Danube River Basin District Management Plan

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Part A – Basin-wide overview

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Disclaimer

The DRBM Plan is based on data delivered by the Danube countries by 14 September 2009. Where countries did not deliver data, other data sources have been used where available. Sources other than the competent authorities have been clearly identified in the Plan.

A more detailed level of information is presented in the national RBM Plans. Hence, the DRBM Plan should be read and interpreted in conjunction with the national RBM Plans. Where inconsistencies may have occurred, the national RBM Plans are likely to provide the more accurate information.

Due to the fact that Montenegro only joined the ICPDR in October 2008, the DRBM Plan does not include data from this country unless explicitly mentioned otherwise. Some other countries have also not been able to provide all the information needed for this report and these gaps are noted in the text. Where data has been made available, it has been dealt with, and is presented, to the best of our knowledge. Nevertheless inconsistencies cannot be ruled out.

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List of Acronyms

AA EQS	Annual Average Environmental Quality Standard
AEWS	Accident Emergency Warning System
AQC	Analytical Quality Control
ARS	Accidental Risk Spots
AWB	Artificial Water Body
BAP	Best Agricultural Practice
BAT	Best Available Techniques
BEP	Best Environmental Practice
BLS	Baseline Scenario
BOD_5	Biochemical Oxygen Demand
BQE	Biological Quality Element
BREF	Best Available Techniques Reference Documents (under the IPPC)
CAP	Common Agricultural Policy
CEE	Central and Eastern Europe
CEA	Cost Effectiveness Analysis
CIS	Common Implementation Strategy of the European Commission
COD	Chemical Oxygen Demand
DABLAS	Danube and Black Sea Task Force
DDT	Dichlordiphenyltrichlorethan
DEHP	di-(2-ethylhexyl)phthalate
DIN	Dissolved Inorganic Nitrogen
DBA	Danube Basin Analysis 2004
DRB	Danube River Basin
DRBD	Danube River Basin District
DRBM Plan	Danube River Basin District Management Plan
DRPC	Danube River Protection Convention
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EC GIG	Eastern Continental Geographical Intercalibration Group
EFI+	Improvement and Spatial extension of the European Fish Index (EU Framework Programme 7 project)
EG	Expert Group
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPER	European Pollutant Emission Register
E-PRTR	European Pollutant Release and Transfer Register
EQR	Ecological Quality Ratio
EQS	Environmental Quality Standard
EU	European Union
EU MS	European Union Member State
EU WISE	European Union Information System on Water
FAOSTAT	FAO (Food and Agriculture Organisation of the United Nations) Statistical Databases & Datasets
FIP	Future Infrastructure Project
FP	Framework Programme of the European Union
Non EU MS	Non European Union Member State
EU WFD	European Union Water Framework Directive

GDP	Gross Domestic Product
GEP	Good Ecological Potential
GES	Good Ecological Status
GFP	Good Farming Practices
GIG	Geographical Intercalibration Group
GSM	Global System for Mobile Communications
GW	Groundwater
GWB	Groundwater Body
HMWB	Heavily Modified Water Body
ICPDR	International Commission for the Protection of the Danube River
IPPC	Integrated Pollution Prevention and Control
JAP	Joint Action Programme
JDS	Joint Danube Survey
JPM	Joint Programme of Measures
LDM	Long Distance Migrants
MAC EQS	Maximum Admissible Concentration Environmental Quality Standard
MDM	Medium Distance Migrants
MONERIS	Modelling Nutrient Emissions in River Systems
MS	Member State
OCP	Organochlorinated Pesticides
PAH	Polyaromatic hydrocarbons
PBDEs	Polybrominated diphenylethers
PCB	Polychlorinated biphenyls
PCDD/Fs	Polychlorinated dibenzo-p-dioxins and dibenzofurans
PE	Population Equivalent
PI	Prioritisation Index
PIAC	Principal International Alert Centers
PRTR	Pollutant Release and Transfer Register
QA/QC	Quality Assurance/Quality Control
RBM	River Basin Management
REACH	EU regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals
SEA	Strategic Environmental Assessment
SPM	Suspended Particulate Material
SWMI	Significant Water Management Issue
TNMN	Transnational Monitoring Network
TOC	Total Organic Carbon
UWWTP	Urban Waste Water Treatment Plant
UWWTD	Urban Waste Water Treatment Directive
WB	Water Body
WWTP	Waste Water Treatment Plant

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1. Introduction and background

1.1. Introduction

The EU Water Framework Directive (WFD)[1] establishes a legal framework to protect and enhance the status of all waters and protected areas including water depending ecosystems, prevent their deterioration and ensure long-term, sustainable use of water resources. The Directive provides for an innovative approach for water management based on river basins, the natural geographical and hydrological units, and sets specific deadlines for EU Member States to produce Programmes of Measures and River Basin Management Plans. The WFD addresses inland surface waters (rivers and lakes), transitional waters, coastal waters, groundwater and, under specific conditions, water dependent terrestrial ecosystems and wetlands. It establishes several integrative principles for water management, including public participation in planning and the integration of economic approaches, and also aims for the integration of water management into other policy areas. The WFD calls for the creation of international districts for river basins that cover the territory of more than one EU Member State and for coordination of work in these districts. EU Member States should aim to achieve *good status* in all bodies of surface water and groundwater by 2015, respectively by 2027 at the latest.

The Danube and its tributaries, transitional waters, lakes, coastal waters and groundwater form the Danube River Basin District (DRBD – see Map 1). For the purpose of this Danube River Basin District Management Plan (DRBM Plan)[2], the DRBD has been defined as covering the Danube River Basin (DRB), the Black Sea coastal catchments in Romanian territory and the Black Sea coastal waters along the Romanian and partly Ukrainian coasts. All Danube countries with territories >2,000 km² in the DRB are Contracting Parties to the Danube River Protection Convention[3] (DRPC): Austria - AT, Bosnia and Herzegovina - BA, Bulgaria - BG, Croatia - HR, the Czech Republic - CZ, Germany - DE, Hungary - HU, Moldova - MD, Montenegro - ME, Romania - RO, the Republic of Serbia - RS, the Slovak Republic - SK, Slovenia - SI and Ukraine - UA. In addition, the European Community – EC - is a Contracting Party. Currently not all countries are EU Member States and therefore not obliged to fulfil the WFD. Six countries (BA, HR, MD, ME, RS and UA) are Non EU Member States (Non EU MS). Out of these Non EU MS, one country (HR) carries the status of an EU Accession Country.

When the WFD was adopted in October 2000, all countries cooperating under the DRPC decided to make all efforts to implement the Directive throughout the whole basin. The Non EU Member States committed themselves to implement the WFD within the frame of the DRPC. In the case of an international river basin district extending beyond the boundaries of the Community, WFD Article 13 (3) requires that "Member States shall endeavour to produce a single river basin management plan". In accordance with this Article, the Danube countries have developed the DRBM Plan entailing measures of basin-wide[4] importance as well as setting the framework for more detailed plans at the sub-basin and/or national level.

The DRPC represents the legal, as well as political, framework for cooperation and transboundary water management in the DRB. The International Commission for the Protection of the Danube River (ICPDR) served as the coordinating platform to compile multilateral and basin-wide issues at the "Roof level"[5] of the DRB and facilitated the compilation of this DRBM Plan (Part A) – see Figure 1.

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[1] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

[2] DRBM Plan stands for Danube River Basin **District** Management Plan.

[3] Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Sofia, 1994).

[4] A definition on the term *'basin-wide'* can be found in the ICPDR document IC 132 on Significant Water Management Issues in the DRB; page 4, Chapter 3.3.

[5] At the Roof level (Part A), the ICPDR agreed on common criteria for analysis related to the DRBM Plan as the basis to address transboundary water management issues. The level of detail of the Roof level (Part A) is lower than that used in the national Part B Plans of each EU MS.

1.2. The development of the DRBM Plan and the EU Water Framework Directive

This DRBM Plan has been elaborated within the framework of the first River Basin Management (RBM) Cycle according to the EU WFD, which lasts until 2015. The first cycle will be followed-up by two more RBM Cycles that will be finalised by 2021 and 2027, respectively.

According to the WFD, the first RBM Cycle follows four phases, each with defined tasks:

PHASE I: Definition of river basin districts; definition of the institutional framework and mechanisms for coordination (until end of 2003).

PHASE II: Analyses of river basin characteristics, pressures and impacts and economic analysis; establishment of the register of protected areas (until end of 2004).

PHASE III: Development of monitoring networks and programmes (until end of 2006).

PHASE IV: Development of the River Basin Management Plan including the Joint Programme of Measures (JPM) (until end of 2009).

The DRB is the "most international" river basin in the world covering territories of 19 countries. Those 14 countries with territories greater than 2,000 km² in the DRB cooperate in the framework of the ICPDR. With an area of 807,827 km², the DRBD is the second largest in Europe. Some of its basic characteristics are given in the following Table 1.

Table 1: Basic characteristics of the Danube River Basin District.

DRBD area	807,827 km^2
DRB area	801,463 km^2
Danube countries with catchment areas >2,000 km^2	**EU Member States** (8): Austria, Bulgaria, Czech Republic, Germany, Hungary, Slovak Republic, Slovenia, Romania. **EU Accession Country** (1)**:** Croatia **Non EU Member States** (5): Bosnia & Herzegovina, Moldova, Montenegro, Serbia and Ukraine.
Danube countries with catchment areas <2,000 km^2	**EU Member States** (2): Italy, Poland. **Non EU Member States** (3): Albania, FYR Macedonia, Switzerland.
Inhabitants	approx. 80,5 million
Length of Danube River	2,857 km
Average discharge	approx. 6,500 m^3/s (at the Danube mouth)
Key tributaries with catchment areas >4,000 km^2	Lech, Naab, Isar, Inn, Traun, Enns, March/Morava, Svratka, Thaya/Dyje, Raab/Rába, Vah, Hron, Ipel/Ipoly, Siò, Drau/Drava, Tysa/Tisza/Tisa, Sava, Timis/Tamiš, Velika Morava, Timok, Jiu, Iskar, Olt, Yantra, Arges, Ialomita, Siret, Prut.
Important lakes >100 km^2	Neusiedler See/Fertö-tó, Lake Balaton, Ozero Ialpug, Razim-Sinoe Lake System (Lacul Razim and Lacul Sinoe, which is also a transitional water body)
Important groundwater bodies	11 transboundary groundwater bodies of basin-wide importance are identified in the DRBD.
Important water uses and services	Water abstraction (industry, irrigation, household supply), drinking water supply, wastewater discharge (municipalities, industry), hydropower generation, , navigation, dredging and gravel exploitation, recreation, various ecosystem services.

The DRBD is not only characterised by its size and large number of countries but also by its diverse landscapes and the major socio-economic differences that exist between the upstream and downstream countries.

The DRBM Plan is based on three levels of coordination:

⇨ Part A: the international, basin-wide level - the Roof level;

⇨ Part B: the national level (managed through competent authorities[6]) and/or the internationally coordinated sub-basin level for selected sub-basins (Tisza, Sava, Prut and Danube Delta);

⇨ Part C: the sub-unit level, defined as management units in the national territory.

The information increases in detail from Part A to Parts B and C (see Figure 1).

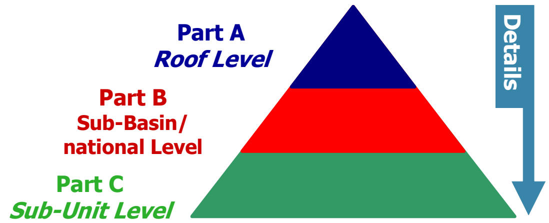


Figure 1: Overall structure of the DRBM Plan showing the increase of details from Part A to Parts B and C.

The investigations, analysis and findings of this DRBM Plan for the basin-wide scale (Roof level) focus on (see Map 1):

- rivers with catchment areas >4,000 km^2; [7]
- lakes >100 km^2;
- transitional and coastal waters;
- transboundary groundwater bodies of basin-wide importance.

Waters with smaller catchment and surface areas are part of the national RBM Plans.

The content of the DRBM Plan at the Roof level is strongly based on findings and actions at the national/sub-basin level. The national RBM Plans and Programme of Measures can be downloaded from the respective websites indicated in Annex 1. So far, the Danube countries have agreed to develop sub-basin management plans for the Danube Delta, the Tisza, the Sava and the Prut Basin, which are to be elaborated in a higher resolution than that used at the Roof level. The Tisza RBM Plan is currently being elaborated by the Tisza countries (UA, SK, HU, RO and RS) under coordination with the activities in the ICPDR and will be finalised in 2010. The International Sava River Basin Commission has finalised a Sava River Basin Analysis in 2009. RBM activities are currently initiated for the Danube Delta, whereas for the Prut River Basin activities still need to be developed.

In addition to the DRPC, many bilateral/multilateral agreements between individual countries are in place and enable transboundary cooperation below the Roof level. At the Roof level, the ICPDR serves as the facilitating and coordinating platform between the different DRPC Contracting Parties. Where the boundaries of the DRBD extend beyond the national borders of the countries cooperating under the DRPC (e.g. into Italy or Poland) it is the responsibility of the respective DRPC Contracting Parties to find an appropriate form of coordination with the relevant neighbours.

1.3. The Danube Basin Analysis 2004 – analytic basis for the DRBM Plan

The Danube Basin Analysis 2004 (DBA) reported the requirements under WFD Article 5 (Annexes II and III) and Article 6 (Annex IV) and was submitted to the European Commission in March 2005. The DRBM Plan fills the gaps and updates the findings of the DBA 2004.

Main tasks, conclusions and updates of the Danube Basin Analysis

The DBA included the first characterisation of surface waters and groundwater of the DRBD; an inventory of protected areas; an economic analysis and information on public participation as well as key conclusions and an outlook. As a first step of the DBA, **surface waters** of the DRBD were

[6] A list of competent authorities can be found in Annex 1.

[7] The scale for measures related to point source pollution is smaller and therefore more detailed.

generally characterised by ecoregions (see Map 2), a river typology and by defining reference conditions for the EU WFD biological quality elements (WFD Annex V). The typology for surface waters (rivers, transitional waters, lakes and coastal waters) has been updated for this DRBM Plan. 160 river types have been identified for the entire DRB and 10 types for the Danube River. Details on the revised typology of DRB surface waters form part of Annex 2.

Further, the DBA water body delineation, which is based on the respective EC WFD Common Implementation Strategy Guidance, has been revised. Water bodies are the basic management units according to the WFD. Therefore, all WFD assessments and activities (i.e. water status, final heavily modified water body designation, measures to improve status etc.) are linked to the unit of water bodies. Surface water bodies are discrete and significant elements of surface water (WFD Art. 2 (10)).

All Danube countries – except MD and ME - have performed water body delineations for surface waters (see Map 3) and groundwater (see Map 4.) For the DRBD rivers with catchment areas >4,000 km^2, 681 river water bodies (25,117 rkm) have been delineated in the DRBD. The Danube River itself is characterised by 45 water bodies. Further, seven lakes water bodies - one being transitional – have been delineated. The two UA lake water bodies Yalpug and Kurgului result together in a lake system with a surface area larger 100 km^2. Overall 7 transitional and 5 coastal water bodies have been identified. For each Danube country, Table 2 provides an overview of river water body (WB) totals; their relation to the overall DRBD WB total; their average length and the length of the national river network.

Table 2: Share of DRBD per country; percentage of state within the DRBD; DRBD population; water body delineation for all DRBD rivers with catchment areas >4000 km^2 and the Danube River.

Country	Share of DRBD (%)	Percentage of state within the DRBD (%)	Population in DRBD (in millions)	Length of national DRB river network	Number of water bodies (WB)		Share of all DRBD WBs (%)	Average national WB length (rkm)	
					All	Danube		All	Danube
DE	7.0	16.0	9.7	1,503	53[8]	15	7.1	28.4	37.7
AT	10.0	96.1	7.9	2,392	190	13	25.6	12.6	27.0
CZ	2.7	27.3	2.8	598	32	0	4.3	18.7	-
SK	5.8	96.0	5.2	1,811	45	4	6.1	40.2	43.4
HU	11.5	100.0	10.2	3,189	57	4	7.7	55.9	128.1
SI	2.0	81.1	1.8	834	25	0	3.4	33.4	-
HR	4.3	61,9	3.1	1,470	33	2	4.4	44.6	70.3
BA	4.7	74.9	2.9	1,602	35	0	4.7	45.8	-
ME	0.9	55.0	0.2	no information					
RS	10.1	92.8	7.5[9]	3,277	63[10]	10	8.5	52.0	77.0
RO	29.6	100.0	21.6	9,474	182[11]	7	24.5	52.1	370.8
BG	5.8	42.6	3.4	1,291	15	1	2.0	86.1	471.6
MD	1.5	36.2	1.1	837	no information				
UA	4.5	6.0	2.6	1,056	13	1	1.7	81.3	245.2
Total	**100[12]**		**80.5[13]**	**25,117[14]**	**681[15]**	**45[14]**	**100**	**38.4**	**85.8**

Danube River	WB number	Total length
	45	2,857[15]

[8] This value includes 2 artificial canal water bodies (Main-Danube Canal).
[9] This value does not include the population of Kosovo - a territory defined by the United Nations resolution 1244 (1999) as an autonomous province of the Republic of Serbia administered by the UN.
[10] This value includes 11 artificial canal water bodies (Danube-Tisa-Danube Canal System).
[11] This value includes 2 artificial canal water bodies (Danube-Black Sea Canal).
[12] This value includes the area of CH, IT, PL, AL and MK.
[13] This value includes the DRBD population share of CH, IT, PL, AL and MK.
[14] This value does exclude doublecounts regarding country shared river stretches and is therefore not the sum of individual river network lengths respectively number of water bodies per country in the table.
[15] This value does not include the length of thet Chilia and St. Gheorge Danube Delta branches.

The overall aim of the DBA's pressure/impact analysis was the identification/estimation of surface water bodies *at risk*, *possibly at risk* or *not at risk* of failing the WFD environmental objectives in 2015. Water bodies have been classified *possibly at risk* in the case of insufficient information or knowledge. During the pressure/impact analysis of the DBA, the results from WFD compliant monitoring networks and WFD compliant classification systems were not available. Therefore, the approach followed an interim procedure of risk estimation using pressure and impact criteria/thresholds for all anthropogenic pressures.

The 2004 analysis focused on anthropogenic pressures resulting from point and diffuse source pollution as well as from hydromorphological alterations. Other pressures/impacts were not identified in detail on the basin wide level but may be important on the more detailed national level.

Regarding the entire DRBD and its surface water bodies, the analysis showed an increase of water bodies *at risk* from upstream to downstream countries due to the pressure ***organic emissions***. Figure 2 illustrates this for the Danube River. The major cause was insufficient wastewater treatment – wastewater treatment either missing or inadequate - in the middle and lower DRB. The countries within the upper basin have already undertaken significant measures related to wastewater treatment during recent decades and have therefore succeeded in reducing negative impacts due to organic pollution on surface water status. Measures to be implemented by 2015 for the entire DRBD to reduce organic pollution are outlined in Chapter 7.

Regarding the pressure ***nutrient emissions***, the DBA showed a similar picture as for organic pollution i.e. the number of water bodies *at risk*, affected by significant pressures and eutrophication, increased from upstream to downstream countries for the Danube River (see Figure 2). The DBA presented modelling results for nutrient emissions in the DRB using the model MONERIS (Modelling Nutrient Emissions into River Systems[16]). Overall, nutrient loads in the DRB have significantly decreased over the past 20 years, although they are still well above the levels of the 1960s.

The pressures resulting from ***hazardous substance emissions*** also predominantly impacted water bodies within the middle and lower Danube River (see Figure 2). Pollution from hazardous substances was analysed as significant although the full extent could not be evaluated.

Hydromorphological pressures[17] were identified as impacting the majority of water bodies within the entire DRB. Water bodies within the upper, middle and lower basin were dominantly *at risk* or *possibly at risk* because of these pressures. The most important pressures were related to hydropower generation, flood protection and navigation. As a consequence, the number of water bodies identified provisionally as *heavily modified* was very high throughout the entire basin.

Figure 2 illustrates the results of the DBA according to the categorised pressures for the entire length of the Danube River itself. 58% of the Danube River length was categorised *at risk* due to organic pollution, 65% due to nutrient pollution and 74% due to hazardous substances. 93% of the Danube River was *at risk* or *possibly at risk* of failing the WFD environmental objectives because of hydromorphological alterations. In conclusion, large parts of the Danube River are subject to multiple pressures. For the entire DRBD, the distribution of pressures is similar.

[16] Modelling Nutrient Emissions into River Systems, Behrendt (2000).

[17] Hydromorphological pressures are human alterations to the natural form, shape or pattern of surface waters such as modification of bank structures, sediment/habitat composition, flow regime and slope and river continuity. The consequence of these pressures can impact aquatic ecological flora and fauna and can hence significantly impact the water status.

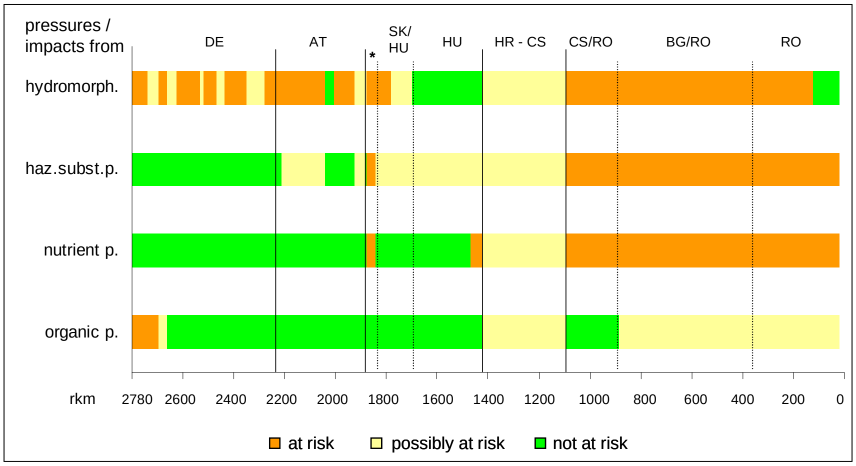


Figure 2: Results of the risk analysis for the entire Danube River length (DBA, 2004).[18] (*: SK territory).

Four of the 11 important transboundary **groundwater bodies** of the DRBD have been identified *not at risk* concerning chemical status. The remaining 7 groundwater bodies were *possibly at risk*. Related to groundwater quantity, it has been concluded that 6 of the transboundary groundwater bodies were *not at risk* and five *possibly at risk.*

The DBA enabled the identification of four Significant Water Management Issues (SWMI)[19] that can directly or indirectly affect the status of both surface water and transboundary groundwater[20]:

- Pollution by organic substances
- Pollution by nutrients
- Pollution by hazardous substances
- Hydromorphological alterations

1.4. Role of the Significant Water Management Issues

The DRBM Plan and the JPM clearly focus on these SWMIs. In addition, the important transboundary groundwater bodies are dealt with as a separate item. In particular, the identified significant pressures, status information and the JPM refer individually to each SWMI and groundwater. However, investigations have also been and will be undertaken to identify other relevant issues and their significance on the basin-wide scale. These include climate change, flood/drought events, sediment transport and invasive species.

For each SWMI and groundwater, visions and operational management objectives have been developed to guide the Danube countries and the DRBM Plan (see Chapter 7). The visions are based on shared values and describe the principle objectives for the DRBD with a long-term perspective. The respective management objectives describe the steps towards the environmental objectives in the DRBD in an explicit way - they are less detailed than at the national water body level and more detailed than expressed in the DRPC and Danube Declaration[21].

Overall, the visions and management objectives reflect the joint approach among all Danube countries and support the achievement of the WFD objectives in a very large, unique and heterogeneous European river basin.

[18] This figure is based on findings of the DBA 2004 and may include differences to final findings at the national level and/or to this DRBM Plan.

[19] ICPDR document IC 132 (2007): Significant Water Management Issues in the Danube River Basin District.

[20] Groundwater quality and quantity of important transboundary groundwater bodies.

[21] ICPDR document IC 089 (2004): The Danube Basin – Rivers in the Heart of Europe (Danube Declaration).

1.5. Structure and logic of the DRBM Plan

The nine chapters of this management plan follow the logic and requirements of the EU WFD. Further, their structure is determined through the SWMIs of the DRB. Chapter 2 and Chapter 7 are specifically dedicated to the SWMIs and their analyses. While Chapter 2 describes existing pressures for each SWMI, important transboundary groundwater bodies and other issues (i.e. sediment quality/quantity, invasive species), Chapter 7 responds with respective measures to be implemented on the basin-wide scale for each SWMI. The latter chapter also includes key conclusions regarding the Joint Programme of Measures, which are important for future river basin management in the DRB. The monitoring networks of the DRB are described in Chapter 4, which also includes the outcomes of the basin-wide water status assessment and the final designation of Heavily Modified Water Bodies and Artificial Water Bodies. The exemptions outlined in Chapter 5 and applied according to WFD Articles 4(4), 4(5) and 4(7) add up to the monitoring assessment results. In combination these chapters clearly indicate actions needed to be taken to improve water status in the DRB. Further, the DRBM Plan includes and inventory of protected areas (Chapter 3 and Annex 10), an economic analysis of water uses (Chapter 6) as it reflects on flood risk management and climate changes in the DRB (Chapter 8) as well as on public information/consultation (Chapter 9).

The DRBM Plan illustrates the findings in 29 thematic maps and detailed information is part of 21 Annexes.

2. Significant pressures identified in the Danube River Basin District

As outlined in the previous chapter, the Danube Basin Analysis 2004 (WFD Article 5) enabled the identification of Significant Water Management Issues in the DRBD. This chapter addresses each of the SWMIs concerning surface waters, addresses groundwater issues and includes revised information since the DBA. The current overview outlines existing pressures in the DRBD. The Joint Programme of Measures responds to all these pressures in order to achieve the environmental objectives on the basin-wide scale.

When addressing pressures on the DRB at the basin-wide scale, it is clear that cumulative effects may occur (this is one reason why the basin-wide perspective is needed). Effects can occur both in a downstream direction (e.g. pollutant concentrations) and/or a downstream to upstream direction (e.g. river continuity). Addressing these issues effectively requires a basin-wide perspective and cooperation between countries, and is addressed in this DRBM Plan.

Further, the country specific emissions regarding organic, nutrient and hazardous substance pollution presented in this chapter should in general be seen in relation to the respective countries share of the DRBD.

2.1. Surface waters: rivers

2.1.1. Organic pollution

Organic pollution is mainly caused by the emission of partially treated or untreated wastewater from agglomerations[22], industry and agriculture. Many agglomerations in the DRB have no, or insufficient, wastewater treatment and are therefore key contributors to organic pollution. Direct, as well as indirect, discharges of industrial wastewaters are also important. Very often industrial wastewaters are

[22] Emissions from agglomerations: all releases of substances originating from the agglomeration reaching the environment (soil, water, air).

insufficiently treated or are not treated at all before being discharged into surface waters (direct emission) or public sewer systems (indirect emission).

Organic pollution can cause significant changes in the oxygen balance of surface waters. As a consequence it can impact upon the composition of aquatic species/populations and therefore water status. Organic emissions and their impact can be measured and expressed with parameters like COD (chemical oxygen demand), BOD_5 (biological oxygen demand) and TOC (total organic carbon).

Analysis of pressures causing organic, nutrient and hazardous pollution

For the DBA, the significance of pressures – in the sense of being of basin-wide importance – was identified and characterised using specific criteria based on the size of the pressure and/or the performance of treatment applied. Unfortunately there were limitations in this approach, especially with respect to data completeness, and so modification of the methodology was required.

To that extent, data collections are primarily based on existing binding EU reporting processes or on existing international conventions. For urban wastewater discharges, the evaluation is based on the methodology of the EU Urban Waste Water Treatment Directive (UWWTD) and uses the data model and information that are also reported to the European Commission. The UWWTD covers all agglomerations with ≥2,000 PE[23]. The UWWTD concept is centered around the term "agglomeration" which means "an area where the population and/or economic activities are sufficiently concentrated for urban wastewater to be collected and conducted to an urban wastewater treatment plant or to a final discharge point".

For industrial emissions, the data and methodology of the "European Pollutant Emission Register" (EPER) was used. In future, the "Pollutant Release and Transfer Register" (PRTR), which supersedes the EPER, and which is currently being implemented in all ICPDR countries, will be used.

Data from Non EU Member States were collected in the same structure so that a basin-wide assessment is possible.

The new data collections and evaluations give a more complete picture on pollutant sources and emissions. The direct comparison with the data of the DBA is not possible.

2.1.1.1. Organic pollution from urban wastewater

In order to address organic pollution pressures in the DRB, collection and assessment of data on urban, industrial and agricultural wastewater have been increasingly improved in the framework of the ICPDR. Significant effort has gone into creating a complete, flexible and pragmatic reporting system that makes the best use of mandatory EU reporting requirements, while keeping the workload for the Contracting Parties as low as possible. Further, respective data have been collected from the Non EU Member States. Details on the methodology and data assessment can be found in Annex 3.

A total of 6,224 agglomerations ≥2,000 PE are located in the DRBD. Out of those, 4,969 agglomerations (21 million PE) are in the class 2,000 -10,000 PE and 1,255 agglomerations can be classified with a PE >10,000 (73.6 million PE) – see Map 18 (Reference Situation UWWT). These figures clearly demonstrate the importance of addressing the organic pollution from this relatively small number of large communities (>10,000 PE), which contain the majority of the population.

There is still a high number of agglomerations ≥2,000 PE that are neither connected to a sewage collecting system nor to a wastewater treatment plant. In total, wastewaters are not collected at all in

[23] PE (Population Equivalent) describes the average untreated biological load generated by one person per day and equals 60g of BOD_5/d.

more than 2,900 agglomerations (12.6% of the total generated load). Approximately 1,000 further agglomerations have collection systems that require more stringent treatment. The construction of sewerage collecting systems for agglomerations ≥2,000 PE will reduce the pollutants emitted directly and infiltrated to the ground; but at the same time this could also lead to a significant increase in organic pollutants if proper treatment is not applied before being discharged to surface waters.

Figure 3 provides an overview of existing wastewater treatment plants, existing treatment levels and degree of connection to wastewater treatment throughout the entire DRB per country.

