubian Hydrological Services
- The Bilateral Contacts on Transboundary Waters
  - The Hungarian-Slovakian Joint Committee on Transboundary Waters
  - Hungarian-Slovakian Joint Committee on the Cooperation in Environmental Protection and Nature Conservation
- The Multilateral Co-operation of UN in Water Management
  - Convention on the Protection and Use of Transboundary Rivers and International lakes (Helsinki Convention)
  - International Hydrological Programme of UNESCO
  - World Meteorological Organisation (WMO)
  - The Water Framework Directive of EU
  - EU COST Action 620

Preparatory phase workplan



Project 2

Implementation phase

Anemone

Annex 6: DE-AT thermal groundwater body

Transboundary Groundwater Bodies

German-Austrian-Cooperation in Modelling and Managing a Transboundary Thermal Groundwater Aquifer

Baudirektor K. Roth/Ministerialrat J. Jedlitschka
München, Mai 2003

1 Introduction

The Water Framework Directive (WFD) requires the determination and description of groundwater bodies in the member states of the European Union.

Usually deep groundwater – sometimes more than 1.000 meter deep – is often not taken into account, as it seems to be well protected by nature and in consequence of its depth exploitation normally is low. This is not the case with groundwater used as thermal water.

In the transboundary Lower Bavarian-Upper Austrian molasse basin thermal water is already intensively used for spa purposes and also to gain geothermal energy. The molasse basin forms the aquifer for thermal groundwater resources as a whole unit and is rather independent of the upper groundwater layer. Therefore we decided to identify this groundwater resource as a separate groundwater body, here particularly as a transboundary groundwater body following the WFD. An interesting feature is the large extension of the groundwater body from Lower Bavaria to Upper Austria. This groundwater body is intensively used especially in the region of the state border between Bavaria and Austria.
To ensure a sustainable use of these important groundwater resources, both states decided for a joint approach to protect the deep groundwater aquifer. The first step was the characterisation of the groundwater body with the help of a numeric groundwater model.

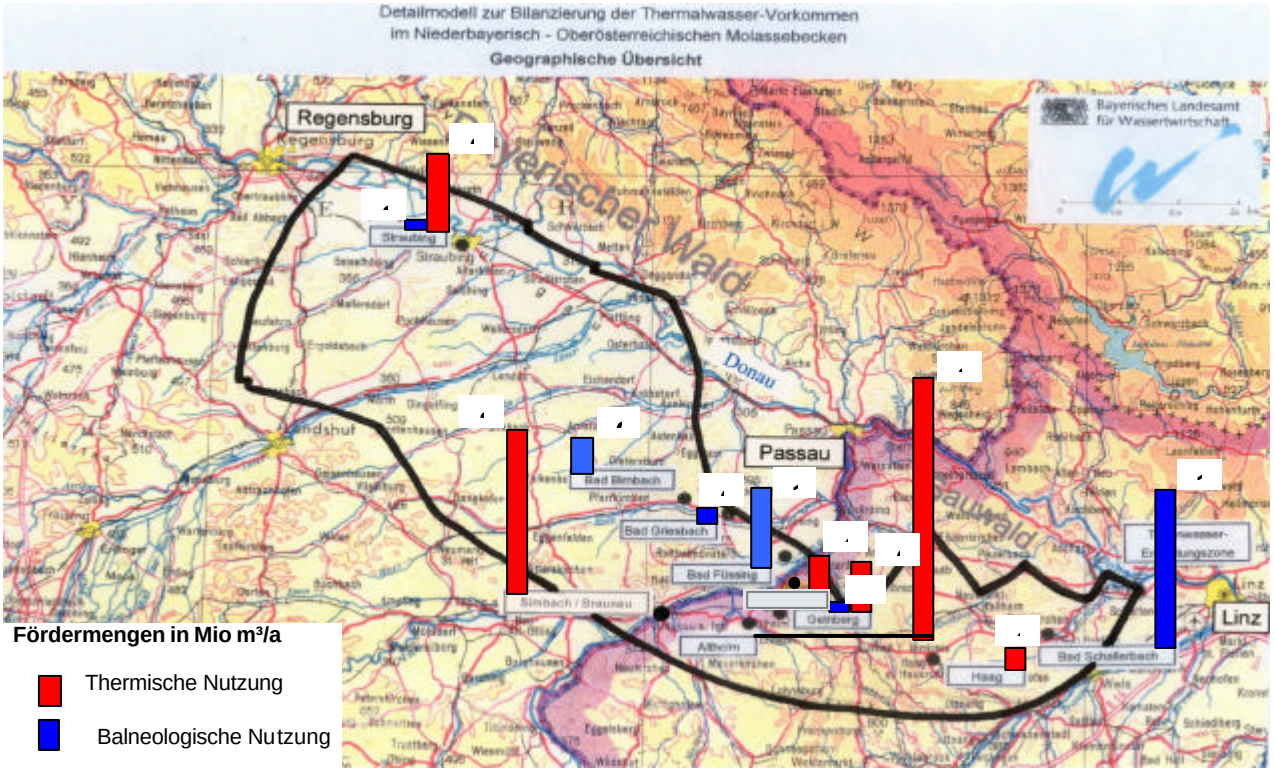
In the following I will present an overview of the further proceeding:

2 Characterisation of the groundwater body

The thermal water of the malmkarst (Upper Jurassic) in the Lower Bavarian and Upper Austrian Molasse Basin is used for spa purposes and in order to gain geothermal energy. The thermal-water use in Bad Füssing, Bad Birnbach and Bad Griesbach in the German region and

Geinberg and others in the neighbouring Austrian region, is today of increasing economical importance; this can be seen by the high number of overnight stays with a high increase during the last years.

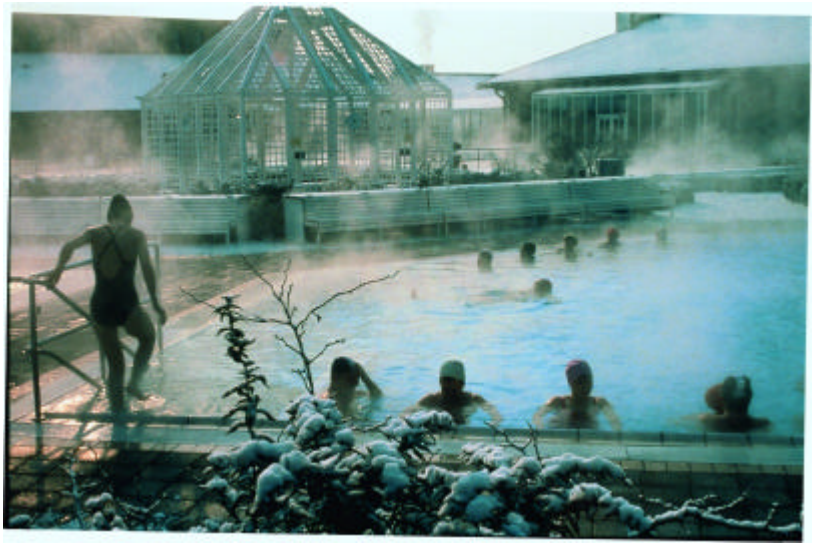
The following figure 1 gives you a survey to the model area – similar to the ground water body - with the main thermal water uses in this area.

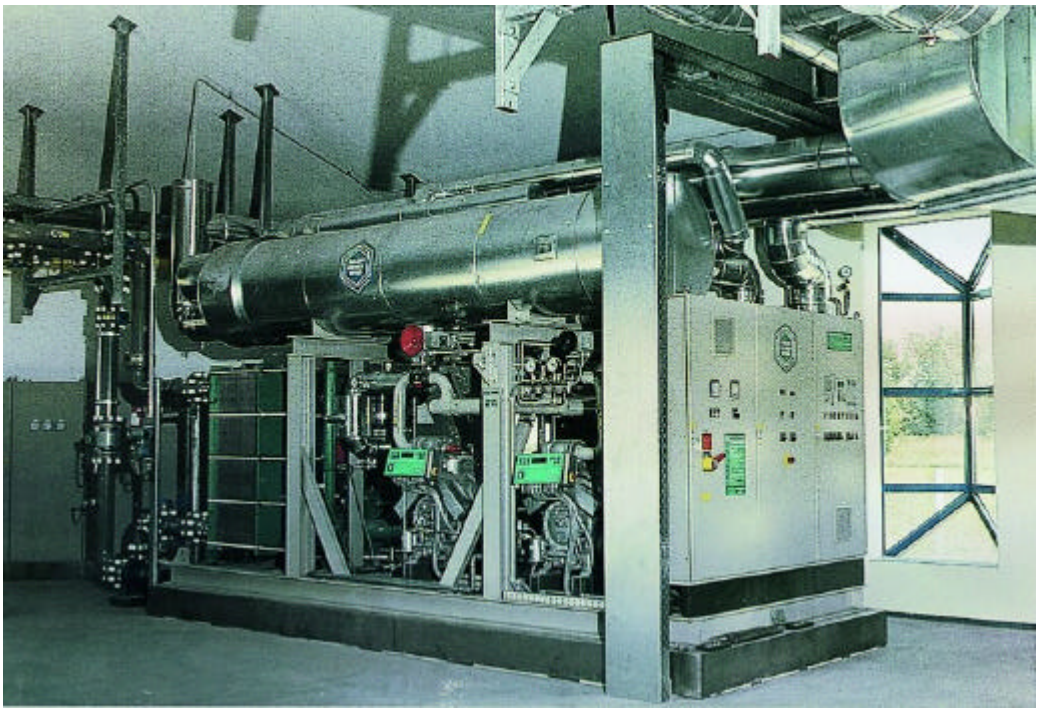


The following pictures show spas in Germany and Austria.

This picture shows a typical scene of thermal water use in a spa.
The main use for spa purposes is in

-Bad Füssing
-Bad Birnbach
-Bad Griesbach
-Bad Schallerbach
-Geinberg





This picture shows part of a geo-thermal plant.
The main use for geothermal energy is in:
-Straubing
-Simbach / Braunau
-Altheim

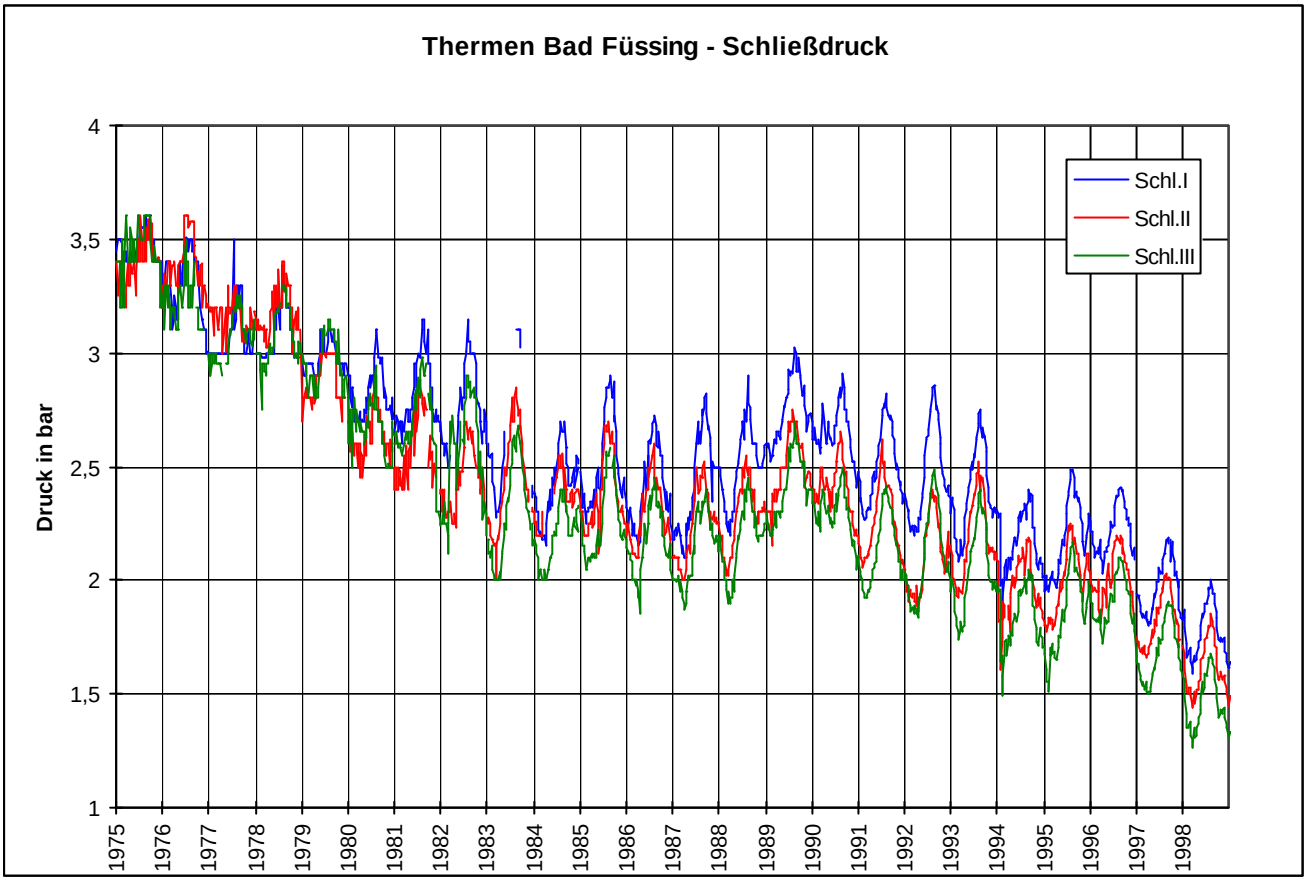


Figure 2: Decreasing closing pressure in Bad Füssing

The decreasing closing pressure of the thermal water wells in Bad Füssing was a sign that this groundwater body might be "at risk" in the sense of the WFD.

The fear that there was an overuse caused by the abstraction of thermal water out of the karstic malm limestones was already confirmed by a previous research project "Hydrogeothermal Energy Balance and Groundwater Resources of the Malmkarst in the large South German Molasse Basin" (1984 – 1989). The result of this project study was, that the natural discharge of thermal water might only be 1.5 m^3/s in the whole area.

Due to the increasing thermal water abstractions in Bavaria and Austria a new more detailed groundwater balance for the German – Austrian part of the whole large South German Molasse Basin was necessary. This was done with the help of a sophisticated groundwater model.

3 Regensburger Vertrag

Since 1987 there exists an international agreement called “Regensburger Vertrag” for border – crossing water management questions between Germany and Austria. The Regensburger Vertrag rules the water management cooperation in the catchment area of the Danube.
The „Ständige Gewässerkommission“ is the highest organ
Under this Commission there are two working groups

- Water quality protection
- Water quantity management

The working group „water quantity management“ installed an ad hoc expert group Tiefenwasser (deep groundwater) to handle common questions of deep aquifers.
This expert-group had to supervise the elaboration of the model with the objective of a better knowledge of the groundwater.

Regensburger Vertrag

International agreement from 1st December 1987
Between

- Germany
- Austria and the
- European Union

concerning the water management cooperation in the catchment area of the Danube

Organisation:

- **Ständige Gewässerkommission**
  (9 members from the BRD + EG,
  6 members from Austria)
  There are 2 expert groups installed:
- **Sachverständigen-Arbeitsgruppe „Gewässerschutz“**
- **Sachverständigen-Arbeitsgruppe**
  „Wassermengenwirtschaft, Wasserbau“
  On its suggestion the
- **ad-hoc-Expertengruppe „Tiefenwasser“**
  was installed and instructed to supervise the elaboration of the ground-water model.

Figure 3: “Regensburger Vertrag”

4 Ground Water Model

The groundwater model was necessary to characterise the groundwater body. But this model should also be a relevant instrument for the German and the Austrian authorities to evaluate the required water abstractions and the potential yield under consideration of other existing wells on a reliable basis when licensing thermal water abstractions. Taking particularly into account the required groundwater abstractions in this area, forecasts were necessary for the future thermal ground-water management as well as an exact identification and description of the existing thermal - water use.

The ground-water balance of the study area is presented in figure 4 and extends from Regensburg and Landshut in the north to Linz in the south. It is only a part of the South German Molasse Basin. The river Danube accompanies the eastern border for long distances. With a total area of 5900 km^2 the length is 150 km and the width is 55 km.

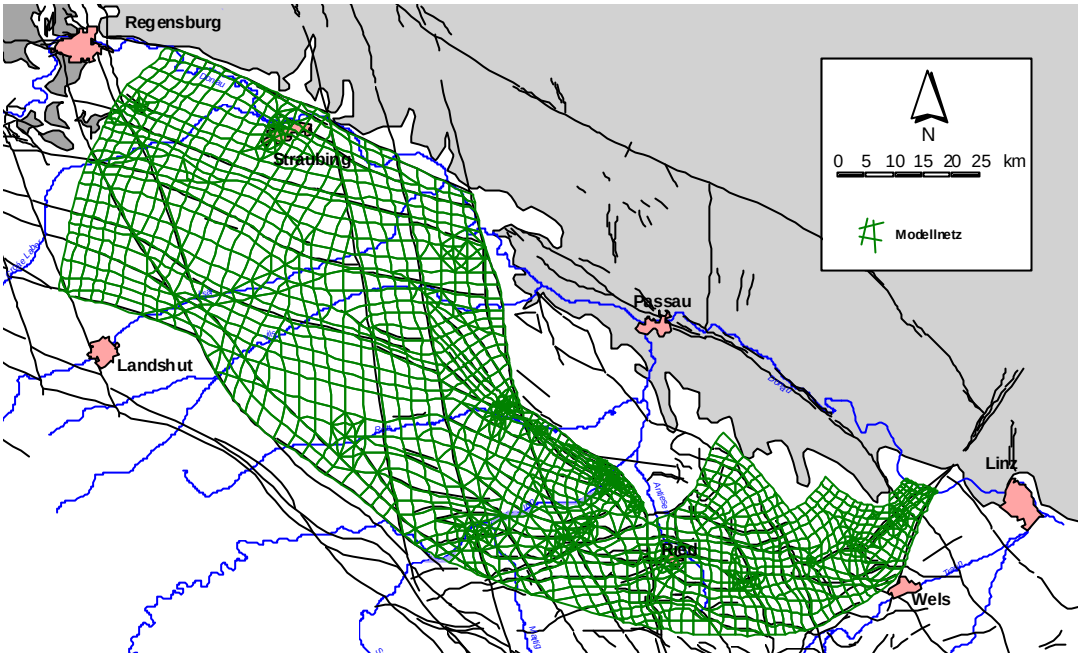


Figure 4: Survey of the water-balance area

The thermal water flows within the carbonate Malm aquifer. The Malm (Upper Jurassic) crops up near Regensburg and dips towards the south as shown in figure 5. Near the river Inn the top of the Malm reaches a depth of about 2000 m below sea level. From the Inn to the east the ascending to the river Danube west of Linz, is cut by important tectonic structures.

The following longitudinal section shows the aquifer level descending from the northwest to the southeast.

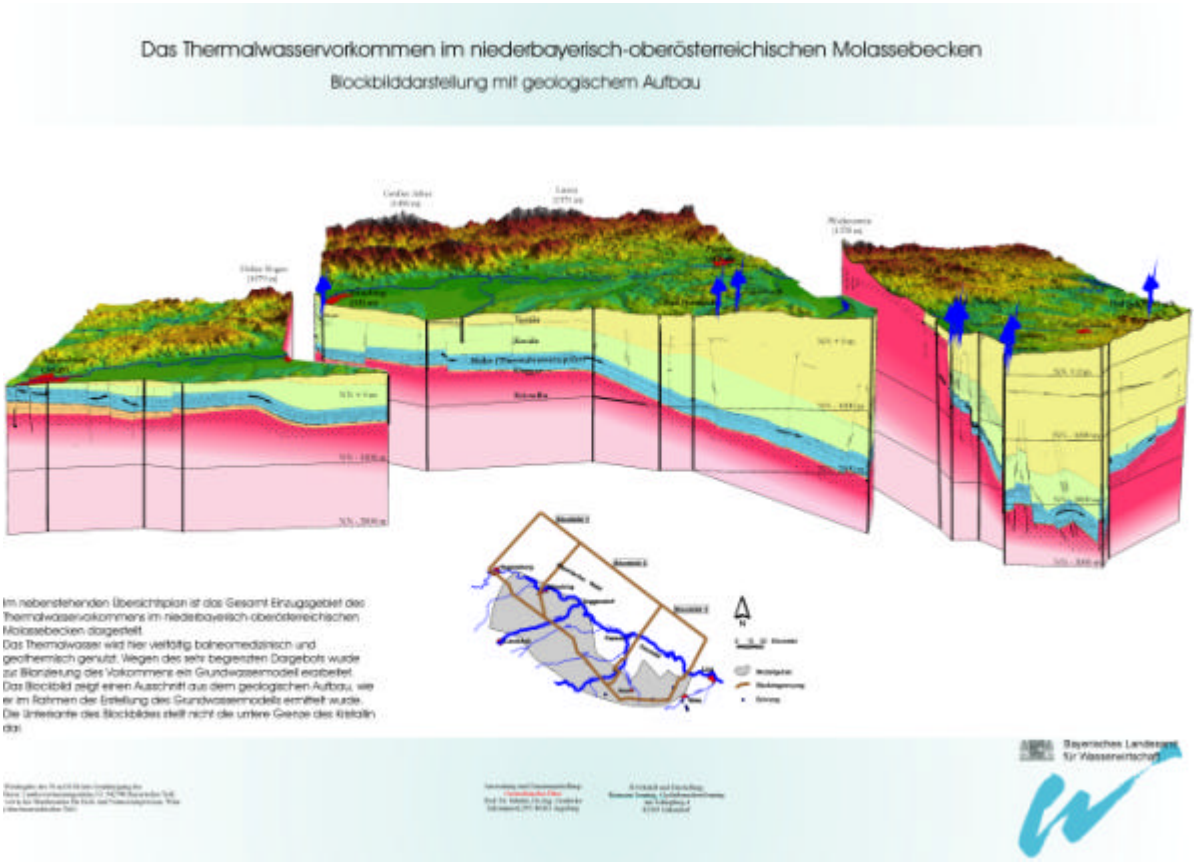


Figure 5: 3D picture – longitudinal section

The model of the thermal-water aquifer was developed in German-Austrian cooperation in the years 1995 to 1998 with the help of a consultant.

The model allows the simulation of different water abstraction– and reinjection configurations.

The main results are the following:

— Up to now an overuse of the thermal-water aquifer cannot be observed.
— Effects of future uses can be forecasted with a sufficient reliability.
— A total reinjection of hydrogeothermally used deep water is mandatory.
— The deep water with high salinity in the southern boundary area of the model can be mobilised.
— The pressure conditions should be held stable as much as possible.

The ground-water model is a reliable instrument for the German and the Austrian authorities to judge the required water abstractions. It allows

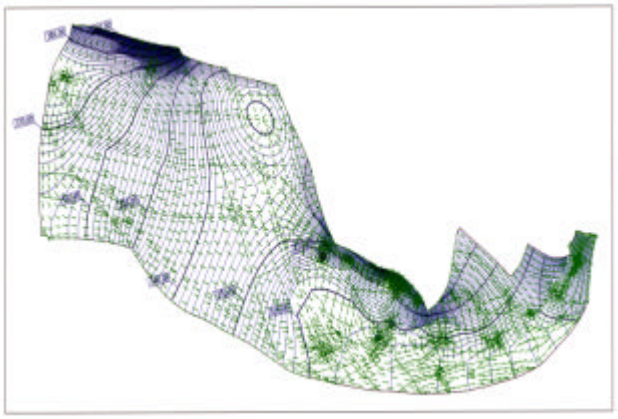
– to balance the ground-water resources in the Lower Bavarian - Upper Austrian Molasse-Basin
– a sufficient quantification of the ground-water recharge and
– a quantification of possible effects on existing neighbouring wells.

The results of the studies carried out show clearly that a further use of the thermal water resources will be only possible if the thermal water is used rationally and the existing hydrostatic conditions will in general be preserved.

5 Keynote Papers

In order to be able to manage the thermal water resources in both countries in a sustainable way and according to the best available technology, the ad hoc expert group worked out keynote papers where joint protection and utilisation strategies are laid down.

Grundsatzpapiere zur Thermalwassernutzung im niederbayerisch–oberösterreichischen Molassebecken



Ad hoc Expertengruppe „Tiefenwasser“

im Auftrag

der Ständigen Gewässerkommission nach dem Regensburger Vertrag

März 2002

The commonly elaborated keynote papers cover the following issues:

- Thermal Water Management principles.
- Dimensioning of installations for thermal water use in spas
  The determined limitations of water abstractions are obligatory for both sides (Austria and Germany) in order to protect the thermal water resources in a sustainable way against overuse.
- Principles concerning the application, maintenance and further development of the mathematical groundwater model
  - the procedure of the application of the model had to be fixed exactly
- Standardized application forms for abstraction licences
  - to ensure for both countries a standard procedure
- Catalogue of requirements
  - in order to ensure that uniform principles are applied when constructing and operating the installations and, in particular, when collecting and documenting data.
- Exchange of relevant information and data
  - an efficient management of the thermal groundwater resources is only possible, if both sides have the same status and level of information at any given time

Figure 6: Keynote Paper

6 Conclusions

The success of the ground-water model and the good results of the expert group work have finally shown, that the common efforts on both sides – German and Austrian – were worthwhile.

The most important results are the excellent cooperation and the exchange of information between the Bavarian and Austrian authorities and the gained knowledge that reinjection of thermal water for geothermal use is mandatory in order to avoid a decreasing closing pressure of the thermal water wells in the spas.