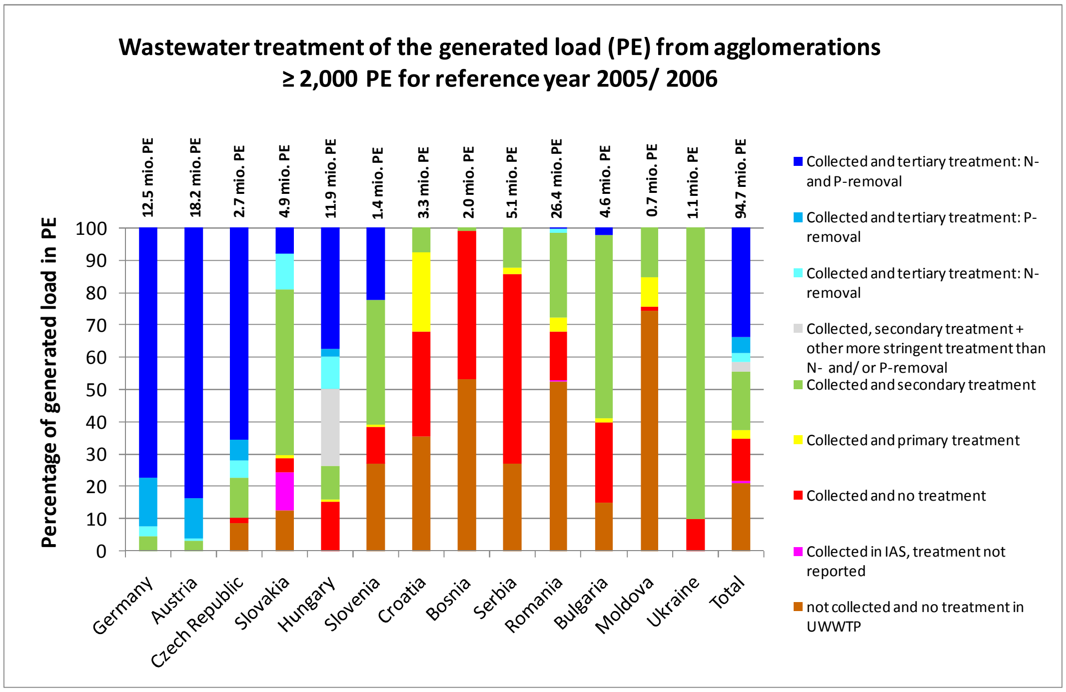


Figure 3: Existing wastewater treatment plants; existing treatment levels and degree of connection to wastewater treatment for the entire DRB by country.[24&25]

(IAS: Individual and appropriate systems e.g. cesspools, septic tanks, domestic wastewater treatment plants).

The updated assessment of this Plan shows that the COD & BOD_5 emission from large agglomerations (>10,000 PE) in the DRB are respectively 922 kt/a and 412 kt/a. Further, the assessments have been improved by calculating emissions from agglomerations ≥2,000 PE. The total emission contribution from these sources is 1,511 kt/a for COD and 737 kt/a for BOD_5 (see Table 3).

Table 3: COD and BOD_5 emissions from agglomerations ≥2,000 PE for each Danube country and the entire DRBD emitted through all pathways (reference year 2005/2006).

	DE	AT	CZ	SK	HU	SI	HR	BA	RS	RO	BG	MD	UA	Total
Emission COD (kt/a)	31.7	30.5	17.0	74.0	87.6	26.3	144.6	87.5	191.3	727.1	62.3	22.0	8.8	**1,511**
Emissions BOD5 (kt/a)	5.9	6.2	7.1	34.6	45.8	12.7	68.0	47.8	95.4	366.6	31.1	11.5	4.7	**737**

[24] For some countries a collection rate of less than 100% does not indicate that the remaining percentage is not treated at all.

[25] Discrepancies in the pressure analysis results between national level and DRB level can be attributed to the differences in the level of aggregation between national and basin wide level, to different reference years (the DRBM Plan considered 2005/2006), and/or to different methodologies used at national levels (i.e. differentiation between emissions to water bodies and emissions into soil).

2.1.1.2. Organic pollution from industry

Over the past twenty years the closure of many heavily polluting industrial activities in the middle and lower Danube countries has contributed to a decrease in organic pollution. A large portion of industrial wastewaters is still being discharged without any, or with insufficient, pre-treatment into the public sewerage network. The pressure analysis shows that emissions from industry are still lower than those from agglomerations but nonetheless important.

A preliminary analysis on industrial and food industrial sources of organic pollution identifies a total number of 173 facilities emitting directly into the DRBD and 189 facilities with indirect emissions to water through urban sewers.[26] Detailed information on the data collection forms part of Annex 5.

The degree of industrial development and amount of pollution caused by the industrial sector varies among the countries. In general, almost all industrial sectors are producing organic pollution. However, the pulp and paper industry is the largest emitter, with significant emission contributions from the chemical, textile and various branches of the food industry. Figure 4 provides an overview of those key industries emitting directly into the waters of the DRB and indicates respective generated load for EU Member States. The Total Organic Carbon (TOC) emissions by the EU MS for the reference year 2004/2005 show a direct[27] industrial TOC load of 41,342 t/a. The TOC emissions of Non EU MS in t/a are currently unknown.

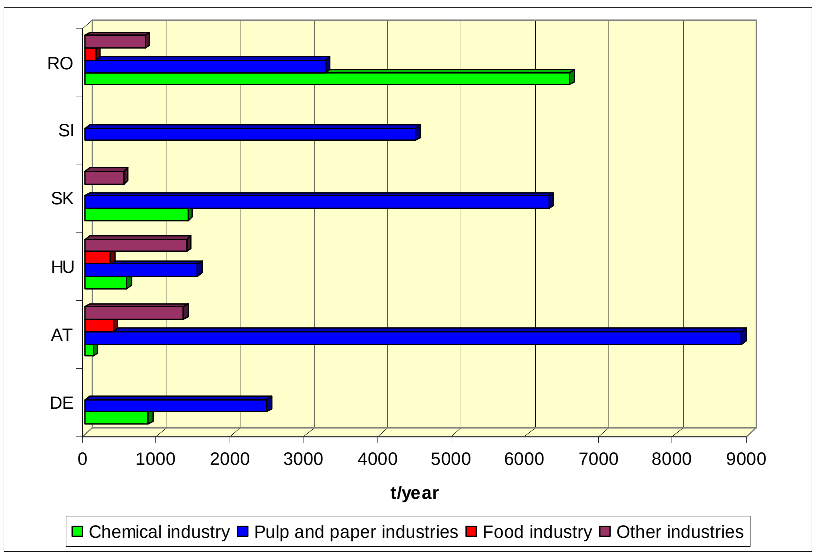


Figure 4: Direct emissions of TOC per relevant types of industries in EU MS (2004).[28]

2.1.1.3. Organic pollution from agriculture

Animal breeding and manure disposal are key agricultural point sources of organic pollution. Related EPER data were collected on facilities for animal breeding for EU MS. However, data gaps still exist regarding the Non EU MS and need to be closed in the future in order to perform a comprehensive

[26] The analysis is incomplete due to the ongoing PRTR protocol implementation.

[27] The EPER data also provided information on "indirect emissions" i.e. industrial emissions into public sewerage systems and subsequent urban wastewater treatment. Depending on the technical performance of the subsequent treatment, the actual emissions into the environment are significantly smaller (often <10%). The dominant activities for indirect emissions of TOC to water are "Pulp from timber or other fibrous materials and paper or board" and "Slaughterhouses, plants for the production of milk, other animal raw materials or vegetable raw materials". The reference year for Romania is 2005.

[28] BG, CZ: Data not reported for EPER 2004, therefore no illustration included in Figure 4. RO: data from 2005.

and more detailed analysis. The contribution of organic pollution from agricultural sources is well below the historical estimates of approximately 30% of the overall total emissions. Among agricultural point sources of pollution, the pig and poultry farms are clearly the most relevant point sources of organic pollution. Although many of these facilities have in recent years reduced the numbers of animals they maintain or made other improvements, this remains a pressure.

2.1.2 Nutrient pollution

Nutrient pollution – particularly by Nitrogen (N) and Phosphorus (P) - can cause eutrophication[29] of surface waters. Further, their emission and discharge into coastal areas and the marine environment can significantly impact upon the status of those ecosystems. Nutrient pollution is a priority challenge, interlinking the freshwater with the marine environment.

N and P emissions cause eutrophication in many DRBD surface waters and contribute to eutrophication in the Black Sea North Western shelf. For the period 1988-2005, the Danube, as one of the major rivers discharging into the Black Sea, was estimated to introduce on average about 35,000 tonnes of P and 400,000 tonnes of inorganic N into the Black Sea each year.

The present level of the total nutrient load in the Danube River system is considerable higher than in the 1960s, but lower than in the late 1980s.. The decrease from the 1990s to the present situation is due to the political as well as economic changes in the middle and lower DRB resulting in (i) the closure of nutrient discharging industries, (ii) a significant decrease of the application of mineral fertilisers and (iii) the closure of large animal farms (agricultural point sources). Furthermore, the application of economic mechanisms in water management (e.g. the *polluter pays principle* also applied in the middle and downstream DRB countries) and the improvement of wastewater treatment (especially in upstream countries) contributed to this decrease.

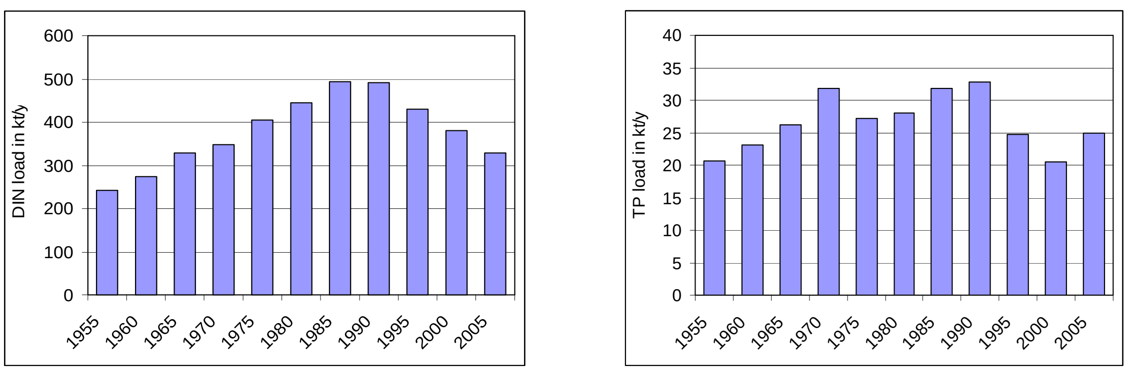


Figure 5: Long-term discharges of dissolved inorganic nitrogen (DIN) and total phosphorus (TP) (1955-2005).

The present level of the total Phosphorus load that would be discharged to the Black Sea (including the P storage that occurs today in the Iron Gate impoundments[30]) would be about 20% higher than in the early 1960s (based on modelling results from daNUbs and MONERIS). The Iron Gate Dams (which were built between 1970 and 1986) are a significant factor in reducing the amount of Phosphorous from countries upstream the dams, in the Danube River that eventually reaches the Black Sea. The reason for this is that large amounts of sediment - containing P attached to the sediment particles - settle out in the reservoir behind the dams. Although this P is at present stored in the Iron

[29] Definition of *eutrophication*: The enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned [Directive 91/271/EEC].

[30] The Iron Gate influences the retention of phosphorus via the sedimentation process and has been taken into account within the MONERIS calculations.

Gates reservoir it may in future be a significant source of pollution in the case of flood events causing chemical P release. This P release and eventual mobilisation could be a pressure factor for the downstream countries but also for the impoundment section upstream of the Iron Gate Dams.
The recent investigations also show that the ecological situation in the North Western Black Sea coastal area has improved significantly since the early nineties due to the lower discharges of N and P to the Black Sea. However, economic recovery in the future, which would potentially result in increasing nutrient loads to the Black Sea (industry, agriculture and increased connection to sewerage), would put the achievement of environmental objectives at risk if not combined with a set of effective measures, especially as required by EU legislation.

Interlinkage between organic and nutrient pollution

Nutrient pollution is – as with organic pollution – mainly caused by emissions from the agglomeration, industrial and agricultural sectors (see Annex 4). Furthermore, for agglomerations, the P emissions via household detergents play a significant role. Regarding nutrient emissions, respective pressures on water bodies can result from (i) point sources (in particular untreated/partially treated wastewaters), and/or (ii) diffuse sources (especially agriculture). The pressure assessment related to nutrient pollution took the synergies between organic and nutrient pollution fully into account. The same basic assumptions and facts regarding wastewater treatment for urban and industrial emissions for organic pollutions are also valid for nutrients (see Chapter 2.1.1.1). The findings of point source analysis have been combined with those related to diffuse sources. The MONERIS model integrates these components and reflects the overall nutrient input in the DRB in total and per Danube country.[31]

2.1.2.1. Nutrient point source pollution

Nutrient pollution from urban wastewater

Nutrient pollution from point sources is mainly caused by emissions from insufficiently or untreated wastewater into surface waters (from agglomerations, industry and agriculture). It should be mentioned that the operation of secondary and tertiary treatment levels at wastewater treatment plants (WWTPs) is of particular importance for the respective elimination/reduction of nitrates/phosphates. An overview of treatment levels is provided in Chapter 2.1.1.1 (Figure 3).
Nutrient emissions and the eventual impact from point sources can be measured and expressed with parameters such as inorganic nitrogen, Total nitrogen (N_{tot}), ammonia (NH_4), nitrate (NO_3), nitrite (NO_2) or total phosphorus (P_{tot}) and phosphates (PO_4)

Organic point source pollution from agglomerations is outlined in Chapter 2.1.1.1 and is also illustrated for nutrients in Map 18. Table 4 shows N_{tot} and P_{tot} generated load emitted from agglomerations ≥2,000 PE for each Danube country and the DRB total generated load emissions (point and diffuse) for reference year 2005/2006).

Table 4: N_{tot} and P_{tot} emissions from agglomerations ≥2,000 PE for each Danube country and the entire DRBD emitted through all pathways (reference year 2005/2006).

	DE	AT	CZ	SK	HU	SI	HR	BA	RS	RO	BG	MD	UA	Total
Emissions N_{tot} (kt/a)	12.3	9.5	2.8	11.4	14.7	3.2	10.9	7.3	16.0	69.3	6.5	1.9	2.1	**168.0**
Emissions P_{tot} (kt/a)	1.0	0.8	0.4	1.7	2.8	0.7	2.8	1.6	2.9	11.5	1.3	0.4	0.7	**28.6**

[31] The MONERIS Model integrates the findings of point source analysis with those related to diffuse sources and reflects the overall nutrient input in the DRB in total and per Danube country. SI is using a method based on the OECD method: *Environmental indicators for agriculture. Methods and Results (2006).*

Industry

Many industrial facilities are significant sources of nutrient pollution. The chemical sector is the most important contributor. Figure 6 and Figure 7 show direct emissions of N_{tot} and P_{tot} for EU MS for the different types of industries in 2004. The N_{tot} and P_{tot} emissions in t/a for Non EU MS are currently unknown.

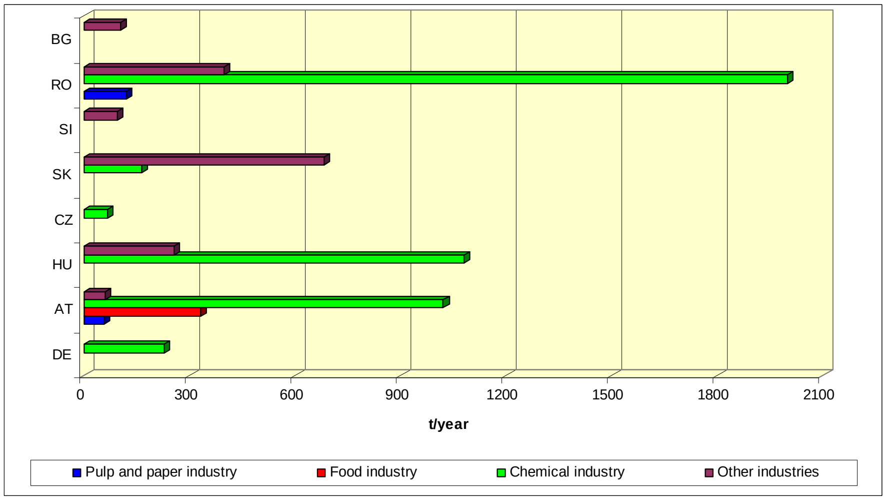


Figure 6: Industrial direct emissions of nitrogen per relevant types of industries and EU MS (2004; RO: 2005).

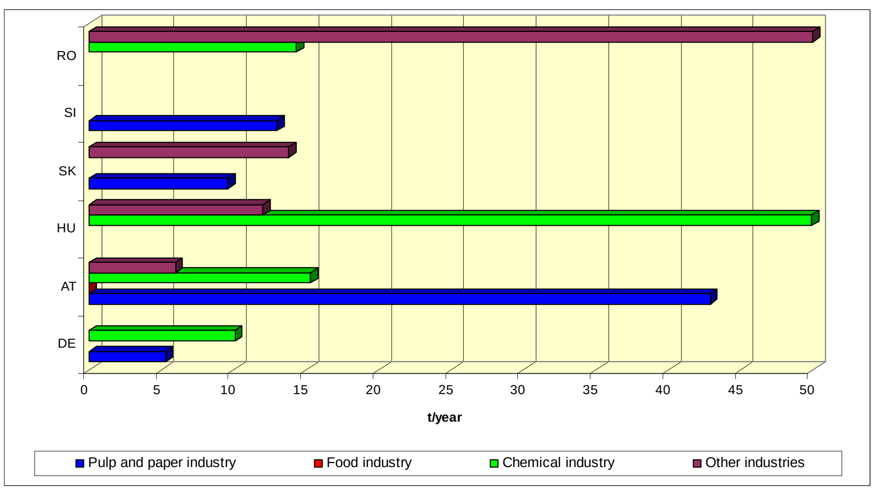


Figure 7: Industrial direct emissions of phosphorus per relevant types of industries and EU MS (2004; RO: 2005).[32]

Nutrient point source pollution from agriculture

For agricultural point source pollution, data gaps (that mainly exist for Non EU MS as EPER data are available for EU MS) need to be closed in the future in order to perform a comprehensive and more detailed analysis. However, agricultural emissions from diffuse sources are of even greater importance and are analysed by MONERIS (see below).

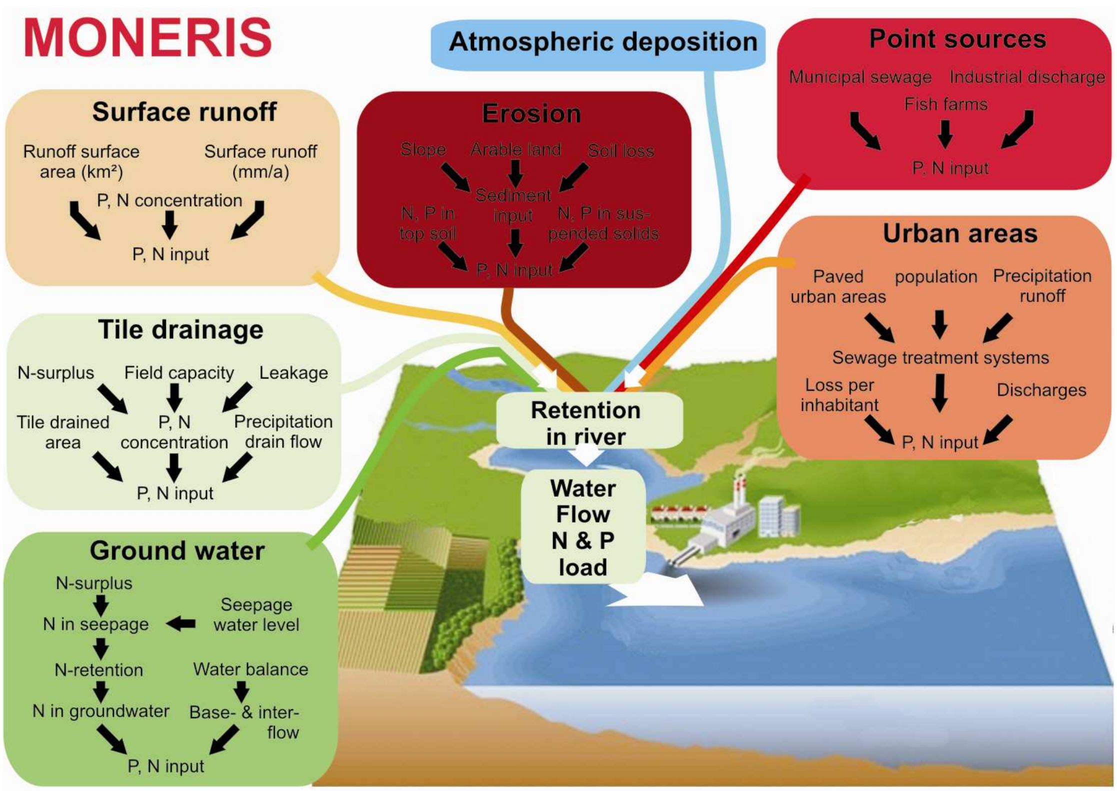
[32] BG, CZ: Data not reported for EPER 2004, therefore no illustration is included in Figure 7.

2.1.2.2. Nutrient diffuse source pollution

Diffuse source pollution is caused by widespread activities such as agriculture and other sources (see Figure 8). The levels of diffuse pollution are not only dependent on anthropogenic factors such as land use, and land use intensity, but also on natural factors such as climate, flow conditions and soil properties. These factors influence pathways that are significantly different. For N, the major pathway of diffuse pollution is groundwater while for P it is erosion.

MONERIS – a model for point source and diffuse source emissions calculations

The emission of substances from diffuse sources cannot be easily measured. The emissions estimation of diffuse source pollution for large river catchments such as the Danube is only possible by mathematical modelling. In the framework of the DBA and DRBM Plan, nutrient emissions into the river system through individual pathways were calculated/estimated using MONERIS (MOdelling Nutrient Emissions in RIver Systems) model.[33] MONERIS considers point source emissions and combines them with emissions resulting from different diffuse source pathways (see Figure 8**).** Furthermore, MONERIS integrates various statistical information for different administrative levels, land use, hydrological, soil and hydrogeological data and works for Geographical Information System (GIS) illustration.

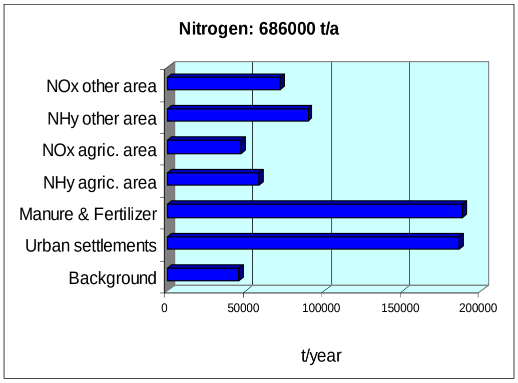


Schernewski (2007)

Figure 8: Schematic picture of main processes in relation to sources and pathways of nutrient inputs, including retention, into surface waters (MONERIS model).

[33] Behrendt et al. (2007): The Model System MONERIS (2007) – User Manual; Leibniz Institute for Freshwater Ecology and Inland Fisheries in the Forschungsverbund Berlin e.V., Müggelseedamm 310, D-12587 Berlin, Germany.

Figure 9 shows the MONERIS results decribing that altogether 686 kt of N and 58 kt of P in total are annually emitted into the DRB. The background conditions presented in MONERIS (7% for N; 9% for P) represent the pre-industrial situation with very limited airborne emissions of reactive N and erosion of soils not yet saturated with P. Consequently, these values are small in comparison with the current DRB emissions. The main contributors for both N and P emission are agglomerations not served by sewerage collection and wastewater treatment. For N pollution, the input from agriculture (fertilisers, manure, NO_x and NH_x) is the most important (totalling 43% of total emissions). For P, emissions from agriculture (area under cultivation, erosion, intensity of production, specific crops and livestock densities) are the second largest source after input from urban settlements. The share of agricultural emissions differs significantly between countries (for details see Chapter 7).



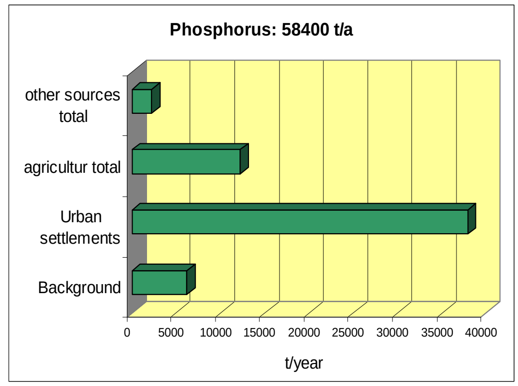


Figure 9: Sources of nitrogen and phosphorus emissions (EU MS and Non EU MS) in the DRBD as of 2005 (MONERIS results).

Phosphate input via detergents

The emission of phosphates via household detergents is significant in the DRB and it is included in the agglomerations contribution to total emissions. In case of no wastewater treatment or treatment without a tertiary treatment the respective P loads find a direct way into the aquatic environment. Currently, only some countries in the DRB have introduced a phosphate ban for laundry detergents, although others intend to follow. P emissions due to laundry and dishwasher detergents in the DRB are estimated at 9,190 t/a. This is 15,7% of the total P emissions.

Nutrient input via mineral fertilisers and livestock manure

The use of mineral fertilisers significantly contributes to nutrient pollution in the DRB and it is included in the agglomerations contribution to total emissions. The two most important plant nutrients applied as mineral fertilisers are N and P.

The use of fertilisers dropped significantly after the economic collapse in the early 1990s in almost all Danube countries. This led to a significant reduction in agricultural productivity in the region, including a decline in the use of mineral fertilisers. Data available from the FAOSTAT database[34] (2004) shows that the use of N fertilisers (kg N/ha) by farmers in the middle and lower DRB countries is far below the EU average and that of upstream Danube countries. In addition, the density of livestock per hectare on farms in lower Danube countries is below the Danube average. It can be expected that the number of livestock will increase in due course leading to an increase in nutrient emissions[35] if it is not done in a sustainable way.

[34] FAOSTAT database: Data from the FAOSTAT database of the UN Food and Agriculture Organisation Pesticide Consumption in CEE countries and the EU15.

[35] Detailed information can be taken from the ICPDR Technical Report on MONERIS published end 2009.

The dynamic situation related to agriculture and respective re-thinking in the region could in future significantly affect the extent of nutrient pressure from agriculture on water resources.
Summarising the situation regarding nutrient inputs from the agricultural sector, emissions from diffuse sources (such as those from mineral and organic fertilisers and manure) are significant.

Nutrient input via atmospheric deposition

In the DRB, the share of nutrient pollution from atmospheric deposition is also significant. It is diverse in different regions of the DRB and stems partly from sources outside the DRB. The share for N is significant (39%) but less so for P (13%). Contributions to atmospheric nutrient pollution stem from human activities including transport, combustion of oil and derivates, agriculture (livestock farming) and industry.

2.1.3. Hazardous substances pollution

Hazardous substances pollution can seriously damage riverine ecology and consequently impact upon water status and affect the health of the human population. Types of hazardous substances include: man-made chemicals, naturally occurring metals, oil and its compounds, endocrine disruptors and pharmaceuticals.
Sources of hazardous substances are: industrial effluents, storm water overflow, pesticides and other chemicals applied in agriculture as well as discharges from mining operations and accidental pollution. For some substances atmospheric deposition may also be of significance.
Article 16 of the WFD has put in place a mechanism through which a list of 33 *priority pollutants* has been created[36]. Their inclusion on the list was based on environmental quality standards and emission control measures (established in the mid 1990s) and ranked effects according to their measured or estimated concentrations in water or sediments. From this list of 33 priority substances, a group of 11 *priority hazardous substances* has been identified, which are to be subject to cessation or phasing out of discharges, emissions and losses according to a timetable that shall not exceed 20 years.
A list of substances/parameters of relevance in the DRB was prepared by the ICPDR[37] consisting of two separate annexes:

- Annex A: 33 priority substances, in accordance with the Annex X of the EU WFD;
- Annex B: 8 additional substances (of which four are hazardous), divided into two groups:
    - B1: General Parameters (COD, NH_4-N-ammonia, Total N, Total P) ;
    - B2: Danube Specific Substances (arsenic, copper, zinc, chromium).

Existing knowledge gaps

For the DBA, the ICPDR Emission Inventory and results from the JDS 1 provided the basis for the pressure analysis regarding hazardous substances. At this stage of analysis, out of the 33 priority substances identified, only 7 were included in the parameters assessed in the Transnational Monitoring Network (TNMN). Very limited basin-wide information was available for the other 26 substances. For this DRBM Plan, the respective lack of data on hazardous substances continues, although new reporting schemes, improved analytical capabilities and results from the JDS 2 (that took place in 2007 - see Chapter 4) have created some improvement. The continued deficiency of adequate analytical instrumentation in some downstream countries; the lack of legal instruments for

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[36] According to WFD Article 2(30), priority substances mean substances identified in accordance with Article 16(2) and listed in Annex X. Among these substances there are *priority hazardous substances,* which are defined as substances identified in accordance with Article 16(3) and (6) for which measures have to be taken in accordance with Article 16(1) and (8).
[37] ICPDR document: List of Priority Substances 2001/2002 (see www.icpdr.org).

obligatory measurements and inadequate wastewater treatment remain major problems. In recent years, endocrine substances and pharmaceuticals have been increasingly analysed in effluents from wastewater treatment plants or water intakes. For pesticides, effluents from cleaning equipment are usually considered of local significance. However, the significant uncertainty in our current knowledge of pressures due to hazardous substances, as well as their impact on water status, is ongoing and needs to be improved in the future.

EU regulations on hazardous substances

Marketing and use of chemicals is subject to EU-wide regulations in EU countries. These regulations consist of:

a. Regulation of plant protection products: Directive 91/414/EEC is the key document for defining the strict rules for authorisation of plant protection products (PPPs). The Directive requires extensive risk assessments for effects on health and environment to be carried out, before a PPP can be placed on the market and used. An amendment to these regulations is currently in the final stage of the European legislative process.
b. Regulation of biocidal products: The Biocidal Product Directive (Directive 98/8/EC) aims to harmonise the European market for biocidal products and their active substances. At the same time it aims to provide a high level of protection for humans, animals and the environment.
c. Regulation of chemicals: REACH is a new European Community Regulation on chemicals and their safe use (EC 1907/2006). It deals with the registration, evaluation, authorisation and restriction of chemical substances. The new law entered into force on 1 June 2007.

Hazardous substances pollution — industrial sources

Manufacturing industries are responsible for the large emission loads of a number of hazardous substances. Heavy metals and organic micro-pollutants in particular are of concern, in addition to traditional pollutants. The EPER covers 26 water pollutants. Information provided by the EU MS in EPER reporting shows an increase of the reported load values of arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc in 2004 (compared with 2001 values). In 2004, the amount of lead directly discharged was 138 t/a, and for zinc, 171 t/a. In the forthcoming PRTR, a total of 71 pollutants (including all priority and priority hazardous substances) will be covered.

Use of agricultural pesticides in the DRB

Another major source of hazardous substances is pesticides used in agriculture. Information on use within the Danube countries prepared for the DBA[38] showed that 29 relevant active ingredients were used in pesticide products. Of these, only three pesticides are authorized for use in all of the DRB countries, while 7 are not authorized in any of the countries, despite the fact that they have been found in testing of water and sediments (see also results from JDS 1 and 2).

Compared with Western Europe and including the upstream Danube countries, the level of pesticide use in central and lower DRB countries is still relatively low. Data from the FAOSTAT database show a strong decline in pesticide use in the CEE countries to approx. 40% of 1989 levels (compared to a relatively small decrease in EU MS during the same period - 1960-2000). There are indications, however, of increasing use in those countries where the economic circumstances for agriculture are improving most rapidly.

[38] UNDP GEF Danube Regional Project: Inventory of Agricultural Pesticide Use in the DRB Countries.

Although pesticide use is currently relatively low in the middle and lower DRB countries, the risks of pesticide pollution remain present and are clearly an important pressure on water resources:

- Pesticides are frequently detected in surface water and groundwater in the DRB and pose a serious hazard to the environment and human health.
- 7 pesticides are not authorized in the Danube countries; some of them continue to be of concern because of the existence of old stockpiles and residues in soils and sediments.
- The uncontrolled and illegal trade of pesticide products lead to the use of banned pesticides (e.g. DDT) by farmers.

Accidental pollution and the inventory of accident risk spots in the DRB

Within the DRB, there have been accidental spills of hazardous substances that have severely affected the aquatic environment and water quality. Accidents are concentrated in time and space and often have severe immediate as well as localized ecological consequences. Prevention is often possible and relatively easy if precautionary measures are taken. The ICPDR has elaborated a basin-wide inventory of potential accident risk spots (ARS Inventory). An estimation of the real risk at a particular site was prepared and a set of checklists elaborated for prevention of accident risk.[39]

In addition to accidental pollution from operating industrial facilities, pollution from sites contaminated by former industrial activities or waste disposal has been identified as significant. It is of specific importance for sites contaminated by hazardous substances to identify those substances that can be mobilised and enter water bodies in the event of a flood. The updated inventories should provide a clear picture on potential risk sites, as well as possible targets for reducing and controlling accidental pollution[40].

A survey in 2002 identified 261 such sites in the DRB. As a consequence, a methodology (M1) was developed to screen their risk potential[41]. It was agreed by the Danube countries that sites with a high risk potential should be investigated further in order to create a more concrete risk estimation and ranking.

In total, approx. 650 risk spots have been recorded and 620 evaluated based on further investigations. As a result, a hazardous equivalent of about 6.6 million tonnes has been identified as a potential danger in the Danube catchment area.

[39] For the classification of potential risk spots, a common procedure was elaborated considering the findings of the International Commission for the Protection of the Elbe, the EU Seveso II Directive and the UN/ECE Convention on the Transboundary Effects of Industrial Accidents.

[40] Based on that estimation it is possible to elaborate a list of necessary immediate measures to enhance the safety level of a site. The selected M1 methodology for risk identification considers the properties of substances used or stored at a site and the quantity of the given substances. The properties of the substances determine the Water Risk Class (WRC), which – in combination with the amount of used/stored substances – determines the Water Risk Index (WRI), the quantitative indicator of the risk.

[41] UNDP GEF DRP: M1 & M2 Methodology on Risk Assessment for Contaminated Sites (2006) – www.icpdr.org.

2.1.4. Hydromorphological alterations

Hydromorphological alterations and their effects on water status have gained vital significance in Europe's water management activities due to the requirements of the EU WFD (in addition to traditional issues related to chemical pollution pressures on water quality).

Anthropogenic pressures resulting from various hydro-engineering measures can significantly alter the natural structure of surface waters. This structure is essential to provide adequate habitats and conditions for self-sustaining aquatic populations. The alteration of natural hydromorphological structures can have negative effects on aquatic populations and therefore result in the deterioration of the water status of surface waters.

Hydropower generation, navigation and flood protection are the key water uses that cause hydromorphological alterations. Hydromorphological alterations can also result from anthropogenic pressures related to urban settlements, agriculture and other sources. These drivers can influence pressures on the natural hydromorphological structures of surface waters in an individual or cumulative way.

Three key hydromorphological pressure components of basin-wide importance have been identified:

a. Interruption of river and habitat continuity;

b. Disconnection of adjacent wetlands/floodplains;

c. Hydrological alterations.[42]

Potential pressures that may result from future infrastructure projects are also dealt with.

This chapter reflects in part findings on hydromorphological alterations and their significance from the DBA 2004, the Joint Danube Survey 2 (JDS 2) and from the most recent national data.

The DBA examined the extent of river continuity interruptions (major hydraulic structures) and the disconnection of floodplains/wetlands for the Danube River and selected tributaries. Hydrological alterations were not analysed as part of the DBA. Future infrastructure projects were addressed with a list of planned hydro-engineering projects that has been updated for this Plan and supplemented with additional information. Overall morphological alterations are considered as an important pressure component for surface waters. However, details on their analysis are part of the national RBM Plans and are not yet addressed on the basin-wide scale. In the DBA, expert judgement served as a basis for the analysis of hydromorphological alterations. This analysis approach has been further elaborated as part of this chapter.

In cases where countries share river stretches it is likely that some hydromophological components (river and habitat continuity interruption, hydrological alterations) include double-counts. This is because the information has been reported separately by the Danube countries and is not bilaterally harmonised. However, the discrepancy between the results of the analysis and the factual values without double-counts is estimated to be only between 1 and 4%. of the total. For the cases where countries reported separately for shared river stretches the information needs to be harmonised in the future.

[42] Hydrological alterations provoke changes in the quantity and conditions of flow.

Hydromorphological alterations in the Danube River – Joint Danube Survey 2

The JDS 2 in 2007 delivered results on hydromorphological alterations for the entire length of the Danube River (from Kehlheim (rkm 2416) to the Danube Delta) for the very first time. A special method for hydromorphological survey and assessment was developed for the JDS 2. A 5-class evaluation for three categories (1. channel; 2. banks; 3. floodplains) formed the basis for the overall hydromorphological assessment. The 5 classes were calculated as a mean of the three categories. The overall hydromorphological assessment of the JDS 2 concluded that more than one third (39%) of the Danube River from Kehlheim to the Black Sea can be classified as class 2. However, 30% of the Danube River's length is characterised as class 3, 28% as class 4 and 3% as class 5 (Figure 10 and Figure 11).

The analysis for the upper, middle and lower Danube indicates that the upper reach in Germany and Austria is the most affected by significant hydromorphological alterations (68 barriers – see Figure 11). There are only a few river stretches in the upper Danube that are not impacted by impoundments and can be classed as free-flowing stretches (e.g. natural flow velocity) e.g. Straubing-Vilshofen (DE) or Wachau (AT) and downstream of Vienna (AT). The middle and lower courses of the Danube River still sustain significant free flowing stretches: upstream of Novi Sad to Gabcikovo Dam (SK) and downstream of the Iron Gate Dams (RO/RS) to the Black Sea.

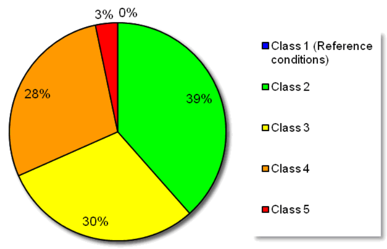

Figure 10: Overall hydromorphological assessment in five classes (mean of channel, banks and floodplain evaluations).

Figure 11: Overall hydromorphological assessment of the Danube River in five classes as longitudinal colour-ribbon visualisation.[43]

Overall, only very short stretches of the Danube can be characterised as reference condition (class 1) in connection with the naturalness of banks and floodplains. Near-natural banks occurred along the steep slopes of the Serbian, Bulgarian and Romanian Danube and longer stretches were observed in the lower Danube. With 2 respect to floodplains, large natural stretches occurred in the protected sites of Kopački Rit (HR) and Gornje Podunavlje (RS) and on the right bank of Small Braila Island (RO). Details of the hydromorphological approach and results can be found in the final scientific report of the JDS[44].

[43] The approach applied by JDS2 for the assessment of the hydromorphological alterations does not replace a WFD compliant status assessment and therefore the JDS2 results do no necessarily correspond to the results of the status assessment for individual water bodies done by the countries at the national level according to the WFD.

[44] ICPDR (2008): Joint Danube Survey 2 – Final Scientific Report; Eds: Liska et al; ICPDR Secretariat, VIC/D0412, P.O. Box 500, 1400 Vienna, Austria.

2.1.4.1. River and habitat continuity interruption as a significant pressure

The key driving forces causing eventual river and habitat continuity interruptions in the DRBD are mainly flood protection (45%), hydropower generation (45%) and water supply (10%). In many cases barriers are not linked to a single purpose due to their multifunctional characteristics (e.g. hydropower use and navigation; hydropower use and flood protection).

1,688 barriers are located in DRBD rivers with catchment areas >4,000 km^2 (Figure 12 and Map 5). 600 of the 1,688 continuity interruptions are dams/weirs, 729 are ramps/sills and 359 are classed as other types of interruptions. 756 are currently indicated to be equipped with functional fish migration aids. **Therefore, 932 continuity interruptions (55%) remain a hindrance for fish migration as of 2009 and are currently classified as significant pressures** (see Figure 12 and Map 5)**.**

296 water bodies in the DRBD are significantly altered by continuity interruptions un-passable for fish species. This is 44% of the total number of DRBD water bodies (681).

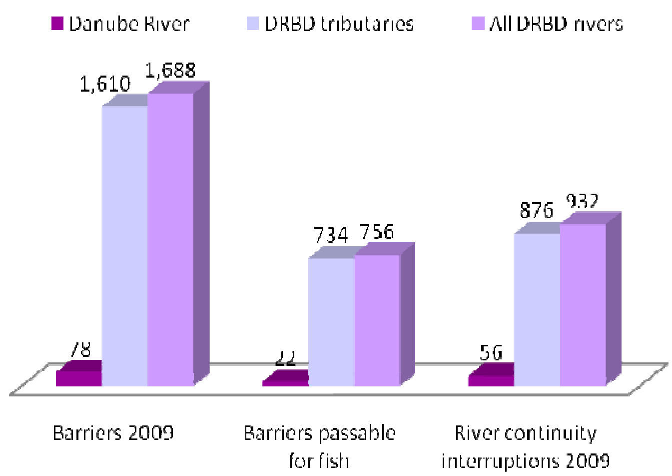

Figure 12: Current situation on interruption of river and habitat continuity in the Danube River, the DRBD tributaries and all DRBD rivers.

For the Danube River itself, 78 barriers can be identified, 22 of which are passable for fish as of 2009. The Austrian/German chain of barriers (75 in total), the Gabcikovo Dam (SK) and the Iron Gate Dams 1 & 2 (RO/RS) are significant river and habitat continuity interruptions for the Danube River. For details see Chapter 7.1.4.1.2 (blue box).

2.1.4.2. Disconnection of adjacent wetlands/floodplains

Among many ecosystem services, wetlands/floodplains and their connection to adjacent river water bodies play an important role in the functioning of aquatic ecosystems by providing important habitats for fish as well as other fauna and have a positive effect on their water status. According to the EU WFD, pressures on wetlands are to be considered as significant and need to be addressed by measures where they are impacting negatively on the water status of adjacent water bodies. Connected wetlands/floodplains play a significant role when it comes to retention areas during flood events and may also have positive effects on the reduction of nutrients.

The DBA concluded that the main causes of wetland destruction have been the expansion of agricultural uses and river engineering works concerning mainly flood control, navigation and power generation. Drainage and irrigation are also responsible for alterations in water levels and the loss of wetlands and floodplains. Compared with the 19th Century, less than 19% of the former floodplain

area (7,845 km² out of a once 41,605 km²) remains in the entire DRB. Since the 1950s, engineering works have accounted for a total of 15-20,000 km² of Danube floodplains being cut off from the rivers.

The basis of the pressure analysis for this DRBM Plan was the consideration that disconnected wetlands/floodplains are potential pressures to aquatic ecosystems on the basin-wide level and that the highest possible area should be re-connected to the adjacent rivers in the DRBD in order to support the achievement the environmental objectives by 2015 and beyond. The pressure analysis therefore focused on analysing the location and area of disconnected wetlands/floodplains (>500 ha or which have been identified by the Danube countries of basin-wide importance) with a definite potential for reconnection by 2015 and beyond.

To date, 95 wetlands/floodplains (covering 612,745 ha) with potential to be re-connected to the Danube River and its tributaries have been identified (see Figure 13 and Map 6). The 31,932 ha of wetlands/floodplains reported by RS are already partly connected to the adjacent river and this will be further improved in the future (see Chapter 7.1.4.2). The location and size of the evaluated wetlands/floodplain are illustrated in Map 6.

The indication of no reconnection potential for wetlands/floodplains in many Danube countries (Figure 13) does not indicate that there is no restoration taking place. Figure 13 illustrates exclusively the reconnection for the basin-wide DRBD scale, whereas many restoration activities are taking place at the national level. Further information on the restoration of wetlands/floodplains are outlined in the national RBM Plans (see Annex 1 for national web links).

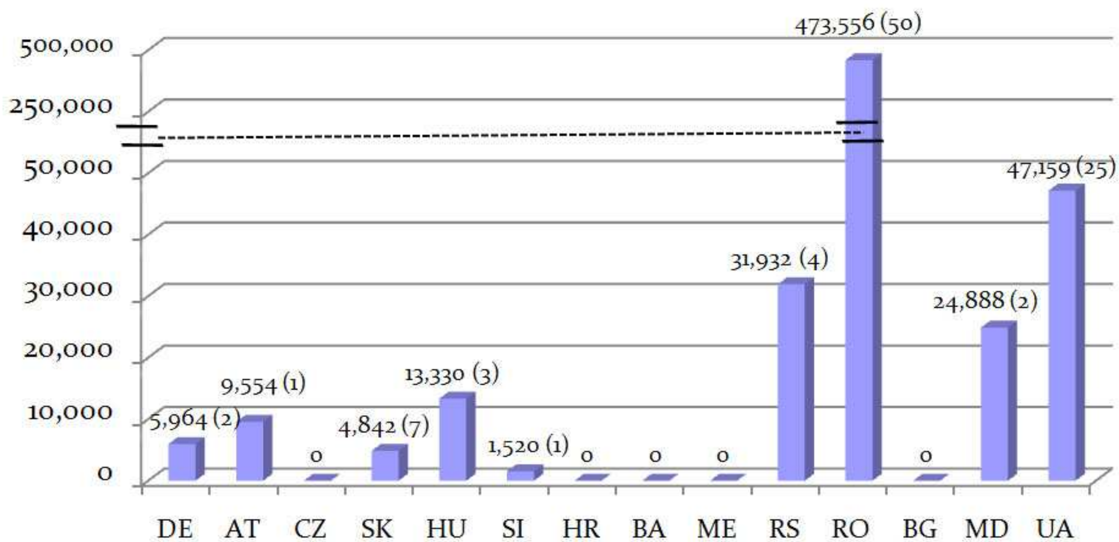

Figure 13: Current situation regarding the area (ha) and number of DRBD wetlands/floodplains (>500 ha or which have been identified by the Danube countries of basin-wide importance) identified as having a potential for reconnection and/or improvement of water regime by 2015 and beyond.

(A reported 31,932 ha in Serbia are already partly reconnected and further reconnection is foreseen).

Table 5 shows the number of water bodies in the DRBD (in absolute numbers and percentage) that will be affected by the potential reconnection of wetlands/floodplains and/or improvement of the water regime that may have a positive effect on their water status. The absolute length of water bodies with restoration potential in relation to disconnected wetlands/floodplains is 2,171 km (9% of total river network).

Table 5: Number of river water bodies adjacent to wetlands/floodplains identified as having reconnection potential by 2015 and beyond and relation to the overall number of water bodies (Danube River, DRBD tributaries, all DRBD rivers).

	Total number of WBs	WBs with reconnection potential	% with reconnection potential
Danube River	45	8	17
DRBD tributaries	636	9	1
All DRBD rivers	681	17	2

2.1.4.3. Hydrological alterations

The DBA 2004 did not provide information on hydrological alterations due to a lack of respective data at that time. The findings below are the first ever results of a pressure analysis, based on reference data from 2009. Additional details on hydrological alterations can be taken from the respective national RBM Plans (see Annex 1 for national web links).

The main pressure types in the DRBD causing hydrological alterations are in numbers: 449 impoundments, 140 cases of water abstractions and 89 cases of hydropeaking[45]. Some of the hydrological alterations are dedicated to purposes classed as not specified. The consequences resulting from the above pressure types and criteria used to assess their significance are shown in Table 6.

Table 6: Hydrological pressure types, provoked alterations and criteria for the respective pressure/impact analysis in the DRBD.

Hydrological pressure	Provoked alteration	Criteria for pressure assessment
Impoundment	Alteration/reduction in flow velocity and flow regime of the river	Danube River: Impoundment length during low flow conditions >10 km Danube tributaries: Impoundment length during low flow conditions >1 km
Water abstraction/ residual water	Alteration in quantity and dynamics of discharge/flow in the river	Flow below dam <50% of mean annual minimum flow[46] in a specific time period (comparable with Q95)
Hydropeaking	Alteration of flow dynamics/discharge pattern in river and water quantity	Water level fluctuation >1m/day or even less in the case of known/observed negative effects on biology

The pressure analysis concludes that 697 hydrological alterations are located in the DRBD – 62 of them in the Danube River. Details on the distribution of hydrological alterations between the different pressure types (impoundments, water abstraction and hydropeaking) and their significance according the ICPDR criteria (Table 6) are outlined below as well as illustrated in Map 7a, b and c.

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[45] Multiple hydrological pressures (impoundment, water abstraction, hydropeaking) can be bound to one hydrological alteration (see also Figure 39 and Table 18). The number of individual hydrological pressures can therefore be larger than the total number of hydrological alterations.

[46] A pressure provoked by these uses is considered as significant when the remaining water flow below the water abstraction (e.g. below a hydropower dam) is too small to ensure the existence and development of self-sustaining aquatic populations and therefore hinders the achievement of the environmental objectives. Criteria for assessing the significance of alterations through water abstractions vary among EU countries. Respective definitions on minimum flows should be available in the national RBM Plans.

Table 7 shows the number of DRBD water bodies affected by hydrological alterations (in absolute numbers and percentage).

Table 7: Number of river water bodies significantly affected by hydrological alterations in relation to the overall number of water bodies (Danube River, DBBD tributaries, all DRBD rivers).

	Total number of WBs	WBs affected by hydrological alterations	Proportion of affected WBs to total number (%)
Danube River	45	25	56
DRBD tributaries	636	228	36
All DRBD rivers	681	253	37

Impoundments

Impoundments are caused by barriers that - in addition to interrupting river/habitat continuity - alter the upstream flow conditions of rivers. The character of the river is changed to lake-like types due to decrease of flow velocities and eventual alteration of flow discharge.

The pressure analysis concludes that 449 impoundments are located in the DRBD (see Figure 14 and Map 7a) affecting 201 water bodies. It can be concluded that out of 25,117 km of all rivers in the DRBD with catchment areas > 4,000 km^2, 4,258 km are affected by impoundments (17 %).

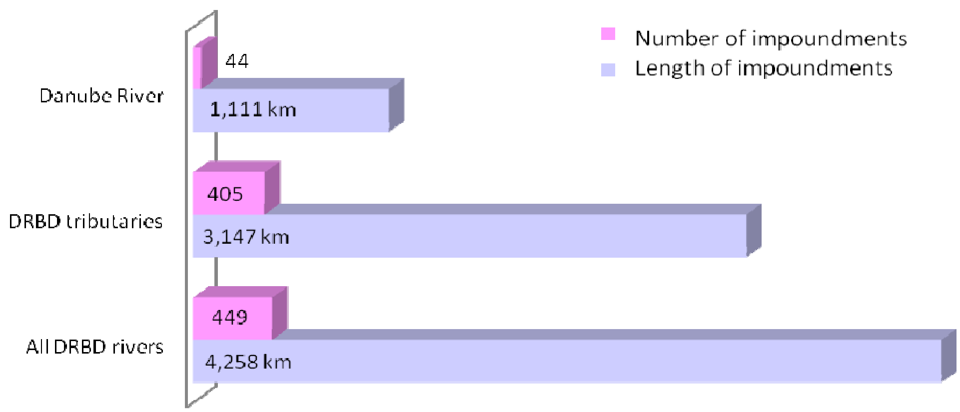

Figure 14: Number and length of impoundments in the Danube River, DRBD tributaries and all DRBD rivers (with catchment areas >4,000 km^2).

For the Danube River, impoundments are the key hydrological pressure type causing significant alterations. 1,111 km of its entire length (of 2,857 km) are impounded (representing 39% of the length) by 78 barriers including hydropower plants. In fact, impoundments are the major hydrological pressure type for the Danube River. Water abstraction due to hydropower generation occurs only in the bypass channel of the Gabcikovo Dam (bypass canal) and hydropeaking does not show any significant effects on water status on the basin-wide scale. The impoundment upstream of the Iron Gate Dams affects the flow of the Danube River over a length of 310 km up to Novi Sad (11% of the entire length of the Danube River) and represents a significant pressure. In the middle Danube Basin, the Gabcikovo Dam impounds for more than 17 km (less than 1% of the entire length) and the AT/DE chains of hydropower plants impound a significant length of the upper Danube River (approx. 269 km; representing 77% of the Austrian Danube River length share). However, significant free-flowing stretches are located upstream of Novi Sad to the Gabcikovo Dam and downstream of the Iron Gate Dams to the Black Sea.

Water abstractions

In the DRBD, the key water uses causing significant alterations through water abstractions are mainly hydropower generation (76%), public water supply (5%), agriculture and forestry (3%) and irrigation (9%)[47]. Water abstraction for energy production (cooling water), manufacturing industry, navigation and other major abstracts totals 5%, with the remaining 2% unspecified. These abstractions can significantly reduce the flow and quantity of water and impact the water status in case where the minimum ecological flow of rivers is not guaranteed.

The pressure analysis concludes that 140 water abstractions are causing alterations in water flow in DRBD rivers >4,000 km^2 (Figure 15 and Map 7b). 77 water bodies are affected by these pressures. Out of the 140 water abstractions, 105 are significant going below the ICPDR criterion (Table 6). The Danube River itself is only impacted by alterations through water abstraction at Gabcikovo hydropower dam (bypass channel) and three water abstractions in Germany as well as Hungary.

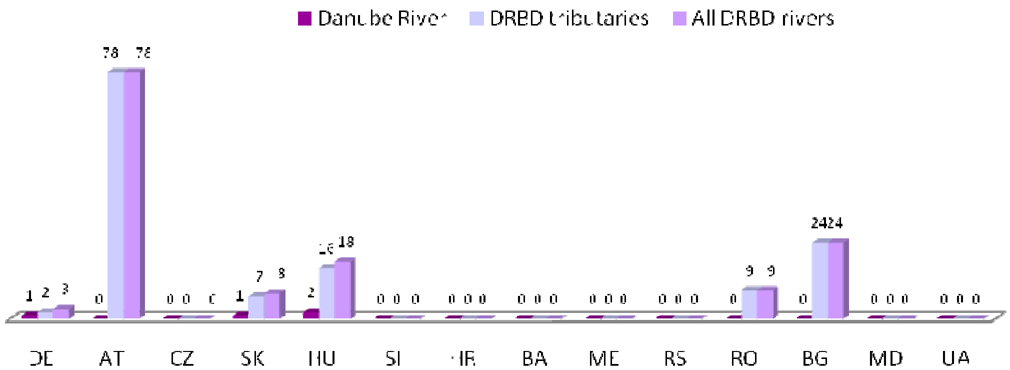

Figure 15: Number of water abstractions in the Danube River, DRBD tributaries and all DRBD rivers with catchment areas >4,000 km^2 (by Danube country).

Hydropeaking

Hydropeaking is a pressure type that occurs in the DRBD and is undertaken by the hydropower sector to generate peak energy supply. Altered flow regimes below hydropower plants occur 89 times in the rivers of the DRBD. Out of those and according to the ICPDR criterion (Table 6), 32 are causing significant water level fluctuations larger than 1 m/day below a hydropower plant (or less in the case of known negative effects on biology) (see Map 7c). Overall, 44 water bodies are affected by an altered flow regime.

2.1.4.4. Future infrastructure projects (FIP)

In addition to already existing hydromorphological alterations, a considerable number of future infrastructure projects are at different stages of planning and preparation throughout the entire DRBD (see Annex 7). These projects, if implemented without consideration to hydromorphological alterations, are likely to provoke pressures on water status.

A list of future infrastructure projects (until 2015) has been compiled based on specific selection criteria:

[47] The percentage values refer to the analysed number of water abstractions in the DRBD.

Danube River: Future infrastructure projects have been identified and listed for which Strategic Environmental Assessment (SEA) and/or Environmental Impact Assessments (EIA) are performed or transboundary effects are provoked.

Danube tributaries: Future infrastructure projects have been identified and listed for which a Strategic Environmental Assessment (SEA) and/or Environmental Impact Assessments (EIA) are performed *and* transboundary effects are provoked.

All FIPs (until 2015) including brief descriptions if provided are compiled in Annex 7 and Map 8.

The pressure analysis concludes that 112 FIPs have been reported for the DRBD. 70 of them are located in the Danube River itself. 64 (57%) are related to navigation; 31 (28%) to flood protection, four (4%) to water supply; three (3%) to hydropower generation and ten (9%) projects are concerned with other purposes (see Map 8). Therefore, it can be concluded that navigation and flood protection, followed by water supply and hydropower generation, are the key drivers that may provoke impacts on water bodies in the DRBD by 2015. 22 of the 112 FIPs are currently being implemented, 33 are officially planned and for 57 projects the planning is under preparation. Details are summarised in Annex 7.

2.1.5. Other issues

2.1.5.1. Quantity and quality aspects of sediments as pressure and impacts – addendum to the DBA 2005

This chapter provides a brief summary overview of the pressures and impacts related to sediment quantity and quality in the DRB. In the conclusion, follow up actions are proposed that are required for drafting the necessary measures in the future. Further details on the status of sediments in the DRB are available in Annex 8.

Sediment quantity

a. Sediment balance

At present the sediment balance of most large rivers within the DRB can be characterised as disturbed or severely altered. Morphological changes during the last 150 years due to river engineering works, torrent control, hydropower development and dredging, as well as the reduction of adjacent floodplains by nearly 90%, are the most significant causes of impacts.

Bed load material

Hydropower plants in the upper Danube catchments trap almost 80-90% of the sediment bed load (see Annex 8). The middle Danube, due to a decreasing slope, is characterised by a transition from a gravel river into a sand river. In the lower Danube, the suspended load dominates the overall sediment transport.

Suspended sediments

At present the torrent control works and impoundments on the upper catchments in the Danube River Basin retain about one third of the suspended load. During floods, large quantities of sediments can be remobilised and deposited e.g. in the inundated floodplains. In the lower Danube the transport of suspended load currently reaches only 30% of the original amount recorded, due to abundant anti-erosion and hydro-technical works throughout the entire DRB and significant sediment settling in the Iron Gate 1 reservoir.

b. Erosion and deposition

Upstream of a dam, in a reservoir or impounded sections, the reduction of the sediment transport capacity of water results in sediment deposition. This retained sediment has often to be extracted in order to maintain the river depth for navigation and reservoir operation and in order to limit the height of the water level in the case of floods. Downstream of dams the loss of sediment load requires an artificial supply of material or other engineering measures to stabilise the riverbed and to prevent incision.

c. Dredging

Dredging is very common throughout the DRB. The extraction of sediment is mostly related to navigation (minimum water depth); flood protection purposes; reservoir management and torrent control. The major dredging user groups include:

- Waterway transport maintenance dredging;
- Commercial extraction, construction sector;
- Channel maintenance for flood protection;
- Impoundment clearing for hydropower plants;
- Fish farming.

Sediment quality

The characterisation of sediment quality in the Danube is primarily based on the results of the Danube Surveys (JDS 1 and 2). During JDS 1 in 2001, significant concentrations of 4-iso-nonylphenol and di[2-ethyl-hexyl]phthalate were found in bottom sediments as well as in suspended solids (from a few µg/kg up to more than 100 mg/kg). During JDS 2 in 2007, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) and dioxin-like polychlorinated biphenyls (PCB) were more than one order of magnitude lower in all compartments when compared to the Elbe River. PCB levels did not exceed the related German quality standards in sediment. Polybrominated diphenylethers (PBDEs), polyaromatic hydrocarbons (PAH) and organochlorinated pesticides (OCP) concentrations in suspended particulate material (SPM) were an order of magnitude lower than their concentrations in Dutch rivers. The results of the Aquaterra survey in 2004 for PAHs, however, showed that fluoranthene exceeded frequently the proposed EU freshwater quality standard for sediment in the upper part of the surveyed reach (down to rkm 1,262).

The results of analysis of heavy metals in the sediment samples collected during JDS 1 and JDS 2 showed that mercury, cadmium, copper, nickel, zinc and lead are often found at elevated concentrations in the DRBD.