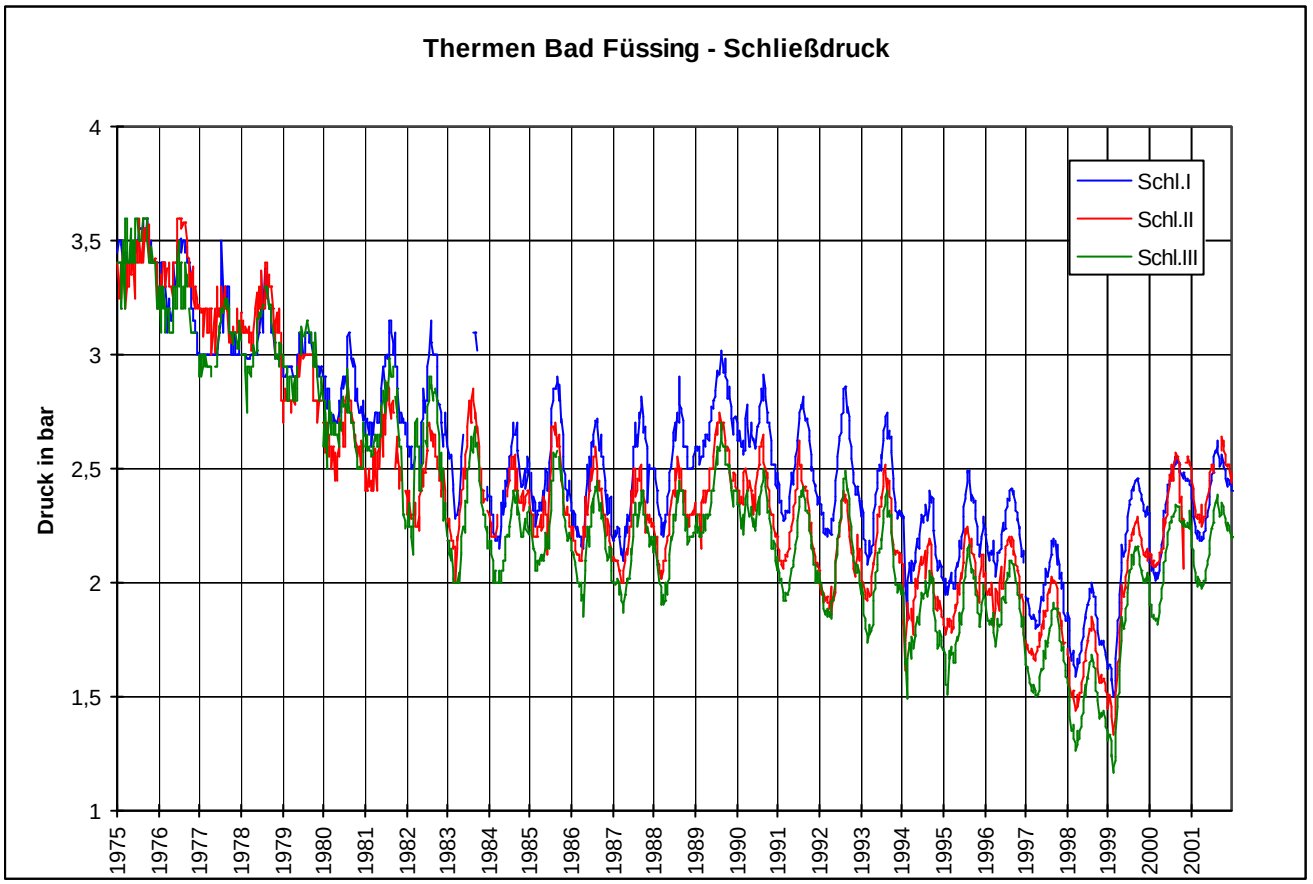


Figure 7: Increasing closing pressure in Bad Füssing since 1999

Finally the last figure shows that since 1999 the closing pressure is again increasing in this transboundary groundwater body.

We thus anticipated the WFD. Before 1995 we found that the groundwater body was "at risk" and after investigating the reasons we could start with remediation measures – in this case with limited rational water abstractions and reinjection into the deep groundwater aquifer (sustainability!). The groundwater body formerly at risk will probably be in good status in 2015.

Annex 7: How to deal with contaminated sites

HOW TO DEAL WITH CONTAMINATED SITES

PRESSURE AND IMPACT ANALYSIS

Dietmar MÜLLER

Outline of the Presentation

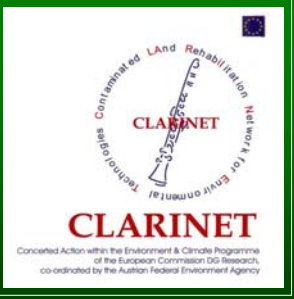
- National Groundwater Protection Strategies
- WFD and GWD
- Proposals by the Common Forum on Contaminated Land
- Case study - Austria

2nd Groundwater WS - Danube River Basin, May 12th 2003

GROUNDWATER POLLUTION BY POINT SOURCES

NATIONAL STRATEGIES

www.clarinet.at



Groundwater Protection National Strategies (1)

- All European countries had specific policies and laws to protect water resources before the WFD
- Strategic importance of groundwater for water supply varies strongly within Europe as well as within individual countries (in relation to the geographical distribution of aquifers)
- Therefore the importance of groundwater in local decision-making also varies considerably

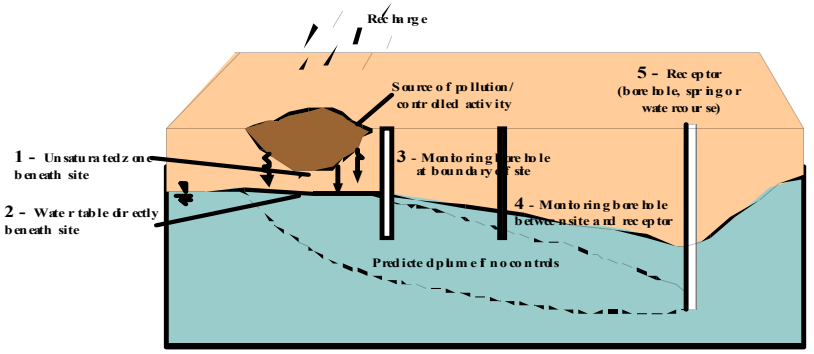
Groundwater Protection National Strategies (2)

- Most countries distinguish between higher levels of protection needed in relation to abstractions as opposed to groundwater resources in general, but
- Some countries have adopted a principal precautionary approach towards groundwater (e.g. Germany, Austria) while others build on site specific risk assessment (e.g. UK, Netherlands) within a certain framework

Groundwater Protection National Strategies (3)

- Principles of approaches in European countries:
  - definition of the sustainability of the resources
  - prevention of new pollution
  - remediation of past pollution where necessary

Groundwater Protection
Point of Compliance



Groundwater Protection - Point Sources
National Strategies (4)

- Point of compliance for groundwater protection in relation to new activities:
  - At surface of soil (Denmark, France, Ireland, Switzerland, Germany [only waste disposal]
  - At monitoring borehole at or near boundary of site (Italy, with some exceptions)
  - At water table for List I subst. where gw is strategic resource otherwise site-specific (UK)
  - No specific rule (Norway)

Groundwater Protection - Point Sources National Strategies (5)

Point of compliance for groundwater protection in relation to historical activities:

- Germany: PoC depends on situation:
  - Usually at water table immediately below site or a monitoring borehole at or near boundary of site
  - Exceptionally borehole between site and receptor
- United Kingdom: PoC varies with the importance of the groundwater:
  - strategic drinking water source - gw at or near site
  - non-strategic but locally important - point of abstraction
  - Gw in continuity with surface water - the surface water

Groundwater Protection - Point Sources National Strategies (5-2)

Point of compliance for groundwater protection in relation to historical activities:

- Denmark: Target is the groundwater resource itself. Assessment in a stepwise approach:
  - At step 1 PoC is immediately below the site;
  - At step 2&3 PoC at a distance equal to 1-year‘s groundwater-travel, up to max. 100m down-gradient.

GROUNDWATER POLLUTION BY POINT SOURCES

WFD & GWD

Groundwater Directive (EC 80/68)

focus on 'point sources'

- direct and indirect discharges
- prevent (list 1 substances)
- limit - (list 2 substances)
- authorisations

does not consider pollution on historical point sources

Water Framework Directive
Regional Groundwater Management

NO DETERIORATION CLAUSE

- Art. 4 (b) 'MS shall implement measures necessary ...'
  - (i) to prevent the deterioration of status of all bodies of groundwater
  - (ii) to reverse any significant and sustained upward trend in the concentrations ... Resulting from human activity
- ANNEX V 2.4.4: 'The calculation of trends shall be undertaken for a body / group of bodies of gw ...'

WFD & Groundwater Daughter Directive
Regional Groundwater Management

THESIS:

- Regional Water Management Approaches put a focus on diffuse sources and may neglect point sources or may cause unreasonable efforts and measures on reporting and monitoring (e.g. reporting of millions of point sources)
- In particular pollution of groundwater by old ('historical') point sources will cause major problems not to achieve a 'good status' of groundwater bodies

GROUNDWATER POLLUTION BY POINT SOURCES

PROPOSALS

COMMON FORUM ON CONTAMINATED LAND

WFD Art. 17 Drafting Process

EXPERT ADVISORY FORUM

- 5 Drafting groups (January to March 2002)
  - unpolluted groundwater bodies - definition of a 'high status'
  - polluted groundwater bodies - diffuse pollution
  - polluted groundwater bodies - point source pollution
  - surface water - groundwater interaction
  - statistical tool

COMMON FORUM ON CONTAMINATED LAND

- GWD - Supporting Task Force (since May 2002)

Water Framework Directive
FRC

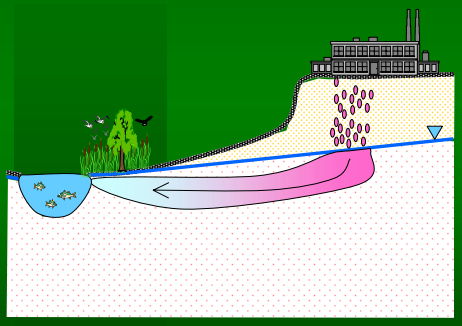
PRESSURES

- contaminated sites (historical)
- ongoing commercial and industrial activities
- how to define inventories & reporting duties?

IMPACTS

- point sources cause long & small plumes - do not affect a groundwater body (three-dimensional)
- diversity of point sources and as a consequence of pollutants
- Historical pollution & 'good status' by 2015: Often neither technically nor economically feasible

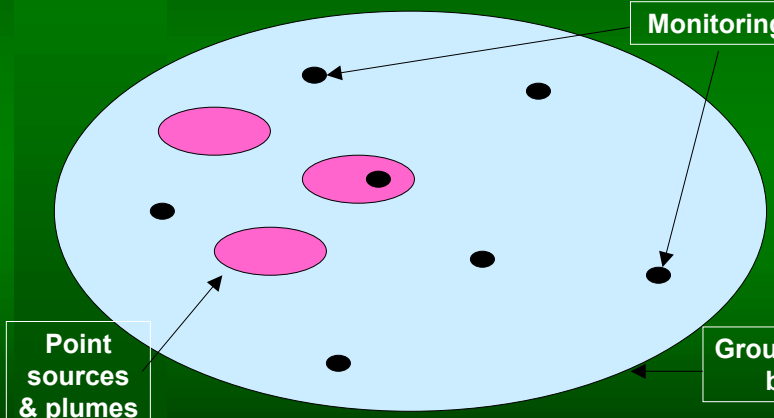
WFD
Definition of point sources



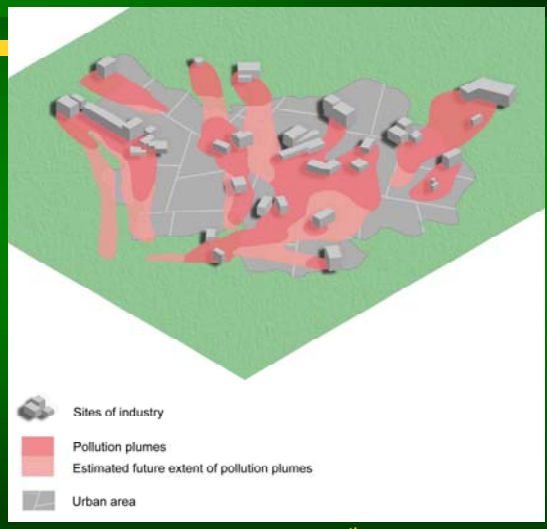
Point source:

An identifiable and localised area, structure or facility which can cause pollution of groundwater
(e. g. contaminated sites)

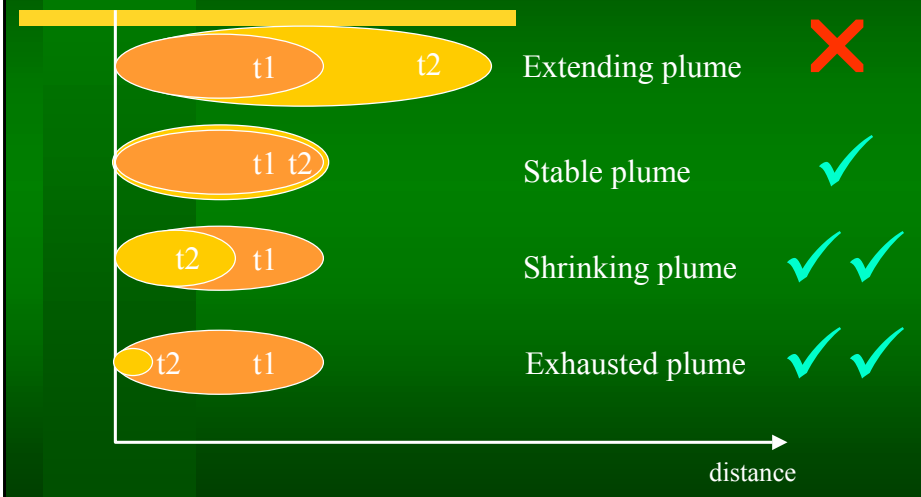
Groundwater Protection
Point Source Pollution



Groundwater Protection
Risk Zones



Plume behaviour



Based on Weidemeier et al, 1999

GWD - Concept
Strategies for Point Sources

Tiered approach (subsidiarity)

- Assessment of point sources: application of common strategies by the Member States
  - **inventorisation of point sources**
  - **concept for prevention of contamination**
  - **assessment strategy for point sources**

GWD - Concept
‘risk (management) zones’

EU-Level:

- define ‘risk-zones’ (e.g. land-use, impacts)
- implement monitoring and reporting system
- develop common assessment strategy
- derive measures and consult on RBDMP

POINT SOURCES
Management concepts

KEY PRINCIPLES - common for point sources & ‘risk (management) zones’:

- distinction between historical and new contamination
- new contamination - prevent & limit
- historical contamination: risk based & site specific
- BATNEEC
- no upward trend = don’t accept extending plumes (extension means an upward trend)

Contaminated Sites & 'Risk Zones'
(historical point sources)
Management Framework

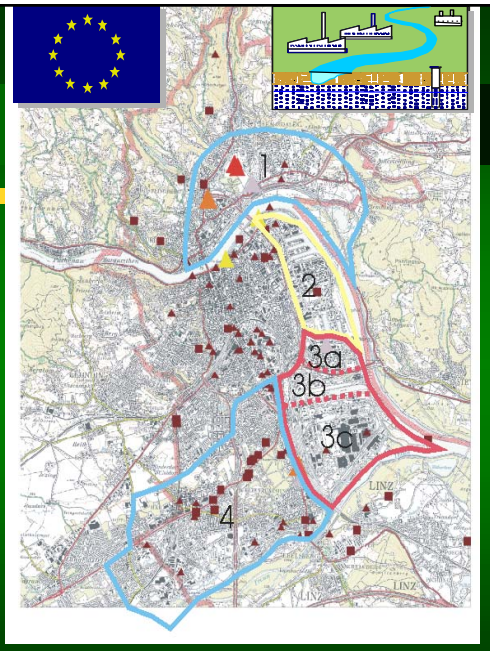
Tier 1: Pressures	Inventories	**Relevant sources, contaminants and distribution ?**
Tier 2: Impacts	Monitoring	**Are impacts evident ?**
Tier 3: Risk Zones	Plume assessment & source identification	**Intensity of pollution, extent and state of the plume ?**
Tier 4: Restoration	Risk management	**Remediate sources & stop migration of plumes**

GROUNDWATER POLLUTION BY POINT SOURCES

CASE STUDY - AUSTRIA

INCORE

INtegrated **CO**ncept for Groundwater **RE**mediation



PROJECT AREA

LINZ (Upper Austria)

INCORE
LINZ - AUSTRIA

- **inventories**
  - **point sources (historical)**
  - **land use**
  - **boreholes and wells**
- **pressure analysis**
  - **evaluation of available groundwater quality data**
  - **groundwater sampling**
- **impact analysis (identified impacts and trends)**
  - **identification of relevant point sources**
  - **delineation 'risk zones'**

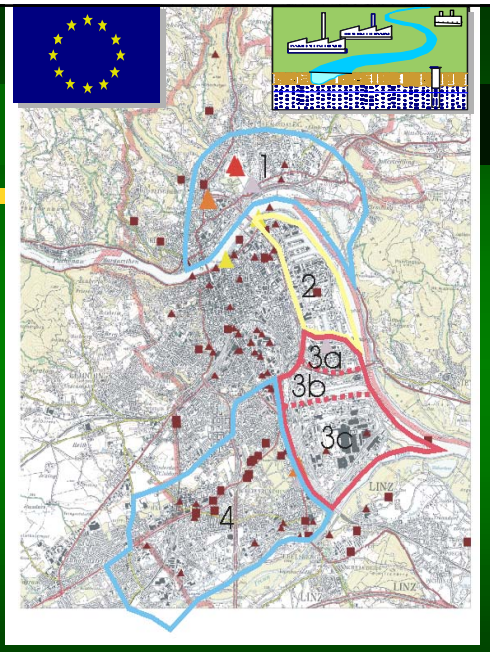
INCORE

LINZ - AUSTRIA

- investigation of 'risk zones'
  - plume assessment - e.g. by integrated pumping tests
  - source identification - define relevant sources
- risk management & restoration
  - remediation of sources
  - revise or stop the migration of plumes
  - (protect water uses and ecosystems)

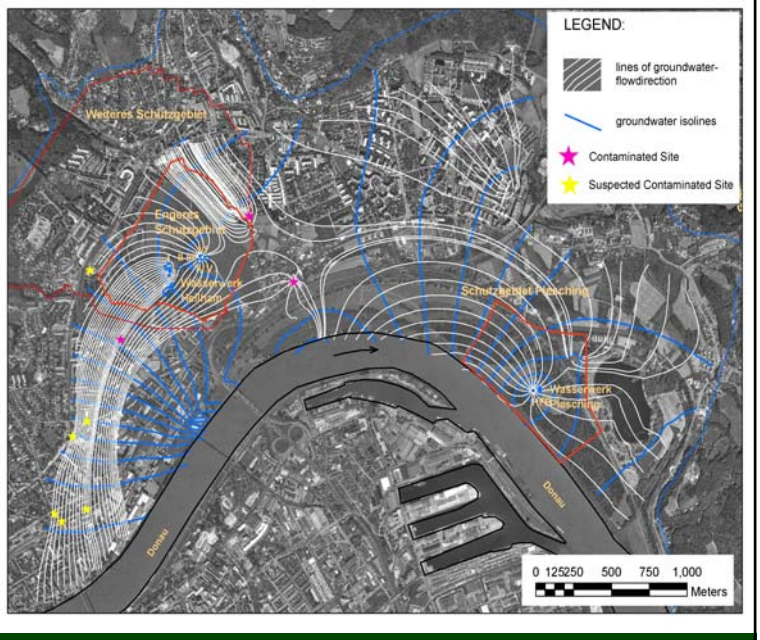
INCORE

INtegrated **CO**ncept for Groundwater **RE**mediation



PROJECT AREA

LINZ (Upper Austria)

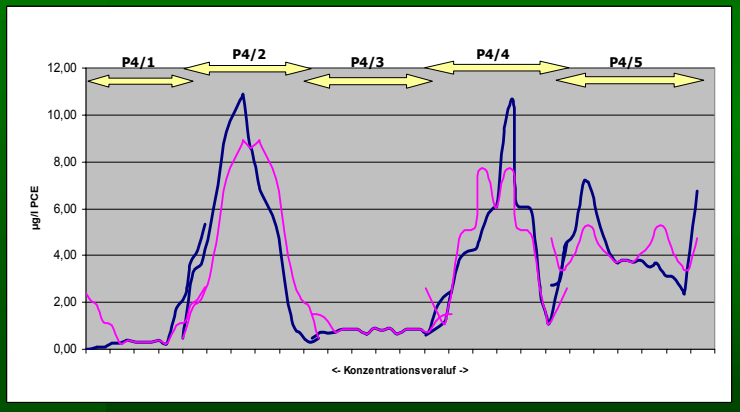


Integrated Pumping Tests

Results

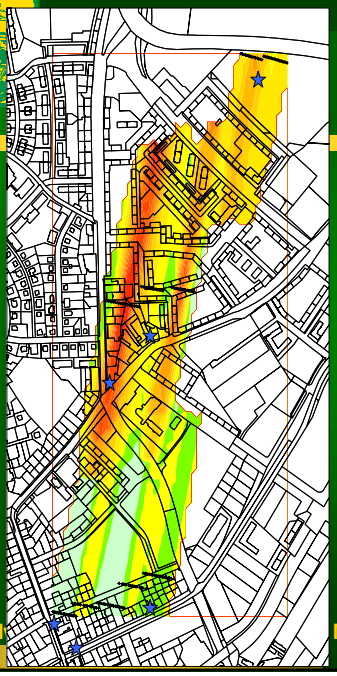
IPT - mathematical analysis

cross-section 3: Blütenstraße



Calculation of Pollutant Mass Flux

Control Plane 1	**BR I**				
mean concentration [µg/l]	10,00				
max concentration [µg/l]	11,90				
mass flow rate	22,46				
Control Plane 2	**P2-1**	**P2-2**			
mean concentration [µg/l]	19,90	11,30			
max concentration [µg/l]	51,70	54,30			
symmetrical mass flow rate [g/d]	6,10	2,10			
left mass flow rate [g/d]	5,59	1,97			
right mass flow rate [g/d]	6,15	3,13			
Control Plane 3	**P3-1**	**P3-2**	**P3-3**		
mean concentration [µg/l]	35,20	11,82	27,60		
max concentration [µg/l]	118,00	33,20	98,70		
symmetrical mass flow rate [g/d]	5,77	0,70	9,56		
left mass flow rate [g/d]	5,66	0,69	8,75		
right mass flow rate [g/d]	5,63	0,73	10,60		
Control Plane 4	**P4-1**	**P4-2**	**P4-3**	**P4-4**	**P4-5**
mean concentration [µg/l]	0,87	5,73	1,04	4,51	4,20
max concentration [µg/l]	3,20	23,00	9,75	19,80	27,90
symmetrical mass flow rate [g/d]	0,09	1,18	0,23	0,80	1,23
left mass flow rate [g/d]	0,13	0,93	0,13	1,83	1,22
right mass flow rate [g/d]	0,07	1,53	0,32	0,71	1,27



Analytical Interpretation

HOW TO DEAL WITH CONTAMINATED SITES

PRESSURE AND IMPACT ANALYSIS

THANK YOU !

Annex 8: Austria – country presentation

River Basin Management Plan Danube Groundwater - Austrian way forward

Federal Ministry for Agriculture and Forestry,
Environment and Water Management

Harald Marent
harald.marent@bmlfuw.gv.at

River Basin Management Plan - Danube

Structure of Presentation:

- Available Information
- How to assess risk of failing good status?
- Contents Roof report (Part A)
- Contents National share of Danube catchment (Part B) - Pilot project

Available Information

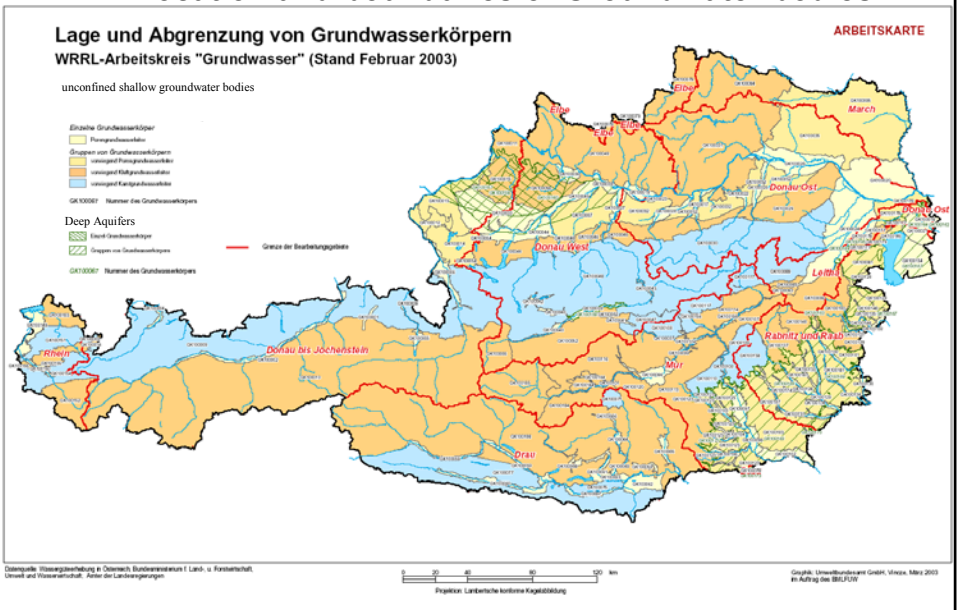
- General Information (settlements, traffic lines, waters, political and administrative borders)
- dense national monitoring network (quantity: 4740 sites for aquifers and 89 for springs + quality: 1781 sites monitoring GW quality, 237 springs; up to 100 parameter, 4 times /year
- Hydrochemical and Hydrogeological maps, Soil maps ...
- Land use (CORINE land cover, Statistics on agriculture ...)
- further Driving forces/pressures: (density of population, of Life stock units per hectare ...)
- Point sources (old landfills, settlements without UWWPP ...)