Conclusions and the way forward regarding sediment management in the DRB

The following concluding remarks outline recommendations, which should provide an essential basis for future decisions on sediment issues in the DRB, and for respective actions to be taken in the next RBM cycles.

Sediment quantity:

- There is an increasing discrepancy in the DRB between sediment surplus in reservoirs and retention basins of torrent control works and sediment deficit in the remaining free-flowing sections. In combination with river channelisation, this leads to river bed degradation and a loss of morphodynamic structures with associated problems concerning ecological status.
- To propose appropriate measures for improving the above mentioned situation, a sediment balance for the DRB has to be developed, including identification of possible consequences due to climate change (e.g. glacier retreat). Availability of sufficient and reliable data on sediment transport is a prerequisite for any future decisions on sediment management in DRB.
- Attention should be given to ensuring the sediment continuum (improving existing barriers and avoiding additional interruptions).
- Additional investigations are needed to identify the significance of sediment transport on the Danube basin-wide scale.
- River regulation works (e.g. to increase transport capacity) contribute to river bed degradation. River restoration is of key importance for reducing degradation and improving morphodynamics, necessary for achieving good ecological status (initiation of river type specific morphodynamics, including floodplains).
- Dredging contributes significantly to the bed load deficit. It is therefore recommended that commercial extraction of sediments be prevented and that material dredged for maintenance be inserted back into the river.

Sediment quality:

- While the JDS 2 results for the organochlorinated compounds in sediments and suspended particulate material (SPM) indicated relatively low concentration profiles of these contaminants in the Danube, concentrations of PAHs have been occasionally found at elevated levels. An appropriate assessment of sediment quality necessitates the establishment of environmental quality standards for sediments and SPM.

- Contamination of sediments and SPM by heavy metals (in particular by lead, cadmium, mercury and nickel) should be further investigated. A thorough evaluation of this issue requires the establishment of natural background concentrations of heavy metals to distinguish the anthropogenic impacts.
- Investigation on sediment grain size (fine suspended sediments) should be performed with regard to adsorption capacity and impact on aquatic communities (i.e. by decreasing photosynthesis, impairing fish-gills and filter-feeders, clogging the interstitial that homes amphibian and fish eggs, subsequent reduction of biodiversity, etc.).

2.1.5.2. Invasive alien species (neozoa and neophyta)

The DRB is very vulnerable to invasive species given its direct linkages with other large water bodies. Many invasives originate from the Ponto-Caspian area, Asia, Australia and North America. The Danube is a part of the Southern Invasive Corridor (Black Sea - Danube-Main/Danube Canal - Main-Rhine - North Sea waterway), one of Europe's four most important routes for invasive species. The river is therefore exposed to intensive colonisation of invasive species and further spreading in both north-west and south-east directions throughout the Basin.[48]

Results of the JDS 2 revealed that invasive species have become a major concern for the Danube and that their further classification and analysis is vital for effective river basin management. At present there are a number of theories, but no common consensus, as to the reasons for the take-over of invasive species in the Danube. Even the question of whether the ecological status of the Danube is really significantly impacted by neozoa is not addressed satisfactorily.

From the point of view of river basin management, neozoa dominate macrozoobenthic fauna at many places in the Danube and thus their classification is a crucial factor in assessing ecological status. Most of them indicate ß-mesosaprobic water quality, which results in an overall *good ecological status* due to their dominance. During JDS 2 the most frequent invasive macroinvertebrates were Asian clams (*Corbicula fluminea*) observed at 93% of sites sampled along the Danube River. Another ubiquitous invasive macroinvertebrates are the Caspian mud shrimp (*Corophium curvispinum*) and *Dikerogammarus villosus* observed at 90% and 69% of all sampled JDS 2 sites, respectively. The JDS 2 found that macroinvertebrate invasive species reached 100% abundance in specific river stretches in the Middle Reach of the Danube. In the Upper Reach, the invasives accounted for up to 90% of specimens observed at some sites. The Asian clams were often one of the only species found at many sites, given their ability to survive the current and bottom conditions there.

Among the Danube fish population along the Danube's Upper and Middle Reach, several *Neogobius* (goby) species, which are immigrants from the Black Sea, were found in high or even dominating abundances along the rip-rap protected and regulated banks. In contrast, downstream of the Iron Gate in the gobies' native range (rkm 850-0), where hydromorphological impacts on the river are much lower, goby abundance is low and only slowly increases towards the Danube Delta.

Within the macrophyte study of the JDS 2, the presence of water hyacinth (*Eichhornia crassipes*), most likely resulting from human impacts, was observed. Considered one of the worst aquatic weeds in the world, it is a fast growing plant with populations known to double in as little as 12 days. Infestations of the weed block waterways, limit boat traffic, swimming and fishing, and prevent sunlight and oxygen from penetrating the water surface.

The approach for classification of invasive species is still the subject of many discussions in the EU MS. Thus, it is essential to deal with this issue in the Danube Basin further, focusing on the influence of invasive species on the assessment of ecological status.

[48] A list of key invasive alien species in the DRB has been compiled in the frame of the FP6 European project DAISIE and can be found under www.europe-aliens.org.

2.2 Surface waters: lakes, transitional waters and coastal waters[49]

In the DRBD, six lakes are identified as being of basin-wide importance: Neusiedlersee/Fertö-tó consisting of two water bodies (AT/HU), Lake Balaton (HU), the Yalpug-Kugurlui Lake System (UA) consisting of the lake water bodies Yalpug and Kugurlui as well as the the Razim-Sinoe Lake System (RO) comprising Lake Razim and Lake Sinoe (also a transitional water body). The DBA 2004 includes a detailed analysis of impacts, as well as the risk of failure of the EU WFD objectives.

Table 8 summarises whether significant hydromorphological alterations and/or chemical pressures are affecting the DRBD lakes (analysed as of 2009). For further details, see the national RBM Plans.

Table 8 : Presence of significant hydromorphological alterations and chemical pressures affecting DRBD lakes.

	Country	Hydromorphological alteration	Chemical pressure
Neusiedler See / Fertö-tó	AT/HU	No	No
Lake Balaton	HU	No	No
Lacul Razim	RO	No	Yes
Lacul Sinoe	RO	No	Yes
Lake Yalpug	UA	Yes	No information
Lake Kurgului	UA	Yes	No information

Out of the four costal waters bodies (see Map 1 for location), two are identified with significant hydromorphological alterations, as a result of harbour activities.

2.3 Groundwater

According to Article 2 of the EU WFD the term *groundwater* refers to all water that is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil. An *aquifer* is a subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater. Finally, a *body of groundwater* means a distinct volume of groundwater within an aquifer or aquifers.

The analysis and review of groundwater bodies (GWBs) in the DRB, as required under Article 5 and Annex II of the *WFD*, was performed in 2004 and identified 11 transboundary GWBs or groups of GWBs of basin-wide importance (listed in Table 9 and illustrated in Map 4).

Transboundary GWBs of basin-wide importance were defined as follows:

1. Important due to the size of the groundwater body i.e. an area >4,000 km² or
2. Important due to various criteria e.g. socio-economic importance, uses, impacts, pressures interaction with aquatic eco-system. The criteria need to be agreed bilaterally.

Other GWBs, even those with an area larger than 4,000 km², that are fully situated within one country of the DRB are dealt with at the national level.

From the time that the Article 5 report was published, some countries changed their method of delineation of GWBs and reconsidered their vertical dimension. As a consequence, the aggregated national part of a transboundary GWB may consist of more or less parts than was reported in the Article 5 Report. More detailed characteristics of the 11 transboundary GWBs of basin-wide importance, as well as their status assessment, are given in Annex 9.

[49] Further details on coastal waters are part of the respective national reports.

For the current version of the DRBM Plan, the Moldovian part of GWB 3 is not included in the analysis, However, the datasets will be improved and included in the future.

There is an ongoing discussion between Romania and Bulgaria on the re-delineation of GWBs 2 and 4 between the DRBD and the Black Sea RBD.

This chapter summarises the significant pressures that have been identified for the 11 transboundary GWBs of basin-wide importance. An indicative overview of these pressures is presented in Table 9 whereas detailed information on the relevant pressures for each groundwater body is given in Annex 11. The basic principles and assessment of pollution sources for surface waters described in Chapter 2.1 also provide relevant background information for groundwater due to the very close interrelation between the two water categories. Specifically, synergies between groundwater and the three SWMIs of organic, nutrient and hazardous substance pollution are of importance.

2.3.1 Groundwater quality

According to the DBA the main reasons for the pollution of groundwater were identified as:

a. Insufficient wastewater collection and treatment on the municipal level;
b. Insufficient wastewater treatment at industrial premises;
c. Water pollution caused by intensive agriculture and livestock breeding;
d. Inappropriate waste disposal sites.

These pressures, in combination with the high vulnerability of some of the aquifers, necessitate the development of appropriate GWB protection strategies based on conceptual models.

The overall assessment of pressures on the quality of the 11 transboundary GWBs of basin-wide importance showed that pollution by nitrates from diffuse sources is the key factor affecting the chemical status of these groundwaters. The major sources of this diffuse pollution are agricultural activities, non-sewered population and urban land use. This analysis confirms the findings of the risk analysis in the Article 5 Report for the DRB district.

Furthermore, in the national parts of two transboundary GWBs the following point sources of pollution were identified:

a. Leakages from contaminated sites;
b. Leakages from waste disposal sites (landfill and agricultural waste disposal);
c. Leakages associated with oil industry infrastructure;
d. Leakages from septic tanks;
e. Discharge of used thermal water.

Detailed information on the relevant pressures for each GWB is given in Table 9 and Annex 11.

2.3.2 Groundwater quantity

The DBA reported that groundwater used for the supply of drinking water plays a major role in Danube countries, estimating that about 60% of the population in the DRB depends on groundwater sources. In general, groundwater quantity in the DRB is affected by groundwater abstraction for drinking water supply or industrial and agricultural purposes. The expected development of future water demand has to be taken into account when identifying water exploitation and protection strategies.

The assessment of pressures on the quantity of the 11 transboundary GWBs of basin-wide importance showed that over-abstraction prevents the achievement of *good* quantitative status for two GWBs.

Table 9: GWBs or groups of GWBs of basin-wide importance and respective pressures, status, measures and exemptions.

Code	Size [km²]	Aquifer characterisation		Main use	Overlying strata [m]	Criteria for importance	Pressures		Status		Measures		Exemptions
		Aquifer Type	Confined				Quality	Quantity	Quality	Quantity	Quality	Quantity	
1-DE-AT	5,900	K	Yes	SPA, CAL	100-2000	Intensive use	No	No	Good	Good	No	No	No
2-BG-RO	30,147	F, K	Yes	DRW, AGR, IND	0-600	> 4,000 km²	No	No	Good	Good	No	No	No
3-RO-MD	21,626	P	Yes	DRW, AGR, IND	0-150	> 4,000 km²	No	No	Good	Good	No	No	No
4-RO-BG	7,027	K, F-P	Yes	DRW, AGR, IND	0-10	> 4,000 km²	DS	No	Good	Good	No	No	No
5-RO-HU	7,699	P	Y/N*	DRW, IRR, IND	2-30	GW resource, DRW protection	DS	No	Poor	Good	BM, SM	No	Yes
6-RO-HU	2,475	P	Y/N*	DRW, AGR, IRR	5-30	GW resource, DRW protection	No	No	Good	Good	No	No	No
7-RO-RS-HU	29,012	P	Y/Y/N*	DRW, AGR, IND, IRR	0-125	> 4,000 km², GW use, GW resource, DRW protection	DS	WA	G/G**/P	G/P**/P	BM	BM, OBM, SM	Yes
8-SK-HU	3,363	P	No	DRW, IRR, AGR, IND	2-5	GW resource, DRW protection	DS	No	G/P	Good	BM,	No	Yes
9-SK-HU	2,216	P	Yes	DRW,IRR	2-10	GW resource	No	No	Good	Good	No	No	No
10-SK-HU	1,090	K, F	Y/N*	DRW, OTH	0-500	DRW protection, dependent ecosystem	No	No	Good	Good	No	No	No
11-SK-HU	3,811	F, K	Y/N*	DRW, SPA, CAL	0-2500	Thermal water resource	No	WA	Good	G/P	No	No	Yes

Code	GWB code which is a unique identifier.
Size: km²	Whole area of the transboundary GWB covering all countries concerned in km².
Aquifer characterisation	[Aquifer Type: predominately **P** = porous/ **K** = karst / **F** = fissured] Multiple selection possible: predominantly porous, karst, fissured and combinations are possible. Main type should be listed first. [Confined: **Yes** / **No**].
Main use	[**DRW** = drinking water / **AGR** = agriculture / **IRR** = irrigation / **IND** = Industry / **SPA** = balneology / **CAL** = caloric energy / **OTH** = other]. Multiple selection possible.
Overlying strata	Range in metres. Indicates a range of thickness min., max. in metres.
Criteria for importance	If size <4,000 km², criteria for importance of the GWB have to be named and bilaterally agreed upon.
Pressures	Indicates the significant pressures. [**AR =** artificial recharge**, DS** = diffuse sources**, PS** = point sources**, OP** = other significant pressures**, WA** = water abstractions].
Status	[**G =** good**, P** = poor**, Risk** (only in the case that there are no monitoring data available)].
Measures	[**BM** = basic measures**, OBM** = other basic measures**, SM** = supplementary measures].
Exemptions	Indicates whether there are exemptions for the GWB.
*	The different national parts don't show a unique assessment.
**	The status information is of low confidence as it is based on risk assessment.

3. Protected areas in the DRBD

The information on protected areas in the DRBD has been collected according to WFD Article 6 and Annex IV. At the DRB basin-wide scale, protected areas for the protection of habitats and species; nutrient sensitive areas, including areas designated as vulnerable zones; and other protected areas in Non EU MS are compiled. Other types of protected areas according to WFD Article 6, Annex IV are not addressed at the Roof level but are an integral part of the national RBM Plans.

Map 9 illustrates protected areas >500 ha designated for the protection of habitats or species where maintenance or improvement of the water status is an important factor in their protection (including Natura 2000 sites)[50]. Furthermore, the map visualises protected areas in the Non EU MS and indicates the respective types. Annex 10 includes a detailed inventory of the protected areas illustrated in Map 9.

Figure 16 provides an overview of these protected area types for the DRBD. Out of a total of 1,080 protected areas (156,361 km^2), 716 (73,023 km^2) have been designated following the EU Habitats Directive and 294 (73,872 km^2) are bird protected areas (EU Birds Directive. Another 44 (5,810 km^2) areas are protected under both the Habitat as well as Bird Directive. All of them are Natura 2000 sites designated in EU MS according to the EU WFD. 25 (3,651 km^2) are protected area types reported by Non EU MS and are mainly nature reserves and Biosphere Reserves.

Map 26 identifies nutrient sensitive areas, including areas designated as nitrates vulnerable zones (EU Nitrates Directive) and areas designated as sensitive areas (EU UWWT Directive). This designation is only illustrated for EU MS as it is not obligatory for Non EU MS.

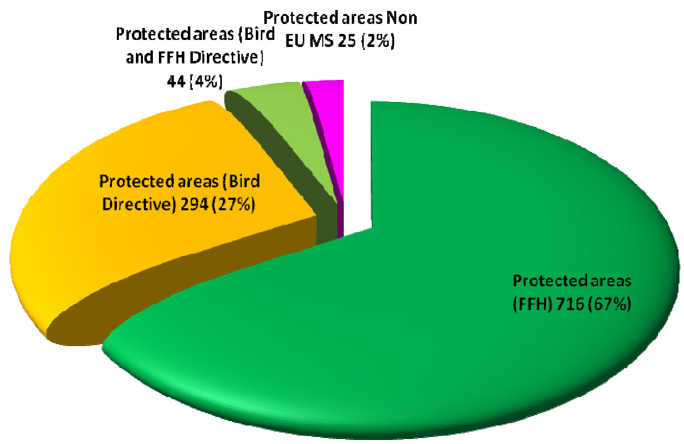

Figure 16: Overview on number of WFD relevant protected areas under the EU Habitats Directive and EU Birds Directive including reported protected areas for Non EU MS (location and type of these protected areas are shown on Map 9).

(FFH: EU Habitats Directive).

[50] Natura 2000 designation under the EU Directive 92/43/EEV and Directive 79/409/EEC.

4. Monitoring networks and ecological / chemical status

4.1. Surface waters

According to the EU WFD, *good ecological and chemical status* has to be ensured and achieved for all surface water bodies. For those identified as heavily modified or artificial, *good ecological potential and chemical status* has to be achieved and ensured.

Monitoring results according to the EU WFD serve the validation of the pressure analysis (DBA) and an overview of the impacts on water status is required in order to initiate measures.

Ecological status / ecological potential

Ecological status results from assessment of the biological status of all WFD biological quality elements (fish, macroinvertebrates, phytoplankton, phytobenthos, macrophytes) and the supportive physico-chemical parameters (general and specific ones).

Ecological potential includes the same biological and physico-chemical components and reflects given hydromorphological changes. It is assessed for heavily modified as well as artificial water bodies and aims for alternative environmental objectives than *ecological status*.

Both *ecological status* and *ecological potential* for surface water bodies are assessed on the basis of specific typologies and reference conditions, which have been defined by EU MS according to WFD Annex V.

The methods regarding the assessment of ecological status vary between different EU MS. However, the EU-wide intercalibration exercise shall ensure the comparability of water status class boundaries (*high/good*, *good/moderate*) among different countries in accordance with the normative definitions of the EU WFD. In the DRBD, the intercalibration exercise for the major area of the DRBD is performed through the work of the Eastern Continental Geographical Intercalibration Group (EC GIG). For some Danube countries, the work of the Central and Alpine GIG is also relevant. The assessment of *ecological status* of large rivers, such as the Danube, has been recognised as a particular challenge and is dealt with by the EC GIG as well as by a specific working group at the European level.

The intercalibration exercise of the EC GIG is not yet fully completed[51]. Therefore, full comparability and high confidence of ecological water status assessment results are not yet ensured throughout the entire area of the Eastern Continental region of the DRBD. Participation of a country in the intercalibration exercise and its completion influences the confidence level of the status data as only intercalibrated methods can produce high-confidence data.

Chemical status

Chemical status has to meet the requirements of environmental objectives for surface waters outlined in EU WFD Article 4(1). *Good chemical status* must not exceed the environmental quality standards established in line with the WFD Article 16(7), in EU Directive 2008/105/EC on environmental quality standards in the field of water policy.

The overall results of the status assessment can be found in Chapter 4.1.4. These results build mainly upon the outcomes of the TNMN (4.1.1) and the JDS 2 (4.1.2).

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[51] See the respective EU Commission Decision on the intercalibration exercise.

4.1.1. Surface water monitoring network under the TNMN

Fulfilling the provisions of the DRPC, the TNMN in the DRB has been in operation since 1996. The original objective of the TNMN was to enable a reliable and consistent trend analysis for concentrations and loads of priority pollutants; to support the assessment of water quality for water use; and to assist in the identification of major pollution sources.

The TNMN laboratories have a free choice of analytical method, providing they are able to demonstrate that the method in use meets the required performance criteria. Therefore, the minimum concentrations expected and the tolerance required of actual measurements have been defined for each determinant so that the method compliance can be checked. To ensure the quality of collected data, a basin-wide Analytical Quality Control (AQC) programme is regularly organised by the ICPDR. The AQC shows satisfactory results for physico-chemical substances but certain laboratories experience problems with the quality of results from the trace analysis of the priority substances.

Implementation of the WFD necessitated the revision of the TNMN. A revised TNMN has been under operation since 2007[52] and provides data for this report (see Map 10).

The major objective of the revised TNMN is to provide an overview of the overall status and long-term changes of surface water and, where necessary, groundwater status in a basin-wide context (with particular attention paid to the transboundary pollution load). In view of the link between the nutrient loads of the Danube and the eutrophication of the Black Sea, the monitoring of sources and pathways of nutrients in the DRB and the effects of measures taken to reduce the nutrient loads into the Black Sea are an important component of the scheme.

To meet the requirements of both the WFD and the DRPC, the revised TNMN for surface waters consists of the following elements:

- Surveillance monitoring I: Monitoring of surface water status;
- Surveillance monitoring II: Monitoring of specific pressures;
- Operational monitoring;
- Investigative monitoring.

Surveillance monitoring II is a joint monitoring activity of all ICPDR Contracting Parties, which produces data on concentrations and loads of selected parameters in the Danube and major tributaries. Surveillance monitoring I and operational monitoring is based on collection of data on the status of surface water and groundwater bodies in the DRBD, to be published in the DRBM Plan. Investigative monitoring is primarily a national task. However, on the basin-wide level, the JDS serve the investigative monitoring as required e.g. for harmonisation of existing monitoring methodologies; filling information gaps in monitoring networks; testing new methods; or checking the impact of "new" chemical substances in different matrices. JDS are carried out every 6 years.

4.1.2. Joint Danube Survey 2

The JDS2 was the world's biggest river research expedition in 2007 aiming to produce highly comparable and reliable information for the entire Danube River and many of its tributaries. The outcomes of JDS 2 were essential to attain the complete overview needed to meet the requirements of the WFD by 2015. Another important aspect of the survey was to increase public awareness in the DRB.

With regard to status assessment, the JDS2 results did not replace the national status assessment but rather allowed the formation of statements and suggestions for the *indication of ecological and chemical status*, to support member states in their national assessment process. The detailed results of

[52] Water Quality in the Danube River Basin – 2005, TNMN (ICPDR, 2005).

the indication of ecological status for the four biological quality elements and chemical status can be found in the Final Report of JDS 2[53].

Hydromorphology

The JDS 2 included the first systematic survey of hydromorphological parameters in the entire navigable longitudinal Danube stretch using a single method (for details see Chapter 2.1.4 and the JDS 2 report[55]).

Biology

The analysis of macroinvertebrates[54] indicated *good* biological water quality for almost 80% of the Danube sites. Significant organic pollution affecting living organisms was detected in the tributaries Sio, Jantra, and Rusenski Lom. Due to excessive pollution, the Arges River did not host any macroinvertebrates. Invasive species (Chapter 2.1.5.2) originating from the Ponto-Caspian area (the Black, Azov and Caspian Sea regions) were found to be a crucial factor influencing Danube macrozoobenthos.

The fish survey, the first ever for the entire length of the Danube, revealed that most of the investigated sites on the Danube indicated *moderate* status while only about one-third of sites indicated *good* status. The lack of migratory species in the Danube indicates a loss of river connectivity. However, a very high species diversity was found in the Danube (almost 50,000 fish of 66 species) indicating that the Danube could be ranked as ‘top’ river in Europe in terms of number of fish species.

In the regulated non-impounded stretches of the Danube, the macrophytes[55] often meet the conditions required for *good ecological status*. However the situation is unsatisfactory in the impounded stretches upstream of hydropower plants and a negative nutrient influence from some tributaries particularly in the lower Danube was observed.

The analysis of phytoplankton[56] found that most of the Danube comprised acceptable conditions. Elevated levels of chlorophyll-a and phytoplankton biomass were found only in the middle reach. The most polluted river indicated by the phytoplankton analysis was the Arges.

Phytobenthos,[57] in contrast to aquatic fauna, relates directly to nutrient content (mostly phosphorus) in the river and is considered to be a reliable indicator of long-term eutrophication processes. The indication of ecological status, based on phytobenthos analysis, suggested an increase of nutrients in the longitudinal profile of the Danube.

Microbial analysis found about one third of the sites polluted. The highest microbial contamination levels for the Danube River were found in the stretch between Budapest and Belgrade; while the tributaries, Arges and Russenski Lom, and side-arms, Rackeve-Soroksar and Moson Danube, can be considered as hot spots. This emphasises the need for ensuring the sufficient treatment of wastewaters.

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[53] ICPDR (2008): Joint Danube Survey 2 – Final Scientific Report; Eds: Liska et al; ICPDR Secretariat, VIC/D0412, P.O. Box 500, 1400 Vienna, Austria. www.icpdr.org/jds

[54] Freshwater benthic macroinvertebrates are animals without backbones that are larger than ½ mm. These animals live on rocks, logs, sediment, debris and aquatic plants during some period in their life. Benthos include crustaceans such as *Gammarus*; molluscs such as clams and snails; aquatic worms and the immature forms of aquatic insects such as stonefly and mayfly nymphs. Macroinvertebrates are Biological Quality Elements to be assessed under the EU WFD.

[55] Aquatic macrophytes are aquatic plants that are large enough to be apparent to the naked eye. Aquatic macrophytes characteristically grow in water or wet areas and are quite a diverse group. For example, some are rooted in sediments while others float on the water's surface and are not rooted to the bottom. Macrophytes are Biological Quality Elements to be assessed under the EU WFD.

[56] Aquatic phytoplankton are microscopic plants and are the autotrophic component of the plankton community. Phytoplankton is a Biological Quality Element to be assessed under the EU WFD.

[57] Aquatic phytobenthos are plant organisms of the river bottom and sediments and are largely algae. Phytobenthos is a Biological Quality Element to be assessed under the EU WFD.

Priority substances

Among the EU's priority substances, di-(2-ethylhexyl)phthalate (DEHP) was found in nearly all JDS 2 water samples at relatively high concentrations; proposed environmental quality standards (EQS) were exceeded in 44% of water samples. At several sites, an indication of WFD non-compliance was found for PAH, nonylphenol, tributyltin and trichlorobenzene. Metal concentrations in water were found to be above quality targets at only three sites (mercury at two downstream of Budapest; nickel at the Timok-Danube confluence). The analytical results obtained for polar compounds in the Danube (pharmaceuticals, pesticides, perfluorinated acids and phenolic endocrine disrupting compounds) were similar to those in other large European rivers such as the Rhine, Elbe or Po. The most relevant polar compounds identified in terms of frequency of detection, persistency and concentrations were anticorrosives benzotriazoles, pesticide 2,4-D and antiepileptics pharmaceutical carbamazepine.

4.1.3. Confidence in the status assessment

Actual confidence levels achieved for all data collected for a RBM plan should enable meaningful assessments of status in time and space. According to WFD Annex V, estimates of the level of confidence and precision of results provided by monitoring programmes shall be given in the plan. For this purpose, a three-level confidence assessment system was agreed for surface water bodies (regarding both ecological and chemical status in the DRBD). Confidence levels for ecological and chemical status are described in Figure 17 and Figure 18 and are illustrated in Map 11 and Map 12.

Figure 17: Confidence levels for ecological status (see also Map 11).

Confidence level of correct assessment	Description	Illustration in map

HIGH
Confidence
	***All** of the following criteria apply:*
	
	Biology:
	• WFD-compliant monitoring data;
	• Biological monitoring complies fully with preconditions for sampling/analysis
	• WFD compliant methods included in intercalibration process at EU level;
	• Biological monitoring results are supported by:
	  • Results of hydromorphological quality elements (for structural degradation);
	  • Results of physico-chemical quality elements (for nutrient/organic poll.);
	• Aggregation (grouping procedure) of water bodies in compliance with WFD shows plausible results.
	
	Chemistry:
	• National EQS available for specific pollutants and sufficient monitoring data (WFD compliant frequency) available;
	• Aggregation (grouping procedure) of water bodies in compliance with WFD shows plausible results.
		

MEDIUM
 Confidence
	<u>One or more</u> of the following criteria apply:
	 Biology:
	 • WFD compliant methods not included in intercalibration process at EU level
	 • WFD compliant monitoring data, but:
	     • biological results not in agreement with supportive quality elements or
	     • only few biological data available (possibly showing different results);
	 • Medium confidence in grouping of water bodies;
	 • Biological monitoring does not comply completely with preconditions for sampling and analysis (e.g. use of incorrect sampling period).
	 Chemistry:
	 • National EQS available but insufficient data available (acc. to WFD);
	 • Medium confidence in grouping of water bodies.	

LOW ***Confidence***	***<u>One or more</u> of the following criteria apply:*** **Biology**: • No WFD-compliant methods and/or monitoring data available; • Simple conclusion from risk assessment to EQS (updated risk assessment is mandatory). **Chemistry:** • No national EQS available for specific pollutants, but data available (pollution detectable).	

Figure 18: Confidence levels for chemical status (also see Map 12)**.**

Confidence level of correct assessment	Description	Illustration in map
HIGH ***Confidence***	**Either:** • No discharge of priority substances; ***<u>Or all</u> of the following criteria apply:*** • Data/measurements are WFD-compliant (12 measurements per year); • Aggregation (grouping procedure) of water bodies in compliance with WFD shows plausible results.	
MEDIUM ***Confidence***	***<u>All</u> of the following criteria apply:*** • Data/measurements are available; • Frequency is not WFD-compliant (less than 12 measurements per year available); • Medium confidence in grouping of water bodies.	
LOW ***Confidence***	***<u>One or more</u> of the following criteria apply:*** • No data/measurements available; • Assumption that good status cannot be achieved due to respective emission (risk analysis).	

4.1.4. Final designation of heavily modified and artificial water bodies

A *heavily modified water body* (HMWB) refers to a body of surface water that as a result of physical alteration by human activity is substantially changed in character. A surface water body is considered as *artificial* when created by human activity.

According to WFD Article 2 and 4(3), EU MS may designate a body of surface water as *artificial* or *heavily modified*, when:

- its hydromorphological characteristics have substantially changed so that *good ecological status* cannot be achieved and ensured;
- the changes needed to the hydromorphological characteristics to achieve *good ecological status* would have a significant adverse effect on the wider environment or specific uses*;*
- the beneficial objectives served by the artificial or modified characteristics of the water body reasonably cannot be achieved by a better environmental option, which is:
  - technical feasible and/or
  - not disproportionate costly.

The designation of a water body as *heavily modified* or *artificial* means that instead of *ecological status*, an alternative environmental objective, namely *ecological potential*, has to be achieved for those water bodies, as well as *good chemical status*.

The DBA 2004 provisionally identified HMWBs, and artificial water bodies (AWBs) were presented on the basis of specific basin-wide criteria. For this Plan, the Danube countries reported the nationally identified artificial water bodies, which are reflected accordingly on the basin-wide scale.