Main problems:

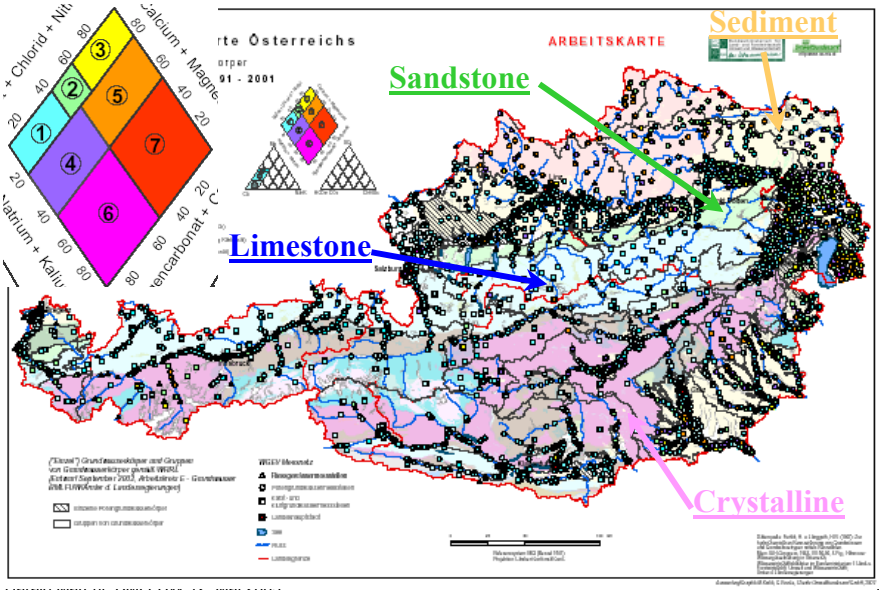
a) Driving forces well known, Loads into Groundwater not known

b) Compilation of multitude of existing info in Conclusive Results

Location and boundaries of Groundwater bodies



Hydrochemistry Map of Austria



Assessment of risk of failing good chemical status (1)

Basis: - Results of the dense national monitoring network

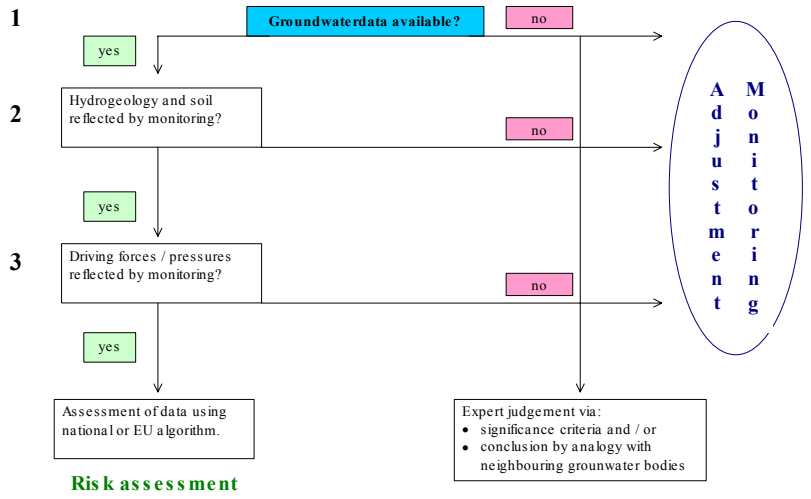
Objective: - assessment of risk yes/no and
- check/redesign of monitoring network

steps:1) Are monitoring data available in sufficient quantity + quality?
2) Does monitoring network reflect Hydrogeology and soil conditions?
3) Does the monitoring network reflect driving forces and pressures?

→ Scale 1:500.000 is not appropriate; more detailed background info is necessary

→ Basic Principle: “Make Best Use of Already Existing Data”

Assessment of risk of failing good chemical status (2)



River Basin Management Plan Danube Groundwater

Roof Report (Part A) - Scale 1:4,5 Mio:

Goal: to provide overview, respectively objectives and problems of Basin wide relevance

→ Groundwater do not meet these criteria

→ Therefore the almost we can imagine would be to point out in the Roof report transboundary groundwater bodies which may need bilateral co-operation!

River Basin Management Plan Danube Groundwater

Report Part B - Scale 1:500.000:

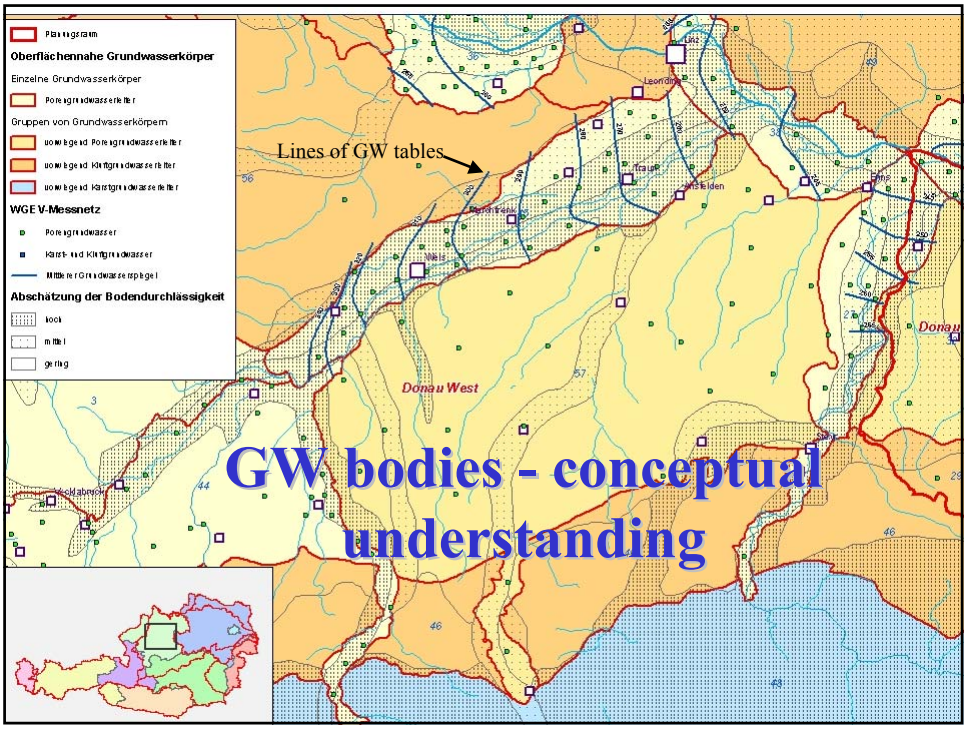
Pilot Project under way:

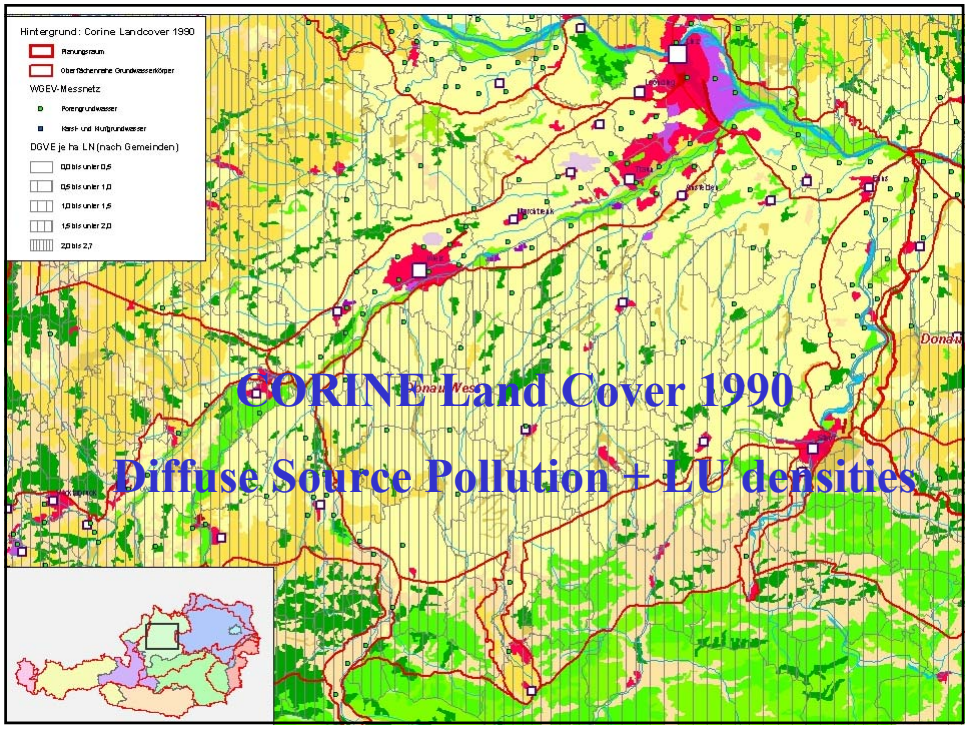
Objective: to look for best and conclusive way of presentation out whether a groundwater body is at risk or not

2 levels are checked

Level of the Report Part B - Scale 1:500.000

Level of background Information (per Groundwater body): Scale 1:50.000 - 1 : 200.000 - see enclosed maps




Hintergrund: Corine Landcover 1990
Planungsraum
Oberflächennahe Grundwasserkörper
WGEV-Messnetz
Porengrundwasser
Karst- und Kluftgrundwasser
DGVE je ha LN (nach Gemeinden)
0,0 bis unter 0,5
0,5 bis unter 1,0
1,0 bis unter 1,5
1,5 bis unter 2,0
2,0 bis 2,7
CORINE Land Cover 1990
Diffuse Source Pollution + LU densities

Annex 9: Bosnia in Herzegovina – country presentation

2nd Groundwater Workshop on the Implementation of WFD in the DRB

May 12-13, 2003 in Budapest, Hungary

Progress with the implementation of the WFD - with main emphasis on transboundary GW-bodies

BOSNIA AND HERZEGOVINA

Presentation by Aleksandar Trifkovic

Progress with the implementation of the WFD - with main emphasis on transboundary GW-bodies

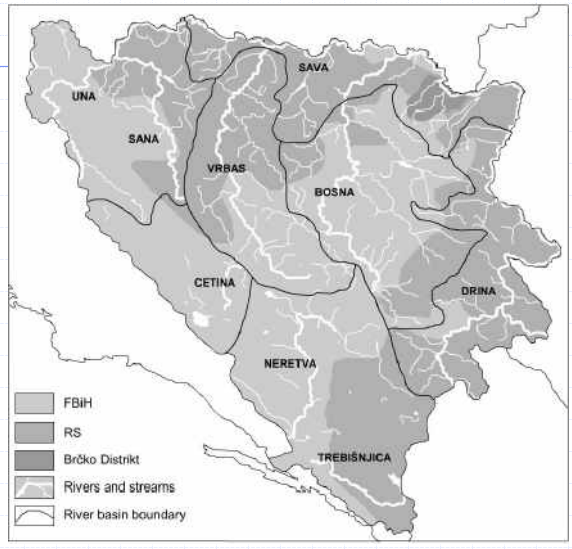
General overview of Groundwater bodies in Bosnia and Herzegovina

Content:

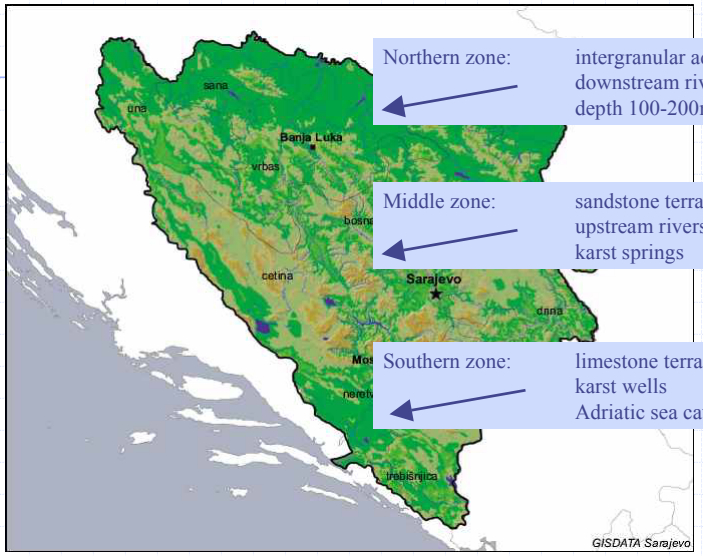
- Position of B&H within the Danube Catchment
- Major River Catchments in B&H
- Groundwater Zones in B&H
- Lithology in B&H
- Regional Slope in B&H
- Rainfall in B&H
- Land Use in B&H
- Groundwater Exploitation in B&H

Position of Bosnia and Herzegovina within the Danube Catchment

Major River Catchments in Bosnia and Herzegovina



Groundwater Zones in Bosnia and Herzegovina

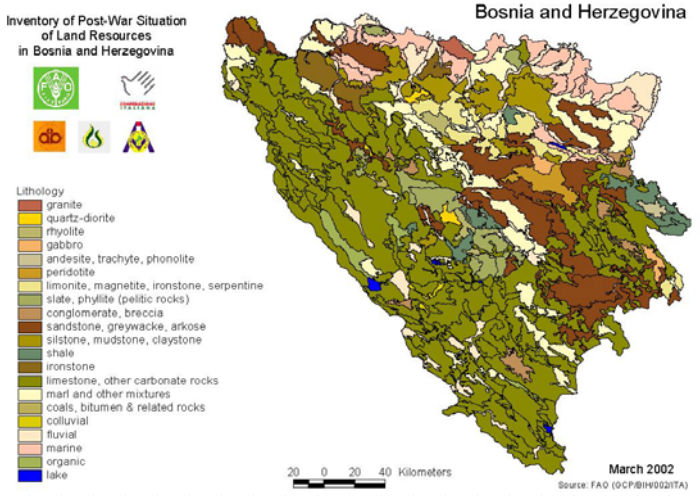


Northern zone: intergranular aquifers, downstream rivers, depth 100-200m

Middle zone: sandstone terrain, upstream rivers, karst springs

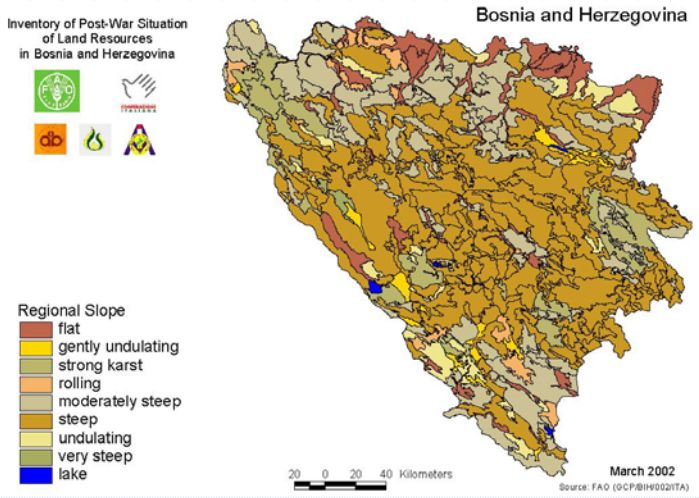
Southern zone: limestone terrain, karst wells, Adriatic sea catchment

Lithology in Bosnia and Herzegovina



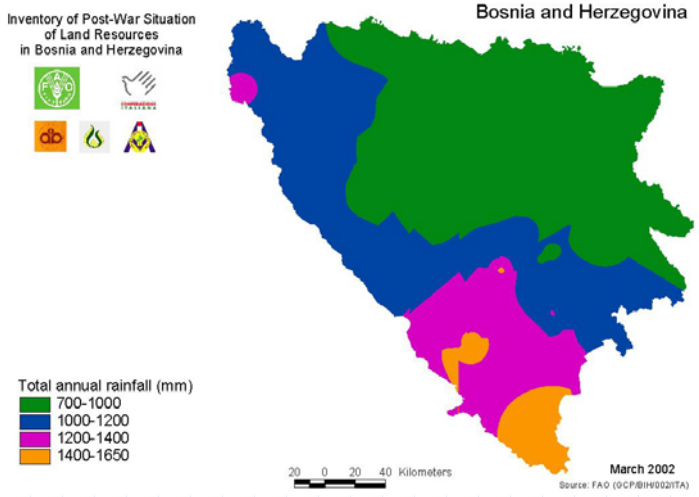
www.fao.org/countryprofiles/overview.asp

Regional Slope in Bosnia and Herzegovina



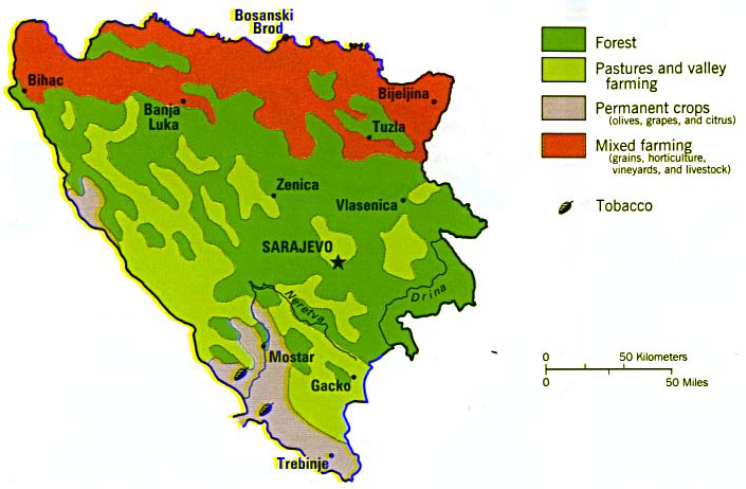
www.fao.org/countryprofiles/overview.asp

Rainfall in Bosnia and Herzegovina



www.fao.org/countryprofiles/overview.asp

Land Use in Bosnia and Herzegovina



Groundwater Exploitation in Bosnia and Herzegovina

1. Lijevce polj-Vrbas (5.0m3/s)
2. Glavicko polje-Drina (3.0m3/s)
3. Modricko-Odza lug-Bosna(2.0m3/s)
4. Sarajevsko polje Bosna (1.7m3/s)
5. Draksenic-Una (1.0m3/s)
6. Semberija-Bosn (0.7m3/s)
7. Bos.Brod-Sava (0.5m3/s)

8. Kotorsko-Bosna (0.5m3/s)
9. Mostarsko polje-Neretva (0.4m3/s)
10. Gabeosko-Neretva (0.35m3/s)
11. Bihac-Una (0.3m3/s)
12. Sprecko polje-Spreca (0.1m3/s)
13. Orasje-Sava (0.45m3/s)

TOTAL (16.0 m3/s)

http://www.lib.utexas.edu/maps/

Instead of Conclusion

- Struggling with negative war heritage
- B&H recognised importance of Groundwater potentials
- Recent activities toward integrated water management
  - Water Sector Institutional Strengthening
  - Establishment of Water and Environment Steering Committees
  - National Action Plan (NAP) for Mediterranean Region of B&H
  - National Environmental Action Plan (NEAP) for B&H
  - Other environmental projects
- Set up priorities in groundwater protection
  - Institutional
  - Legislative
  - Administrative
  - Technical

Annex 10: Bulgaria – country presentation

Progress with the implementation of the WFD on groundwater in the Bulgarian Danube River Basin

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Boryana Georgieva – junior expert in water protection, "Water" Directorate of the Bulgarian Ministry of Environment and Water,
e-mail: bgeorgieva@mail.bulgaria.com

Second Groundwater Workshop on WFD Implementation in the DRB, 12-13 May, Budapest, Hungary

Figure 1. Map of Republic of Bulgaria

Bulgarian environmental legislation

- **Water law and 12 subsidiary regulations have been enforced.**
- **Incl. 6 regulations, concerning ground water (reported on the 1st Groundwater Workshop).**
- **Subsidiary to Water law - Statute rules about activities, organization of work and staff of the 4 River Basin Directorates in Bulgaria (new)**
- **Subsidiary to Water law Statute rules about activities, organization of work and staff of the 4 River Basin Councils in Bulgaria (new)**
- **New Environmental Protection Law have been enforced.**
- **Subsidiary to New Environmental Protection Law – Regulation for provisions and order for issuing of Complex permits for construction and exploitation of new industrial installations and equipment and exploitation of these ones in operation (new)**
- **Subsidiary to New Environmental Protection Law – Regulation for provisions and order for the assessment of the effects on the environment of investment projects for construction, activities and technologies (new)**
- **Legislation concerning harmful impact of the waste (reported on the 1st Groundwater Workshop)**
- **Manual for good agricultural practices for reducing pollution with nitrates from agricultural sources (new)**

Bulgarian environmental legislation

In compliance with the Water Framework Directive have been accepted the River Basin management.

River Basin Directorates are in the process of strengthening.

Also there have been established River Basin Councils.

Bulgaria is in the process of developing River Basin Management Plans. With an order of the Minister of Environment and Water a tender procedure have been opened this year for preparation of terms of references.

According to the environmental legislation Bulgarian water bodies are managed from 4 River Basins Authorities: River Basin Directorates and River Basin Councils

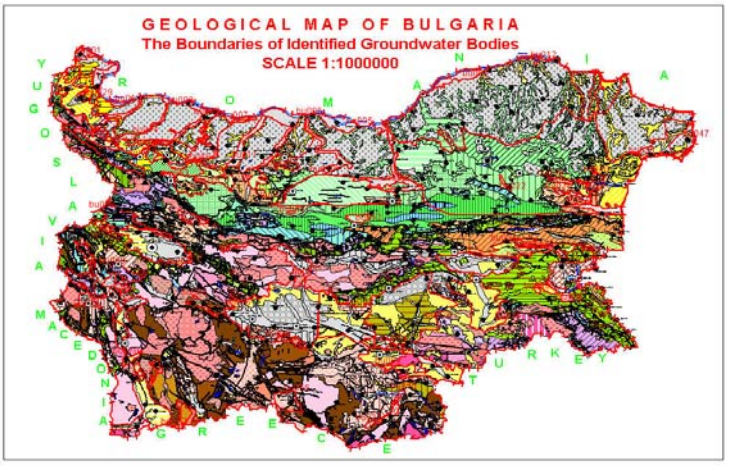
- Danube River Basin
- Black Sea River Basin
- East – Aegean River Basin
- West – Aegean River Basin

The activities of the River Basin Directorates are supported by the existing and acting 15 Regional Inspectorates of Environment and Water.

Current state of the delimitation of GW-bodies

- As initial steps for application of WFD it have been identified 155 groundwater bodies in Bulgaria, done in the Executive Environment Agency (ExEA) on the basis of hydrogeological and geological characteristics.
- The above mentioned GWB are delineated on the GIS map in Scale 1:500 000.

Figure 2. Boundaries of identified ground water bodies of Republic of Bulgaria



Current state of the delimitation of GW-bodies

- The areas of GW bodies identified vary from 17 to 25 000 km2.
- There are determined 3 types of groundwater bodies – porous, carst and fissured according to EUROWATERNET.
- Under Dutch project on the implementation of WFD for groundwater is forthcoming the verifying and refining of the identified bodies.
- The geological and hydrogeological conditions in Bulgaria are very different and much more types of GW bodies exist – carst-fissured, carst-porous, fissured-porous.

Table 1. A part of the list with identified GW-bodies in Bulgaria

EWN-Code	National code	Name of the GW body	Location (province etc.)	Area (in km^2)	Aquifer type
bu001		Bregovo-Nowoselska lowland	Montana	40.0	porous media
bu002		Opizvet-Dragovishtiza carst basin	Sofia	520.0	karst
bu003		Brashljan lowland	Russe	364.0	porous media
bu004		Vardim-Novgrad lowland	Russe	34.0	porous media
bu005		Belensko-Svishtov lowland	Pleven	150	porous media
bu006		Karaboazka lowland	Pleven	200	porous media
bu007		Ostrov lowland	Vratza	22	porous media

Current state of the description of GW-bodies

The characterisation of GW bodies according to of EUROWATERNET have been made (see Table 2).

Table 2. Characterisation of GW bodies according to EUROWATERNET

General Characterisation of the Groundwater Body	
EWN-Code (from GWLST_cc.xls)	
name of groundwater body	
max. length (in km)	
max. width (in km)	
No. of horizon (top = 1,...)	