4.1.4.1. Approach for the final designation of heaviliy modified water bodies

4.1.4.1.1. Rivers

This DRBM Plan includes the final HMWB designation for EU MS. The Non EU MS performed a provisional identification based on the criteria outlined in the DBA 2004. The criterion for the size of water sections >50 km was changed and all water bodies have been fully considered for the designation. The designation of HMWBs will be revised for every river basin management cycle (every six years).

For the DRBM Plan (Part A), the designation of HMWBs for rivers and transitional waters was performed for:

a. The Danube River;

b. Tributaries in the DRBD >4,000 km^2.

For the Danube River, the Danube countries agreed on a harmonised procedure for the final HMWB designation (the designation for HR, RS and UA is provisional) and on specific criteria for a step-by-step approach (see Annex 13). Both national and JDS 2 data were used for the designation of HMWBs.

The HMWB designations for the tributaries are based on national methods and respective reported information. However, the preconditions for the basin-wide final HMWB designation (regarding both the Danube River and tributaries >4,000 km^2) were to follow the EC HMWB CIS[58] guidance document i.e. that the water body had to:

a. be *significantly physically altered* (not only in hydrology but also morphology) which has led to a change in character: the alteration is profound, widespread and permanent **and**

b. *fail 'good ecological status.'* This had to be proven with high confidence (that the biological monitoring result is based on a WFD-compliant assessment method and assessed worse than *good* status).

The harmonised designation of HMWBs for the Danube River was encountered with difficulties as the agreed criteria were not applied by all riparian Danube countries. Due to the fact that the intercalibration exercise has not yet been completed for all countries in the DRB only Austria, Germany and Slovakia can provide water status assessment results *(ecological status/ecological*

[58] EC HMWB CIS: European Commission's Common Implementation Strategy for HMWB.

potential) with high confidence and perform a final HMWB designation according to the agreed criteria as well as to the respective EC CIS Guidance,. Although *clear cut situations*[59] (such as impoundments) have been identified to enable a harmonised final designation of HMWBs, the exercise has not been completed successfully. Therefore, Figure 19 on the HMWB designation for the Danube River reflects only partly a harmonised outcome based on the agreed ICPDR criteria. It can be concluded that the final HMWB designation still needs further validation.

4.1.4.1.2. Lakes, transitional waters and coastal waters

The HMWB/AWB designations for coastal and lake water bodies are based on national methods and the respective reported information is summarised below.

4.1.4.2. Results of the final designation of heaviliy modified and artificial water bodies

4.1.4.2.1. Rivers

Out of overall 681 river water bodies in the entire DRBD (Danube River and DRBD Tributaries) a total number of 270 are designated heavily modified (241 final and 29 provisional HMWBs). These are 40 % of the water bodies. Further, 21 water bodies are AWBs. This means that 9,835 km out of 25,117 river kilometres are heavily modified (83 % final HMWBs and 17 % provisional HMWBs) due to significant physical alterations causing a failure of the *good ecological status*. 1,592 km of the Danube River itself are designated as HMWB – this is 56 % of its entire length (83 % final and 17 % provisional). Table 10 summarises the designation of HMWBs for all DRBD rivers, the Danube River itself and the three transitional water bodies in the DRB indicating absolute numbers and length of water bodies designated as HMWB.

Table 10: Final designated HMWBs in the Danube River and all rivers of the DRBD (expressed in km, number of water bodies and percentage).

Rivers - Danube River Basin District (DRBD)		
Total WB length (km): 25,117	Total HMWB length (km): 9,835	Proportion HMWB (length): 39%
Total number of WBs: 681	Total number of HMWBs: 270 (241 final and 29 provisional HMWB)	Proportion HMWB (number): 40%
The Danube River		
Total length (km): 2,857	Total HMWB length (km): 1,592	Proportion HMWB (length): 56%
Total number of WBs: 45	Total number of HMWBs: 26 (21 final and 5 provisional HMWB)	Proportion HMWB (number): 58%

HMWB designation for the Danube River

Map 13 shows the final and provisional HMWB designations. Out of a total of 45 Danube River water bodies, 21 water bodies were designated as finally heavily modified by the EU MS. 5 were designated as provisionally heavily modified by the Non EU MS (see Figure 19 and Table 10). Therefore, 1,592 rkm of the entire Danube River length (56%) have been designated as HMWB. No artificial water body has been designated.

[59] In the case of *clear cut situations*, a clear change of river type and/or category can be identified and g*ood ecological status* is not met. In specific cases, the definition of *clear cut situations* is therefore a practical tool to enable the final designation of HMWB, as the failing of *good ecological status* has already been proven by WFD-compliant assessment methods and monitoring data in some Danube countries

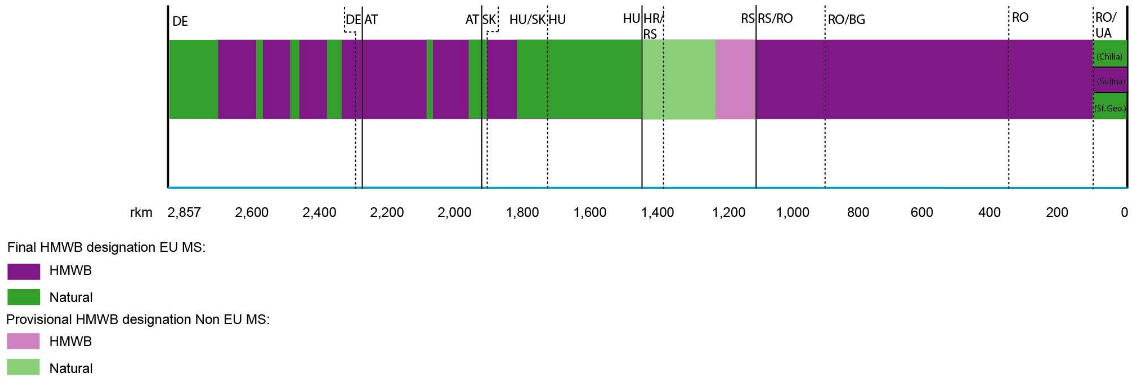


Figure 19: Heavily modified water bodies of the Danube River – results of the joint approach.

HMWB designation for all DRBD rivers with catchment areas >4,000 km²

Map 13 shows the final and provisional HMWB designations for all DRBD rivers with catchment areas >4,000 km^2. Out of 681 river water bodies 241 water bodies are designated as finally heavily modified by the EU MS. 29 are designated as provisional HMWB by the Non EU MS (see Figure 20). 21 are identified as artificial water bodies. This means that 9,835 rkm of the overall DRBD rivers (25,117 rkm) are designated as HMWB (39%) and 1,071 rkm as AWBs (4%).

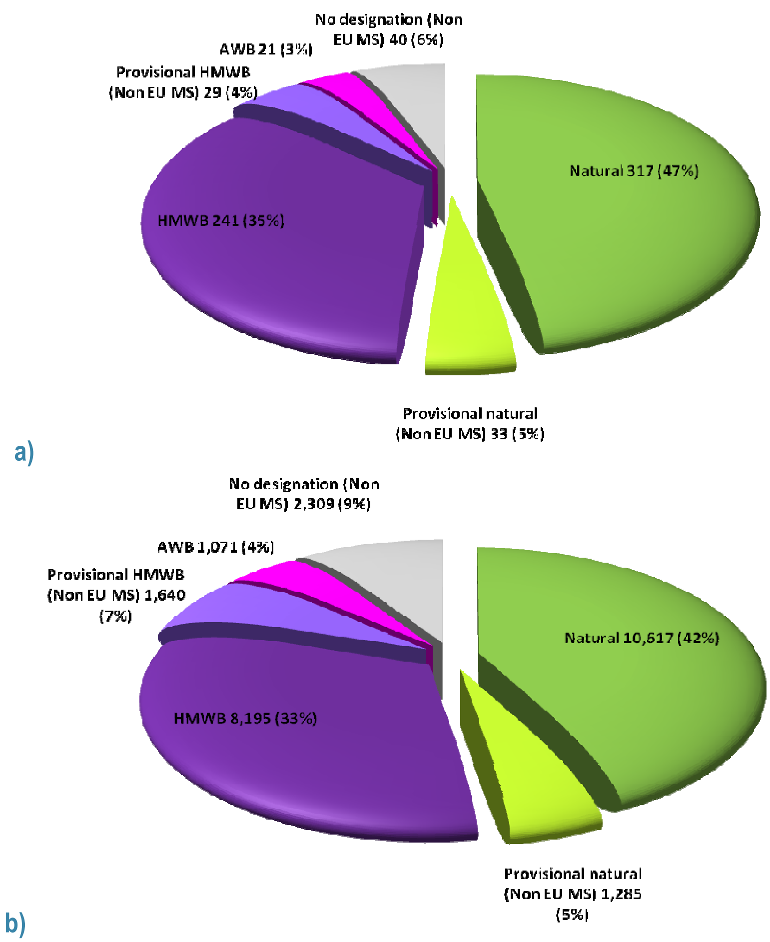


Figure 20: HMWBs and AWBs and natural water bodies (indicated in numbers and relation to total number of river water bodies (a), as well as length (km) and relation to total length of river water bodies (b)).

4.1.4.2.2. Lakes and transitional waters

Out of seven lake water bodies (one of them being transitional), none was designated as finally heavily modified. No water body was identified as artificial.

4.1.4.2.3. Coastal waters

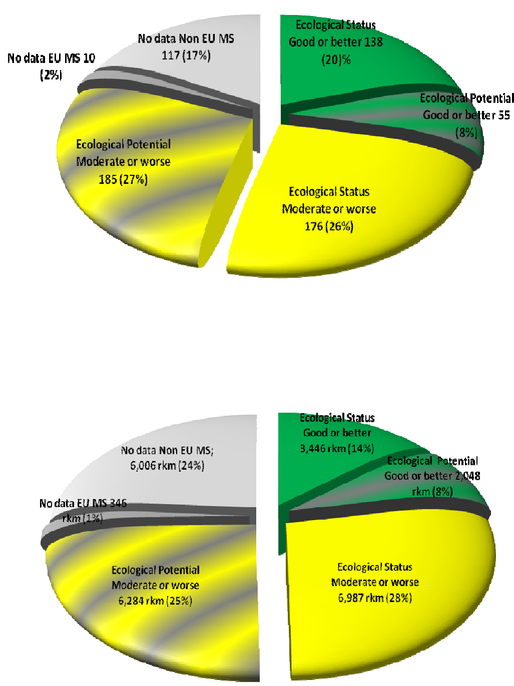
Out of the five coastal water bodies, two were designated as finally heavily modified. No water body was identified as artificial.

4.1.5. Ecological and chemical status

In this chapter, the results of the monitoring programmes concerning the ecological and chemical status of rivers, transitional waters and coastal waters (carried out under Article 8. and Annex V of the WFD) are presented both in map form and percentage values. More detailed results of the classification of all assessed surface water bodies according to particular biological, hydromorphological and chemical quality elements are provided in Annex 14.

4.1.5.1 Rivers

Figure 21 and Figure 22 illustrate the water status regarding *ecological status*, *ecological potential* and *chemical status* for the number and length (rkm) of water bodies. Further, their relation to the total number and length of water bodies in the DRBD is shown. Altogether 681 river water bodies were evaluated. Out of these 193 achieved *good ecological status* or *ecological potential* (28%) and 437 river water bodies achieved *good chemical status* (64%). Out of a 25,117 rkm network in the DRBD, *good ecological status* or *ecological potential* is achieved for 5,494 rkm (22%) and *good chemical status* for 11,180 rkm (45%). Figure 21 provides a general overview of water status including the data from Non EU MS and does not include information on the three different confidence levels. Details on the confidence levels are provided in Map 11, Map 12 and Annex 14. Figure 21 also illustrates the share of existing data gaps.



a)

b)

Figure 21: Ecological status and ecological potential for river water bodies in the DRBD (indicated in numbers and relation to total number of river water bodies (a), as well as length (km) and relation to total length of river water bodies (b)).

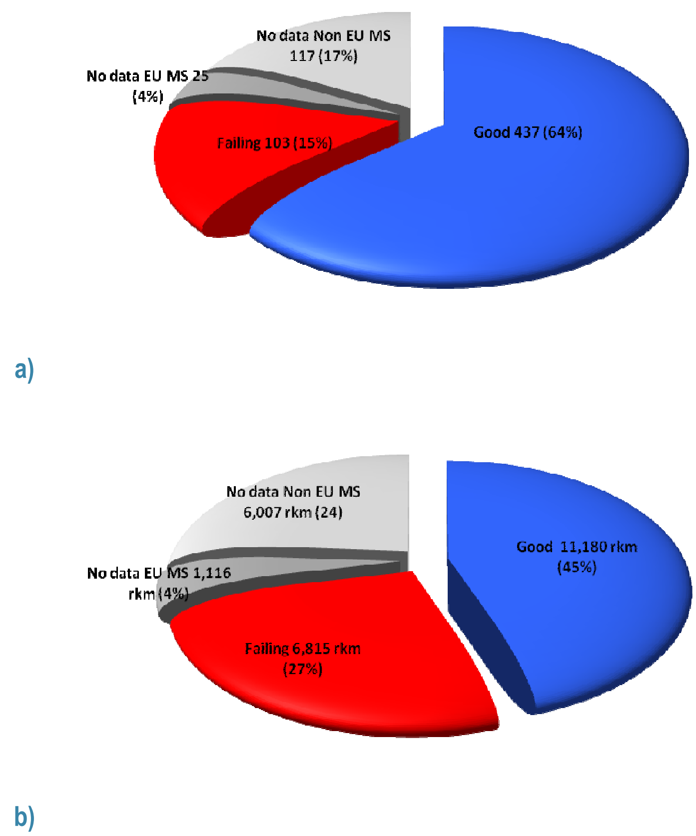


Figure 22: Chemical status of river water bodies in the DRBD (indicated in number and relation to total number of river bodies (a), as well as length (km) and relation to total length of river water bodies (b)).

In the case of final HMWBs (EU MS), 53 water bodies were assessed with a good or better ecological potential and 177 with moderate or worse ecological potential. More information on ecological potential for HMWBs for all DRBD rivers and the Danube River itself is illustrated in Figure 23 and Figure 25. The ecological potential for AWBs for all rivers in the DRBD is illustrated in Figure 24. Two out of the 21 AWBs were assessed with an ecological potential good or better. Both Figure 23 and Figure 24 include the share of Non EU MS that performed a provisional designation.

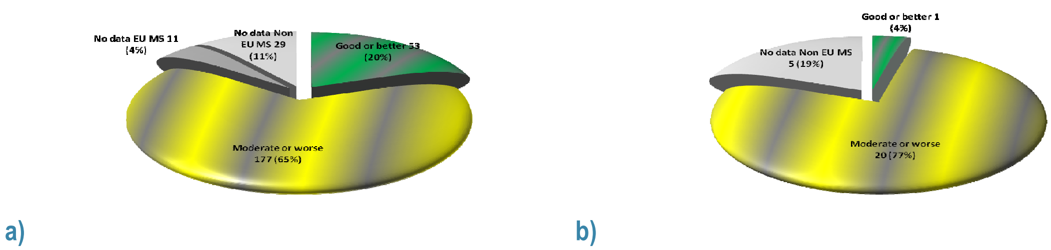


Figure 23: Ecological potential for HMWBs in relation to the overall number of HMWBs (incl. share of Non EU MS providing provisional designation). [a: all DRBD Rivers; b: Danube River].

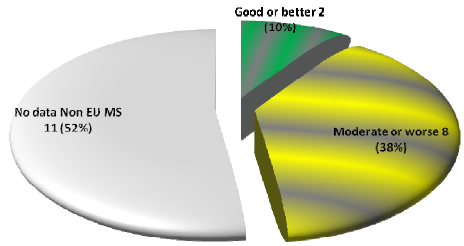


Figure 24: Ecological potential for AWB in relation to the overall number of AWBs (incl. share of Non EU MS providing provisional designation).

Figure 25 illustrates the water status classification for the Danube River itself regarding *ecological status*, *chemical status* and *ecological potential* (for those stretches that were designated as HMWB). Altogether 45 river water bodies were evaluated in the Danube itself. Out of these, three river water bodies achieved *good ecological status* (4%) and 30 achieved *good chemical status* (67%). For 21 final HMWBs (EU MS), one is assessed with good or better ecological potential.

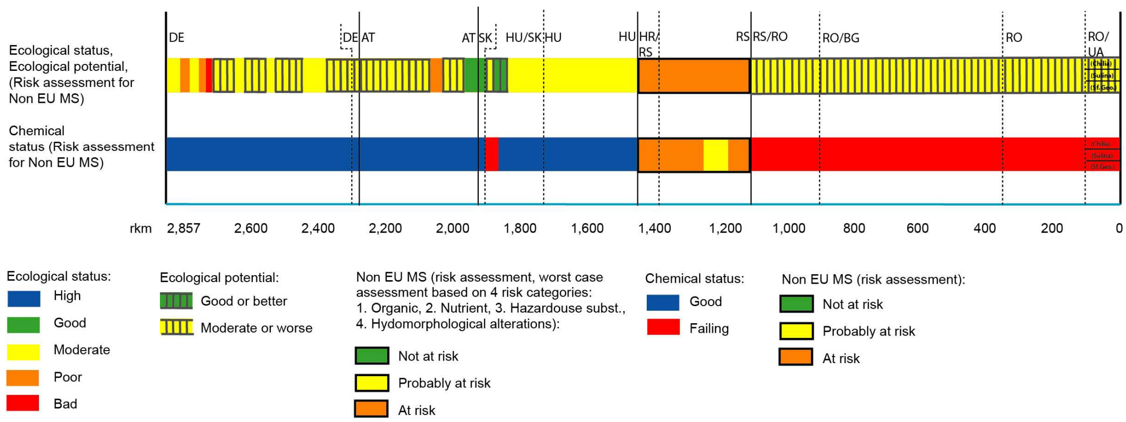


Figure 25: Status classification for the Danube River represented as continuous bands.

More detailed information on data availability and on results of classification of all assessed surface water bodies according to particular biological, hydromorphological and chemical quality elements are provided in Annex 14.

4.1.5.2. Lakes and transitional waters

Six Lakes - consisting of seven lake water bodies - were evaluated, one of them a transitional water body. Out of these, three achieved *good ecological status* (43%) and two *good chemical status* (29%) (see Map 11 and Map 12). No lake was designated as a final HMWB.

4.1.5.3. Coastal waters

Altogether five coastal water bodies were evaluated. Out of these, none achieved *good ecological status*. Furthermore, all water bodies failed *good chemical status* (see Map 12). For the two coastal water bodies designated as final HMWBs, the *ecological potential* was assessed as bad for one and moderate for the other (see Map 11).

4.1.6. Gaps and uncertainties

This section comprises a description of all gaps and uncertainties encountered in relation to the assessment of ecological and chemical surface water status.

The assessment of the ecological status according to the requirement of the WFD was a challenge for all Danube countries. WFD compliant methods for the analysis of biological quality elements (BQEs) and their assessment had to be applied for the first time. Enormous efforts were needed to apply the new sampling methods for all BQEs, to establish appropriate classification systems and to put these new methods into practice at the national level. The intercalibration exercise of the Eastern Continental Region, aiming for international harmonisation and comparability of status class boundaries, demanded additional efforts and has not been fully completed so far.

Those ambitious activities logically brought along a number of gaps and uncertainties that were reported by the countries and which have to be taken into account when interpreting the results of the status analysis in the DRBM Plan.

Most of the countries did not so far manage to use all BQEs for the ecological status assessment as required by the WFD. The key data absent were those for macrophytes as well as for phytobenthos and fish. It has to be pointed out that in the intercalibration exercise performed for the Eastern Continental Region only two countries (AT and SK) completed the exercise regarding the harmonisation for their river classification schemes. Even in this case the intercalibration has been only for one BQE (benthic macroinvertebrates). However, efforts are currently underway to finish the intercalbration exercise of the EC GIG by 2011. The focus is on all BQEs. For the water bodies in the Danube countries belonging to the Central and Alpine GIGs (AT, DE, SI) a higher level of intercalibration was achieved but improvement are also still to be undertaken by 2011.

As regards the confidence of the ecological status assessment almost all Danube countries reported some cases of a preliminary assessment using the risk assessment data or insufficient monitoring data requiring further investigations and/or monitoring. In general the usually reported reasons for low and medium confidence of the ecological status assessment were:

- Lack of or insufficient monitoring data;
- Missing intercalibration of biological methods for individual quality elements.
- Impossibility of statistical correlations between BQEs and physical and chemical support elements because of monitoring data collected at different times;
- Missing data on hydromorphological elements;
- Lack of WFD compliant methodologies for certain BQEs;
- Missing classification schemes for ecological status;

These results indicate that achieving a fully coherent and WFD compliant ecological status assessment in the DRBD requires additional time. Those shortcomes are consequently also reflected for some countries in other implementation steps of the WFD such as in the final designation of Heavily Modified Water Bodies. Therefore, the final HMWB designation still needs validation based on fully intercalibrated and high confidence assessment results regarding the ecological status.

Regarding the improvement of the situation in confidence of the data several countries indicated following actions will be taken:

- Higher density of suitable monitoring sites;
- Higher sampling frequency;
- Improving QA/QC systems for BQEs;
- Improving taxonomic knowledge;
- Further development of ecological assessment methods (especially for phytobenthos, phytoplankton, macrophytes and fish)

The assessment of the chemical status was in most of the countries based on the EQS laid down in Part A of Annex I in the Directive 2008/105/EC of the European Parliament and of the Council on environmental quality standards in the field of water policy. Only Austria (due to an early start of

monitoring of the priority substances before the Directive 2008/105/EC was adopted) applied the national Ordinance on Quality Standards – Chemistry - Surface Waters (BGBl. II Nr. 96/2006).

As regards the assessment methodology the countries applied the rule that the good chemical status is achieved when values of all parameters do not exceed AA-EQS and MAC-EQS. Some countries however did not use the values of MAC-EQS.

Another key principle applied by all countries was that, if for a substance the limit of detection of the analytical method available was above the EQS, this substance has been excluded from the chemical status assessment. Applying this principle led to exclusion from the assessment of the following substances in one or more countries: Benzo(g,h,i)perylene, Ideno(1,2,3-c,d)pyrene, Benzo(k)fluoranthene, Benzo(b)fluoranthene, Benzo(a)pyrene, Hexachlorobenzene, Chlorpyrifos, Tributyltin compounds, Brominated diphenylethers, Trifluralin, C10-13-chloroalkanes, Mercury, and Nickel.

Medium or low confidence of the chemical status assessment was reported primarily because of incomplete monitoring due to the lack of appropriate analytical equipment and also due to a low monitoring frequency.

4.2. Groundwater

According to the EU WFD, *good chemical and quantitative status* should be achieved for groundwater bodies.

Groundwater status is determined by the poorer of its *quantitative status and its chemical status*. *Good groundwater status* means the status achieved by a groundwater body when both its *quantitative and its chemical status* are at least good.

A GW body has good *quantitative status* when the level of water in the groundwater body is such that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction.

The groundwater body has a *good chemical status* when its chemical composition is such that the concentrations of pollutants do not exhibit the effects of saline or other intrusions, do not exceed the EU quality standards and do not pose any significant damage to terrestrial ecosystems which depend directly on the groundwater body

4.2.1. Groundwater monitoring network under TNMN

The transnational groundwater management activities in the DRBD were initiated in 2002 and were triggered by the implementation of the WFD. Monitoring of the 11 transboundary GWBs of basin-wide importance has been integrated into the TNMN of the ICPDR (see Map 4). For groundwater monitoring under the TNMN (GW TNMN) a 6-year reporting cycle has been set, which is in line with reporting requirements under the WFD. GW TNMN includes both quantitative and chemical (quality) monitoring. It shall provide the necessary information to: assess groundwater status; identify trends in pollutant concentrations; support GWB characterisation and the validation of the risk assessment; assess whether drinking water protected area objectives are achieved and support the establishment and assessment of the programmes of measures and the effective targeting of economic resources. In line with the WFD, monitoring programmes meeting these requirements were operational by 22 December 2006 and a report on the GW TNMN was submitted to the EC.

To select the monitoring sites, a set of criteria has been applied by the countries, such as aquifer type and characteristics (porous, karst and fissured, confined and unconfined groundwater) and depth of the GWB (for deep GWBs, the flexibility in the design of the monitoring network is very limited). The flow direction was also taken into consideration by some countries, as well as the existence of associated drinking water protected areas or ecosystems (aquatic and/or terrestrial). The current

monitoring network designs are based on already existing national monitoring programmes which, in some countries, are still under adaptation to the requirements of Article 8 of the WFD.

The qualitative monitoring determinants of GW TNMN, which are set as mandatory by the WFD, include dissolved oxygen, pH-value, electrical conductivity, nitrates and ammonium. The measurement of temperature and set of major (trace) ions is recommended as they can be helpful to validate the Article 5. risk assessment and conceptual models. Selective determinants (e.g. heavy metals and relevant basic radionuclides) would be needed for assessing natural background concentrations. It is also recommended to monitor the water level at all chemical monitoring points in order to describe (and interpret) the *physical status of the site* and to help in interpreting (seasonal) variations or trends in chemical composition of groundwater. In addition to the core parameters, selective determinants will need to be monitored at specific locations, or across GWBs, where the risk assessments indicate a risk of failing to achieve WFD objectives. Transboundary water bodies shall also be monitored for those parameters that are relevant for the protection of all uses supported by groundwater.

As regards quantitative monitoring, WFD requires only the measurement of groundwater levels but the ICPDR has also recommended monitoring of spring flows; flow characteristics and/or stage levels of surface water courses during drought periods; stage levels in significant groundwater dependent wetlands and lakes and water abstraction as optional parameters.

All groundwater monitoring data reported to the ICPDR are integrated into the ICPDR TNMN database. The major tool for this purpose is the Danube GIS, which also includes quality control processes. Interoperability with the European Information System on Water (WISE) is foreseen.

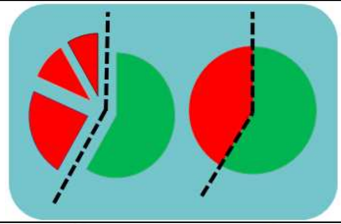
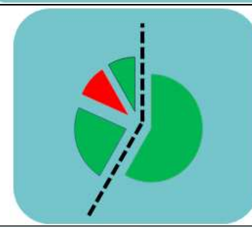
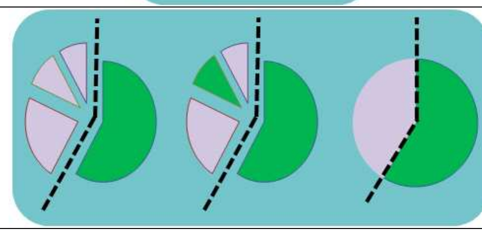
The number of groundwater monitoring stations and the density in a particular GWB is shown in Annex 12. This information has changed since the Article 5 report to the EC as three countries have changed the delineation of nominated transboundary GWBs.

4.2.2. Status assessment approach and confidence in the status assessment

The results of the status assessment of the 11 transboundary GWBs of basin-wide importance are provided for the whole national part of a particular ICPDR GWB (so called: aggregated GWB). If a national part of an ICPDR GWB consists of several individual national-level GWBs, then *poor status* in one national-level GWB is decisive in characterising the whole national part of an ICPDR GWB as having *poor status*.

The confidence of the status assessment for the whole national part of an ICPDR GWB is illustrated in Map 14. The confidence level indicates the (in)homogeneity of the status within an aggregated GWB and is presented as illustrated in Figure 26. The information on confidence level is indicated in maps on groundwater status. More detailed description of the technicalities of the GW TNMN and groundwater status assessment are given in the ICPDR Groundwater Guidance[60].

[60] ICPDR document: IC 141 ICPDR Groundwater Guidance (2008).

High confidence 1.) Status assessment is based on WFD compliant monitoring data. **2.)** If the national part of an ICPDR GW-body is formed by more than one GW-body or groups of GW-bodies, all have the same status.	
Medium confidence - If the national part of an ICPDR GW-body is formed by more than one GW-body or groups of GW-bodies, the status assessment is based on WFD compliant monitoring data and not all have the same status.	
Low confidence - Status assessment is based on risk assessment data.	

Poor status   Good status   Risk

Figure 26: Confidence levels for groundwater status as illustrated in Map 14.

4.2.3. Status of GWBs of basin-wide importance

A summary overview of the chemical and quantitative status for the 11 transboundary GWBs is presented in Table 9. The detailed information on status for each GWB is given in Annex 11.

For two national parts of GWBs there is currently no status information available due to a lack of information on status assessment. In this case the information based on risk assessment is included.

4.2.3.1. Groundwater quality

Processing the data from the TNMN groundwater monitoring programmes, the results on chemical *status* of the transboundary GWBs of basin-wide importance were received and are presented in a map form (see Map 15). The description of the methodology for chemical status assessment and, in the case of *poor status*, information on threshold values including their relation to background values and environmental quality objectives, is provided in the ICPDR document on characterisation methodology of status assessment (see Annex 9).

Out of 11 transboundary GWBs of basin-wide importance (22 national parts evaluated), *good chemical status* was observed in all national parts of 8 transboundary GWBs (73%). In two additional transboundary GWBs, *poor chemical status* was observed in one national part. In only one GWB were all national parts found to be in *poor status*.

Altogether, *poor chemical status* was identified in four out of 22 of the evaluated national parts of the 11 transboundary GWBs. Nitrates were the cause of the *poor* classification in every case.

4.2.3.2. Groundwater quantity

The results for the quantitative status of the transboundary GWBs of basin-wide importance are presented both in map form (see Map 15) and in Table 9 (see Chapter 2.3).

Out of 11 transboundary GWBs (22 national parts evaluated), *good quantitative status* was observed in all national parts of 9 transboundary GWBs (82%). In two transboundary GWBs, *good quantitative status* was observed in only one national part. The poor quantitative status is caused in two cases by the exceeding of available groundwater resources; in one case by damage to terrestrial ecosystems and in one case by damage to surface waters (springs). In the case of the national part of one GWB, former mining activities still have an impact on the quantitative status. Herewith it should be stated that *poor status* can be caused by more than one reason.