Table 2. Characterisation of GW bodies according to EUROWATERNET

Hydrology	
Annual precipitation (in mm)	Min
	Mean
	Max
Geology	
Stratigraphy (keywords)	
Petrographic description (keywords)	
Thickness of the groundwater body (in m)	Min
	Mean
	Max
Overlying strata (type), soil	
Depth to groundwater (in m)	Min
	Mean
	Max

Table 2. Characterisation of GW bodies according to EUROWATERNET

Hydrology	
Recharge due to	precipitation
	irrigation
	Surface water
	Groundwater
	others
Hydraulic conductivity of the groundwater body	Min
(in kf=m/s)	Mean
	Max
Annual groundwater level amplitude (in m)	Min
	Mean
	Max

Table 2. Characterisation of GW bodies according to EUROWATERNET

Pressures		
Land use (in %)	**%**	arable land
	%	permanent crops
	%	permanent pasture
	%	forest and woodland
	%	urban areas
	%	other
Water abstractions **if yes, purpose:**		yes / no
Artificial recharge **if yes, purpose:**		yes / no

Table 2. Characterisation of GW bodies according to EUROWATERNET

Pressures		
Main infrastructures influencing the groundwater dynamics		yes / no
if yes, which?		
Associated aquatic ecosystems		yes / no
if yes, which?		

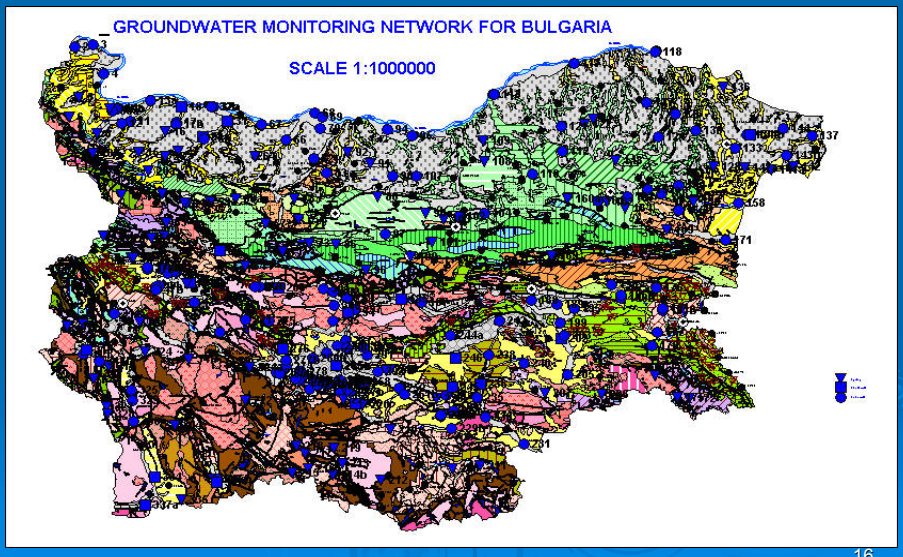
Current state of the description of GW-bodies

The present maintained GW monitoring system in the frame of the MoEW was presented in the previous workshop.

The sampling sites are shown on the following map.

Forthcoming is a strengthening of the capacity and enhancement of the National groundwater monitoring system in Bulgaria towards implementation of WFD under the Dutch project.

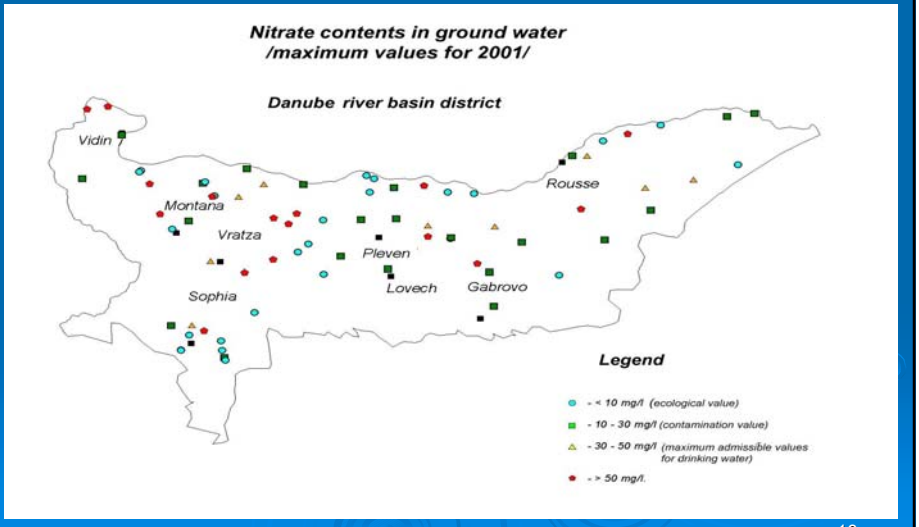
Figure 3. GW monitoring network in the frame of the MoEW



Current state of the description of GW-bodies

- Quarterly and annual reports on status of the environment are prepared in ExEA every year, including GW status.
- Qualitative status of groundwater in the different bodies is reported every year in line with the requirements of EUROWATERNET on 4 parameters .
- We are showing you a map of the Danube RB with nitrate content in GW.

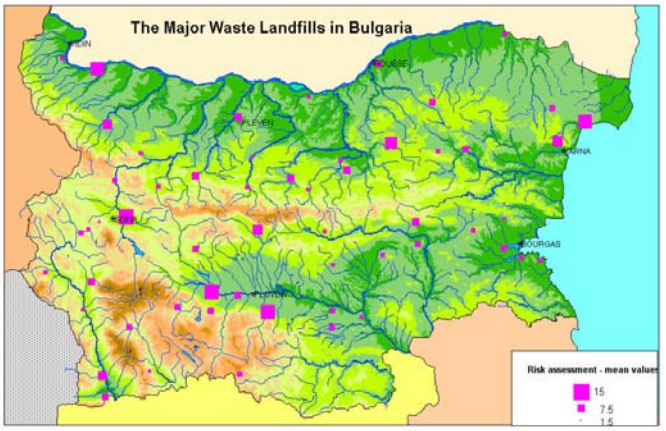
Figure 4. Danube River Basin with nitrate content in groundwater



Current state of the description of pressures on the GW-bodies

- Consider to diffusive sources of pollution the GIS map with land use in Scale 1:100 000 is developed in ExEA, and there are available monitoring data for polluter contents caused by agriculture.
- Point sources of pollution is visualized on the GIS map, showing the biggest municipal waste landfills in Bulgaria
- There was prepared assessment of the risk level for GW – minimum, mean and maximum values.
- At present a similar project on industrial waste landfills is carried out.

Figure 5. GW Risk level assessment from the biggest municipal waste landfills in Bulgaria



Current state of the description of GW-bodies

- Data from Environment Impact Assessment reports and evaluation reports on previous pollution damages are available in the frame of the MoEW, but it is not collected in a common data base.
- The same is the situation with the local ground water monitoring data.
- A software for electronic register is in a process of developing for permits on water bodies use and water consumption, which will be connected with a number of massives with Data Base from the National Statistic Institute.

Current state of the description of GW-bodies

- A problem had been considered in compatibility between the transposing WFD and Council Directive 97/11/EC (amending DIRECTIVE 85/337/EEC of 27 June 1985) on the assessment of the effects of certain public and private projects on the environment.
- **Problem:** The procedure on the assessment of the effects of certain public and private projects on the environment is not clearly compatible with the permission process for water bodies use and water consumption.

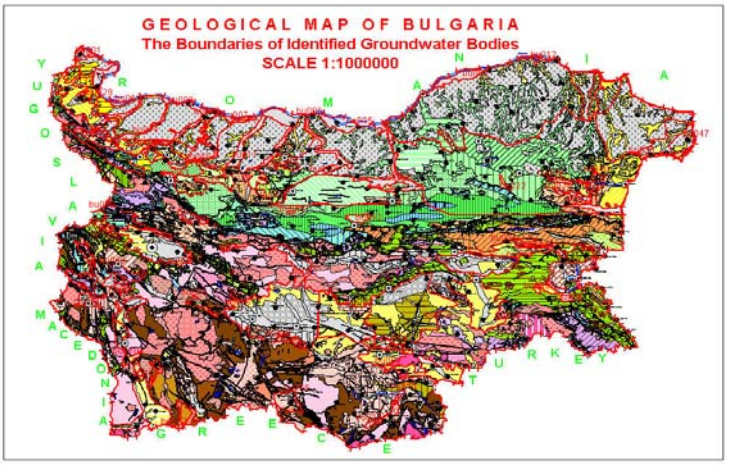
Current state of the identification and delimitation of transboundary GW bodies

Until now are identified the following transboundary GW bodies for Danube River Basin in Bulgaria:

- Sarmatian aquifer in the North-East of Bulgaria
- Malm-Valanginian aquifer in the North-East of Bulgaria

This process have been drawn up as part of the working programme 96/97/98 of the CEE task force on monitoring and assessment under the convention on the Protection and Use of Transboundary Watercourses and International lakes.

Figure 2. Boundaries of identified ground water bodies of Republic of Bulgaria



Current state of the identification and delimitation of transboundary GW bodies

We suggest some information available about 2 GW bodies in the North Bulgaria:

Sarmatian aquifer

- carst – porous by type
- unconfined by hydraulic character
- partly included in the Danube River Basin
- thickness: min - 0; mean - 50; max-200 m
- depth of the ground water below surface: min - 10; mean - 30; max-100
- the GW body is vulnerable to contamination

Current state of the identification and delimitation of transboundary GW bodies

We suggest some information available about 2 GW bodies in the North Bulgaria:

Malm-Valanginian aquifer

- carst – porous-fissured by type
- mainly confined by hydraulic character
- underground watershed is coincide with south-east boundary of Danube RB
- thickness: min - 600; mean - 700; max-800
- depth of the ground water below surface: min - 100; mean - 120; max-200
- Malm - Valanginian GWB is not opened on the surface in the area of Danube River Basin and is partially not vulnerable to contamination

Existing/planned bi-lateral co-operation in the Danube River Basin

The basic co-operation is in the frame of the Danube Convention and bi-lateral co-operation with Republic of Romania.

A Twinning project has been proposed and approved for funding named:

"Institutional strengthening of the River Basin Authorities in Bulgaria for Implementation of the EU Water Framework Directive in the Danube River Basin (pilot River Basin and sub-River Basins)"

in the frame of MoEW.

A partner country from EU members will be consultant on the WFD implementation for this project.

The project will be supported by the EU on Phare 2003 programme.

Summary

Obstacles:

- Need of recommendatory major and minor criteria for preliminary classification of ground water bodies and sub-group classification;
- The procedure on the assessment of the effects of certain public and private projects on the environment is not clearly compatible with the permission process for water bodies use and water consumption.

Thank you for the attention

Rossitsa Gorova and Boryana Georgieva
Bulgaria

Annex 11: Czech Republic – country presentation

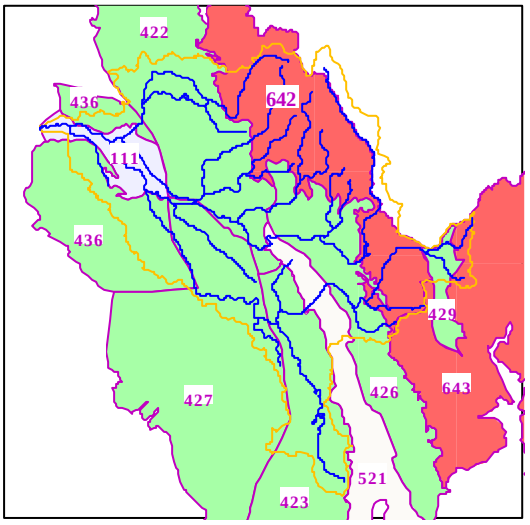
Implementation of WFD in the Field of Groundwater - CR

Hana Prchalova
Water Research Institute, Prague

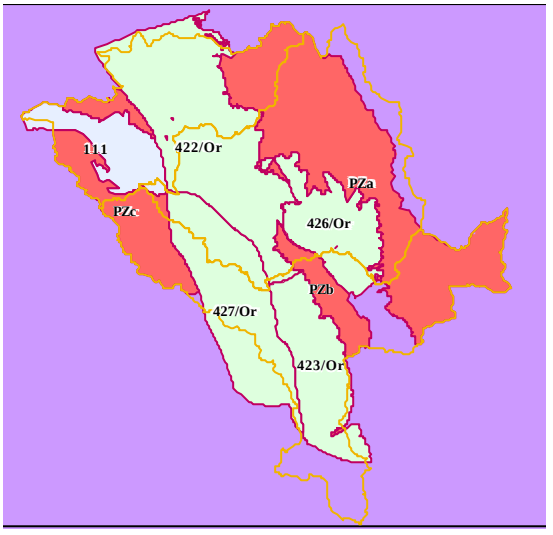
Delineation of groundwater bodies

- Current hydrogeological zones
- Hydrogeological zones update (New project 11/02 – 12/05)
- Hydrogeological zones analysis
- Hydrogeological zone boundaries adaptation

Current hydrogeological zones – Orlice Basin



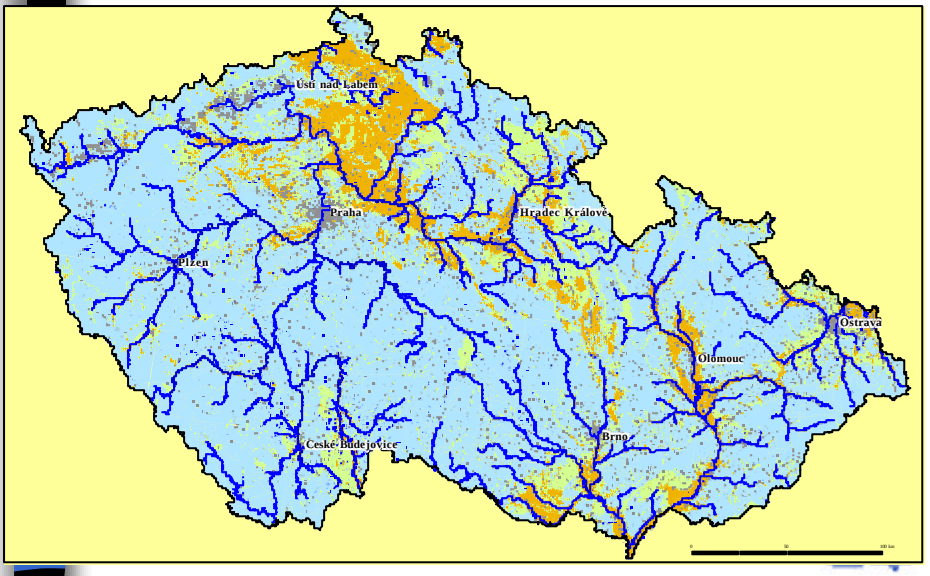
Delineation of GW bodies – Orlice Basin



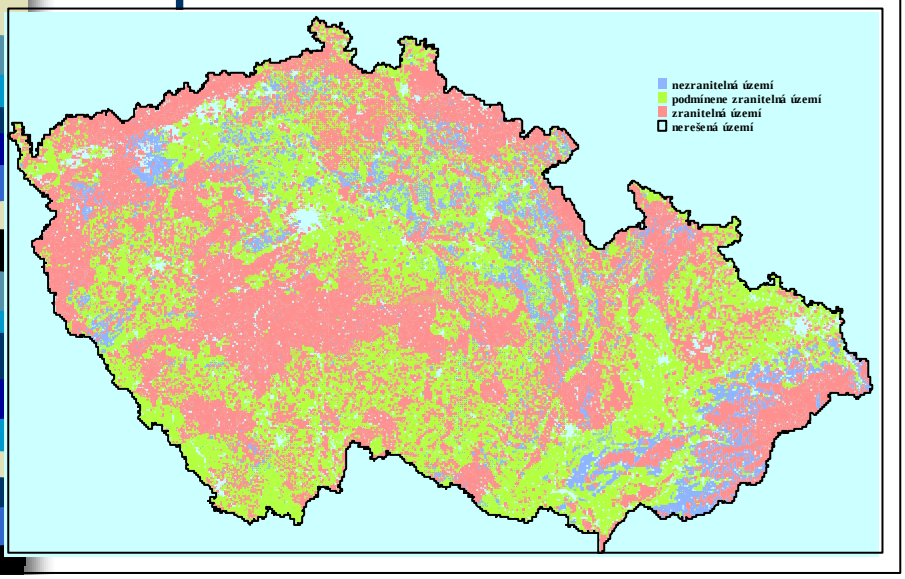
Initial characterisation of GW bodies

- Selection of essential natural parameters
  - Continual or discontinual flow
  - Vulnerability of soil and subsoil (GIS layers)
- Inventory of pressures (GIS layers)
- Identification of groundwater drainage – localization of river segment
- At risk and tranboundary GW bodies identification

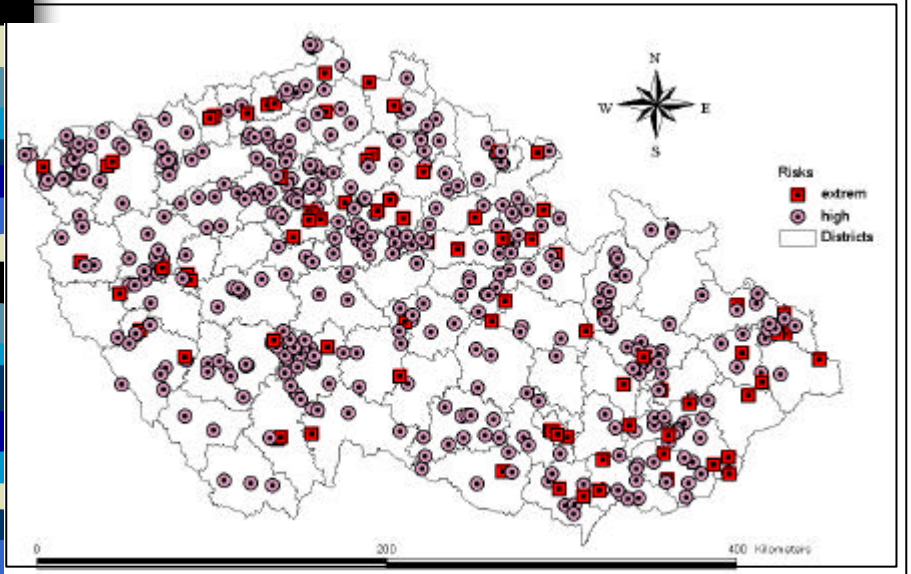
Subsoil vulnerability map



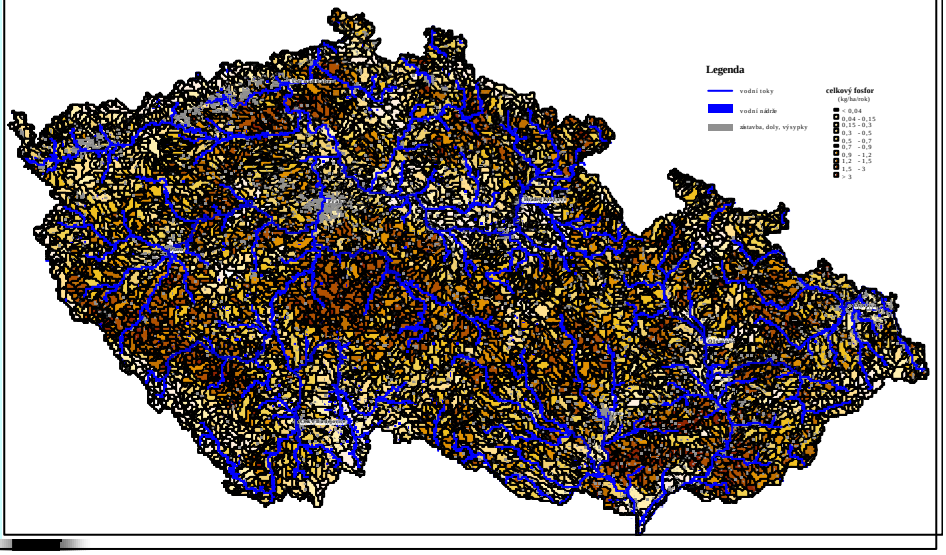
Acidification vulnerability map



Old contaminated sites



Specific phosphorus loss from erosion



Transboudary GW bodies

- preparing
- WFD pilot implementaion:
  - Twinning project – Orlice Basin
  - Not focused for groundwater

Cooperation

- International Commision for Elbe River
- International Commision for Danube River
- International Commision for Odra River
- Tranboundary water groups

Summary

- One methodology for Elbe, Danube and Odra basins
- One small team for implementation of WFD
- GIS layers

Current gaps:

- Cooperation for transboundary GW bodies
- Time pressure

Annex 12: Germany – country presentation

Current State Implementation of the WFD :Groundwater Germany/Bavaria

May 2003

- ***Current state of the delimitation of GW-bodies***

  In the Bavarian Danube basin 31 groundwater bodies (400 – 3000 km2) are delimitated (see map 1)

  To be added 1 deep groundwater body transboundary with Austria (5900km2)

- ***Current state of the description of GW-bodies and pressures***

  Description and pressures on the way

- ***Current state of the identification and delimitation of transboundary GW bodies - present a map indicating these GW-bodies and bring a list with info on size, involved country, GW-type***

  To be added 1 deep groundwater body transboundary with Austria (5900km2)

  Information will be found in my contribution to this workshop

  Other groundwater bodies at the border to Austria or crossing this border are actually coordinated (see map 1)

- ***Is there a WFD pilot implementation in transboundary GW bodies - which?, state?***

  Joint Groundwater modelling of the transboundary deep groundwater body started early before the WFD in 1995, could serve as a pilot implementation.

- ***Existing/planned bi - (multi)lateral co-operation***

  Bilateral cooperation exists in the frame of the Regensburger Vertrag.

  Work is done by a ad hoc joint expert group (see my contribution to this workshop)

Summary: detected problems and gaps. presented in key words

For the transboundary deep groundwater body the following problems and requirements were detected:

The most important results were the excellent cooperation and the exchange of information between the Bavarian and Austrian authorities and the gained knowledge that reinjection of thermal water for geothermal use is mandatory in order to avoid a decreasing closing pressure of the thermal water wells in the spas. – sustainability!

More detailed information see my contribution to this workshop

Annex 13: Croatia – country presentation

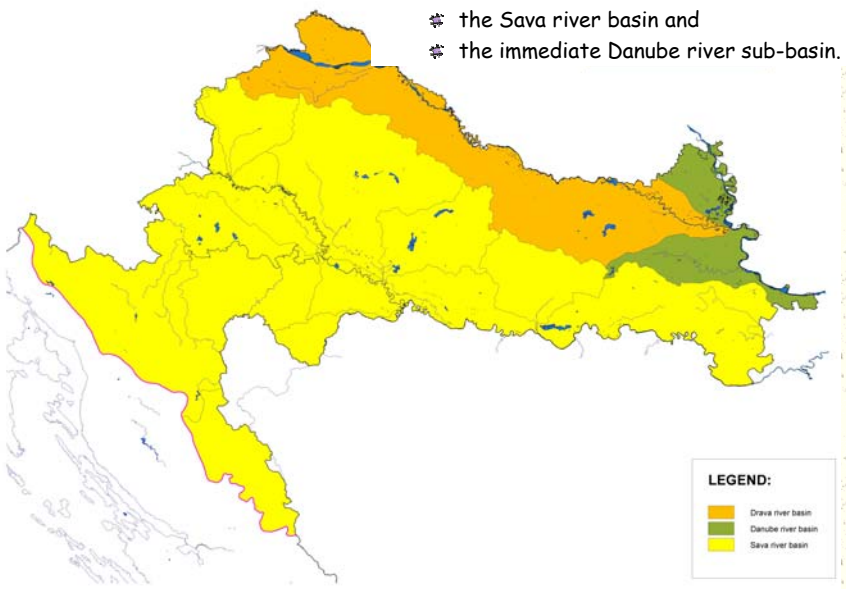
Progress with the implementation of the WFD

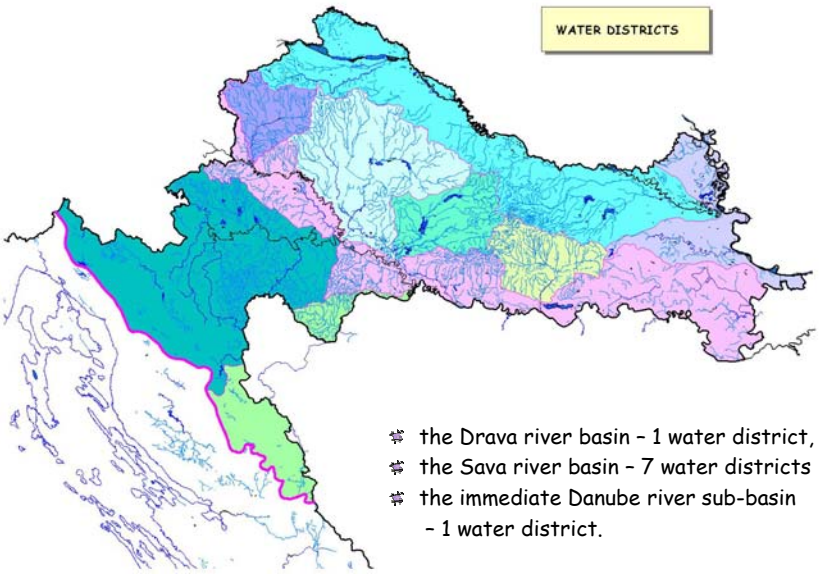
CROATIA

Prepared by Pekaš Ž. & Brkić Ž.

The Danube river basin in Croatia is divided into:

- the Drava river basin,
- the Sava river basin and
- the immediate Danube river sub-basin.

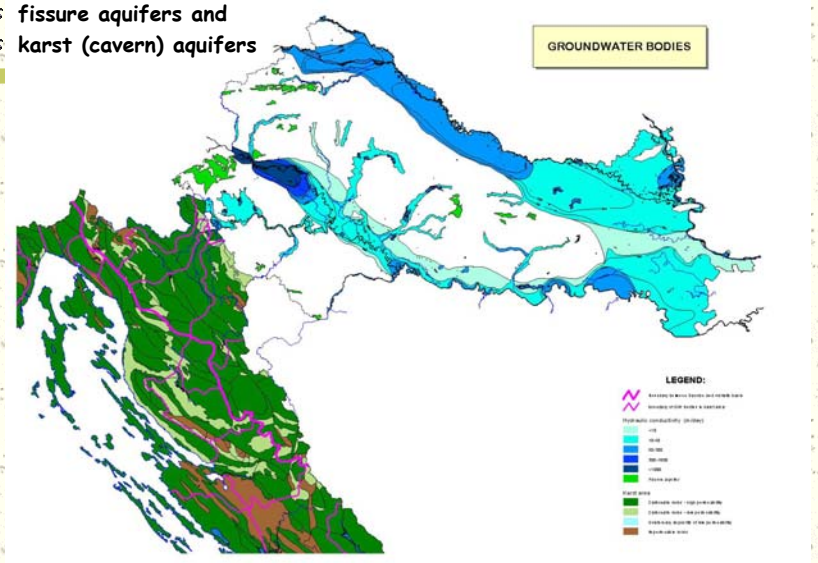




- the Drava river basin – 1 water district,
- the Sava river basin – 7 water districts
- the immediate Danube river sub-basin – 1 water district.

The initial characterisation of groundwater bodies is based on the hydraulic properties of the aquifers:

- **pore (alluvial) aquifers,**
- **fissure aquifers and**
- **karst (cavern) aquifers**

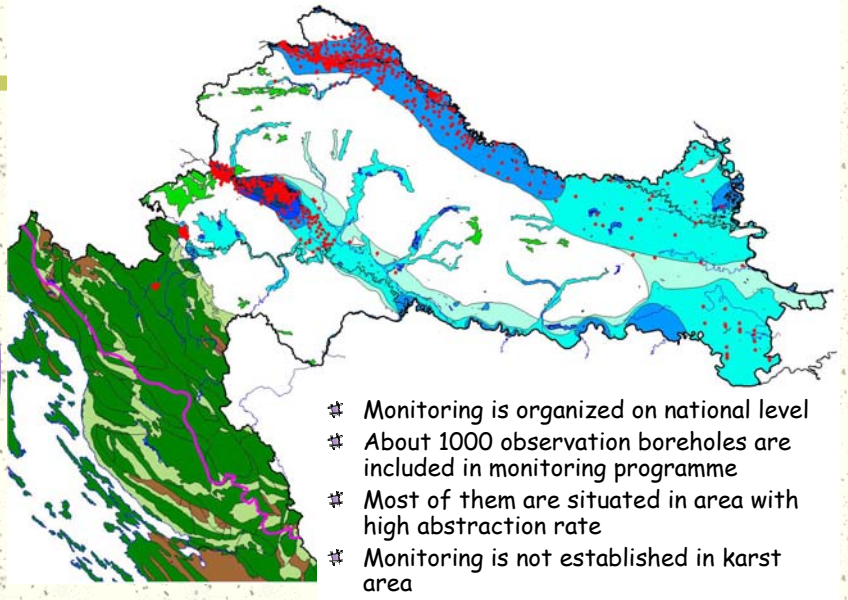


DELIMITATION OF GROUNDWATER BODIES

CURRENT STATE

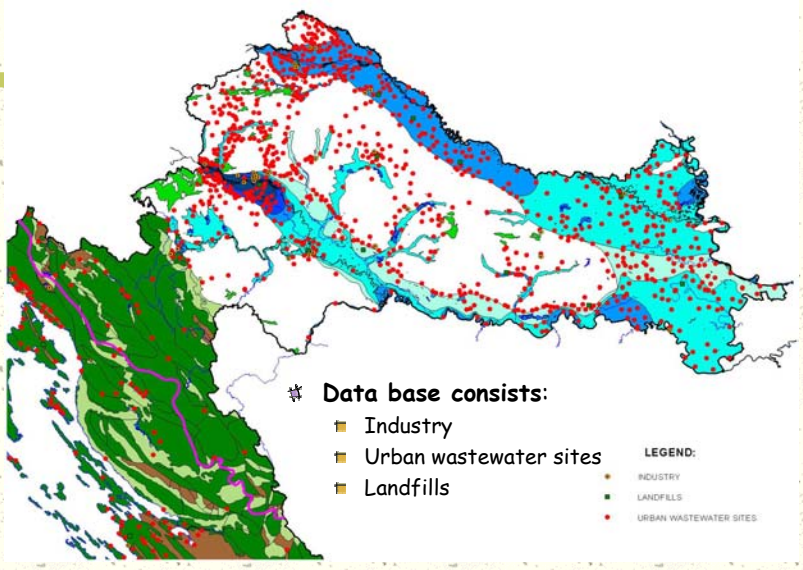
- Approach for the initial characterization of groundwater bodies is made in the regional level
  - For defining smaller groundwater bodies there is no sufficient information about hydraulic properties of aquifers and groundwater flow
- **Delineation of horizontal boundaries**:
  - Hydraulic properties,
  - Groundwater flow
  - Interaction of surface and ground water – karst areas
- **Upper boundary** – covering aquitard is included in groundwater bodies
- **Lower boundary** - temperature of 20^{0}C, mineralization of 1000 mg/l
  - Aquifers of termal and mineral water is not included in groundwater bodies because there is not enough data

Monitoring of groundwater level



- Monitoring is organized on national level
- About 1000 observation boreholes are included in monitoring programme
- Most of them are situated in area with high abstraction rate
- Monitoring is not established in karst area

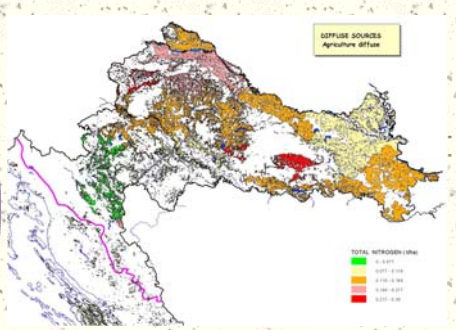
Point sources of groundwater pollution

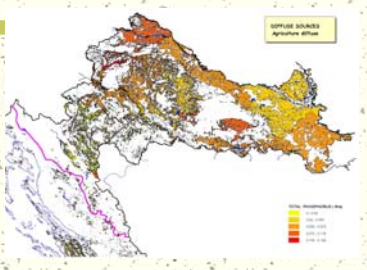


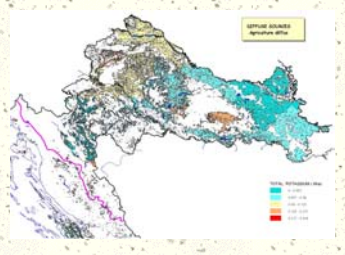
- **Data base consists:**
  - Industry
  - Urban wastewater sites
  - Landfills

Diffuse sources of groundwater pollution

Agriculture

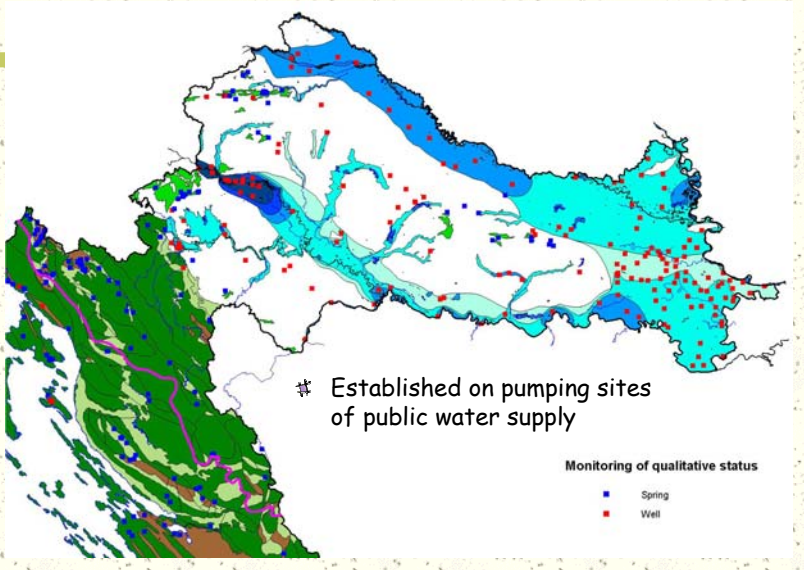






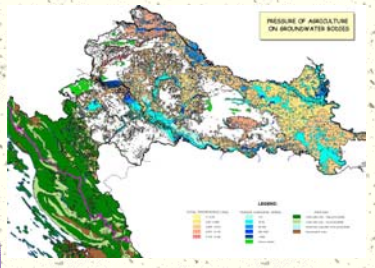
Monitoring of groundwater quality

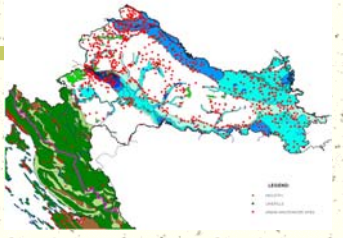
Current state

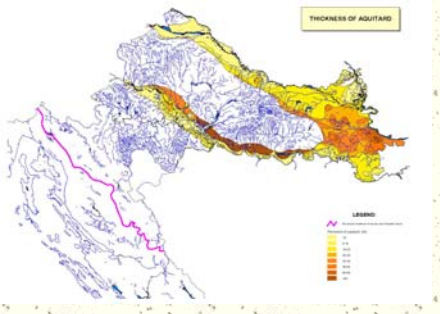


- Established on pumping sites of public water supply

Assessment of impacts on groundwater quality

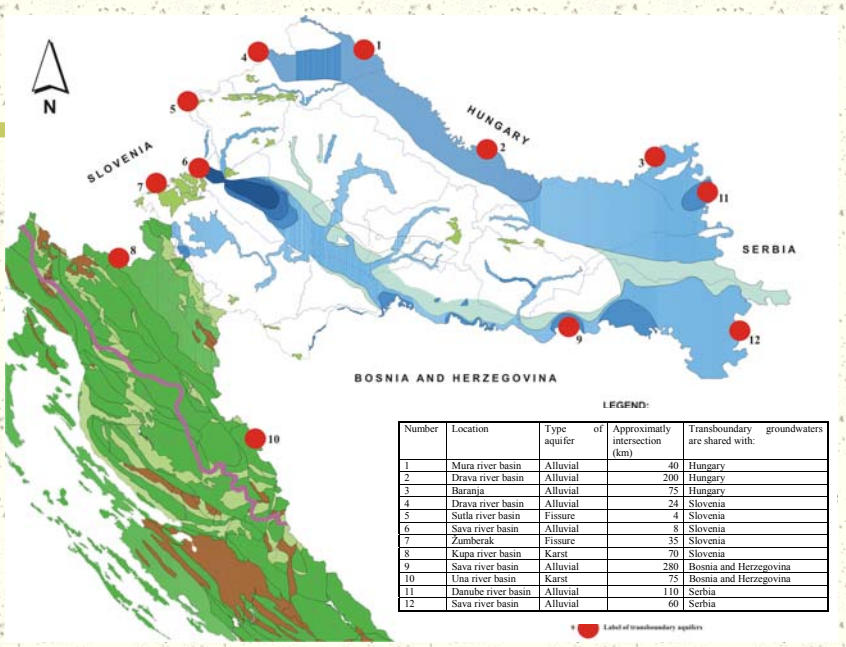






- Results will be base for development of groundwater quality monitoring according to WFD

Potential transboundary aquifers



LEGEND:

Number	Location	Type of aquifer	Approximatly intersection (km)	Transboundary groundwaters are shared with:
1	Mura river basin	Alluvial	40	Hungary
2	Drava river basin	Alluvial	200	Hungary
3	Baranja	Alluvial	75	Hungary
4	Drava river basin	Alluvial	24	Slovenia
5	Sutla river basin	Fissure	4	Slovenia
6	Sava river basin	Alluvial	8	Slovenia
7	Zumberak	Fissure	35	Slovenia
8	Kupa river basin	Karst	70	Slovenia
9	Sava river basin	Alluvial	280	Bosnia and Herzegovina
10	Una river basin	Karst	75	Bosnia and Herzegovina
11	Danube river basin	Alluvial	110	Serbia
12	Sava river basin	Alluvial	60	Serbia

Label of transboundary aquifers

Research of transboundary aquifers

Bilateral cooperation

- MEDITERRANIAN BASIN
  - Transboundary aquifers between Slovenia and Croatia – the area between Gulf of Kvarner and Gulf of Trieste (on going project)
- DANUBE RIVER BASIN
  - There is no cooperation with neighbouring countries
  - It will be established on bilateral agreements

Annex 14: Hungary – country presentation

2nd Groundwater Workshop
on the Implementation of the Water Framework Directive
in the Danube Basin

PROGRESS IN THE IMPLEMENTATION OF THE WFD IN THE FIELD OF GROUNDWATER IN HUNGARY

László Balásházy
Ministry of Environment and Water

Tasks related to groundwater bodies until 2004

Tasks	2002	2003	2004
Preliminary designation of water bodies based on hydrogeological characteristics			
Transboundary negotiation			
Quantitative characterisation (available groundwater resources)			
Identification of grw. dependent ecosystems			
IMPRESS (quality)			
Additional survey of water quality			
Further characterisation of water bodies in critical status and transboundary wb.			
Co-ordination and summary of th above works (inc. GIS)			
Monitoring			

Identification of water bodies

Preliminary approach:

all groundwaters are part of any water body
justified by the new guidance
definition of the significant flow includes vertical flow as well

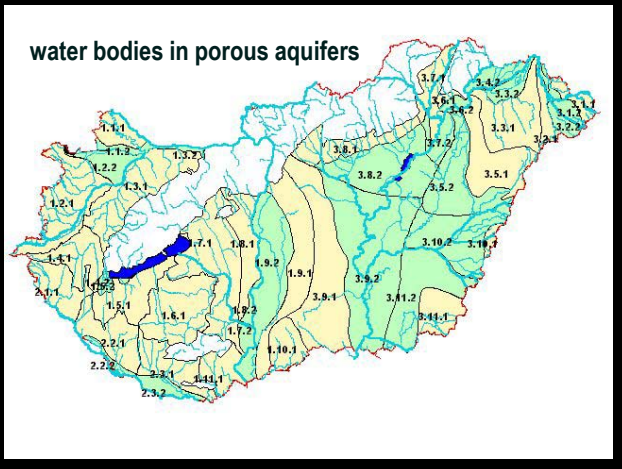
Hierarchical approach:
according to the horizontal guidance

geological type of the aquifer

hydrogeological units

temperature

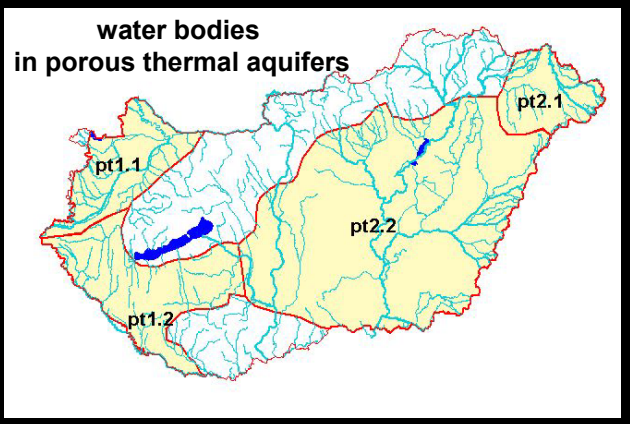
Identification of water bodies



Sepration according to subsurface catchments and vertical flow direction

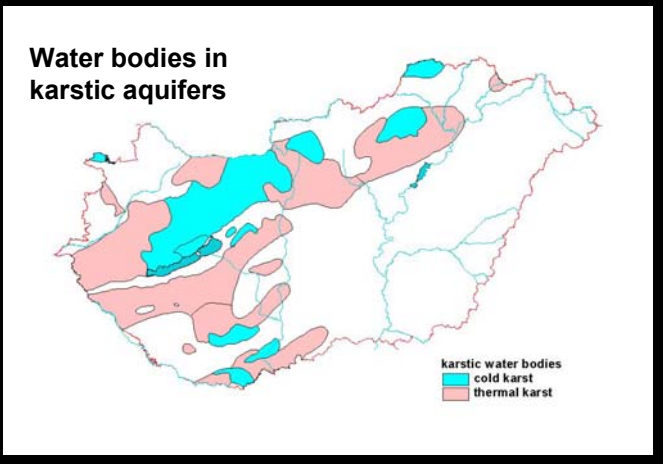
Shallow aquifer will be separated based on the characterisation (critical status ←→ risk zones)

Identification of water bodies



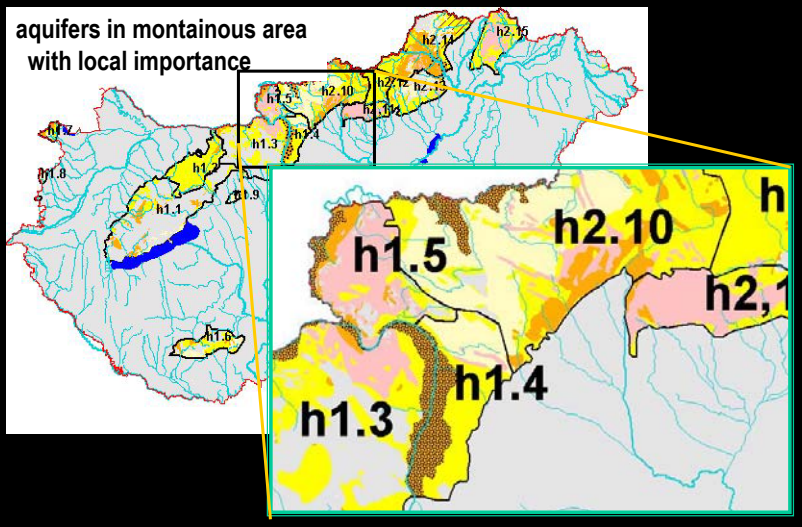
Separation according to management units

Identification of water bodies



Separation according to geological units and temperature

Identification of water bodies



Separation according to geological units and type of aquifers

Identification of water bodies

	Number of water bodies	out of them transboundary
Porous aquifers	45/25	26/16
Thermal porous aquifers	4	4
Karstic aquifers	11	4
Thermal karstic aquifers	12	7
Group of porous aquifers in mountains	15	1
Group of fissured aquifers in mountains	12	-
Total	**99/79**	**42/32**

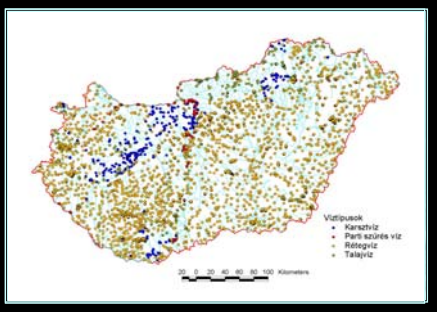
List and maps are ready for transboundary co-operation

Characterisation of water bodies

Assessment of pressures

Point sources of pollution

inventory of human activities (discharges) and polluted sites
not complete



Diffuse sources of pollution

CORINE land use database
Data on agriculture
(cultivation, fertilizer, animals, manure, sludge)
Statistical data at different levels
No reliable information on household agriculture
Data on non-sewered population

Groundwater abstarctions

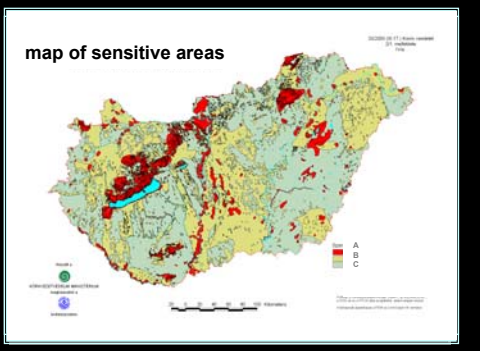
GIS-based database
(type of aquifer, yearly abstraction, purpose, owner)

Characterisation of water bodies

Assessment of impacts

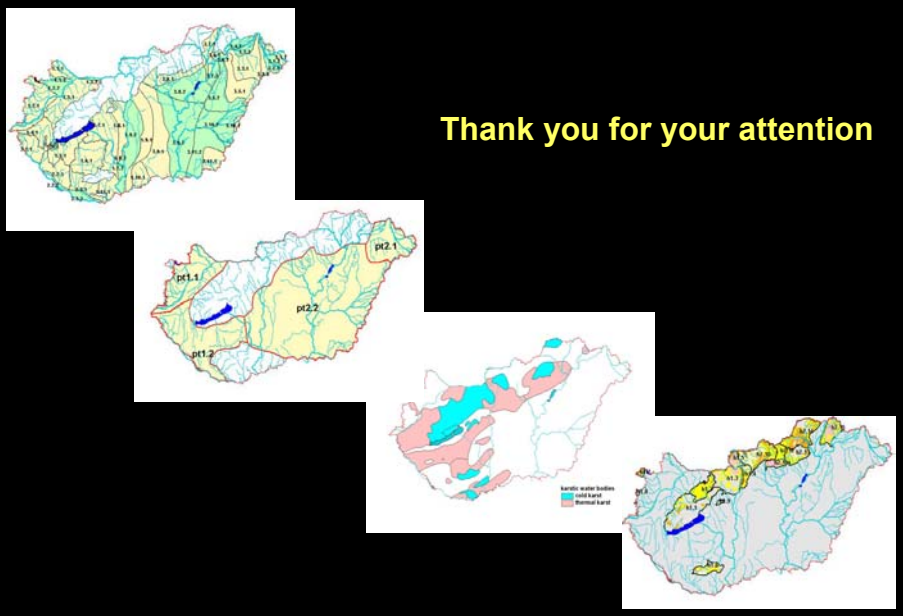
Quantitative status:
by comparing
estimated available resources
and abstraction
+
Groundwater dependent
ecosystems (?)

Chemical status:
using all available information
on groundwater quality



where no monitoring data are available
if the pollution source is very dangerouse -> risk of failing good chemical status
settlements, illegal communal dumping sites, waste disposal with inappropriate technology or occuring compounds from the prevent list, liquid manure ponds

considering vulnerability as well for other pollution sources


Thank you for your attention
pt1.1
pt1.2
pt2.1
pt2.2

Annex 15: Romania – country presentation

IMPLEMENTATION OF THE EU WATER FRAMEWORK DIRECTIVE
Questionnaire for an overview of countries' activities in the field of groundwater

A. Identification (delineation) of bodies of groundwater

Question	Answer(1)	Details
Is the map of groundwater bodies available?	Yes / No	The map was made for an exprimental area in the Tisa-Somes basin (Somes plain)
What levels of the hierarchical approach (Horizontal Guidance on „Water Bodies") have been applied:		
Geological boundaries	Yes / No	if yes, further info on the methodology, resulting number of water bodies *In the area where separated 4 (four) grundwater bodies of Quaternary(shallow phreatic water body and mean deep confined water body) and Pannonian age (multi layer deep aquifer and termal aquifer). The water bodies are separated by tick impervious clay strata. The two groundwater bodies of Pannonian age are overpassing the limits of the river-basin*
Hydraulic boundaries Is the shallow aquifer separated?	Yes / No Yes / No	if yes, further info on type of boundary, resulting number of water bodies *Groundwater highs in the case of shallow aquifer* if yes, further info on criteria and resulting number of water bodies *Vulnerability and water quality of the shalow aquifer are the criteria to separate it from the confined aquifer of quaternary age*
Are aquifers of a strata identified separately or merged together with aquitars in one water body?	Separately / merged	further details: explanations and resulting number of water bodies *The shallow aquifer is of a strata and not merged with the subsequent clay strata* *The other three water bodies are multilayers aquifers and the aquitars within them are merged in the water body*
Are the thermal aquifers separated?	Yes / No	if yes, info on applied temperature limit or other criteria, resulting number of water bodies *The termal water body is a very deep aquifer and the temperature limit for separation is 23°C*
How will the parts of water bodies in critical conditions be treated (i.e. where achievement of the good quantitative and/or qualitative status is risky)?	as separate water bodies/ as sub-water bodies	Remarks (how many new water bodies and / or sub-bodies are expected?) *According to the above mentioned, different sub-bodies will be taken into account*
Are all groundwater attached to a groundwater body?	Yes /No	If not, which groundwater is excluded
How large are groundwater bodies?	From … to (km2)	*In the experimental area the surface of the shallow water body and the mean deep body have 1000 to 1300 km² surface*
How is the connection of bodies of groundwater treated with surface water bodies.	At river basin district level (requirement of art. 3.1 of WFD) or lower level (e.g. sub-catchment or units)	Remarks *The shallow aquifer is the only one which have connexions with the surface waters*
Are bodies of groundwater grouped?	Yes / No	Reasons
Are transboundary bodies of groundwater selected and identified?	Yes / No	If yes, please attach the list and/or the map *Romania has identified the transboundary aquifers and those at the River Basin Dristict limit*

(1) Please underline the appropriate answer

B. Characterisation of bodies of groundwaters

Please comment in general the lists of tasks for initial characterisation in IMPRESS (3.10. Review of groundwater – see annex). According to this table: *further characterisation practically replicates the initial characterisation for water bodies (or part of water bodies) in risk, but based on additional data and more sophisticated analysis techniques.* It implicitly means, that information listed in Annex II. 2.2. is not necessarily to be collected for each water bodies in risk, or some of them are used during the initial characterisation.