4.2.3.3. Gaps and uncertainties

As the overall coordination of groundwater management in the DRBD only started during preparation of the Article 5 report in 2002, there were differences in the approaches taken in the WFD implementation throughout the District. The Danube countries used a broad spectrum of different methodologies for the delineation and characterisation of GWBs; the assessment of the risk of failure to reach *good status*; the establishment of threshold values and status assessment. Despite there being overall coordination, further harmonisation of the national methodologies is still needed. Data gaps and inconsistencies have become apparent in the underlying data, resulting in uncertainties in the interpretation of data. Furthermore, additional information may be needed for a proper assessment of the water balance. In addition, some countries have identified the need to expand the current monitoring networks to include monitoring stations along national borders, where transboundary GWBs are located. In some cases, countries have assessed the need to adapt their current monitoring programmes to collect more comprehensive information on groundwater quality and quantity.

To achieve a harmonisation of data sets for transboundary GWBs, there is a need for intensive bi- and multilateral cooperation. In addition, the interaction of groundwater with surface water or directly dependent ecosystems need further attention. At present, no harmonised system for coding the various layers of the GWBs is available. The issue of different groundwater horizons needs further discussion and clarification.

As Serbia has not yet established a monitoring network based on the WFD, only a risk assessment could be carried out in this country due to the lack of monitoring data.

5. Environmental objectives and exemptions

5.1. Management objectives for the DRBD and WFD environmental objectives

The WFD requires achievement of the following environmental objectives by – in principle – 2015:

a. *good ecological/chemical status* of surface water bodies;
b. *good ecological potential* and *chemical status* of HMWBs and AWBs;
c. *good chemical/quantitative status* of groundwater bodies.

The DRBM Plan provides an overview of the status assessment results of both surface water bodies and groundwater bodies for the entire DRBD and risk assessment classifications for the Non EU MS (see Chapter 4). However, the DRBM Plan (Part A) differs from the national RBM Plans (Part B) regarding the basin-wide scale, the respective objectives and respective complexity related to each SWMI and groundwater. In order to make the approach on the basin-wide level complementary and inspirational to national planning and implementation, visions and specific operational management objectives have been defined for all SWMIs and groundwater. They guide the Danube countries towards agreed aims of basin-wide importance by 2015 and also assist the achievement of the overall

WFD environmental objectives. The visions are based on shared values and describe the principle objectives for the DRBD with a long-term perspective.

The respective management objectives describe the steps towards the 2015 environmental objectives in an explicit way - they are less detailed than at the national level and more detailed than expressed in the DRPC and Danube Declaration. The DRBD basin-wide management objectives:

a. describe the measures that need to be taken to reduce/eliminate existing significant pressures for each SWMI and groundwater on the basin-wide scale and
b. help to bridge the gap between measures on the national level and their agreed coordination on the basin-wide level to achieve the overall WFD environmental objective.

Based on the management objectives to be realised by 2015 as the target, measures reported from the national to the international level have been compiled in such a way that they give an estimation of their effectiveness in reducing and/or eliminating existing pressures/impacts on the basin-wide scale.

The visions and management objectives are listed for each SWMI and groundwater in Chapter 7 (The Joint Programme of Measures), which includes the relevant conclusions regarding the achievement/failure of the management objectives.

5.2. Exemptions according to WFD Article 4(4), 4(5) and 4(7)

The application of WFD Article 4(4) indicates that respective measures will not be implemented by 2015, but either by 2021 or 2027, whereas less stringent environmental objectives will be aimed for in water bodies subject to WFD Article 4(5). Future Infrastructure Projects (FIP) may need an exemption according to WFD Article 4(7) in the case that they would provoke deterioration in water status – the application of these exemptions is also summarised. Details on the application of the three Articles on exemptions are part of the national Part B reports.

For the 681 river water bodies of the DRBD, it can be summarised that Article 4(4) is applied for 259 water bodies (38%) and Article 4(5) for 10 water bodies (1%). Article 4(7) is implemented in 20 water bodies (3%). Exemptions according to WFD Article 4(4) are applied in none of the six lakes and in none of the four coastal water bodies. Article 4(5) is not implemented at all for lakes but for two coastal water bodies. Further details on exemptions according to WFD Articles 4(4) and 4(5) for all three components of hydromorphological alterations (river and habitat continuity interruption, reconnection of wetlands/floodplains and hydrological alterations) are part of Chapter 7.1.4. Map 16 clearly illustrates which specific measures will be undertaken by 2015, which after 2015, or not at all due to exemptions according to Articles 4(4) and 4(5). Information on FIPs, which may be subject to apply WFD Article 4(7) during the planning process is provided in Chapter 7.1.4.4, Annex 7 as well as in Map 8.

For the 11 important transboundary groundwater bodies of the DRBD, Article 4(4) is applied for quality for four national parts of GWBs and for quantity for two national parts of a GWB. Details are illustrated in Map 17.

6. Economic analysis of water uses

6.1. WFD economics

The WFD requires that river basins are also described in economic terms. Economic principles are addressed in WFD Article 5 (and Annex III) and Article 9. An economic analysis of water uses was carried out in 2004 based upon the requirements of Article 5. Article 9 requires that by 2010, EU MS take account of the principle of cost-recovery, including environmental and resource costs. In addition to these direct references to economic instruments, the WFD refers implicitly to economic principles in many of its Articles e.g. by allowing for exemptions in the case of “disproportionate costs”.

Results of economic analysis in DBA 2004

The economic analysis in 2004 covered three issues and was based on national contributions and basin-wide assessments, with the reference year 2000:

a. Assessing the economic importance of water uses;
b. Projecting trends in key economic indicators and drivers up to 2015;
c. Assessing current levels of recovery of costs for water services.

The assessment of the economic importance of water uses showed relatively high rates for connection to public water supply but lower rates for connection to the public sewerage system and to wastewater treatment plants. Differences identified in the economic structure of the Danube countries (level of agriculture, level of electricity generation etc) contribute to the varied importance of economic values of water among the countries.

The analysis of projected trends in key economic indicators and drivers up to 2015 showed that factors such as the level of connection rates and efficiency improvements in water supply are important in assessing future trends; but quantitative forecasts in total water supply and demand were not available in the majority of the Danube countries.

The assessment of current levels of cost recovery for water services was based on data from pricing and tariffs. As a result of differing economic, financial and institutional conditions in the Danube countries, the pricing systems also varied considerably among the countries.

The Danube Economic Analysis 2009

The current basin-wide analysis, which is closely linked to national procedures, considers only those economic issues that are of relevance on the basin-wide scale and enable international comparison. For linking pressures with economics, so-called *horizontal economic issues* were identified. These are issues within each SWMI that should, as far as possible, be addressed as individual topics in the economic analysis. The horizontal issues are:

a. Baseline scenario up to 2015;
b. Cost recovery analysis;
c. Cost-effectiveness analysis;
d. Cost-benefit analysis[61].

A data collection system, based on agreed templates, was adapted in a way that reduces inconsistencies in data definition and collection and methodological difficulties that arose in 2004.

[61] The cost-benefit analysis has not been performed at the basin-wide scale. It is dealt with on the national level.

6.2. Description of relevant water uses and economic meaning

6.2.1. The economic analysis of water use

An economic analysis of water uses was carried out with the aim of assessing the importance of water use for the region's economy and assessing the socio-economic development of the river basin.

Data concerning the general socio-economic situation in the Danube countries have been collected and compiled at the basin-wide level (Annex 15, Table 1 & 2). The data reveals a significant disparity between economic circumstances in the Danube countries, with a clear decline in GDP from West to East. Germany, for example, has a GDP of approx. 36,000 EUR per capita/year and Moldova, a downstream country, has a GDP of less than 1,000 EUR per capita/year (see Figure 27).

Water abstraction among Danube countries is divided as follows: approx. 40% for agriculture, 40% for industry (including energy production) and 20 % for urban use (Annex 15, Table 4).

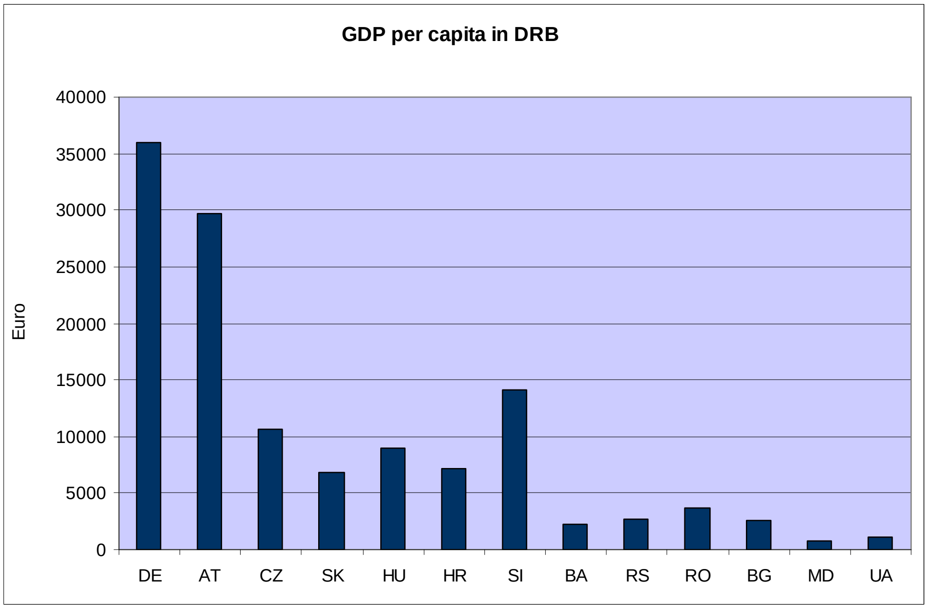


Figure 27: GDP per capita in the DRB (2005/2006)[62].

Characteristics of water services

Water services means all services which provide, for households, public institutions or any economic activity (WFD Article 2(38)):

(a) abstraction, impoundment, storage, treatment & distribution of surface water or groundwater;

(b) wastewater collection and treatment facilities which subsequently discharge into surface water.

Basic information regarding water services and connection rates of the population to public water supply, public sewerage systems and wastewater treatment plants are presented in Figure 28 (see Annex 15, Table 4). Out of the 80.5 million inhabitants living in the DRB, about 57% live in urban areas. The share of population connected to public water supply varies from 51% in Ukraine to 99% in Bulgaria and Germany. In many Danube countries, the water supply networks are in poor condition due to faulty design and construction, and lack of maintenance and ineffective operation as a consequence of the economic decline in the past decade. Leakage is generally high - in many cases 30–50% of the water is lost. The extent of piped drinking water supplies to households varies between urban and rural areas, with rural populations in some countries less well provided. The share of the population connected to public sewer system varies from 15% in Moldova to 95% in Germany.

[62] For BA only information for the Republika Srpska is included.

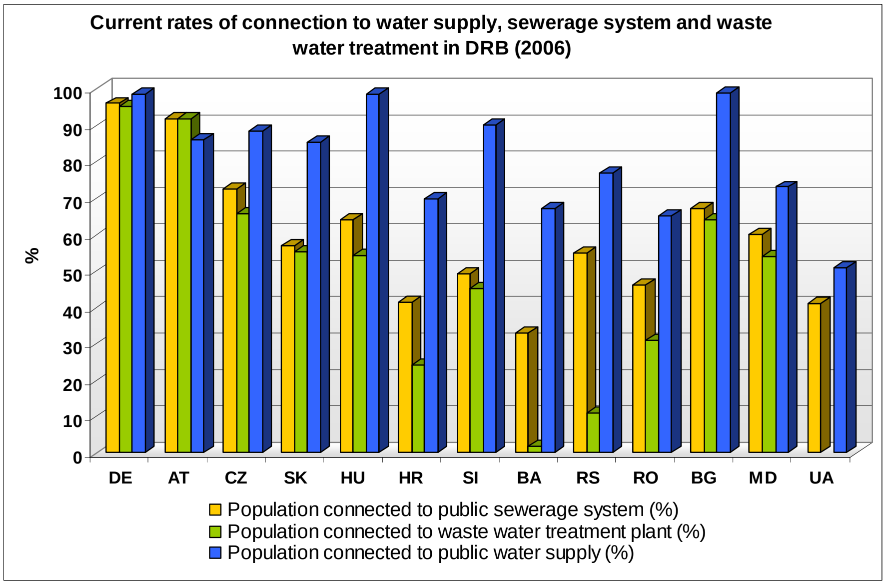


Figure 28: Drinking water supply, wastewater services and connection rates (2005/2006)[63].

Many agglomerations in the region continue to discharge untreated municipal wastes into basin waters. Sewage treatment in a large number of agglomerations is also limited to screening before being discharged directly into rivers. A number of urban sector improvements in the 6 new EU MS (CZ, BG, SK, SI, HU, RO) have been realized in recent years and improved the level of collection and treatment of sewage. Tertiary treatment (N and P removal) is now also being applied in a large number of the upgraded and new wastewater treatment plants, but not in all cases. A detailed analysis of the population connected to wastewater treatment plants shows the situation on the national level, distinguishing between the share of population connected to primary, secondary and tertiary wastewater treatment facilities, as well as total connection rates (see Figure 3, Chapter 2.1.1.1 and Annex 15, Table 4).

Characteristics of other water uses

The WFD requires the identification of water uses: abstraction for drinking water supply, irrigation, leisure uses, industry, etc, and characterisation of the economic importance of these uses. Water use means water services together with any other activity having a significant impact on the status of water. The economic significance of water use in the DRB can be measured through wastewater discharge per sector in each country (expressed in inhabitant equivalents).

Present water consumption

The aggregated annual water consumption of the DRB population connected to centralised water supply systems is of the order of 30,849 million m^3. Urban water use has decreased in many Danube countries as a result of measures to reduce demand and as a consequence of economic restructuring (Annex 15, Table 3). An overview of the economic importance of most relevant water uses is provided in Annex 15, Tables 7-10.

6.3. Projecting trends in key economic indicators and drivers up to 2015

In order to assess key economic drivers likely to influence pressures (see Chapter 2) and thus water status up to 2015, a Baseline Scenario (BLS) has been developed. In the BLS, trends in water supply and water demand are evaluated. The focus is on changes in general socio-economic variables (e.g. population growth), in economic growth of main sectors and changes in implementation of planned investments linked to existing regulation. Future trend projections up to 2015, for developments of relevant sectors, are considered in the BLS calculation for measures (Annex 15, Table 10).

[63] For BA only information for the Republika Srpska is included.

Projection of water demand

The water demand projection for 2015 is calculated based on national methodologies, which considers minimum, average and maximum scenarios. The scenarios identified by all Danube Countries indicate a small increasing trend of water abstraction as a consequence of increases in water demand at basin wide level in industrial, urban and agricultural sectors (Annex 15, Table 10).
Some economic sectors indicate reductions in water demand mainly through technological changes which increase efficiency of water use in the industrial sector. Additionally, water abstractions for urban needs will decrease slightly in upstream Danube Countries under the analyzed scenarios and small increases in central and lower Danube Countries as consequence of increased connection rate to centralized water supply will occur. Water demand for agriculture is expected to become more significant due to a large increase of DRB population, intensification of agriculture in downstream countries, and anticipated climate changes.

Projection of wastewater discharge

The aggregated wastewater generation of the population connected to central sewerage systems is anticipated to increase. This should not result in increased pollution, as the amount of untreated wastewater will be significantly reduced and several measures will be implemented which contribute to the reduction of water pollution (such as reduction of losses; increased water efficiency in industry; proper norms for irrigation during drought events; effective pricing policies).

6.4. Economic control tools

6.4.1. Cost recovery as an incentive for efficient use of water resources and as a financing instrument

The WFD calls for accounting related to the recovery of costs of water services and information on who pays, how much and what for. Cost recovery for specific water services is defined as the ratio between the revenues paid for a specific service and the costs of providing the service. In most countries, the assessment of cost recovery focuses mainly on water supply as well as sewerage services for industry and households. Costs include management costs, depreciation, interests, taxes and fees, and the environment and resources costs. Environmental and resource costs are not taken directly into account in most countries as part of the economic analysis, due to both a lack of methodology and information. In some countries, existing economic instruments that are intended to partly internalise environmental and resource costs are considered separately in the cost recovery assessment. The issue of cost recovery is primarily an issue of national importance. Case studies are presented in Annex 16.

6.4.2. Cost-effectiveness as a criterion for selecting measures to achieve reduction targets

Cost-effectiveness analysis (CEA) can be a decision support at the national level for selecting the most cost-effective combinations of measures for inclusion in the Programme of Measures as described in Article 11 of the WFD. The application of CEA might be useful in assessing the effectiveness of supplementary measures, which are relevant in a transboundary context. Achieving the nutrient reduction targets cost-effectively, for example, requires analysis of the costs and effects of potential measures. It is planned that cost functions of various measures to reduce nutrients will be added in the MONERIS scenario calculations.

6.5. Conclusions

Information and data on economic variables and factors remains central to the implementation of the WFD. The economic analysis shows an increase in the availability of data that are comparable across countries and a large number of useful studies on the costs and prices of water services (including environmental and resource costs). With respect to the challenging environmental objectives of the WFD and the necessary financial resources (which may in the short term exceed the capabilities of some countries in the DRB), it seems essential to establish a pragmatic, targeted and integrated view of the economic analysis that is applicable within the first implementation cycle of the WFD.

7. Joint Programme of Measures (JPM)

The JPM builds upon the results of the pressure analysis (Chapter 2), the water status assessment (Chapter 4) and includes, as a consequence, measures of basin-wide importance oriented towards the agreed visions and management objectives for 2015. It is firmly based on the national programmes of measures, which shall be made operational by December 2012, and describes the expected improvements in water status by 2015. Priorities for the effective implementation of national measures on the basin-wide scale are highlighted and are the basis of further international coordination. Some additional joint initiatives and measures on the basin-wide level that show transboundary character are presented as well. They are undertaken through the framework of the ICPDR.

The JPM is structured according to the Significant Water Management Issues (organic, nutrient and hazardous substances pollution and hydromorphological alterations) as well as groundwater bodies of basin-wide importance. It follows the basin-wide management objectives for each SWMI and groundwater in order to achieve the WFD environmental objectives by 2015. The JPM represents ***more than a list of national measures*** as the effect of national measures on the Danube basin-wide scale is also estimated and presented.

Key findings and conclusions on identified measures and their basin-wide importance, as well as priorities regarding their implementation on the basin-wide scale, are summarised as part of the JPM. The implementation of the measures of basin-wide importance is ensured through their respective integration into the national programme of measures of each Danube country. A continuous feedback mechanism from the international to the national level and vice versa will be crucial for the achievement of the basin-wide objectives, in order to improve the ecological and chemical status of water bodies.

The three SWMIs of organic, nutrient and hazardous substances pollution have been approached taking into account the specific interlinkages between them. The basic principles of those interlinkages are described as part of Chapter 2.1.2. Regarding the conclusions on these three SWMIs but also hydromorphological alterations, an important follow-up will be the improvement of understanding with regards to the linkages between respective DRBD river loads and the ecologic response (ecological water status – see Chapter 4). This improvement will be based upon additional monitoring results that will be available in the coming years.

The JPM does not address basic and supplementary measures (WFD Article 11(3) & (4)) separately. However, as the supplementary measures are of importance on the national level, they have been taken fully into account and are therefore indirectly reflected.

7.1. Surface waters: rivers

7.1.1. Organic pollution

7.1.1.1. Vision and management objectives

The ICPDR's basin-wide vision for organic pollution is zero emission of untreated wastewaters into the waters of the Danube River Basin District.

As steps towards the vision, the implementation of the following management objectives is foreseen by 2015:

EU Member States:

- ⇨ Phasing out – by 2015 at the latest – all discharges for untreated wastewater from towns with >10.000 population equivalents and from all major industrial and agricultural installations, through:
  - ⇨ Implementation of the Urban Waste Water Treatment Directive[64].
  - ⇨ Where required, identification of construction and/or improvement of wastewater treatment plants according to the ICPDR Emission Inventory by 2015.
  - ⇨ Implementation of the Sewage Sludge Directive (86/278/EEC) and the Integrated Pollution Prevention Control Directive (96/61/EC).
  - ⇨ Increase of the efficiency and level of treatment thereafter when necessary.

Accession Country and Non EU Member States:

- ⇨ Specification of number of wastewater collecting systems (connected to respective WWTPs), which are planned to be constructed by 2015.
- ⇨ Specification of number of municipal and industrial wastewater treatment plants, which are planned to be constructed by 2015 including:
  - ⇨ Specification of treatment level (secondary or tertiary treatment)
  - ⇨ Specification of emission reduction targets

7.1.1.2. JPM approach towards the 2015 management objectives

Data for the JPM have been collected in combination with pressure information. Details on the data collection can be found in Annex 3. The JPM considers and addresses significant pollution pressures from agglomerations, industries and agriculture as identified in Chapter 2.

In order to estimate the effectiveness of specific measures regarding the reduction of organic pollution on the basin-wide scale a *scenario approach* has been developed. The scenario approach is relevant for both organic and nutrient pollution when point sources are addressed. To a certain degree the scenarios are also relevant for the reduction of hazardous substances in the DRB.

The scenario approach describes - as a starting point - the status-quo regarding wastewater treatment in the DRB (reference situation) and further its potential future development (three scenarios) using different assumptions. The **Reference Situation-UWWT 2005/2006** (RefSit-UWWT) gives an overview of the current situation regarding wastewater treatment and treatment efficiency in the DRB[65] (see Map 18).

- **Baseline Scenario-UWWT 2015 (BS-UWWT):**
  This scenario describes the agreed measures for the first cycle of the WFD implementation on the basin-wide scale until 2015 (see Map 19). Measures that are legally required for EU MS and other measures that are realistic to be taken by the Non EU MS have been taken into account. The Baseline Scenario is based on the fact that Romania has designated all of its territory (including its coastal waters) as a *sensitive area* under the UWWTD, in order to protect the Black Sea

[64] For RO the implementation year is 2018 regarding agglomerations 2.000 - 10.000 PE.

[65] Reference data 31/12/2005 or 31/12/2006 for all EU MS.

environment against eutrophication. Accordingly, the entire DRB is considered as a catchment area for the sensitive area under Article 5(5) of the UWWTD. This means that discharges from urban wastewater treatment plants situated in the Danube catchment area and which contribute to the pollution of the sensitive area need to apply more stringent treatment from agglomerations >10,000 PE. Or, as an alternative approach, these provisions do not apply to individual plants if it can be shown that the minimum percentage of reduction of the overall load in that area is at least 75% for total P and 75% for total N. The following assumptions for measures to be implemented by 2015 were taken:

- EU MS (except RO): Implementation of the UWWTD. For EU MS that have already fulfilled Article 5(4) of UWWTD in their national parts for the DRB by 2005/2006, the exact same reported treatment levels for agglomerations >10,000 PE were taken into account for the scenario. In the case of further improvement of wastewater treatment by 2005/2006 (for agglomerations <10,000 PE), this has been considered within the calculated scenario.
- RO (transition period for full UWWTD implementation: 31/12/2018[66]): The scenario considers agglomerations >10,000 PE: N and P removal. For further agglomerations 2,000 PE – 10,000 PE: secondary treatment for 77% of the total biodegradable load.
- Non EU MS: The scenario considers the reported number of wastewater treatment plants with secondary treatment/more stringent treatment to be constructed by 2015 (see Table 11 for specifications).

More information on the Baseline Scenario-UWWT 2015 can be found in Annex 17.

Table 11: Reported number of agglomerations in Non EU MS for which wastewater treatment plants will be constructed / rehabilitated by 2015 and indication of the respective generated load.

	HR	BA	RS	MD	UA	Total
No. of agglomerations for which WWTPs will be constructed / rehabilitated by 2015	14	8	8	4	14	**48**
Generated load (PE)	1,727,700	113,700	694,000	124,000	638,600	**3,218,000**

Two additional scenarios have been developed describing further steps toward the vision for organic pollution as an orientation for future policy decisions:

- **Midterm Scenario-UWWT (MT-UWWT):**
  This scenario (Map 20) is based on the BS-UWWT. In addition it assumes for Non EU MS, P removal for agglomerations >10,000 PE in order to achieve management objectives. This measure would clearly be a major step towards achieving the vision. Removal of P from all water treatment plants (>10,000 PE) was assessed as crucial for protecting waters in river basins, economically justified and technically simple[67]. In contrast to N removal, P removal can be realised more easily.

- **Vision Scenario-UWWT (VS-UWWT):**
  This scenario (Map 21) goes beyond the BS-UWWT as well as the MT-UWWT and therefore far beyond the requirements of the UWWTD. It is based on the assumption that the full technical potential of wastewater treatment regarding the removal of organic influents and nutrients is exploited for both EU and Non EU MS. If such a scenario is to be realised, it is assumed that agglomerations >10,000 PE are equipped with N and P removal (secondary/tertiary wastewater treatment), whereas all agglomerations ≥2,000 PE are equipped with secondary treatment.

[66] The deadline for CZ is 2010 and the deadline for SI is 2015.(see http://ec.europa.eu/environment/water/water-urbanwaste/legislation/deadlines/index_en.htm)
[67] daNUbs: Nutrient Management in the Danube Basin and its Impact on the Black Sea, EU FP 5 project (EVK1-CT-2000-00051).

7.1.1.3. Summary of measures of basin-wide importance

Implementation of UWWTD

The implementation of the UWWTD in the EU MS and the development of wastewater infrastructure in the Non EU MS are the most important measures to reduce organic pollution in the DRB by 2015 and also beyond.

At present extensive improvements in urban wastewater treatment are under implementation throughout the Basin. For full implementation of the UWWTD in the DRB for EU MS, facilities >10,000 PE have to be subject to more stringent treatment since the DRB discharges into a *sensitive area*. Alternatively, requirements for individual plants need not apply for sensitive areas in the case that it can be shown that the minimum percentage of overall load reduction entering all UWWTPs in that area is at least 75% for Total P and at least 75% for Total N. In general, the overall treatment efficiency is almost completely achieved in the upstream countries and is fulfilled less in the middle and lower Danube countries. Extensive efforts are underway in the middle and lower Danube countries to improve wastewater treatment. The overall application of nutrient removal technologies are expanding, particularly in response to the UWWTD in the new EU MS. It is necessary that the investments in wastewater collection and treatment in non EU MS also consider nutrient removal technologies during upgrade or new construction. This is necessary so that the overall increase in wastewater flow that will occur as more communities are connected to sewerage collection systems, does not create excessive amounts of nutrient pollution.

Regarding P removal, regulatory demands (under the UWWT Directive) for implementation of tertiary treatment are variable among the DRB countries and are dependent upon the classification in national legislation of *sensitive areas* of surface water. The majority of projects under construction or planned in the new EU MS contain tertiary treatment technology for P removal, as a result of legislative transposition during the EU accession period. N removal is more prevalent than P removal among the municipal projects.

7.1.1.3.1. Results from calculated scenarios

The calculation results and the effects of agreed measures as part of the BS-UWWT 2015 (BOD_5/COD emissions) are presented in Figure 29. Figure 29 also illustrates the potential for further reduction as described by the MT-UWWT and VS-UWWT. These results allow conclusions regarding the achievement of the WFD environmental objectives, which are described in the end of this chapter.

By 2015 not all emissions of untreated wastewater from agglomerations with >10,000 PE will be phased out (see Map 19: BS UWWT 2015). For the reference year 2005/2006, 1,059 wastewater treatment plants serve a total of 1,255 agglomerations (>10,000 PE) in the DRB. However, 228 agglomerations with sewerage collecting systems are still lacking wastewater treatment plants (for parts of the collected wastewater). These need to be realised by 2015. 41 agglomerations >10,000 PE are not equipped with sewerage collecting systems and no wastewater treatment is in place for the entire generated load. There are 4,969 agglomerations between 2,000 and 10,000 PE. 1651 of these agglomerations have been reported to be served by 1,658 wastewater treatment plants (see Map 18: Reference situation-UWWT).

As can be seen from Figure 29, the implementation of collecting systems (without treatment) for agglomerations ≥2,000 PE in the DRB will lead to a significant increase of organic pollutants and nutrients discharged to surface waters. In order to avoid a deterioration of the actual situation, the building of collecting systems is recommended to be combined with the implementation of appropriate wastewater treatment techniques. In the case of the DRB, these appropriate techniques include nutrient removal as the entire Danube Basin is a *catchment of sensitive area* under the UWWTD.

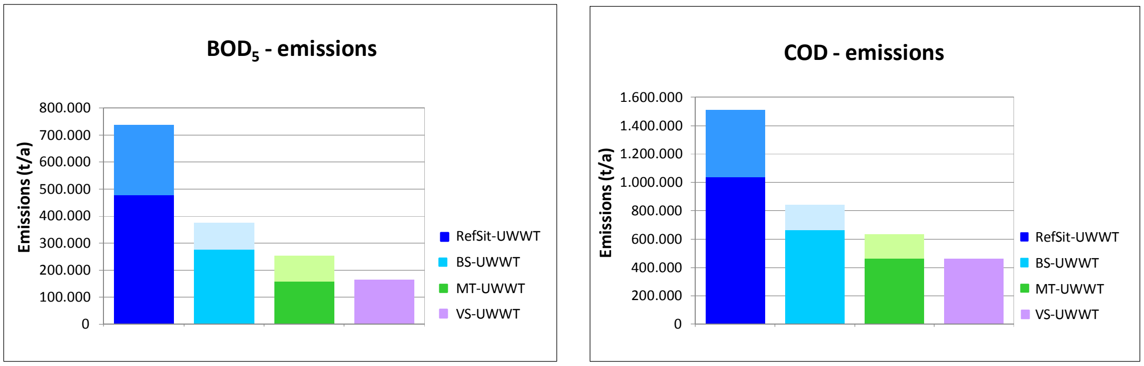


Figure 29: Emissions of BOD_5 and COD for the Reference Situation UWWT (RefSit-UWWT) and the three different scenarios (Baseline Scenario-UWWT 2015; Midterm Scenario-UWWT; Vision Scenario-UWWT)[68]. [The lighter coloured parts of the columns represent wastewater emissions that are not collected in sewerage systems and not treated in a wastewater treatment plant.]

In the DRB, there are approx. 6,224 agglomerations ≥2,000 PE, which generate a load of more than 94.7 million PE. There are 137 large cities >100,000 PE in the DRB that produce about 46% of the total wastewater load generated.