Question	Answer	Details
Identification of pressures		
Is information available for the characterisation of diffuse sources?	Yes / No	If yes, please give details (in comparison with the requirements of Annex II. 2.3. g). Is it in computerised database? Is it complete? Maps? *The introduction of the inventory in a computerised data base is in progress*
Does the inventory of point sources of pollution exist (inc. inventory of contaminated sites) ?	Yes / No	Same as above, but compared with Annex II. 2.3. d., e., f. *The introduction of the inventory in a computerised data base is in progress*
Does the inventory of groundwater abstraction exist?	Yes / No	Same as above .. but compared with Annex II, 2.3. a., b., c. *The introduction of the inventory in a computerised data base is in progress*
Does the inventory of human activity modifying recharge conditions exist (drainage, artificial recharge, injection, land sealing, damming..)?	Yes / No	Same as above .. compared with Annex II. 2.3. g. The inventory is in progress
When are sur face water ecosystems or terrestrial ecosystems directly dependent of groundwater bodies?		Comments on available information and /or on applied methodology

B. Characterisation of bodies of groundwaters (cont.)

Question	Answer	Details
Assessment of impact of human activities on the status of groundwater. Preliminary risk assessment of failing to achieve good status.		
How will the significance of the impact of a pollution source (human activity) be determined? a) point sources b) diffuse sources	 Threshold values / other Threshold values / other	Short description of the methodology The EC methodology adaptation and implementation is in progress
Does vulnerability mapping exist for the country?	Yes / No	If yes, short description of the methodology *In the first step where determined the intrinsic vulnerable areas of the shallow aquifers taking into account the thicknes of the lithology of covering deposits, the mean depth and the amplitude of the piezometric level variations* If no, what kind of basic geological and hidrogeological data are available? To be compared with the needs listed in Annex II., 2.2. !
How will water bodies (or parts of water bodies) be classified at risk of failing good chemical status?	Based on monitoring data and/or using other information	How do the existing monitoring data cover the requirements for direct evaluation? *The monitoring data with some exceptions cover the requirements for direct evaluation?* Classification by components or in an integrated way *By components* If monitoring data are not available, which approach will be applied?
How will water bodies (or parts of water bodies) be classified at risk of failing good quantitative status"?	By estimating the available water resources Without estimating the available water resources by evaluation of changes in groundwater levels	Is the conceptual model approach of IMPRESS (chapter 3.7) acceptable? Estimation of water balance? What kind of background information exists for estimaton of average recharge and impact on the dependent ecosystems (decreasing base flow and/or evapotranspiration or changing quality)? To be compared with the needs listed in Annex II. 2.2.! *An conceptual model approach is considered* If the classification is based on indirect evaluation, what kind of approach (method) will be used?
Is additional monitoring planned if the available information allows only very uncertain classification?	*Yes* / No	If yes, what kind of measures are planned? Estimated costs? *Adaptation of the monitoring system: 1.500.000 EURO*

C. Monitoring

Please attach available maps of the existing network.

Element of the monitoring	***Actual situation***		***Necessary development (realistic/optimistic approach)***	
	number of wells frequency/component	**operational cost** (million Euro)	**number of wells frequency/component**	**Investment + operational cost** [3] (million Euro)
observation wells for water levels				
In shallow aquifer	*3528/3 days/piezometric levels*	***0.2***		
In conf. porous aquifers[1]				
in karstic aquifers				
in fissured rocks				
discharge of springs				
observation wells for quality [2]				
In shallow aquifer Considered as surveillance monitoring: as operational monitoring:	*Surveillance: 1268/4 per year/18 components* *Operational: 373/industrial and waste disposal sites*	***0.5***		
In conf. porous aquifers[1] Considered as surveillance monitoring: as operational monitoring:				
in karstic aquifers Considered as surveillance monitoring: as operational monitoring:				
in fissured rocks Considered as surveillance monitoring: as operational monitoring:				
quality of sprigs Considered as surveillance monitoring: as operational monitoring:				
drinking water wells In shallow aquifer				
In conf. porous aquifers[1] In bank filtered aquifers				
in karstic aquifers in fissured rocks				

[1] grouped by category of depth (if possible)

[2] In the case of operational monitoring, please indicate the type of the monitored pollution source (as industrial, agricultural or communal, point or diffuse)

[3] If estimates of cost are available Please indicate the expected sources of financing too.

Which data are available in a computerised database?
Geological, hydrogeological and technical data of the monitoring wells, piezometric levels, pumping test data, and chemical data

How are the databases accessible?
By internet whith password

What kind of processed results are available (maps, time series, statistics, reports, other periodicals..)
Geological maps, hidrogeological maps, groundwater resources maps, hydrochemical maps, time series graphs, reports etc

Annex 16: Slovenia – country presentation

PROGRESS WITH IMPLEMENTATION OF WFD WITH MAIN EMPHASIS ON TRANSBOUNDARIES GWB

SLOVENIA

MAY 2003

DELINEATION OF GWB

THREE PHASES OF THE DELINEATION OF GWB (2001-2004):

1. **Phase (2001-2002):**

Identification of GWB on based on:

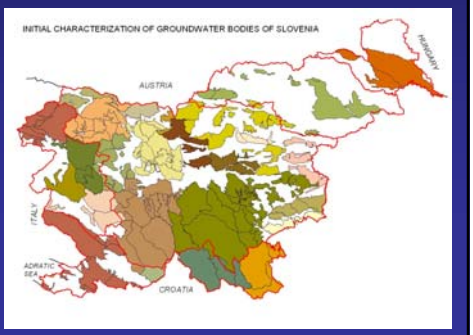
a) Data of actual abstraction of GW for public watersupply
b) Data about pressures and protection on the state level
c) Data about existing GW monitoring

Identification of GWB on 3 levels:

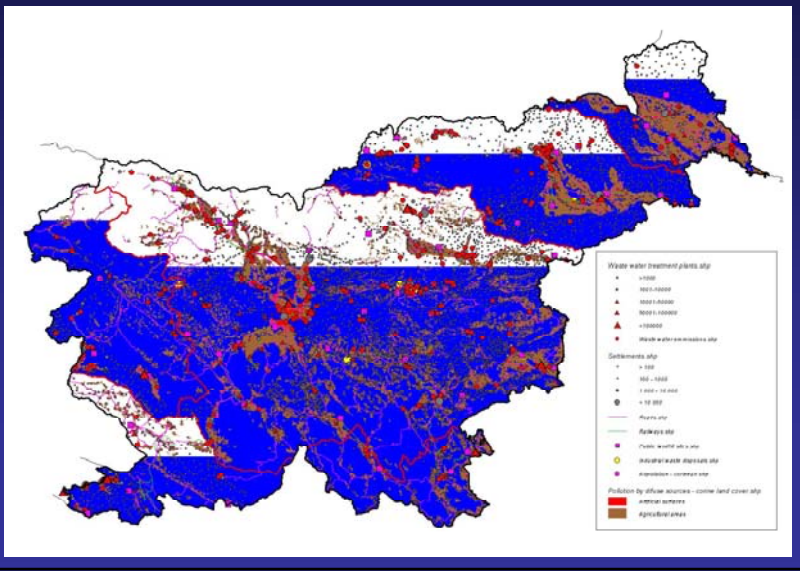
a) state level (groups of GWB from lower levels),
b) river basin level,
c) local level

6 proposed GWB on the state level:

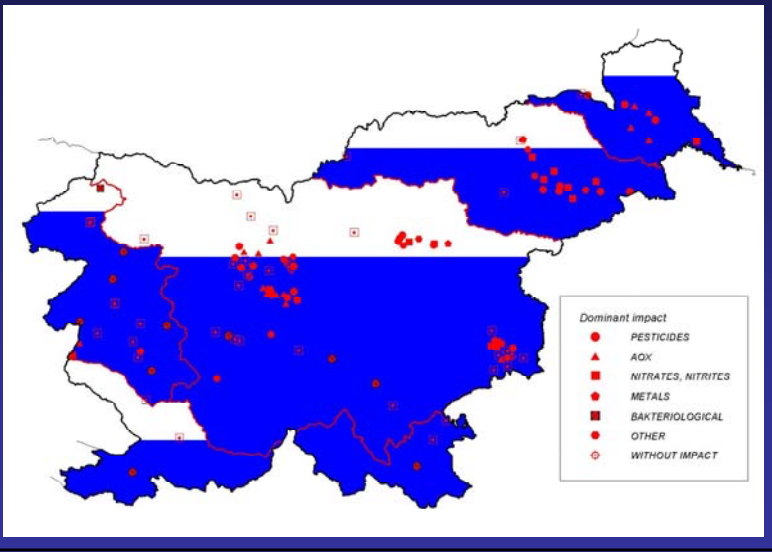
- Sava
- Drava
- Mura
- Soča
- Coastal area
- Kolpa



Data about pressures on GWB



QUALITY LOADS ON PROPOSED GROUNDWATER BODIES



2. Phase (2003):

Identification of GWB on additional data :

a) Local data of GW use and abstraction, pressures and load
b) Production of Map of aquifers as elementary units of GWB
c) Verifying the obtained boundaries of GWB to 25.000 scale and larger
d) Monitoring programme optimisation
   - o Veryfing the representativity of existing monitoring
   - o Planning of redistribution of sites or additional sites plan

3. Phase (2003-2004):

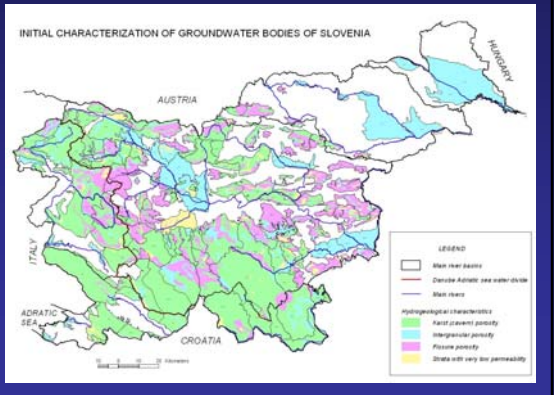
Modeling:

a) Final map of aquifers as elementary units of GWB
b) GIS modeling of GWB using:
   a) Map of aquifers
   b) Hydrogeological data
   c) Data of pressures and loads
   d) Other relevant data
c) GW monitoring programme redesign

TRANSBOUNDARY GROUNDWATER BODIES SLOVENIA

Actually
-Intensive bilateral cooperation with neighbouring countries: Croatia, Austria
(A certain part of transboundary aquifers are bilaterally identified and investigating)

Actually
Not intensive bilateral cooperation with neighbouring countries:
Hungary, Italy



THREE STEPS OF THE INTENSIVE BILATERAL TRANSBOUNDARY AQUIFERS INVESTIGATION:

1. STEP:

Identification of common aquifers (Common HG maps)

2. STEP:

a) Comparisson of identified water divides and aquifer boundaries with GW flow across state border
b) Common classification of pressures and loads
c) Proposal of representative monitoring sites

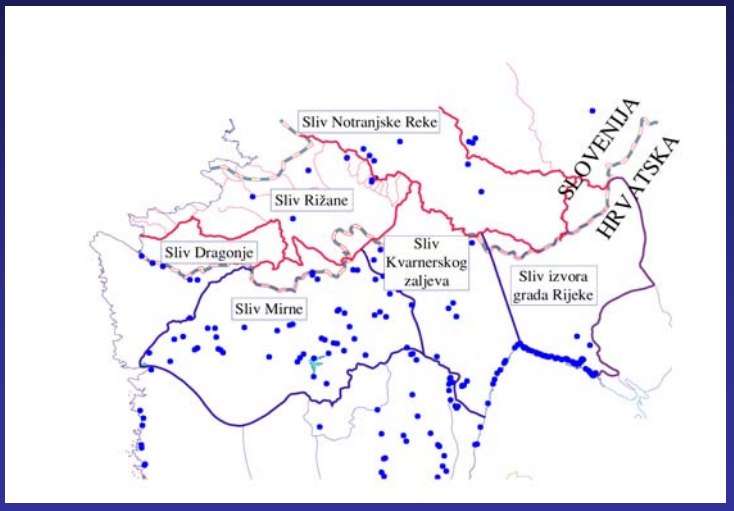
THREE STEPS OF THE INTENSIVE BILATERAL TRANSBOUNDARY AQUIFERS INVESTIGATION:

3. STEP:

a) Water balance assessment of transboundary GW flow
b) Simultaneous monitoring activities
c) Common protection and intervention measures design proposal

SLOVENIA – CROATIA TRANSBOUNDARY GROUNDWATER BODIES

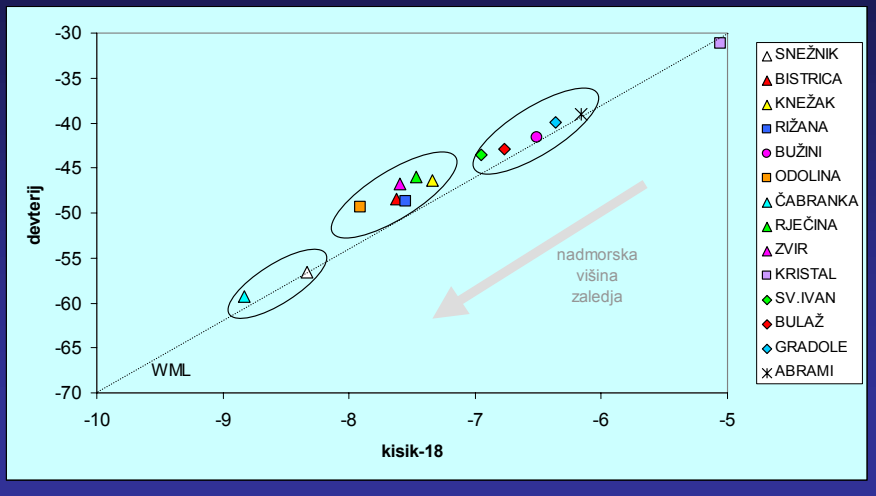
(EXAMPLE OF COMMON AQUIFER SYSTEMS WITH TRANSBOUNDARY GW FLOW)



Institut za geološka istraživanja Zagreb, Geološki zavod Slovenije, 2002

SLOVENIA – CROATIA TRANSBOUNDARY GROUNDWATER BODIES

(EXAMPLE OF COMMON MONITORING SITES EVALUATION)



Institut za geološka istraživanja Zagreb, Geološki zavod Slovenije, 2002

GROUNDWATER BODIES DELINEATION
(detected problems and gaps - KEYWORDS)

1) KARST WATERDIVIDES

2) DELINEATION OF BODIES IN VERTICAL DERICTION

3) REPRESENTATIVITY OF MONITORING SITES

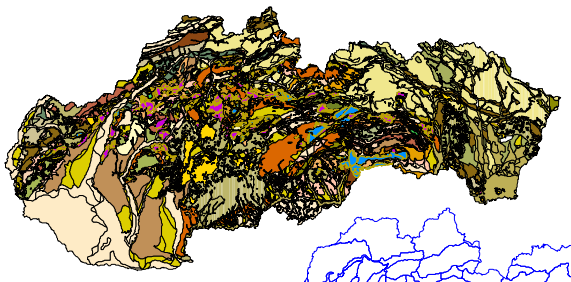
Annex 17: Slovakia – country presentation

2nd GROUNDWATER WORKSHOP
WFD IMPLEMENTATION IN THE DRB

progress with the WFD implementation - Slovak Republic

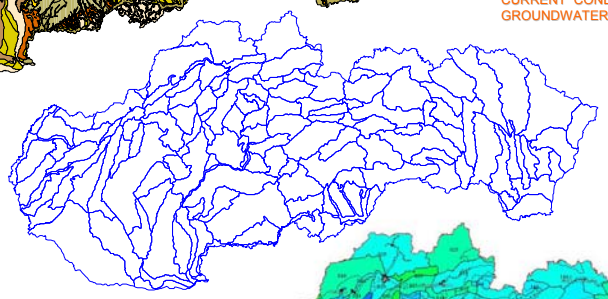
WORKING GROUP 2.8 – CLASSIFICATION AND EVALUATION OF GROUNDWATER

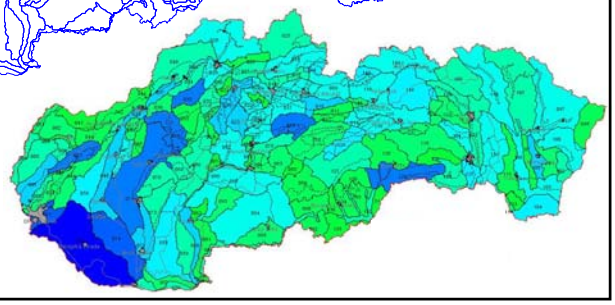
Budapest, May 12-13, 2003



GEOLOGY AND HYDROGEOLOGY

CURRENT CONDITION IN
GROUNDWATER EVALUATION PROCESS





THE EFFORT OF MAXIMAL UTILIZATION
OF EXISTING DATABASE

PRESENT STATUS

- IDENTIFICATION OF GROUNDWATER BODY

  GENERAL STRATEGY :

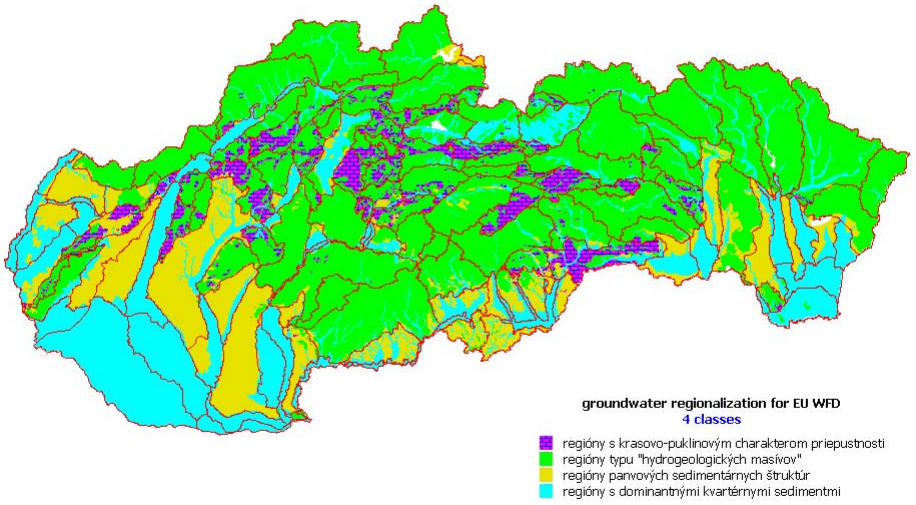
  REEVALUATION OF EXISTING HYDROGEOLOGICAL UNITS
  ATTACH UNITS, MINIMAL CHANGES, MAXIMAL EXTRAPOLATION

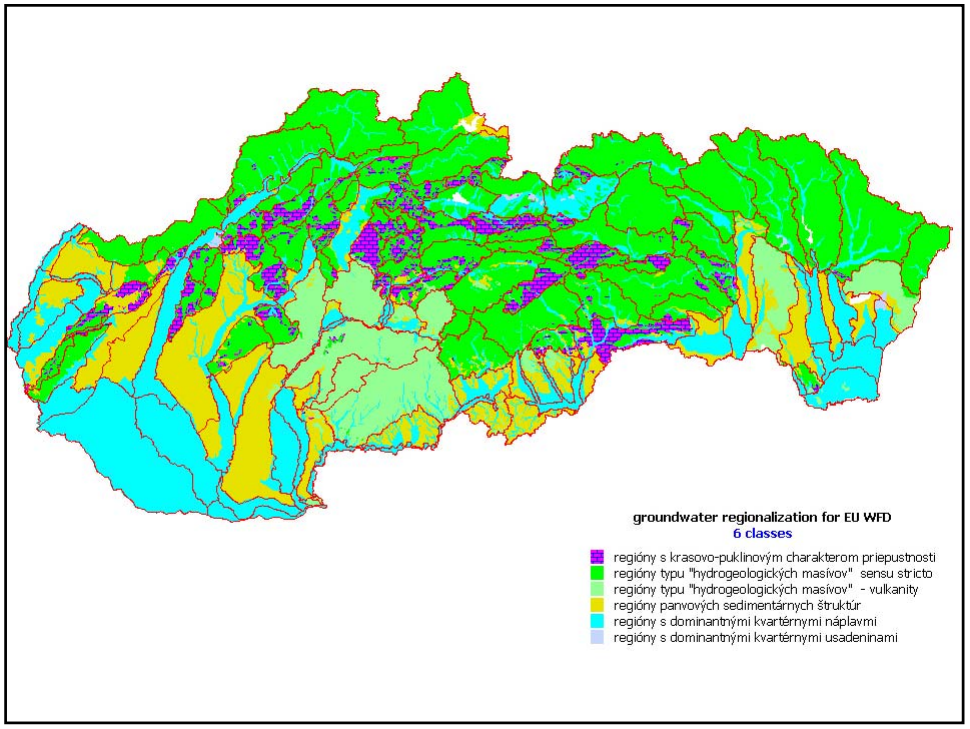
  TRY TO MAKE MAXIMAL EASIER GEOLOGY A HYDROGEOLOGY
  ACCORDING WITH HORIZONTAL QUIDANCE „WATER BODIES“

  GROUNDWATER – GEOTHERMAL WATER

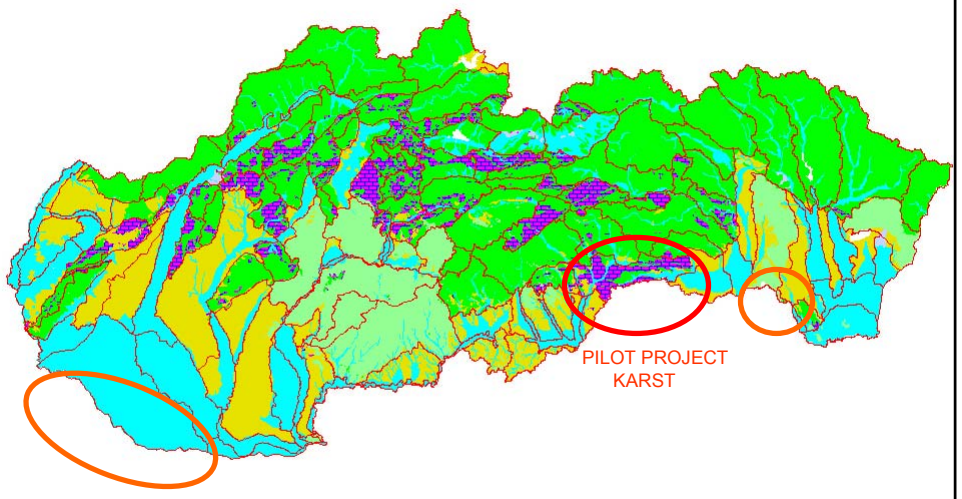
  ESTIMATION THE AREAS WITH MULTIAQUIFER IMPORTANCE

- 2D GROUNDWATER QUALITY MAPS (on progress)
- MAPS OF SOIL DEPOSITS (on progress)
- GIS DATABASE OF GROUNDWATER ABSTRACTION
- PILOT PROJECT SLOVENSKÝ KRAS – AGGTELEK KARST

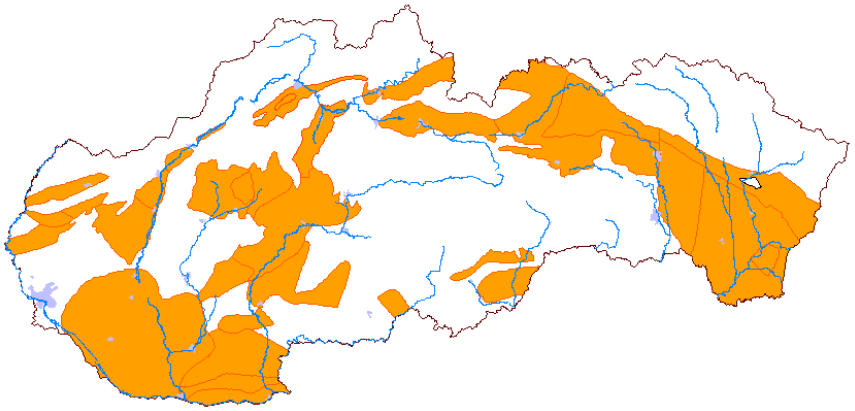




TRANSBOUNDARY GROUNDWATER AREAS



MAP OF SELECTED 27 GEOTHERMAL AREAS



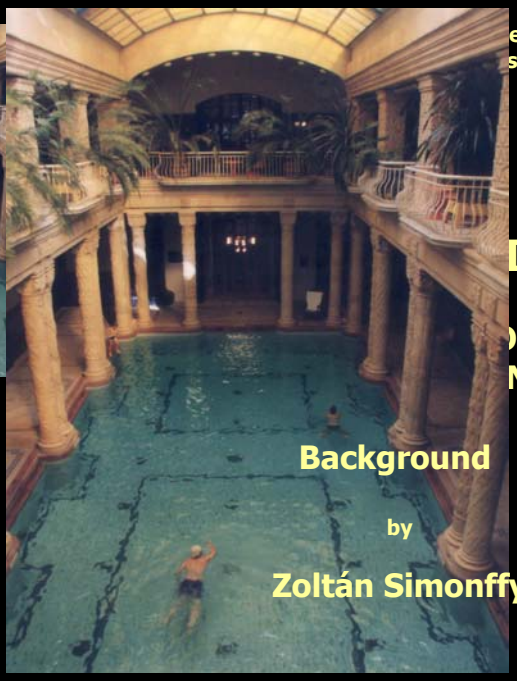
Annex 18: Serbia and Montenegro – country presentation

CURRENT STATE OF DELIMITATION OF GW-BODIES IN SERBIA and MONTE NEGRO

(Reported by Ms. Nada Lazic on 2nd Groundwater Workshop, Budapest 12 May,2003)

1. Several studies related to characterisation of GW-bodies for quantity and quality status assessment have been prepared up to now. In the Study on Ground Water prepared by the Institute for Water Resources "Jaroslav Cerni" characterisation of GW-bodies in the territory of Vojvodina is defined.
2. From the water utilization point of view, the most significant is the so-called "basic water-bearing formation" stretching up to the edges of the Pannonian basin. This aquifer is being recharged from the direction of the northern and eastern boundary of the Pannonian basin. Recharge rate from the western and southern direction is insignificant.
3. "Pliocene" aquifer is also of relative significance for utilization, but to much lesser extent.
4. Water use from the first aquifer involves, for the most part, withdrawal of water from alluvial aquifers along the banks of the Danube, Sava and Drina rivers. Taking into account water yielding capabilities of these aquifers and relatively simple water treatment processes required, Water Management Master Plan provides for their larger utilization. In order to achieve this, however, wastewater treatment is needed to ensure protection of layers and surface bodies, as these aquifers are exposed to primary pollution.
5. Groundwater monitoring is performed mostly for the local needs. Scope of organised monitoring network is unsatisfactory.
6. Transboundary cooperation, if any, is not of satisfactory scope and quality.
7. Up to now, no important steps have been taken towards WFD pilot implementation in transboundary aquifers.
8. Funding issues and undefined legal status of water sector in Serbia and Montenegro represent yet another obstacle to the WFD implementation.
9. We, for our side, are ready and willing for an open cooperation in all areas of WFD implementation.
10. Recently, an initiative for drafting and enactment of the new Water Law has been taken to provide clear and consistent legal framework for water sector.
11. An initiative for the preparation of the National Programme related to management, protection and use of waters in Serbia and WFD implementation has been forwarded to the Vojvodina Provincial Government.