Implementation of the Sewage Sludge Directive

The progressive implementation of the UWWT Directive in the EU MS is increasing the quantities of sewage sludge requiring disposal. This increase is mainly due to the practical implementation of the Directive as well as the slow but constant rise in the number of agglomerations connected to sewers and the improvement of treatment (tertiary treatment with removal of nutrients). Full implementation will ensure that contaminated sewage sludge is no longer contributing to organic pollution via application in the agricultural sector.

Implementation of the Integrated Pollution Prevention Control (IPPC) Directive

Organic point source pollution coming from industrial units is partly addressed by the IPPC Directive as well as a number of specialised EU Directives covering specific sectors and specific Best Available Techniques (BAT) regulations. According to the IPPC Directive, authorities need to ensure that measures of pollution prevention and control are up-to-date with the latest developments in BAT. The main reporting requirement of the IPPC Directive is the publication of an inventory of chemical emissions and sources called the European Pollutant Emission Register (EPER).

The EU Member States have been implementing the IPPC Directive and as of end 2006 over 200 facilities had permits, which were reported to EPER. Romania and Bulgaria have, however, received gradual transition periods for IPPC implementation up to 2015 and additional facilities would be receiving permits and implementing BREF up to this date. It is expected that all facilities in the EU Member States will meet the IPPC requirements according to the legal timelines.

ICPDR BAT industrial sector recommendations

In the framework of the ICPDR, the Danube countries have adopted the Recommendations on Best Available Techniques in the following industrial sectors: chemical, food, chemical pulping and papermaking[69].

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[68] Note: there are different scales of the Y- axis.

[69] ICPDR Doc IC 033: Recommendation on Best Available Techniques in the Food Industry (2000); ICPDR Doc IC 034 Recommendation on Best Available Techniques in the Chemical Industry (2000); ICPDR Doc IC 035 Recommendation on Best Available Techniques in the Chemical Pulping Industry (2000) and ICPDR Doc IC 037 Recommendation on Best Available Techniques in the Paper Making Industry (2000).

An assessment of BAT implementation in the Danube countries has been undertaken based on case studies of selected pilot IPPC installations in two industrial sectors: chemical and pulp and paper. The pulp and paper industry was selected because it is the largest discharger of COD, accounting for almost 50% of total discharges in the DRB (Emission Inventory 2004).

The estimates are very preliminary and only based upon existing data. Actual reductions may be higher or lower and are subject to a variety of factors, such as the closure of installations and building of new ones.

The analysis shows that BAT implementation will have a positive impact on pollution reduction in the DRB. The estimated reduction of 50% for COD for the pulp and paper industry would result in an annual reduction of 26,653 t/a in that sector. Applying the same calculation to total industrial COD discharges of 133,950 t/a (for all Danube countries except AT/DE as they have already implemented all BATs), the reduction would be 66,975 t/a.

In developing the DRBM Plan, the ICPDR's role is to encourage all the Danube countries to adopt and implement IPPC legislation. The majority of countries have a mandatory obligation to the EU, while the remaining countries could be encouraged to adopt legislation requiring the application of BAT as basic measures in the JPM.

Recommendation on BAT at agro-industrial point sources

Agriculture is an important source of organic pollution. The wastewater discharged by agro-industrial point sources contains large amounts of organic substances. As installations for the intensive rearing of poultry or pigs must meet the requirements of the IPPC Directive, the application of BAT is seen as a way to reduce this pollution. For EU MS, biodegradable industrial wastewater from plants representing ≥4,000 PE belonging to the food industry that does not enter urban wastewater treatment plants before discharge to receiving waters, shall respect conditions established in the UWWTD.

The ICPDR has developed a recommendation on BAT at agro-industrial units including (i) technical in-plant measures for the reduction of wastewater volume and abatement of pollution load; (ii) reduction of pollution load by end-of-pipe measures and (iii) environmental management improvement actions. Additional measures are proposed to improve environmental compliance at the plant and enforcement of the permitting environmental authority. The full application of these BATs for agro-industrial units is recommended to take place in the Non EU MS not covered by the IPPC Directive.

The recommendation also includes a provision that all agro-industrial units be required to prepare a Manure Management Plan, when applying for a permit to discharge.

7.1.1.3.2. Estimated effects of national measures on the basin-wide scale

In comparison with the Reference Situation-UWWT 2005/2006 (RefSit-UWWT), a reduction of emissions regarding organic pollution will be achieved by the implementation of any of the three scenarios. However, it can be concluded that:

- **The Baseline Scenario-UWWT 2015 implements the management objectives** but will not ensure the achievement of the WFD environmental objectives on the basin-wide scale for organic pollution by 2015 (see Map 19).
- **The Midterm Scenario-UWWT goes beyond the 2015 management objectives.** However, the Midterm Scenario-UWWT will not ensure the achievement of the WFD environmental objectives on the basin-wide scale for organic pollution by 2015. The measures proposed are not fully able to be implemented by 2015 for economic, administrative and technical reasons (see Map 20).
- **The Vision Scenario-UWWT goes beyond the 2015 management objectives (beyond the BS-UWWT and MT-UWWT and therefore beyond the requirements of the UWWTD) and would ensure the achievement of the WFD environmental objectives on the basin-wide scale by 2015 for organic pollution.** However, the measures proposed within this scenario are not fully able to be implemented by 2015 for economic, administrative and technical reasons (see Map 21).

The effectiveness of measures for the reduction of organic pollution from industry and agriculture in the DRB is currently not sufficiently quantified, but further efforts will be undertaken in this regard within the next WFD cycle.

Ultimately, the magnitude of reduction depends on political decisions and the economic support for investments in wastewater treatment. To support further steps toward the environmental objectives, strategic discussions (e.g. with regard to potential financing mechanisms - see Chapter 7.4) are foreseen in the framework of the ICPDR.

7.1.2. Nutrient pollution

7.1.2.1. Vision and management objectives

The ICPDR's basin-wide vision for nutrient pollution is the balanced management of nutrient emissions via point and diffuse sources in the entire Danube River Basin District that neither the waters of the DRBD nor the Black Sea are threatened or impacted by eutrophication.

As steps towards the vision, the implementation of the following management objectives is foreseen by 2015:

EU Member States, Accession Country and Non EU MS:

⇨ Reduction of the total amount of nutrients entering the Danube and its tributaries to levels consistent with the achievement of the good ecological/chemical status in the Danube River Basin District by 2015.

⇨ Reduction of discharged nutrient loads in the Black Sea Basin to such levels, which permit the Black Sea ecosystems to recover to conditions similar to those observed in the 1960s.

⇨ Reduction of phosphates in detergents preferably by eliminating phosphates in detergent products as it is already the case for some Danube countries.

⇨ Implementation of the management objectives described for organic pollution with additional focus on the reduction of nutrient point source emissions (see above).

⇨ Implementations of best environmental practices regarding agricultural practices (for EU Member States linked to EU Common Agricultural Policy (CAP)).

⇨ Create baseline scenarios of nutrient input by 2015 taking the respective preconditions and requirements of the Danube Countries (EU Member States, Accession Country, Non EU Member States) into account.

⇨ Definition of basin-wide, sub-basin and/or national quantitative reduction targets (i.e. for point and diffuse sources) taking the respective preconditions and requirements of the Danube Countries (EU Member States, Accession Country, Non EU Member States) into account.

In addition, for EU Member States:

⇨ Implementation of the UWWTD (91/271/EEC) as described for organic pollution (see above) taking into account the character of the receiving coastal waters as a sensitive area.

⇨ Implementation of the EU Nitrates Directive (91/676/EEC) taking vulnerable zones into account in case natural freshwater lakes, other freshwater bodies, estuaries, coastal waters and marine waters of the DRBD are found to be eutrophic or in the near future may become eutrophic.

7.1.2.2. JPM approach towards the 2015 management objectives

The sources of nutrient emissions and measures to reduce respective pollution strongly overlap with those from organic pollution. These inter-linkages are considered within the working methodology. In addition to measures related to the improvement of wastewater treatment and the application of BAT for industry and agriculture, measures to control diffuse nutrient pollution are required. Further, measures to reduce phosphate emissions from household laundry and dishwater detergents are addressed and, finally, nitrogen pollution from atmospheric deposition is also dealt with.

Nutrient removal is required to avoid eutrophication in many DRB surface waters and the Black Sea North Western Shelf, in particular taking into account the character of the receiving coastal waters as a *sensitive area* under the UWWTD. The nutrient loads discharged from the DRB are an important factor responsible for the deterioration and eutrophication of parts of the Black Sea ecosystem. The Danube countries committed themselves to implement the Memorandum of Understanding adopted by

the International Commission for the Protection of the Black Sea (ICPBS) and the ICPDR in 2001[70] and agreed that *"the long-term goal is to take measures to reduce the loads of nutrients discharged to such levels necessary to permit Black Sea ecosystems to recover to conditions similar to those observed in the 1960s"*. In 2004 the Danube countries adopted the Danube Declaration[71] in the framework of the ICPDR Ministerial Meeting and agreed that in the coming years they would aspire *"to reduce the total amount of nutrients entering the Danube and its tributaries to levels consistent with the achievement of good ecological status in the Danube River and to contribute to the restoration of an environmentally sustainable nutrient balance in the Black Sea"*. Since Romania is an EU MS, the environmental objectives of the EU WFD are also to be applied to transitional and coastal waters in the Black Sea. Also for the Black Sea, the EU Marine Strategy Framework Directive will be implemented.

For the assessment regarding the effects of measures to reduce nutrient pollution by 2015 the MONERIS model (see Chapter 2.1.2.2) has been applied[72]. The model takes into account both nutrient point source as well as diffuse emissions. The scenarios presented (see below) are based on assumptions for organic pollution regarding wastewater treatment (see previous chapter for details). MONERIS compares the calculated nutrient input (scenario 2015) with the observed nutrient loads (reference situation average 2001-2005) in the rivers of the DRB and allows the respective conclusion for measures implementation.

There is still a high uncertainty regarding the cause-effect relationships between nutrient pollution and the ecological status of the surface water bodies of the Danube and the Black Sea. Therefore further research and monitoring is needed, as well as a continuous improvement and calibration of the MONERIS scenarios.

7.1.2.3. Summary of measures of basin-wide importance

On the basin-wide level, basic measures (fulfilling the UWWTD and EU Nitrates Directive) for EU MS and the implementation of the ICPDR Best Agricultural Practices Recommendation for Non EU MS are the main measures contributing to nutrient reduction.

Implementation of measures regarding urban wastewater treatment

The implementation of the UWWTD by EU MS and the reported measures of Non EU MS significantly contribute to the reduction of nutrient point source pollution, as already outlined above. Map 18 illustrates the Reference Situation-UWWT that indicates the current situation regarding nutrient point source pollution in the DRB. Map 19 to Map 21 show the three different scenarios for UWWT (Baseline Scenario-UWWT 2015, Midterm Scenario-UWWT, and Vision Scenario-UWWT) and therefore the future development and improvement regarding point source pollution. It is clear from the results that an additional measure to decrease phosphates in detergents would further contribute to the P emission reduction.

Implementation of the EU Nitrates Directive

A key set of measures to reduce nutrients relate to farming practices and land management. Nitrates in particular, leach easily into water from soils that have been fertilised with mineral fertilisers or treated with manure or slurry. High nitrate levels are one of the greatest challenges facing the WFD implementation in the DRB. Action programmes have been established in the EU MS by either applying the *whole territory approach* or in so called *Nitrate Vulnerable Zones* under the Nitrates

[70] ICPDR Document IC 027: Memorandum of Understanding between the ICPBS and the ICPDR, 2001 (www.icpdr.org).
[71] ICPDR Document IC 089: The Danube Basin – Rivers in the Heart of Europe (Danube Declaration), 2004 (www.icpdr.org).
[72] The MONERIS Model integrates the findings of point source analysis with those related to diffuse sources and reflects the overall nutrient input in the DRB in total and per Danube country. SI is using a method based on the OECD method: *Environmental indicators for agriculture. Methods and Results (2006).*

Directive (see Map 26). The EU Nitrates Directive aims to limit the amount of nitrate permitted and applied and the resulting concentrations in surface waters and groundwaters.

Implementation of Best Agricultural Practice (BAP)

Within the DRB, a concept of BAP[73] has been developed. This is different but complementary to the existing EU concepts of Codes of Good Agricultural Practice (GAP) under the EU Nitrate Directive and verifiable standards of Good Farming Practice (GFP) under the EC Rural Development Regulation 1257/1999.

To be effective, any BAP must not only be technically and economically feasible, it must also be socially acceptable to the farming community. As such, BAP can be applied as a uniform concept across the whole DRB, but the level of environmental management/performance that can be expected from farmers in different regions/countries will vary significantly according to: (i) the agronomic, environmental and socio-economic context in which they are operating, and (ii) the availability of appropriate policy instruments for encouraging farmers to adopt more demanding pollution control practices.

A key action for successful implementation of BAP is ensuring adequate storage capacity for manure generated on farms and the application of advanced techniques for spreading manure. It is apparent that implementation of BAPs should be linked to the EU CAP. Future reforms of the CAP, its funds and strategic priorities can also contribute to WFD objectives. In particular, the voluntary agri-environmental measures can be used to address diffuse and point sources of agricultural water pollution (nitrates, phosphates and pesticides) as well as soil erosion.

Implementation list of possible measures to control diffuse pollution

The information provided by countries in the national programmes of measures to control diffuse pollution has been used in the development of the DRBM Plan. Possible measures include: soil and manure sample analysis; a parcel-specific field balance for each growing season and annual farm balance for N and P. These are not costly but require a commitment and proper technical support.

Lack of information at the national, regional and local level on the causes of agricultural pollution and the practical measures available to farmers for reducing the risk of pollution can be addressed. It is important to link the promotion of more environmentally friendly farming methods to economic benefits such as improvements in yield and savings in the cost of agrochemical inputs. The development of appropriate and well written agricultural advisory messages is therefore essential, as are demonstration plots/farms, training for advisors and other capacity building measures for agricultural extension services.

Basic considerations on the introduction of phosphate-free detergents

The ICPDR has initiated a process to support the introduction of P-free detergents in the Danube countries. This measure is part of the **Phosphate Ban Scenario-Nutrients** (see Map 25 and below). At the moment, phosphates are completely replaced in laundry detergents in DE and AT. The introduction of P-free detergents is considered to be a fast and efficient measure to reduce nutrient emissions into surface waters. For the large number of settlements of <10,000 PE, the EU UWWTD does not legally require P removal. A reduction of phosphate in detergents could have a significant influence on decreasing nutrient loads in the Danube, particularly in the short term before all countries have built a complete network of sewers and wastewater treatment. Dishwashing detergents are an important and increasing source of that pollutant in all Danube countries. Efforts to regulate this source are also likely to be needed.

[73] The concept of BAP in the DRB is defined as: "…the highest level of pollution control practice that any farmer can reasonably be expected to adopt when working within their own national, regional and/or local context in the Danube River Basin."

7.1.2.3.1. Scenarios for nutrient reduction

While point source inputs from urban wastewater treatment plants and industry are directly discharged into rivers, diffuse emissions into surface waters are caused by the sum of different pathways that are realized by separate flow components. MONERIS[74] considers seven pathways regarding inputs into surface waters via pathways outlined in Figure 8 (Chapter 2). In addition, the retention of nutrients in rivers (divided in main rivers and tributaries) is calculated.

To explore the potential and effect of nutrient reduction measures, the effect of measures are estimated for point and diffuse sources using MONERIS and scenarios for nutrient reduction have been calculated and are presented.

The **Reference Situation-Nutrients 2000-2005** (RefSit-Nut) describes (as a starting point) the status-quo regarding nutrient emissions in the DRB (see Map 22 and Map 23). The Reference Situation-Nutrients is based on average nutrient emissions (N and P) for the years 2000-2005 and includes the situation for these years described by analysing urban wastewater development and other point sources of nutrients.

Furthermore, four nutrient scenarios have been calculated from the data provided by the countries and using some assumptions, in order to draw a picture of potential future developments.

The scenario analysis is focused on possible measures, or developments, related to the main sources of nutrients (UWWTPs/point sources, agriculture) and the introduction of P- free detergents. Changes to important input parameters (from these sources) have been developed and agreed by the Danube countries to be evaluated by the model. The net effects of changes in input parameters on emissions have then been calculated while keeping the emissions from other sources constant (as in the Reference Situation).

In a second step, the most likely developments related to each source are combined to give the overall baseline scenario for nutrient reduction.

The different scenarios for urban wastewater treatment development are described in Chapter 7.1.1.2, and in short the assumptions are as follows:

- **Baseline Scenario-UWWT 2015 (BS-UWWT):** Implementation of the UWWTD for EU MS; implementation of commitments by Non EU-countries.
- **Midterm Scenario-UWWT (MT-UWWT):** Baseline scenario plus additional, momentarily not financially secured projects in Non EU MS, implementing at least P-Elimination for treatment for agglomerations above 10,000 PE.
- **Vision Scenario-UWWT (VS-UWWT):** N and P removal for all agglomerations above 10,000 PE in all countries.

Due to the large uncertainty in both industrial development and in the IPPC implementation and related reporting, it is assumed that industrial emissions remain constant for the purpose of this analysis.

There are still major uncertainties related to future agricultural development. To account for this situation three different options have been considered and used for scenario calculations.

The first scenario **Baseline Scenario – Agriculture 2015** combines the best estimates of the countries for future agricultural development. It is based on *moderate development* of the agricultural sector and the implementation of measures foreseen by the countries. This scenario is the most realistic one compared with the other two agricultural scenarios (**Agricultural Scenario-Nutrients 1 2015 and Agricultural Scenario-Nutrients 2 2015)**. These two scenarios have been calculated assuming an increase in the level of intensity of agricultural development for the middle and lower DRB. The implemented measures are identical to the first scenario.

These two scenarios use different sets of estimates for relevant input parameters, especially N surplus.

[74] Behrendt et al. (2007): The Model System MONERIS (2007) – User Manual; Leibniz Institute for Freshwater Ecology and Inland Fisheries in the Forschungsverbund Berlin e.V., Müggelseedamm 310, D-12587 Berlin, Germany.

In summary:

- **Baseline Scenario – Agriculture 2015 (BS-Agri-Nut):**
  This reflects a moderate development of agriculture and builds upon agreed measures to reduce nutrient emissions in the DRB. This scenario forecasts the future NO_x deposition and incorporates changes in agriculture. The parameter set can be found in Table 12.
- **Agricultural Scenario-Nutrients 1 2015 (I-Agri-Nut-1)**:
  This assumes that the N surplus of Danube countries will be the same as for the EU 15 in the year 2000 (i.e. 57 kg/ha/a). Further, it is assumed that no change in atmospheric deposition will occur.
- **Agricultural Scenario-Nutrients 2 2015 (I-Agri-Nut-2):**
  This assumes that the N balance for the Danube countries will be same for CZ, BA, HR, SK, RS, BG, HU, RO and UA as the upstream countries DE, AT and SI (see Table 13). Further, it is assumed that no change in atmospheric deposition will take place and N surplus in the remaining countries stays unchanged.

A further scenario evaluation calculated the impacts of a phosphate ban for laundry and dishwasher detergents:

- **Phosphate Ban Scenario-Nutrients (PBan-Nut):**
  This explores the reduction potential of an introduction of reduction of phosphates in laundry detergents and dishwashers as recommended by the Resolution of the 10th ICPDR Ordinary Meeting, December 2008.

After exploring the reduction potential of the measures addressing the various sources of nutrient inputs, the **overall Baseline Scenario-Nutrients** (**BS-Nut-2015**) combines the agreed most likely developments in different sectors (urban wastewater, agriculture and atmospheric deposition[75]) and describes the expected nutrient emissions in 2015 (Map 24 and Map 25). This scenario has been compared to the expected emissions of nutrients based upon application of the management objectives for the basin-wide scale.

Table 12: Changes in input parameters affecting agricultural diffuse emission for the Baseline Scenario – Agriculture 2015 in percentage relative to the Reference Situation-Nutrients.

	DE	AT	CZ	SK	SI	HR	BA	RS	HU	RO	BG	UA	MD
Nitrogen surplus	-23,0	-18,0	-12,8	19,5	-20,1	8,6	14,2	95,4	14,9	36,8	18,0	42,7	18,2
Projection Livestock	-14	-6	0	0	-10	10	0	10	10	25	0	0	10
Projection Fertilizer application	-2	4	10	21	0	20	20	20	20	24	30	20	30
Projection Agricultural land	0	0	-1	-2	0	0	0	-1	-1	-1	0	0	-2
Projection NHy Deposition	-14	-6	0	0	-10	10	0	10	10	25	0	0	10
Projection NOx Deposition	-25	-38	-45	-40	-42	39	5	-45	-45	-33	-47	24	96

[75] BS-Nut Scenario considers inputs from the Baseline Scenario for urban wastewater, moderate agriculture and the level of NO_x from the atmospheric deposition.

Table 13: Changes in nitrogen surplus as input parameter for the two scenarios reflecting an intensified agricultural development in percentage relative to the Reference Situation-Nutrients (the other input parameters are identical to the BS Agri- Nut).

	DE	AT	CZ	SK	SI	HR	BA	RS	HU	RO	BG	UA	MD
2005 (kg/ha/a)	81,6	43,6	47,4	26,5	73,8	34,1	17,5	13,3[76]	22,5	22,8	15,5	13,4	20,0
I-Agri-Nut-1)	30,1	30,8	20,4	115,3	-22,7	67,5	226,0[77]	328,9[77]	153,0	150,1	267,5[77]	327,1[77]	185,5
(I-Agri-Nut-2	-0,9	-0,5	105,4	183,2	2,5	35,5	122,5	425,6[77]	173,7	128,3	250,4[77]	196,3[77]	138,5

7.1.2.3.2. Results from calculated scenarios and pollution reduction effects 2015: Nitrogen and phosphorous emission in the DRB

Figure 30 and Figure 31 present the changes relative to the reference situation for different scenarios. Figure 30 illustrates the results for nitrogen. It can be clearly seen that the expected development will lead to a decrease of inputs. However, the intensified agricultural scenarios (I-Agri-Nut-1 and I-Agri-Nut-2) show that a potentially significant increase in N pollution would occur for several countries.

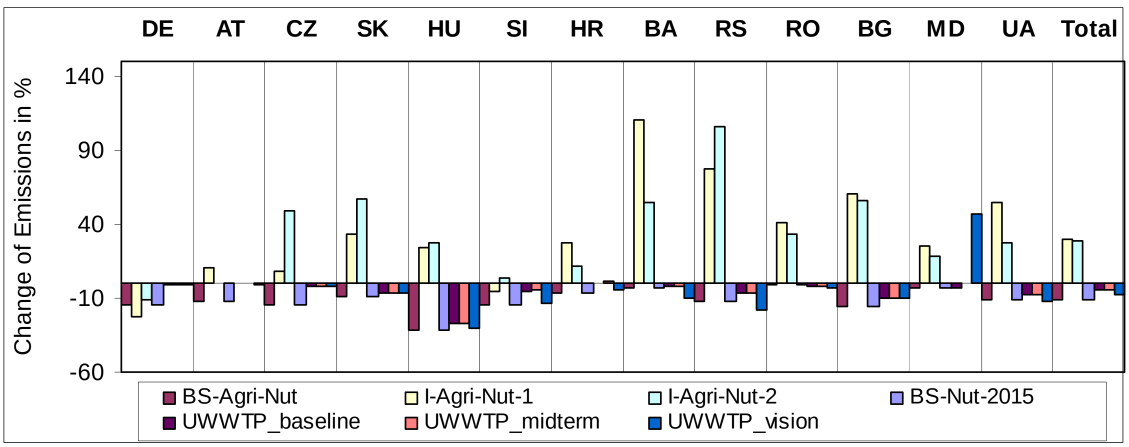

Figure 30: Relative changes in Nitrogen emissions compared to the Reference Situation 2005 for the different scenarios for UWWT and agricultural development. The Baseline Scenario-Nutrients (BS-Nut-2015) consists of the Baseline scenario for UWWT 2015 (Baseline Scenario UWWTP-2015) and the Baseline Scenario for Agriculture (BS-Nut-2015).

(The national RBM Plans provide additional information on Nitrogen emissions.)

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[76] It is clear that the starting figure in the reference situation in 2005 (13.3 kg/ha/a) might significantly underestimate the N-Surplus which is very low compared with other neighbor countries. As there is a large uncertainty on this very low starting figure for RS of the reference situation in 2005, the increase foreseen in 2015 should be also seen with caution.

[77] The very high increase in the two intensified agricultural scenarios for BA, BG, RS and UA does not indicate that these countries will be large contributors of nutrients at all: even with this increase, the situation in these countries is currently far below the EU average and this should put the increase in the baseline scenario into a comparable context.

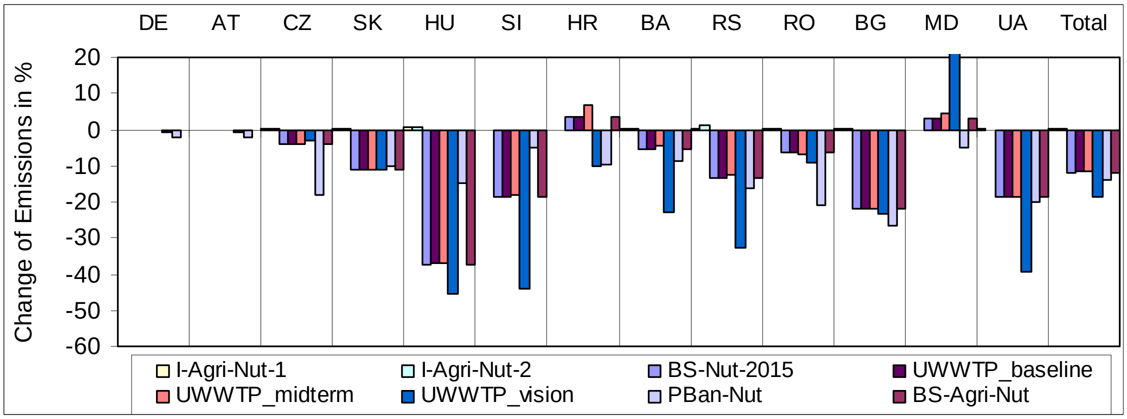

Figure 31: Relative changes in Phosphorus emissions compared to the Reference Situation 2005 for the different scenarios for UWWT, agricultural development scenarios and the scenario of a basin wide ban of Phosphorous containing laundry detergents and dishwashers (PBan-Nut).
(The national RBM Plans provide additional information on Phosphorus emissions.)

Figure 31 illustrates the Phosphorus load changes relative to the Reference Situation-Nutrients. The parameter changes for the intensified agriculture scenarios do not influence the results for P, as additional input is temporally stored in the soil, leading only to changes on a longer time scale.

The significance of P reduction in detergents (laundry and dishwashers detergents) was also calculated and the results are presented in Figure 31. This figure also illustrates the values for urban wastewater treatment development in the DRB (based on the EU MS basic measures and the commitments of non EU MS in achieving wastewater treatment plants until 2015).

The results for the calculated Phosphate Ban Scenario-Nutrients show that that the P emission would be significantly reduced. This relatively cheap measure has a reduction potential similar to the investments in urban waste water treatment. This leads to a very favourable cost-effectiveness solution.

The following section presents the calculated results for the overall effects for N and P.

Reference Situation and calculated Baseline Scenario-Nutrients 2015 (BS-Nut 2015)
Nitrogen emissions and loads

Regarding N emissions, Figure 32 illustrates the N loads for both the Reference Situation-Nutrients and the overall Baseline Scenario-Nutrients 2015 (see also Map 22 and Map 24). The green bar gives an indication of the fulfilment of the management objective regarding "Reduction of discharged nutrient loads in the Black Sea Basin to such levels, which permit the Black Sea ecosystems to recover to conditions similar to those observed in the 1960s.

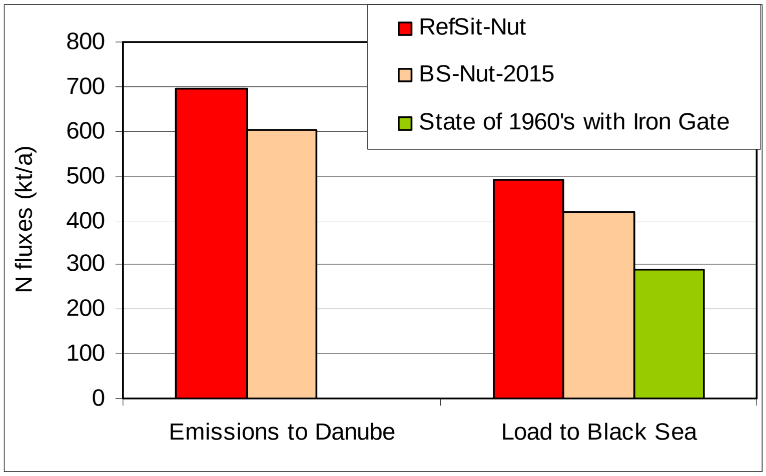

Figure 32: Nitrogen emissions for the Reference Situation-Nutrients (RefSit-Nut), Baseline Scenario-Nutrients 2015 (BS-Nut 2015) and the situation in the 1960s[78].

Nitrogen emission sources

Figure 33 shows the main sources of N emission in the DRB. Regarding the **Reference Situation-Nutrients**, about 49 % of the N emissions are related to agriculture (27 % directly due to fertilizer and manure application; 22% indirectly due to NHy deposition coming from agriculture) (see Map 22). Significantly, 41% of the N emissions (NHy emissions from agriculture and NOx emissions mainly from industrial incineration processes and traffic) cannot be directly influenced by the Danube countries alone because it is partly due to atmospheric deposition from sources outside the DRB.

With regard to the Baseline Scenario-Nutrients 2015, changes for the share of contribution of each source are expected. This is mainly caused by the fact that with the further development of UWWT within the DRB, the share of N coming from urban agglomerations will be reduced (see Map 24). The share of most of the other sources will correspondingly increase.