Annex 19: GW-Questionnaire - background



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NDWATER

Background

by

Zoltán Simonffy

Aim of the questionnaire

To collect information

- on the applied methodology and
- on the available information

In order to

- exchange experiences
- harmonize the methodology
  (especially which are relevent for transboundary level)

Structure of the questionnaire

Three parts, related to our actual tasks:

A. **Identification of water bodies**

B. **Characterisation of water bodies**

C. **Preparation of the monitoring**

Aspects considered

Horizontal guidance on water bodies

IMPRESS Guideline

Our practical problems

Identification of water bodies

According to the horizontal guidance:

- Geological boundaries
- Hydraulic boundaries
- Other aspects
  - Fitting to the boundary of river basins or sub-basins
  - Vertical separation (depth, temperature, aquifers)
  - Grouping
  - To treat critical status

Identification of water bodies

Appropriate scale?

Different problems ←→ one structure of water bodies

Transboundary negotiation:

for common problems: mostly quantity,
perhaps diffuse pollution

Characterisation of bodies of groundwater

Pressures:

Available information on:

- diffuse and point sources of pollution,
- modification of recharge conditions,
- groundwater abstraction

Impact assessment:

Classification of water bodies or part of the water bodies at risk of failing good quantitative and chemical status

Characterisation of bodies of groundwater

Quantitative status

Estimation of available groundwater resources
or
Evaluation of changes in groundwater levels

Identification of

- surface waters directly dependent from groundwater
- groundwater dependent terrestrial ecosystems

ecosystems? → scale problems

Characterisation of bodies of groundwater

Chemical status

based on:

- existing data
- additional survey (?? IMPRESS)
- preliminary screening

(significant pressure + vulnerability)

Characterisation of bodies of groundwater

Preliminary and further characterisation (WFD or IMPRESS?)

What is the appropriate detail of pressure-analysis?

How to deal with lack of information?

How to combine the characterisation for transboundary water bodies?

How to harmonize the characterisation for the roof report?

Monitoring

Existing monitoring

- quantity
- quality (for surveillance and operative monitoring?)

Necessary development

- number of wells, investment + operational cost
- realistic/optimistic approach

Aims:

- comparison,
- planninig co-ordination and support (?)

A missing question: transboundary monitoring

Some conclusions:

The implementation of the WFD for the countries is mainly a task

of adaptation the existing structure, knowledge and information,

considering new requirements

The applied methodology would have secondary importance if we were able to satisfy the requirements

The problem identification at transboundary level would have priority

Good examples of approaches or methodologies in the case of new challenges is very useful

The questionnaire was prepared with the participation of:

Mr. Jens Jedlitschka

and

Dr. László Balásházy

Annex 20: GW-Questionnaire – original template

IMPLEMENTATION OF THE EU WATER FRAMEWORK DIRECTIVE
Questionnaire for an overview of countries' activities in the field of groundwater

A. Identification (delineation) of bodies of groundwater

Question	Answer(1)	Details
Is the map of groundwater bodies available?	Yes / No	If yes, please attach it,
What levels of the hierarchical approach (Horizontal Guidance on „Water Bodies") have been applied:		
Geological boundaries	Yes / No	if yes, further info on the methodology, resulting number of water bodies
Hydraulic boundaries	Yes / No	if yes, further info on type of boundary, resulting number of water bodies
Is the shallow aquifer separated?	Yes / No	if yes, further info on criteria and resulting number of water bodies
Are aquifers of a strata identified separately or merged together with aquitars in one water body?	Separately / merged	further details: explanations and resulting number of water bodies
Are the thermal aquifers separated?	Yes / No	if yes, info on applied temperature limit or other criteria, resulting number of water bodies
How will the parts of water bodies in critical conditions be treated (i.e. where achievement of the good quantitative and/or qualitative status is risky)?	as separate water bodies/ as sub-water bodies	Remarks (how many new water bodies and / or sub-bodies are expected?)
Are all groundwater attached to a groundwater body?	Yes /No	If not, which groundwater is excluded
How large are groundwater bodies?	From … to (km2)	
How is the connection of bodies of groundwater treated with surface water bodies.	At river basin district level (requirement of art. 3.1 of WFD) or lower level (e.g. sub-catchment or units)	Remarks
Are bodies of groundwater grouped?	Yes / No	Reasons
Are transboundary bodies of groundwater selected and identified?	Yes / No	If yes, please attach the list and/or the map

(1) Please underline the appropriate answer

B. Characterisation of bodies of groundwaters

Please comment in general the lists of tasks for initial characterisation in IMPRESS (3.10. Review of groundwater – see annex). According to this table: *further characterisation practically replicates the initial characterisation for water bodies (or part of water bodies) in risk, but based on additional data and more sophisticated analysis techniques.* It implicitly means, that information listed in Annex II. 2.2. is not necessarily to be collected for each water bodies in risk, or some of them are used during the initial characterisation.

Question	Answer	Details
Identification of pressures		
Is information available for the characterisation of diffuse sources?	Yes / No	If yes, please give details (in comparison with the requirements of Annex II. 2.3. g). Is it in computerised database? Is it complete? Maps?
Does the inventory of point sources of pollution exist (inc. inventory of contaminated sites) ?	Yes / No	Same as above, but compared with Annex II. 2.3. d., e., f.
Does the inventory of groundwater abstraction exist?	Yes / No	Same as above .. but compared with Annex II, 2.3. a., b., c.
Does the inventory of human activity modifying recharge conditions exist (drainage, artificial recharge, injection, land sealing, damming..)?	Yes / No	Same as above .. compared with Annex II. 2.3. g.
When are surface water ecosystems or terrestrial ecosystems directly dependent of groundwater bodies?		Comments on available information and /or on applied methodology

B. Characterisation of bodies of groundwaters (cont.)

Question	Answer	Details
Assessment of impact of human activities on the status of groundwater. Preliminary risk assessment of failing to achieve good status.		
How will the significance of the impact of a pollution source (human activity) be determined? a) point sources b) diffuse sources	 Threshold values / other Threshold values / other	Short description of the methodology
Does vulnerability mapping exist for the country?	Yes / No	If yes, short description of the methodology If no, what kind of basic geological and hidrogeological data are available? To be compared with the needs listed in Annex II., 2.2. !
How will water bodies (or parts of water bodies) be classified at risk of failing good chemical status?	Based on monitoring data and/or using other information	How do the existing monitoring data cover the requirements for direct evaluation? Classification by components or in an integrated way If monitoring data are not available, which approach will be applied?
How will water bodies (or parts of water bodies) be classified at risk of failing good quantitative status"?	By estimating the available water resources Without estimating the available water resources by evaluation of changes in groundwater levels	Is the conceptual model approach of IMPRESS (chapter 3.7) acceptable? Estimation of water balance? What kind of background information exists for estimation of average recharge and impact on the dependent ecosystems (decreasing base flow and/or evapotranspiration or changing quality)? To be compared with the needs listed in Annex II. 2.2.! If the classification is based on indirect evaluation, what kind of approach (method) will be used?
Is additional monitoring planned if the available information allows only very uncertain classification?	Yes / No	If yes, what kind of measures are planned? Estimated costs?

C. Monitoring

Please attach available maps of the existing network.

Element of the monitoring	***Actual situation***		***Necessary development (realistic/optimistic approach)***	
	number of wells frequency/component	**operational cost** (million Euro)	**number of wells frequency/component**	**Investment + operational cost** [3] (million Euro)
observation wells for water levels				
In shallow aquifer				
In conf. porous aquifers[1]				
in karstic aquifers				
in fissured rocks				
discharge of springs				
observation wells for quality [2]				
In shallow aquifer Considered as surveillance monitoring: as operational monitoring:				
In conf. porous aquifers[1] Considered as surveillance monitoring: as operational monitoring:				
in karstic aquifers Considered as surveillance monitoring: as operational monitoring:				
in fissured rocks Considered as surveillance monitoring: as operational monitoring:				
quality of sprigs Considered as surveillance monitoring: as operational monitoring:				
drinking water wells				
In shallow aquifer				
In conf. porous aquifers[1]				
In bank filtered aquifers				
in karstic aquifers				
in fissured rocks				

[1] grouped by category of depth (if possible)

[2] In the case of operational monitoring, please indicate the type of the monitored pollution source (as industrial, agricultural or communal, point or diffuse)

[3] If estimates of cost are available Please indicate the expected sources of financing too.

Which data are available in a computerised database?

How are the databases accessible?

What kind of processed results are available (maps, time series, statistics, reports, other periodicals..)

ANNEX.
IMPRESS, 3.10. Review for groundwater

Summary of key tasks for groundwater

Initial characterisation.

Using existing data:

· Collate data on pressures on the groundwater body, taking particular regard to those pressures listed under Annex II, 2, 2.1.

· Collate information on impacts on the groundwater, taking particular regard to those pressures listed under Annex II, 2, 2.1, and having special regard to the natural condition.

· Review existing groundwater monitoring data (chemical and water level), and data on dependent surface waters and ecosystems, having regard to the known pressures and impacts on the groundwater body, and the environmental objectives that are relevant to the body (Art. 4).

· Assess vulnerability of groundwater to pollution from the recorded pollution pressures, to assess whether the groundwater body is likely to be at risk of failing to achieve good chemical status.

· Assess the water balance of the groundwater body, having regard to the recorded quantitative pressures, to assess whether the groundwater body is likely to be at risk of failing to achieve good quantitative status.

· Consider possible relationships between the groundwater body and connected wetlands.

· Consider both chemical and quantitative status to decide whether the groundwater body is likely to be at risk of failing to achieve good status, including an assessment of time-lag of pollutants in aquifers.

· A review of the delineation of the groundwater body may be undertaken if the data on pressures and impacts indicates that it may be helpful to subdivide bodies for the purpose of developing a practical programme of measures. However, any subdivision should conform to the 'rules' on groundwater body definition contained within Commission guidance.

· The development of a conceptual model of the groundwater flow, which also incorporates flow to/from associated surface waters, and a model for the chemical system are recommended as the basis for understanding and documenting the groundwater body, and to aid decision making.

Where there are no monitoring data for a groundwater body, the likely presence or absence of pressures and impacts should be considered when making a decision of the likely status of the groundwater body. Where it is clear from monitoring data that the groundwater body is 'at risk', or where there is inadequate data to make a decision with reasonable confidence that a groundwater body is 'at risk', the process should continue to Further Characterisation.

Further characterisation

The key stages replicate Initial characterisation but relies on additional data and more sophisticated Analysis techniques

Annex 21: GW-Questionnaire – presentation of replies

Implementation of the WFD in the Danube River Basin

GW-Questionnaire – presentation of replies

2nd Groundwater Workshop

Budapest, May 12-13, 2003

Scheidleder, Lindinger, Grath – Federal Environment Agency - Austria

Umweltbundesamt

Introduction

Umweltbundesamt

- Questionnare developed by Mr Simonffy, Mr Bálasházy, Mr Jedlitschka
- 8 out of 13 countries replied (62 %)
- Missing: BA, YU, RO, MD, UA (≈ 50% of DRB-area)
- Answers often given with limiting remarks
- Y/N not unambiguous – not fully comparable
- Often unclear whether answers refer to whole country or DRB part

A.1 Identification of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Map of GW bodies	Y map	Y map	N	Y map	Y map	Y map	N	N
Applied level of hierarchical approach								
Geological boundaries	Y	Y	Y	Y	Y	Y	N	Y
Hydraulic boundaries	Y		Y	Y	N	Y	N	Y

A.2 Identification of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Shallow aquifers separated	Y	Y	Y	N	Y	Y	N	n.a. yet
Aquifers and aquitards **S**eparated or **M**erged	S	M	S/M	M	M	M	n.a.	M
Therm. aquifers separated	Y	Y	N	Y	Y	Y	N	Y

A.3 Identification of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Parts of GWB in critical conditions. Separate GWB or subbody	No sep.	sub	In progr.	risk zones	sub	both	sep.	sub
All GW attached to a GW body	N	N	Y	Y	Y	Y	Y	Y
Size of GW bodies (km²)	20-1 k	17-25 k	100-10 k	500-1.5 k	812-4.3 k	60-26.7 k	n.a. 2004	20-2 k

A.4 Identification of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
GW - SW body connection. Treatment level RB district? GW body assigned to RBD or lower level? (art 3.1)	Under disc.	Under requ. of EWN	groups of SW bodies and sub-catch-ments	RB or sub-RB	RBD	(sub)-RBD	RBD	sub-catch ment level

A.5 Identification of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Grouping of GW bodies	Y	Y	Y	Y	Y	Y		in disc.
Transbound. GW bodies identified	in disc.		N	Y	Y	Y	N	parti ally

B.1 Characterisation of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Information available for diffuse sources characterisation	Y	Y	Y	Y	N	Y	N	N
Inventory of								
point sources of pollution	Y	Y	Y	Y	Y	Y	N	Y
GW abstraction	Y	Y	Y	Y	Y	Y	Y	Y
human activity modifying recharge conditions	N	Y	N	N	Y	Y	Y	N

B.2 Characterisation of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
When are SW ecosystems or terr. ecosystem directly dependent of GW bodies	in disc.		intersect. between protected areas and relevant aquifers or important relation between SW and GW bodies	no method yet		Due to climatic cond.; spatial distr. of GW-abstr. ; regional flow system;		Info in "Plan of protection and Rational utilisation of waters" 2nd edition 2002

B.3 Characterisation of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Determination of significance of impact of pollution source by Threshold values / Other								
	from mon. data		in disc.		in disc.			from mon. data
point sources				exp. knowl edge	T	T	from mon. data	
diffuse sources		T for NO3 & pesti		T for N	T	T		

B.4 Characterisation of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Existence of vulnerability mapping	N	Y	Y	Y	N	Y	N	Y

B.5 Characterisation of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Classification of GW bodies at risk of failing good …								
chemical status	mon. data	mon data + imp. data	mon data + other info	mon data + other info	other info (mon data when availab le)	mon data + other info		integr. approach
quantitative status	level chan-ges		conc. model	level chan-ges		estim. availab. resource		estim. availab. resource

B.6 Characterisation of GW-bodies

Question	AT	BG	CZ	DE	HR	HU	SI	SK
Additional monitoring planned in case of too less information for classification	Y	Y	Y	N	N	Y		Y

C.1 Monitoring

Monitoring sites	AT	BG	CZ	DE	HR	HU	SI	SK
quantity sites costs - mio €	3077	381 0.024	1720	911	1032 0.55	2323 1.78	264	1521 0.25
quality sites costs - mio €	2050 1.5	205 0.08	325	~501	elab.	320 0.15	160	423 0.09
drinking water sites costs - mio €	incl.			partl. incl.	273	4830 2.43	oth. resp	106 0.03

D.1 Availability of data

	AT	BG	CZ	DE	HR	HU	SI	SK
which data in databases	all	chem data	all	all	most	all	GW levels and quality	all rep. in quest.
accessibility	on demand		through operato r	intra-net		diff. acc. legally regul.	through ministry	intra-net
available products	bi-annual reports	maps, time series, reports	all	all		maps, time series , stats	data, stats, reports	GIS, report, stats

Conclusion

- Good overview of progress & state in countries regarding WFD groundwater implementation
- Good basis for exchange of experience
- 50% of DRB-area missing
- Answers often given with limiting remarks – attched in final report
- Often unclear whether answers refer to whole country or DRB part

Thank you for your attention!

Annex 22: GW-Questionnaire – all replies

IMPLEMENTATION OF THE EU WATER FRAMEWORK DIRECTIVE
Questionnaire for an overview of countries' activities in the field of groundwater

A. Identification (delineation) of bodies of groundwater

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Is the map of GW- bodies available?	Yes See separate file	Yes for part of the GW bodies – 74, where MoEW has sampling sites map Is attached	No attached is map of hydrogeolog. zones	Yes	Yes Only large groundwater bodies	Yes	Yes Map was wade for experimental area in the Tisa-Somes basin	No We have almost finished the preparation of the special regulation on the ministerial level based on Horizontal Guidance on "Water Bodies".	No
What levels of the hierarchical approach (Horizontal Guidance on „Water Bodies") have been applied:									
Geological boundaries	Yes main geolog. zones represent groups of water bodies.	Yes We use geological and hydrgeological maps, their annexes and connected reports and a dictionary with official lithologic-stratigraphical units in Bulgaria. 135 groundwater bodies are identified on the basis of a.m. maps and reports.	Yes As basis of designation of GW-bodies hydrogeological zones will be used	Yes 70 shallow and 1 deep GW-body,	Yes 34 groundwater bodies	Yes Karstic and porous aquifers, Fissured rocks not finished	Yes 4 GW-bodies of Quaternary and Pannonian age , separated by thick impervious clay strata	No We have started with the preparation of some basic data regarding aquifers in 2002	Yes Mainly hydrogeological approach primary dividing alluvial sediments + lithology and stratigraphy
Hydraulic boundaries	Yes 66 "single GW-bodies" have hydraulic borders (=geolog. borders)		Yes	Yes as far as possible bodies follow river basins or sub-basins	No only for certain smaller areas.	Yes geological units of porous aquifers separated into 23 water bodies with down- and 21 with upward flow. In karstic aquifers geological means hydraulic boundary	Yes Groundwater highs in the case of shallow aquifer	No We have started with the preparation of some basic data regarding aquifers in 2002	Yes Partially in basinal sedimental structure

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Is the shallow aquifer separated?	Yes bottom of the first shallow water body is the end of the recent water circle or the first main aquitard	Yes Where it is possible to divide quaternary deposits for example the valleys along the river Danube, and alluvial deposits of other rivers – 27 groundwater bodies are separated	Yes	No with one exception (thermal aquifer Malm)	Yes In areas with intergranular porosity, vertical limits are temperature and total mineralization	Yes upper 20 m of the porous aquifers are separated as shallow groundwater bodies. 88 bodies	Yes Vulnerability and water quality of shallow aquifer are the criteria to separate it from confined aquifer	No Data are not available jet	Yes / No Not unified result yet
Are aquifers of a strata identified separately or merged together with aquitards in one water body?	Separately Shallow GW until first important aquitard	Merged The aquifers connected with covering layers are part of the gw body. All alluvial river deposits in Bulgaria (above 90%) are composed of two or three layers. Also all valleys along the river Danube are identified as gw bodies composed of two layers. The bottom one is built of gravel and sand; the upper one is built of clay, sandy clay and clayey sands. The groundwater table is situated in the upper layer. When the gw table is lowering it reaches the lower sandy -gravel layer.	Separately / merged often several collectors form one GW-body	Merged shallow aquifers in all parts of Bavaria; deeper aquifers attributed to the shallow GW-bodies	Merged	Merged Hungarian Plain with a deep multi-layer system characterised by several aquifers separated with aquitards. Linked hydraulically	Merged Water bodies which are multilayer aquifers and the aquitards within them are merged in the water body	Separately / merged Data are not available jet	merged
Are the thermal aquifers separated?	Yes deep GW is separated from shallow GW	will be Yes They are not separated till now, but will.	No Not yet	Yes One deep aquifer (used thermally) is separated	Yes more detailed data lacking for the major part of the territory.	Yes temp. limit value is 30°C; karstic aquifers: 7 units separated in 10 cold & 12 thermal bodies; porous aquifers: 4 thermal bodies	Yes Thermal water body is a very deep aquifer, temperature limit for separation is 23°C	No	Yes the proposal is 24 geothermal structures

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
How will the parts of water bodies in critical conditions be treated	No separation	as separate water bodies/ as sub-water bodies The personal opinion is that the gw-bodies in critical conditions will be treated as sub-bodies	Methodology is in process.	as risk zones relatively small parts of GW-bodies in critical condition shall be treated as hot spot	as sub-water bodies max. of appr. 20 relatively small sub-water bodies expected	as separate water bodies/ as sub-water bodies both possible chemical problems: risk zones	As sub-water bodies Different sub-bodies will be taken into account	as separate water bodies Data are not available yet	As sub-water bodies
Are all groundwater attached to a groundwater body?	No all shallow GW-attached, deep GW only when used	(No) Part of fissured groundwater is excluded	Yes	Yes exclusion possible according to art. 2 (11 and 12) WFD	Yes	Yes	Yes	Yes	Yes
How large are groundwater bodies?	20 – 1000 km², groups of GW-bodies may be larger	From 17 to 25000 (km2)	Expected from 10^2 – 10^4 km²	from about 500 to about 1500 km2	From 812 to 4261 km2.	Karstic: 60 – 6250 km2, Porous: 100 – 7250 km2 Porous thermal: 7300 – 26700 km2	1000 – 1300 km² in the experimental area	All the data will be available in 2004	If we take into consideration the background of delineation described above, the groundwater bodies would have the area between 20 – 2000 km²
How is the connection of bodies of groundwater treated with surface water bodies.	At river basin district level (art. 3.1 of WFD) or lower level (e.g. sub-catchment or units) Under discussion	At river basin district level (requirement of art. 3.1 of WFD) or lower level (e.g. sub-catchment or units) In general characteristics of gw bodies have been completed under requirements of the EUROWATERNET we indicate some of the connection with the river or with wetlands – indicate the name of the river	At river basin district level (art. 3.1 of WFD) or lower level (e.g. sub-catchment or units) At a level of groups of surface water bodies and sub-catchments	(requirement of art. 3.1 of WFD) or lower level (e.g. sub-catchment or units), at river basin or sub-basin level	At river basin district level Lack of data for more details	At (sub)-river basin district level (requirement of art. 3.1 of WFD)	At lower level (e.g. sub-catchment or units) Shallow aquifer is the only which has connections with the surface water	At river basin district level (requirement of art. 3.1 of WFD)	sub-catchment level

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Are bodies of groundwater grouped?	Yes Many small	Yes / No Under requirements of EUROWATERNET we determine porous media, karst and fissured bodies	Yes similar conditions	Yes they easily may follow river sub-basins	Yes unfinished	Yes For monitoring, for assessment of background characteristics; Risk zones	No		Still in discussion
Are transboundary bodies of groundwater selected and identified?	Under discussion		No Under preparation	Yes Cooperation with AT on the way	Yes Only partially	Yes	Yes RO has identified the transboundary aquifers and those at River Basin District limit	No	Yes / No Partially South East transboundary area (Hungary – Slovakia) Slovenský kras – Aggtelek project (In progress

B. Characterisation of bodies of groundwaters

Please comment in general the lists of tasks for initial characterisation in IMPRESS (3.10. Review of groundwater – see annex).
According to this table: *further characterisation practically replicates the initial characterisation for water bodies (or part of water bodies) in risk, but based on additional data and more sophisticated analysis techniques.* It implicitly means, that information listed in Annex II. 2.2. is not necessarily to be collected for each water bodies in risk, or some of them are used during the initial characterisation.

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Identification of pressures									
Is information available for the characterisation of diffuse sources?	Yes Corine landcover (agriculture) Settlement and urban areas	Yes We attached the map with nitrate concentration in groundwater	Yes N – most of data, nitrogen balance in soil, acidification. Digital maps + database available	Yes Computerised data exist and are in preparation for Land use, Nitrogen surplus. Monitoring data since long	No Data collection has begun recently	Yes Agriculture; wastewater and sewage sludge usage in agricultural areas; Info on land use: CORINE	Yes reorganisation of inventory in a computerised database is in progress	No	No
Does the inventory of point sources of pollution exist (inc. inventory of contaminated sites) ?	Yes inventory of contaminated sites exists.	Yes / No There are available Environment Impact Assessment reports and reports of Evaluation of Previous contaminations, but they are not systemised till now.	Yes not completed	Yes An inventory of contaminated sites with priorities exists	Yes constant monitoring of nearly all point source pollution (stored in data base)	Yes Inventory of activities jeopardising, polluting groundwater and geological medium (FAVI); Inventory of contaminated sites (KÁRINFO)	Yes In progress	No Some data already exist	Yes Only on regional scale – pilot area Michalovce district
Does the inventory of groundwater abstraction exist?	Yes completion is under discussion	Yes / No Same as above, but compared with Annex II, 2.3. a., b., c.	Yes Completed database of GW abstraction for abstractions over 500 m3/month or 6000 m3/year	Yes Authorised abstractions are registered in the County Offices	Yes b) and c) are incomplete.	Yes Practically complete for location, type of aquifer, licensed amount, yearly abstracted amounts, purpose, owner.	Yes In progress	Yes Some data already exist No data for GW abstraction for irrigation or industry	Yes The database of groundwater abstraction points, monthly and annual abstraction amount. (limit criterion : abstraction is higher than 1250 m^3 per month)

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Does the inventory of human activity modifying recharge conditions exist (drainage, artificial recharge, injection, land sealing, damming..)?	No not as an inventory	Yes / No Same as above .. compared with Annex II. 2.3. g.	No	No Only damming will be taken in account.	Yes Reconstruction and data update are under way.	Yes Inventory of the drain systems and the pumped amount of excess water is known at regional authority level.	Yes Inventory in progress	Yes Some data already exist	No
When are surface water ecosystems or terrestrial ecosystems directly dependent of groundwater bodies?	under discussion		Bodies with intersection between protected areas and relevant aquifers or important relation between surface and GW bodies identified.	Mapping of these ecosystems is on the way, the methodology will be soon available	Data only exist for some smaller areas.	Due to climatic conditions. Impacts will be handled at water body level while determining the available groundwater resources.			Available information is in document "Plan of protection and Rational utilization of waters" 2nd edition, 2002

B. Characterisation of bodies of groundwaters (cont.)

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Assessment of impact of human activities on the status of groundwater. Preliminary risk assessment of failing to achieve good status.									
How will the significance of the impact of a pollution source (human activity) be determined? a) point sources b) diffuse sources	Derived from monitoring data	For nitrate content and pesticide content we compare with threshold values	Methodology is in process.	a) Hot spots only using expert knowledge b) Threshold values for nitrogen (proposal: 40 kg/ha a Nitrogen surplus) under consideration	a) Threshold values b) Threshold values Elaboration of methodology is currently under way.	a) Threshold values b) Threshold values To obtain permission for carrying out activities investigation (in the case of new activities) or environmental audit has to be carried out. Manure deposits: Nitrate Directive; Nutrients in agriculture: value corresponding to good agricultural practice.	a) Threshold values b) Threshold values EC methodology adaptation and implementation is in progress	a) GW monitoring at point source pollution Threshold values / other Threshold values / other	Groundwater quality is assessed according to Slovak national standard "STN 75 7111 Drinking waters". The standard defines limit values for variety of chemical and biological determinants. Anthropogenic activities impact is assessed based on presence of indicative chemical compounds and microbiological determinants (specific organic compounds, Nitrate, faecal streptococci etc.)

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Does vulnerability mapping exist for the country?	No Geological, hydrological, soil maps exist.	Yes The map was made in 1981, and was in Scale 1:200000. It was made on the basis of geological and hydrogeological conditions, permeability of the unsaturated zone, availability of karst and tectonic zones. 7 categories of vulnerability are divided. Now we have only the report for this map. The map is available in NIMH to the Bulgarian Academy of science. We also have geological map of Bulgaria in scale 1:500 000 and 1:100 000 and hydrogeological maps in different scales.	Yes	Yes in preparation, methodology after Hölting 1995	No Under way. The most suitable methodology is being selected in the karst area.	Yes "sensitivity map" groups the Hungarian territory in three classes: A: nature conservation area with high priority B: nature conservation area with secondary priority C: other areas	As first step were determined the intrinsic vulnerable areas of the shallow aquifers taking into account the thickness of the lithology of covering deposits, the mean depth and the amplitude of the piezometric level variations	No	Yes Partially In scale 1:200 000 only 40 % of Slovakia is covered. The evaluation is based on simplified methodology that used 2 parameters: k_f and groundwater level (" actual qualitative vulnerability"). The application of European Approach of vulnerability evaluation is only in 4 pilot regions (scale 1 : 50 000)

Question	AT	BG	CZ	DE	HR	HU	RO	SI	SK
How will water bodies (or parts of water bodies) be classified at risk of failing good chemical status?	Based on monitoring data; classification by components	We will use the monitoring data and available impact data	Based on monitoring data and/or using other information necessary to combine monitoring data and assessment of impacts and pressures in all cases to prepare classification in an integrated way.	other information Nitrogen surplus and land use in combination with a threshold value; Monitoring data will play a decisive role; classification in an integrated way approach: estimation	other information Change of methodology is planned after the establishment of monitoring. The approach to be applied will be based on vulnerability and available data about polluter.	Based on monitoring data and/or using other information basic quality data from wells in safeguarding zones; data from national groundwater quality network, KÁRINFO and FAVI. 1999-2001: Survey on the nitrate content of groundwaters. For classification no adopted method yet. Approach: defining risk zones	Monitoring data with some exceptions cover the requirements for direct evaluation. Classification will be made by components.		Classification by an integrated way
How will water bodies (or parts of water bodies) be classified at risk of failing good quantitative status"?	by evaluation of changes in groundwater levels		Conceptual model is only possible for the classification. CR has sophisticated model for quantitive assessment	by evaluation of changes in groundwater levels Quantitative status is documented by changes in groundwater levels.	by evaluation of changes in groundwater levels	By estimating the available water resources evaluation of changes in groundwater levels only as preliminary screening	By estimating the available water resources A conceptual model approach is considered		By estimating the available water resources Present status : each hydrogeological region has the quantification of utilizable (exploitable) amount of groundwater
Is additional monitoring planned if the available information allows only very uncertain classification?	Yes question too early	Yes / No local monitoring networks have to start working? To revise the available National monitoring network → Dutch project 2003-2004, will suggest additional monitoring points	Yes Monitoring of significant pollution sources and GW level of important abstraction sites	No	No establishment of the monitoring of groundwater quality under way	Yes For Springs, representative agricultural areas and settlements, costs ~1.8 mio € Regular monitoring of point sources in progress and regular monitoring related to contaminated sites	Yes Adaptation of monitoring system will cost 1.500000 Euro.		Yes Supplementary monitoring in areas not covered by existing state monitoring programmes

Assessment of impact of human activities on the status of groundwater.

C. Monitoring

Please attach available maps of the existing network.

Element of the monitoring	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Observation wells for water levels		47 664 leva(for 2001 year		About 600 (230 of that planned)					826 H,T – weekly 322 H,T – daily 0,2* (* 1 EUR = 42 SKK)
In shallow aquifer	3000; cost not available	182 /gw level/(10-365 times/year)	total in all categories 1720 of which in shallow aquifers1475	About 300	715; automatic or 2x/week) 0.35 million Euro; Novelation under way	1640; 1.30 milion euro;	3528 3 days, piezometric levels 0.2 million Euro	138 continuous or weekly/ GW level, T	642, develop app 750
In conf. porous aquifers(1)	2; cost not available	28/gw level or discharge/(9-12 times/year		About 400	225; automatic or 2x/week; 0.114 million Euro; Novelation under way	380; 0.26 milion euro;		/	450, develop app 500
in karstic aquifers	---	44 gw level or discharge /(7-365times/year)		About 60	52; 2x/week; 0.035 million Euro; novelation under way	250; 0.17 milion euro;		63 continuous or dayly/ GW levels, T	22, develop app 100
in fissured rocks	---	30 gw level or discharge /(9-365times/year)		about 140		3; 0.01milion euro;			34, develop app 100
discharge of springs	75 springs monitored	35 springs/discharge/365 times/year and 62 springs /95-12 times per year	402	about 11, additionally a large number of drinking water springs	40; 0.05 million Euro, Novelation under way	50; 0.04 milion euro;		63	305 Q,T - weekly 68 Q,T – daily 0,05*, develop app 500
observation wells for quality (2)	1.5 million euro for the whole quality program				Methodology of establishing surveillance monitoring is being elaborated				423 Chem. status – 1-4/year 0,07*, develop App 1200 (all types of monitoring sites)

Element of the monitoring	AT	BG	CZ	DE	HR	HU	RO	SI	SK
In shallow aquifer Considered as surveillance monitoring: as operational monitoring:	1700 / 1700	113(2-4 times/year basic program; 1 time/year heavy metals; 32 sampl.sites/ 1 time/year pesticides (for 2002) for chemical analyse for year 200? 156 540 leva without travel expense	total in all categories 325	about 200		170 /6/ (general) with 0.08 million euro operational cost; 100 /8/ (diff. agr.) with 0,05 million euro operational costs	Surv: 1268 4 times a year / 18 components Operat: 373 Industrial and waste disposal sites 0.5 million Euro	83 twice a year / 90 parameters 0,243 million Euro	350
In conf. porous aquifers(1) Considered as surveillance monitoring: as operational monitoring:		35(2-4 times/year basic program; 1 time/year heavy metals; 5 sampl.sites/ 1 time/year pesticides (for 2002)		about 160		150 /5/ (general) with 0,07 million Euro operational cost		1 twice a year / 90 parameters	
in karstic aquifers Considered as surveillance monitoring: as operational monitoring:	0 0	31(2-4 times/year basic program; 1 time/year heavy metals; 12 sampl.sites/1 time/year pesticides (for 2002)		about 23				6 – every year, 70 – periodically once a year / 170 paramet.	25
in fissured rocks Considered as surveillance monitoring: as operational monitoring:	100 / 100	6 (2-4 times/year basic program; 1 time/year heavy metals;		about 92					58
quality of springs Considered as surveillance monitoring: as operational monitoring:	250 / 250	20(2-4 times/year basic program; 1 time/year heavy metals; 9 sampl.sites/1 time/year pesticides (for 2002)	137	about 26	33; 0.4 mio €				36 Chem. status – 1/year 0,02*

Element of the monitoring	**AT**	**BG**	**CZ**	**DE**	**HR**	**HU**	**RO**	**SI**	**SK**
drinking water wells	Not separately observed (incl. in the other programs)		Data will be available this year for the first time.	only partly included into monitoring (large number)	In the Black Sea catchment area there are 273 wells, but evidence is not kept either for the total number or type of wells.			responsibility of Ministry of Health and National Institute of Public Health	106 Chem. status – 1-4/year 0,03*
In shallow aquifer						340			69
In conf. porous aquifers(1)						3210 1.30 million Euro			
In bank filtered aquifers						1000; 0.70 million Euro			
in karstic aquifers						200; 0.15 million Euro			16
in fissured rocks						80; 0.06 million Euro			21
Observation wells in the safeguarding zones of vulnerable groundwater resources						2870 wells 1-1.3 mio €			
Necessary development									
Element of monitoring	**AT**	**BG**	**CZ**	**DE**	**HR**	**HU**		**SI**	**SK**
Observation wells for water levels (+ discharge of springs)		Will be assessed under Dutch Project			reformation of monitoring network is under way	425-860 wells inv: 1.92-3.84 mio € op: 0.33-0.56 mio €			~1950 wells and springs
Observation wells for quality	Under discussion in conf. porous aquifers	Will be assessed under Dutch Project				Plans are made Inv: ~0.8 mio € Op: 1.3-1.6 mio €			
Quality of springs						Op: 0.1-0.2 mio €			

Element of the monitoring	AT	BG	CZ	DE	HR	HU	RO	SI	SK
Drinking water wells						Op: 1-1.2 mio €			
Wells in safeguarding zones of vulnerable gwresources						Inv: 3-3.5 mio € Op: 2-2.4 mio €			

(1) grouped by category of depth (if possible)

(2) In the case of operational monitoring, please indicate the type of the monitored pollution source (as industrial, agricultural or communal, point or diffuse)

(3) If estimates of cost are available Please indicate the expected sources of financing too.

Austria: All data available in a computerised database. Accessible on demand, incl. electronic delivery. Biannual reports

BG: The data from chemical status are available in computerised database. They have maps, time series, annual reports, quarterly reports.

Czech Republic: All data available in a computerised database. Accessible through the operator – the national monitoring network and databases are operated by the Czech Hydrometeorological Institute.

DE: All data available in a computerised database. Accessible by Intranet. All components available.

HR: Most data is available through individual data bases. The development of Water Information System has begun for the purpose of integration of all data.

HU: Practically all data available (database periodically renewed). Hydrological databases are available at the Water Resources Research Centre (VITUKI) - background institution of the Ministry of Environment and Water. Some groundwater level and quality data can be found at the Geological Survey as well. FAVI and KÁRINFO databases are available at Environmental Management Institute (KGI). In general the accessibility is legally regulated. In other cases data or reports are accessible through permit of the Ministry**.** Maps, time series and statistics made for the Ministry can be found in reports. E. g. annual assessment of the groundwater - an obligation by the Water Act of 1995 - and Data on Hungarian Environment – annual report on behalf of the Environment Act. New periodical is planned for assessment of groundwater in Hungary in every 6 years.

RO: geological, hydrogeological and technical data of the monitoring wells, piezometric levels, pumping test data and chemical data are available in a computerised database. Databases are accessible by internet with password. Geological maps, hydrogeological maps, groundwater resources maps, hydrochemical maps, time series graphs, reports etc. are available results.

SI: Data for GW levels and GW quality are available in a computerised database. Accessible through Ministry of Environment, Physical Planning and Energy. Available are GW quantity and quality: network, monitoring results, statistical evaluations, report (mostly Slovene language).

SK: all data reported in the questionnaire are available. Databases are operated by administrators and are accessible by responsible experts (SHMI staff) via intranet of SHMI. Data are provided to all users based on their request addressed to the Hydrological Service. Available are Special maps - outputs from GIS, annual reports (include maps, and basic statistics).

Remarks

BG:

The monitoring sampling sites from National monitoring network in Bulgaria for quality gw status now are 205 (in 1997 they were 225 and about 20 points are removed because destroying, filling with stones etc.) and we put them as surveillance monitoring now , despite of the fact that part of them are points for drinking water supply.

The geological and hydrogeological conditions in Bulgaria are very different. And aquifers vary by type – porous, carst, fissured and also carst-fissured (Lower Cretaceous sediments), carst –porous (for example lower Eocene aquifer in North-East Bulgaria – different formations with – sands, clayey sands, sandstones, numulitic limestones), fissured-porous (for example Upper Cretaceous in South-East Bulgaria – volcanic-sedimentary formation – andesites, dacites, andesitobasalts in extrusive, explosive and subvolcanic facies with rare sediments; flish etc.). Also aquifers vary by hydraulic character – confined and unconfined. We have shallow aquifers in carst and in fissured rocks – in these cases we divided them in the groups of carst and fissured aquifers.

So it is very difficult in Bulgarian hydrogeological conditions to follow the a.m. given classification of groundwater monitoring points.

From another side part of our boreholes are in shallow unconfined quaternary aquifers and in confined Pliocene porous aquifers and in this case we consider them as confined porous aquifers and this is not very correct. May be in future these points must to be replaced by other ones?

CZ: Annex Note 1)

As basis for designation of groundwater bodies hydrogeological (HG) zones will be used, defined as balance units for quantitative assessment of groundwater. Hydrogeological zones cover the whole territory of CR and possess certain homogeneity within their boundaries: a HG zone is a territory with similar hydrogeological conditions where certain type of aquifer flow and groundwater discharge prevails. Boundaries of the zones are defined according to the type of geological structure as combination of types of boundaries – boundary of a hydrogeological structure, significant geological faults, hydraulic lines, basin boundaries. For designation of groundwater bodies it will be necessary to resolve the question of three-dimensional characteristics of the bodies – hydrogeological zones were designated in two dimensions. In practice it will require to distinguish significant collectors (for example significant Quaternary structures) the boundaries of which will often be independent of boundaries of hydrogeological zones. Often several collectors will form one groundwater body. Another criterion for designation of separate body will be the risk of failure to achieve the status both quantitative and chemical.

HR: Due to unavailability of data we are not in the position to complete the summary in the required terms. However, it is our intention to prepare individual parts (depending on available data) for the Workshop in May 2003.

SK: Slovakia is in the beginning of the process of delineation of groundwater bodies due with Horizontal Guidance dated 15.I. 2003. The background of the process represents the existing system of groundwater evaluation through "hydrogeological regions" established in 1980 (141 regions in Slovakia, from 22 km^2 to 1900 km^2).

The answers on the questions below reflect the preliminary theoretical persuasions of working group 2.8 for implementation WFD –"Evaluation and classification of groundwater in Slovakia".

Annex 23: Coordination requirements of the WFD

Coordination requirements of the WFD

Dr. Ursula Schmedtje
ICPDR Secretariat

Coordination requirements of the WFD

Where a river basin district extends beyond the territory of the Community:

"the Member States concerned shall endeavour to establish appropriate coordination with the relevant non-Member States, with the aim of achieving the objectives of this Directive throughout the river basin district." (Art. 3.5)

For coordination of the river basin management plan:

"The Member States shall endeavour to produce a single river basin management plan, and, where this is not possible, the plan shall at least cover the portion of the international river basin district lying within the territory of the Member State concerned." (Art. 13.3)

Countries in the Danube River Basin

- Germany
- Austria
- Czech Republic
- Slovak Republic
- Hungary
- Slovenia
- Bosnia-Herzegovina
- Croatia
- Yugoslavia
- Bulgaria
- Romania
- Moldova
- Ukraine

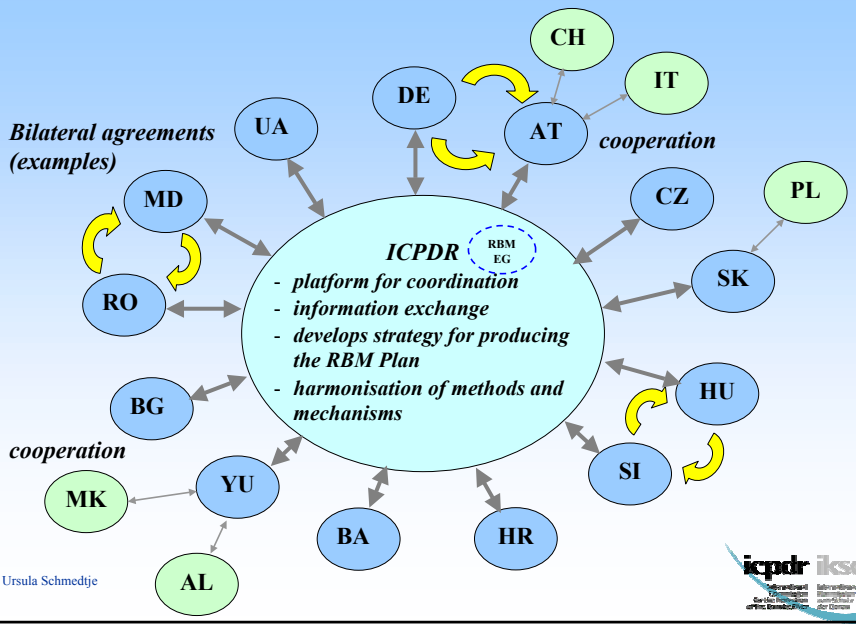
ICPDR

Small territories*:

- Switzerland
- Italy
- Poland
- Albania
- Macedonia

*areas less than 2000 km²

Coordination Mechanisms in the DRB

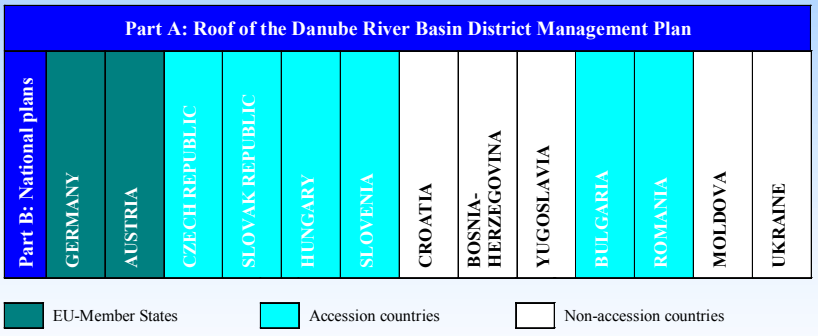


Levels of coordination

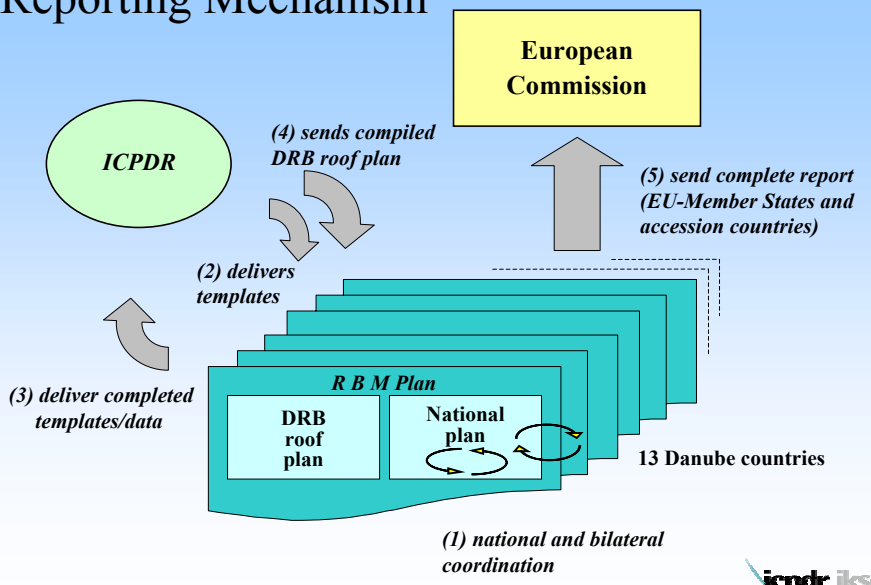
Level	Amount of coordination
• Danube river basin level	limit to the absolutely necessary *(issues affecting the whole DRBD)*
• Bilateral/multilateral level	a lot *(in case of transboundary effects)*
• National level	a lot *(for all issues regarding implementation)*

Report form for 2003 and 2004

consisting of 2 levels



Reporting Mechanism



Annex 24: Discussion Session

Implementation of the WFD in the Danube River Basin

Discussion session - Recommendations

2nd Groundwater Workshop

Budapest, May 12-13, 2003

Scheidleder, Lindinger, Grath – Federal Environment Agency - Austria

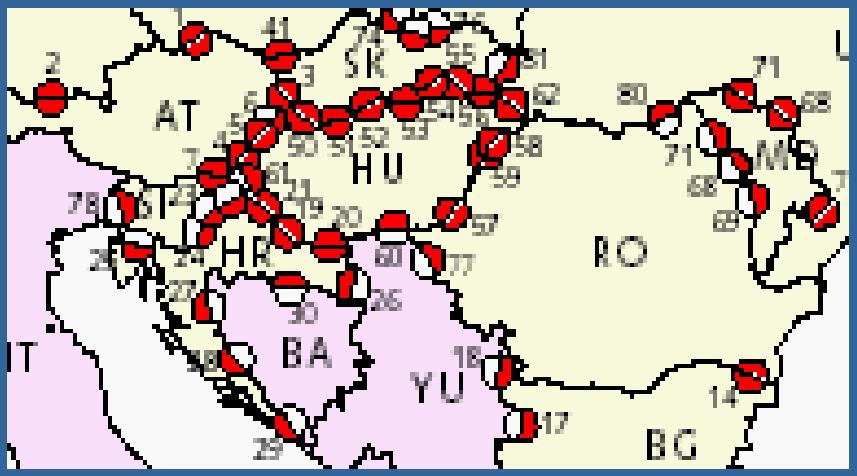
Umweltbundesamt

Structure of discussion

Umweltbundesamt

- Transb. GW-bodies subject of Roof Report
  - Definition of important transb. GW-bodies (CRITERIA)
  - Elements of characterisation of important transb. GW-bodies
  - Timeline
- Harmonisation needs for elements of Part B (national reports)

Transboundary aquifers



Source: UN/ECE, Inventory of transboundary GW-bodies

GW-bodies subject of Roof Report

CRITERIA for importance of transboundary GW-bodies

- Size ?
- Socio-economic importance ?
- Uses ?
- Impacts ?
- Pressures ?
- Interaction with aquatic eco-systems ?

GW-bodies subject of Roof Report

- CRITERIA for importance of transboundary GW-bodies
  - Big transboundary GW-bodies (> 4,000 km² and smaller but very important)
  - IMPORTANCE bilaterally agreed according to criteria

Information to be delivered for Part A

- Elements for the Roof Report on important transb. GW-bodies
  - GIS information (maps) – scale 1:4.5 mio, medium term 1:1 mio
    - GW experts will give guidance on content of Roof Report to GIS expert sub-group
  - Summary on initial/further characterisation / review of human activity on GW

Timeline

- Identification of GW-bodies and report to ICPDR
  - End of Nov 2003
- Data for map preparation (GIS layer)
  - End of Dec 2003
- Data delivery for summary
  - End of Jan 2004
- First draft April 2004
- First draft to standing WG June 2004
  - Recommendations for changes
- Ordinary meeting Nov 2004

Harmonisation needs for elements of Part B

- Delineation of GW-bodies ?
  - Not necessary
- Characterisation of GW-bodies ?
  - Pressure from diffuse pollution (nutrients and partly pesticides) handled by MONERIS, results available very soon (distributed to workshop participants)
- Definition of „significance" of the risk (Annex II, 2.2)
- Harmonisation not needed at the moment, further process might show some need

Harmonisation needs for elements of Part B

- Point sources of pollution
  - Not necessary
- Abstractions
  - > 10 m^3/day, all abstractions
- How to deal with missing information ?