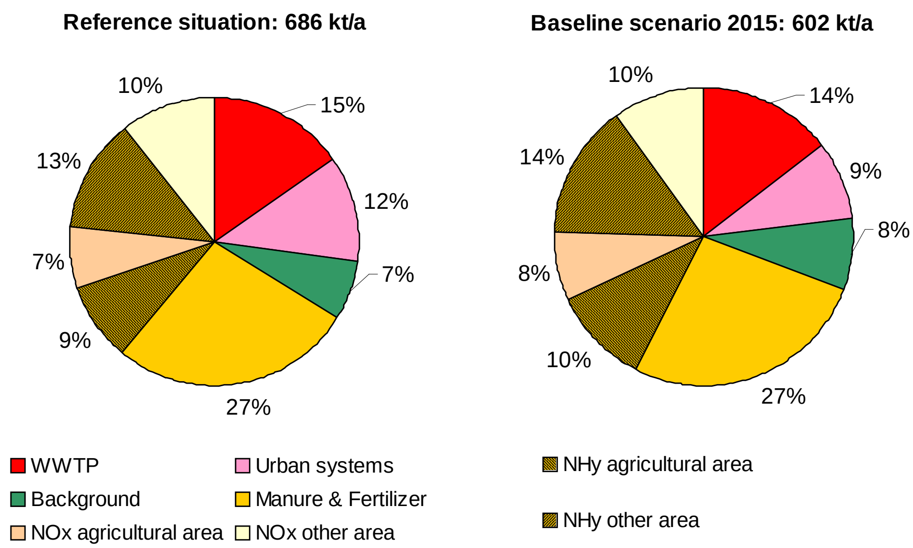

Figure 33: Sources of nitrogen emissions in the DRB for the Reference Situation-Nutrients and Baseline Scenario-Nutrients 2015 (BS-2015).

[78] Both emissions and load values are normalized to the longterm hydrological situation.

Basic considerations regarding nitrogen load due to atmospheric deposition
As mentioned above, nutrient emissions via atmospheric deposition in the DRB are significant (41% of the total nitrogen load). These nitrogen emissions, from atmospheric deposition do not exclusively originate from the DRB but come as well from countries outside the DRB. The reduction of this source of nitrogen will require a broader regional approach. Normalized

Phosphorus emissions and loads
Regarding P emission, Figure 34 illustrates P loads for both the Reference Situation and the Baseline Scenario 2015 (see also Map 23 and Map 25). The green bar gives an indication of the fulfilment of the management objective regarding "Reduction of discharged nutrient loads in the Black Sea Basin to such levels, which permit the Black Sea ecosystems to recover to conditions similar to those observed in the 1960s.

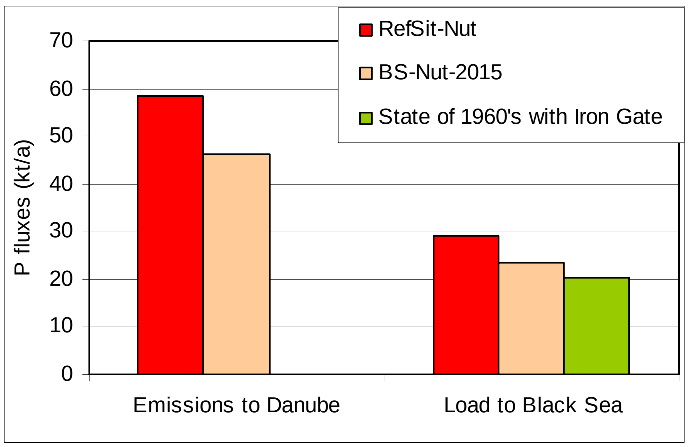

Figure 34: Phosphorus emissions for the Reference Situation-Nutrients (RefSit-Nut), Baseline Scenario-Nutrients 2015 (BS-Nut 2015) and the situation in the 1960s[79].

Phosphorus emission sources
Figure 35 shows the main sources of P emission in the DRB.

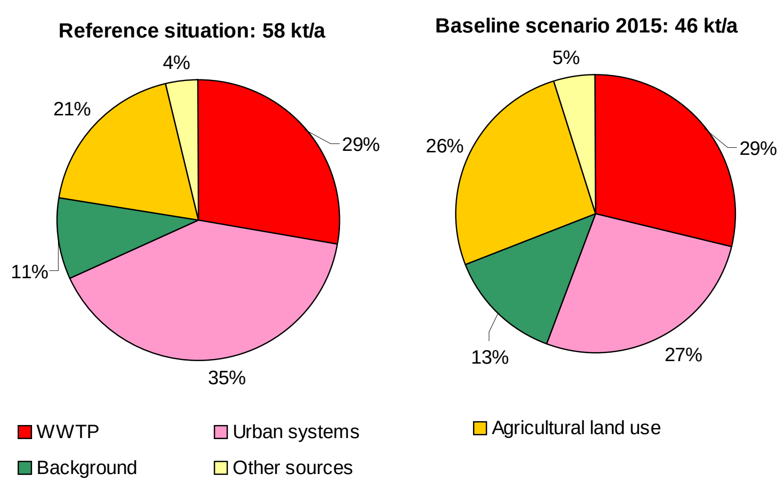

Figure 35: Sources of phosphorus emissions in the DRB for the Reference Situation-Nutrients and Baseline Scenario-Nutrients 2015.

[79] Both emissions and load values are normalized to the longterm hydrological situation.

7.1.2.3.3. Estimated effects of national measures on the basin-wide scale

Nitrogen pollution

Comparison between the Baseline Scenario-Nutrients 2015 and the Reference Situation-Nutrients shows a reduction of N pollution in the DRB.

For the Reference Situation-Nutrients, the N emissions to surface waters are 686 kt/a, whereas the calculated Baseline Scenario-Nutrients 2015 to achieve the management objective 2015 will be 602 kt/a, which is a reduction of 12 % (84 kt/a). However, the total nitrogen load into the receiving Black Sea is currently 468 kt/a, the BS 419 kt/a,, which is still 40 % higher than the loads of the 1960s. Therefore, it can be estimated that for nitrogen pollution the management objective 2015 regarding the reduction of nutrient loads to such levels, which permit the Black Sea ecosystem to recover to conditions similar to those observed in the 1960s will not be achieved.

Therefore, it can be concluded that the measure taken by 2015 on the basin-wide scale to reduce nitrogen pollution will not be sufficient enough to achieve to achieve the respective management objective and the WFD environmental objectives 2015.

Phosphorus pollution

The comparison between the Baseline Scenario-Nut 2015 and the Reference Situation-Nutrients shows a reduction of phosphorus pollution in the DRB.

For the **Reference Situation-Nutrients**, P emissions to surface waters are 58 kt/a, whereas the calculated **Baseline Scenario-Nutrients 2015** to achieve the management objective 2015 will be 46 kt/a, which is a reduction of 21 % (12 kt/a). However, the total Phosphorus load into the receiving Black Sea (taking into account retention processes) is currently 29 kt/a, and according to the BS 23.5 kt/year, which is still 15% higher than the loads of the 1960s.

Therefore, for Phosphorous the **respective management objective on the basin-wide scale will not be achieved by 2015, and this is most likely also the case for the WFD environmental objectives.**

A ban of P containing laundry detergents by 2012 and dishwasher detergents by 2015 (**Phosphate Ban Scenario-Nutrients**) is seen as a cost effective and necessary measure to complement the efforts of implementing urban waste water treatment. This ban - as already recommended by the 11th Ordinary Meeting of the ICPDR (December 2008) would further reduce the P emissions by aproximately 2 kt/a to a level only 5% above the values of 1960s. This measure appears necessary to bring the DRB closer to reaching the management objectives as well as the WFD environmental objectives.

Concluding for both N and P pollution in the DRB this means that the management objective by 2015 related to reduction of nutrient load to the level of 1960's will be partially achieved for Nitrogen and Phosphorus.

7.1.3. Hazardous substances pollution

7.1.3.1. Vision and management objectives

The ICPDR's basin-wide vision for hazardous substances pollution is no risk or threat to human health and the aquatic ecosystem of the waters in the Danube River Basin District and Black Sea waters impacted by the Danube River discharge.

As steps towards the vision, the implementation of the following management objectives is foreseen by 2015:

EU Member States, Accession Country and Non EU MS:

- ⇨ Elimination/reduction of the total amount of hazardous substances entering the Danube and its tributaries to levels consistent with the achievement of the good chemical status by 2015.
- ⇨ Implementation of Best Available Techniques and Best Environmental Practices including the further improvement of treatment efficiency, treatment level and/or substitution.
- ⇨ Explore the possibility to set up quantitative reduction objectives for pesticide emission in the Danube River Basin District.

In addition, for EU Member States

- ⇨ Implementation of the Integrated Pollution Prevention Control Directive (96/61/EC), which also relates to the Dangerous Substances Directive *76/464/EEC*.

7.1.3.2. JPM approach towards the 2015 management objectives

Reducing hazardous substances emissions is a complex task that requires tailor made strategies as the relevance of different input pathways is highly substance-specific and generally shows a high temporal and spatial variability.

Although there is insufficient information on the magnitude and implications of problems associated with hazardous substances at a basin-wide level, it is clear that continued efforts are needed to ensure the reduction and elimination of discharges of these substances. This is particularly the case because hazardous substances can remain in the environment for a very long time, can bioaccumulate and can harm ecosystems and human health, even in very low concentrations.

As discussed in Chapter 2, the sources of hazardous substances vary. They include: direct and indirect discharge from industrial point sources (including air pollutants); municipal wastewater from households and through urban runoff; direct application of pesticides and other hazardous substances and accidental pollution. Therefore, measures to reduce or eliminate hazardous substances need to be based on a variety of approaches addressed to the individual pressures and sectors.

7.1.3.3. Summary of measures of basin-wide importance

Implementation of measures regarding urban wastewater treatment

Due to the synergies between measures to address organic, nutrient pollution and hazardous substances, the further implementation of the UWWTD for EU MS contributes to the reduction of hazardous substances pollution from urban wastewater and from indirect industrial discharges. For Non EU MS, the construction of 47 municipal WWTPs by 2015 will improve the situation (although it should be noted that the construction of new sewerage collecting systems which are not connected to respective WWTPs may have a detrimental effect).

A further area of importance is the input from urban areas via storm water overflows. Here, the reduction of emissions requires improved storm water management.

Implementation of measures regarding the industrial sector

For the industrial sector, the implementation of the EU IPPC Directive is the most important measure for the EU MS. The IPPC Directive is a comprehensive instrument to integrate and address different aspects of pollution control at large-scale industrial activities. The EU MS must ensure that installations of a specified size are neither established nor altered without an IPPC permit. One of the main obligations for operators of facilities is to ensure that Best Available Techniques (BAT) are applied. In addition, the implementation of respective EU Directives will reduce pollution by hazardous substances as well.

Measures include *reduction of point source emissions*, especially from industrial sources, by applying BAT as a first, inevitable step. These measures have been proven to bring significant reduction in a short time period. BAT, as required by the implementation of the IPPC Directive and the ICPDR BAT recommendations for Non EU MS, comprises technological changes in the production process, substitution of specific substances and the use of end of pipe technologies.

Other relevant measures for substances being released to the environment include chemical management measures. These are mostly based on EU regulations such as REACH (EU regulation on Registration, Evaluation, Authorization and Restriction of Chemicals) or the Pesticides Directive and involve e.g. bans/substitution of certain substances or measures which ensure the safe application of products (e.g. pesticides) - often referred to as Best Environmental Practices (BEP). Further, the Dangerous Substances Directive (2006/11/EC) aims to reduce pollution of waters by certain dangerous substances, which have been selected mainly on the basis of how toxic or persistent they are, including how much they may accumulate in organisms.

The implementation of BAT in different industrial sectors – outlined for EU MS by the IPPC Directive and for Non EU MS by relevant ICPDR Recommendations - will further contribute to achieving the management objectives.

Implementation of measures regarding the agricultural sector

For agro-industrial installations, implementation of the IPPC and application of BAT and BEP are relevant measures for the EU MS. With regard to the use of pesticides and other hazardous substances in agriculture, the concept of BAP is expected to result in positive effects both in EU MS and Non EU MS. For EU MS, the EU CAP offers potential for additional reductions in pollution from agriculture. However, a possible increase of agricultural activities (particularly in countries of the middle and lower DRB) might offset these efforts if the increased activity is not undertaken in a sustainable way. An immediate pesticide ban for the most hazardous priority pesticides (e.g. Atrazine, Lindane, Diuron and Endosulfan) in Non EU countries would also reduce input of hazardous substances in the DRB.

Implementation of measures regarding accidental pollution

With regard to accidental pollution, the most important measures are prevention of accidents and ensuring effective contingency planning in the case of an incident. In the framework of the ICPDR, the Danube countries have taken important steps to ensure such mechanisms are in place. An *Accident Early Warning System* has been developed and is being maintained, used and continually improved.

The Accident Emergency Warning System (AEWS) in the DRB

The need for an Accident Emergency Warning System (AEWS) in the DRB is recognized in Article 16 of the DRPC. Established in the early 1990s, the AEWS is an integral part of the activities of the ICPDR and all Danube countries are involved (not yet Montenegro). The AEWS is activated whenever a risk of transboundary water pollution exists, or threshold danger levels of hazardous substances are exceeded. The System sends out international warning messages to countries downstream. This helps national authorities put environmental protection and public safety measures into action. Principal International Alert Centres (PIACs) in each country form the central points of basin-wide cooperation in early warning. The ICPDR Secretariat maintains the central GSM based communication system, which is integrated within the ICPDR information system (Danubis).

In addition, the ICPDR has developed an inventory of potential accident risk spots (ARS Inventory). The Danube countries reported a total of 97 contaminated sites (86 deposit sites, 11 industrial sites and/or abandoned industrial sites) that have potential accidental risks for water. For 12 contaminated deposit sites (out of 23 contaminated sites with all relevant information), *short, middle and long-term-measures* are recommended. In cases of contaminated industrial and/or abandoned industrial sites, the information is limited. For approx. 27% of the reported contaminated industrial sites, *short, middle and long-term-measures* are necessary.

7.1.3.3.1. Estimated effects of national measures on the basin-wide scale

The Dangerous Substances Directive, the IPPC Directive and UWWTD implementation by EU MS, as well as widespread application of BAT/BEP throughout the DRB, will improve but not solve problems regarding hazardous substances pollution. **The reduction/elimination of the amount of hazardous substances entering the Danube and its tributaries to levels consistent with the achievement of *good chemical status* may not be possible by 2015 and further efforts are needed. Due to the lack of reliable information, an assessment as to whether the management objectives will be achieved by 2015 is not possible.**

Against this background, an overall improvement in the information available on the use and input to water of hazardous substances is a priority task for the ICPDR in the future. Experience in other basins has shown that simply ensuring the availability and calculation of data on hazardous substances discharged has initiated a sustainable reduction.

Therefore, it is an important additional objective of the JPM to **improve knowledge** on sources and relevant input pathways of the various hazardous substances. To this extent, the inventory of emissions, discharges and losses required under the EU Daughter Directive on Priority Substances, adopted by the Environment Council in October 2008, should be used. The Danube countries should perform this inventory in a comparable and coordinated way. The ICPDR and its expert groups should ensure coordination and reporting.

7.1.4. Hydromorphological alterations

The pressure analysis and water status assessment show that surface waters of the DRBD are impacted by hydromorphological alterations to a significant degree. In fact a majority of surface waters fail the WFD objectives because of those alterations, which signals the need for measures to achieve the management objectives and WFD environmental objectives. Interruption of river and habitat continuity, disconnection of adjacent wetland/floodplains, hydrological alterations and future infrastructure may impact water status and are therefore addressed as part of the JPM.

On the European level, measures related to the improvement of hydromorphological alterations are exclusively foreseen and required by the EU WFD and not by any other, specific European Directive. Therefore the respective DRBD management objectives have an important role in guiding the joint improvement of ecological water status. The objectives are the same for EU MS and Non EU MS.

Measures reported by the Danube countries to restore hydromorphological alterations - in the case that *good ecological status/good ecological potential* is not achieved or measures are needed to achieve *good ecological status/good ecological potential* - have been screened for their estimated effect on the basin-wide scale. Priorities for implementation on the basin-wide scale and the expected status improvement between 2009 and 2015 are summarised for each hydromorphological component.

As also outlined in Chapter 2.1.4., in cases where countries share river stretches it is likely that some hydromophological components (river and habitat continuity interruption, hydrological alterations) include double-counts. This is because the information has been reported separately by the Danube countries and is not bilaterally harmonised. However, the discrepancy between the results of the analysis and the factual values without double-counts is estimated to be only between 1 and 4%. of the total. For the cases where countries reported separately for shared river stretches the information needs to be harmonised in the future.

7.1.4.1. Interruption of river and habitat continuity

7.1.4.1.1. Vision and management objectives – interruption of river and habitat continuity

The ICPDR's basin-wide vision for hydromorphological alterations is the balanced management of past, ongoing and future structural changes of the riverine environment, that the aquatic ecosystem in the entire DRB functions in a holistic way and is represented with all native species.

This means in particular, that anthropogenic barriers and habitat deficits do not hinder fish migration and spawning anymore - sturgeon species and specified other migratory species are able to access the Danube River and relevant tributaries. Sturgeon species and specified other migratory species are represented with self-sustaining populations in the DRBD according to their historical distribution.

As steps towards the vision, the implementation of the following management objectives is foreseen by 2015:

EU Member States, Accession Country and non EU MS:

- ⇨ Construction of fish migration aids and other measures to achieve/improve river continuity in the Danube River and in respective tributaries to ensure reproducing and self-sustaining of sturgeon species and specified other migratory species.
    - Specification of number and location of fish migration aids and other measures to achieve /improve river continuity, which are intended to be implemented by 2015 by each country.
- ⇨ Restoration, conservation and improvements of habitats and their continuity for sturgeon species and specified other migratory species in the Danube River and the respective tributaries.
    - Specification of location, extent and measure type, which are intended to be implemented by 2015 by each country.
- ⇨ Performance of a feasibility study regarding the possibility for sturgeon and other important species to migrate upstream and downstream through the Iron Gate I & II dams including habitat surveys. If the results of this feasibility study will be positive the respective measures should be integrated into the DRBM Plan and Joint Programme of Measures for implementation.

7.1.4.1.2. JPM approach towards the management objectives – interruption of river and habitat continuity

The DRB rivers with catchment areas >4,000 km² are large to medium sized and include crucial living and spawning habitats, vital to the life cycles of fish species. These rivers can be classified as ecologically very sensitive as they are the key routes and starting points of fish migration for long and medium distance migratory fish species. The Danube River, for example, is not only a key migration route itself, it is also of special importance for those species migrating from the Black Sea and connects all tributaries in the basin for migration.

The overall goal of river and habitat continuum restoration is free migration routes for the DRBD rivers with catchment areas >4,000 km^2, as this will be crucial for achieving and maintaining *good ecological status/potential* for the future. However, due to the results of the objective setting already undertaken at the national level (related to the application of WFD Article 4(5)), some restoration measures will not be implemented (see Figure 37 and Map 27).

In general, all fish species of the DRB are migratory, however, the importance of migration for the viability of fish populations varies considerably among them. Differences exist in terms of migration distances, direction (upstream, downstream, lateral), spawning habitats, seasons and the life stage for which migration takes place. DRB migration requirements are more relevant in *lowland rivers* than in headwater fish communities. (The definition of *headwater* and *lowland* rivers and their relation to the *rhithral* and *potamal* sections, as well as the different fish regions of rivers, are illustrated in Figure 36).

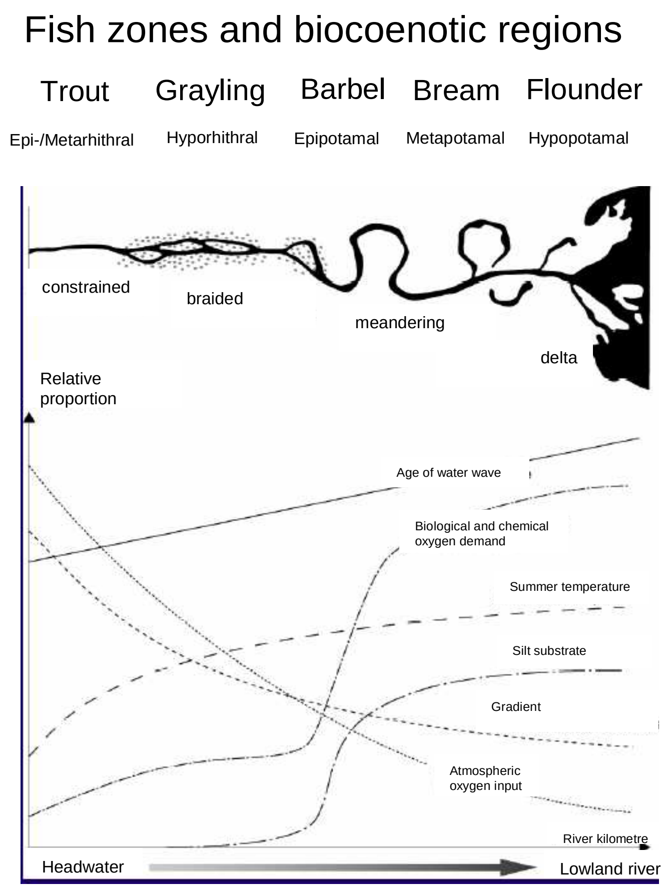

Figure 36: Fish zones, abiotic conditions and rhithral (headwater)/potamal (lowland river) sections (*adapted from Jungwirth et al. 2003*)[80].

[80] Jungwirth, M., Haidvogl, G., Moog, O., Muhar, S., Schmutz, S. (2003): Angewandte Fischökologie an Fließgewässern. p552; Facultas Universitätsverlag,Wien; ISBN 3-8252-2113-X.

Long distance migrants (LDM), such as the Beluga sturgeon (*Huso huso*), formerly migrated from the Black Sea up to (what is termed) the *Barbel region* of the DRB. Medium distance migrants (MDM, so called potamodromous fish species) such as Nase (*Chondrostoma nasus*) and Barbel (*Barbus barbus*) migrate migrate within the river over distances between 30 to 200 km within the *Barbel* and *Grayling regions* of the DRB[81]. In contrast, headwater fish species migrate over comparable short distances because their living an spawning habitats are closer to each other. Nevertheless, under a long term perspective all fish species need open river continuity.

Table 14 lists examples for both the long distance migrants of the DRB as well as nine DRB medium distance migrants that are represented with the highest numbers in the Danube River and adjacent lowland rivers, and which are therefore of key importance regarding continuity restoration. The key MDMs have been selected out of overall 58 fish species that have been classified in the European FP7 Project EFI+. The technical report on the ecological prioritisation approach (Annex 18) includes more details on LDMs and MDMs.

Table 14: Examples for long and medium distance migrants in the DRB (based on EFI+ guild classification (see http://efi-plus.boku.ac.at).

DRB Long Distance Migrants (LDM)		
Nr.	**Scientific name**	**English name**
1	*Huso huso*	Great sturgeon, beluga
2	*Acipenser guldenstaedti*	Russian sturgeon
3	*Acipenser nudiventris*	Ship sturgeon
4	*Acipenser stellatus*	Stellate sturgeon
5	*Alosa caspia*	Caspian shad
6	*Alosa immaculate (pontica)*	Pontic shad
DRB Medium Distance Migrants (MDM)		
1	*Abramis brama*	Common bream
2	*Abramis sapa*	Danubian bream
3	*Acipenser ruthenus*	Sterlet
4	*Aspius aspius*	Asp
5	*Barbus barbus*	Barbel
6	*Chondrostoma nasus.*	Nase
7	*Hucho hucho*	Danube salmon
8	*Lota lota*	Burbot
9	*Vimba vimba*	Vimba

[81] Waidbacher, H. & G. Haidvogl (1998): Fish migration and fish passage facilities in the Danube: Past and present. In: Jungwirth, M., Schmutz, S. & Weiss, S. (eds.): Fish Migration and Fish Bypasses. Oxford, Fishing News Books: pp 85-98.

Ecological prioritisation approach for continuity restoration in the DRB

The focus for measures in the DRBD is on establishing free migration for long and medium distance migrants of the Danube River and the connected lowland rivers that are addressed at the Roof level (for a list of the respective fish species in the DRB, see Table 14 and Annex 18) This results in a decrease in the level of ecological measure priority (on the basin-wide scale) from the Danube River to the DRBD headwaters. In order to enable a sound estimation of where to target measures most effectively at the basin-wide scale, it is necessary to carry out an ***ecological prioritisation of measures to restore river and habitat continuity*** in the DRBD. A respective study has been performed for this DRBM Plan in coordination with the Danube countries (Annex 18). The elaborated approach provides indications on the step-wise and efficient implementation of restoration measures at the basin-wide scale. It provides useful information on the estimated effects of national measures in relation to their ecological effectiveness at the basin-wide scale and serves as a supportive tool for implementation of future measures. Therefore, it also supports feedback from international to national level and vice versa. The approach allows the illustration of key migration routes for long and medium distance migrants of the DRB (see Map 28). The illustrated distribution of LDMs is based on historical information going back centuries. The historical information serves the definition and use as reference conditions corresponding to entirely or almost entirely undisturbed natural conditions. The distribution of MDMs is based on modelled data that has been calibrated with current information. Details of the prioritisation approach are part of the full technical report (see Annex 18).

In general, the approach is based on various criteria (see Annex 18 for details) focusing on the migratory behaviour of LDMs as well as MDMs in the DRB. The criteria are weighted differently, to perform an ecological prioritisation of measures for continuity restoration on the basin-wide scale.

The output of the approach is a calculated Prioritisation Index (PI = migratory habitat x (1 + first obstacles upstream + distance from mouth + reconnected habitat + protected site). This allows an estimation of where measures would be most effective from the ecological point of view for implementation on the basin-wide scale. A maximum possible PI value of 36 indicates the utmost priority, whereas a PI of 0 indicates a low priority for a measure (see Map 28). The PI was grouped into classes of ecological priority (utmost priority: PI >13, very high priority: (PI 10-12), high priority: PI 7-9, medium priority: PI 4-6), low priority: PI 1-3). Based on the results, the approach allows an illustration of potential key migration routes for long and medium distance migrants in the DRB (see Map 28). The achievement of free fish migration for the identified key migration routes by 2015 (taking into account the existing barriers in the DRBD and reported measures for continuity restoration to be taken by 2015 – see Figure 37 and Table 15 for details) will contribute to both the implementation of the DRB management objectives for river and habitat continuity and achievement of the WFD environmental objectives and their maintenance in the future.

The key findings of the ecological prioritisation approach are part of the next sub-Chapter 7.1.4.1.3..

The Danube River and the restoration of river and habitat continuity

The status of migratory fish, such as sturgeon (declared as a species of basin-wide importance in the framework of the ICPDR), is a strong indicator of the ecological condition of the entire DRB.

The Danube River itself is a key migration route and connects all tributaries for migration. **The Iron Gate Dams I & II, in part the Gabcikovo Dam, and the chains of hydropower plants in AT and DE** represent significant migration barriers for fish. Migratory fish, such as sturgeon and medium distance migrators, are particularly affected, being unable to move up or downstream between their spawning grounds and areas used at other times in their life cycle. Further information regarding the effects of the dams on fish migration can be found in Chapter 2.1.4. (JDS 2 info box).

In particular, the impact of the Iron Gate Dams I and II has resulted in sharp declines in most Danube sturgeon species (now endangered), with significant regional economic impacts on the productivity of fisheries.

As a result, the ICPDR has developed a step-by-step approach (see Annex 19) to jointly ensure the achievement of the management objectives related to the restoration of river and habitat continuity in the DRB. As part of the DRBM Plan and JPM, the first step foresees the performance of a **feasibility study to re-open the Iron Gate Dams for free fish migration**, with a focus on sturgeon species. The technical and ecological problems to be investigated and overcome are complex. However, at present, joint investigations are still ongoing regarding the funding of the feasibility study. Due to the respective timeframe, results of the feasibility study can only be expected during the second and/or third WFD cycles.

The feasibility study's key objectives are to:

- Identify the management and restoration measures required to ensure availability of suitable habitats for migratory fish, especially sturgeon, along the main Danube River from the Black Sea to upstream of the Iron Gates Dams.
- Develop innovative means of adapting the Iron Gate Dams I and II so that the sections and habitats of the river above and below the dams are ecologically 'reconnected' in a way that meets the needs of migrating aquatic species.
- Undertake all necessary pre-implementation studies so that the solutions identified are fully developed and justified from environmental, economic, social and cultural perspectives.
- Demonstrate how such solutions could be developed and implemented for large dams elsewhere in the DRB.

In case the results from the feasibility study are positive, the next steps for the ICPDR approach include the implementation of measures for the Iron Gate Dams and a similar feasibility study regarding Gabcikovo Dam. Once the decision is made to assist sturgeon species in bypassing the Gabcikovo Dam, respective actions need to be discussed and considered in the upper DRB.

7.1.4.1.3. Summary of measures of basin-wide importance – interruption of river and habitat continuity

Overview of measures to restore river continuity in the DRBD

The Danube countries have reported on the measures that will be undertaken by 2015 to ensure fish migration (where still needed) e.g. construction of fish migration aids. Measures that will be taken are intended to ensure both up and downstream migration of fish and will also help to improve the migration of other fauna. Figure 37 and Map 27 illustrate that, as of 2009, 932 interruptions of river and habitat continuity are located in the DRBD (56 of which are located in the Danube River). By 2015, 108 fish migration aids will be constructed in the DRBD that should ensure the migration of all fish species and age classes according to best available techniques. The figure is limited to 108, as 686 measures to restore river continuity interruptions are subject to an exemption according to WFD Article 4(4) and 32 measures to WFD Article 4(5). This indicates that most restoration measures will not be undertaken until the second and third WFD cycle (Article 4(4)) and that some migration barriers will not be restored at all due to technical infeasibility and disproportionate costs (Article 4(5)[82]. Consequently, 824 interruptions of river continuity will remain impassable for fish migration by 2015 and *good ecological status* may not be ensured. To date, the status regarding 106 interruptions has yet to be clarified by the respective Danube countries and no measures have yet been indicated. This means that at present no measures are foreseen and neither WFD Article 4(4) nor 4(5) can be applied. However, it has to be taken into account and further investigated that some measures may not be necessary as the ecological status/potential is already achieved in 2009 despite the presence of a continuity interruption (see also Map 27).

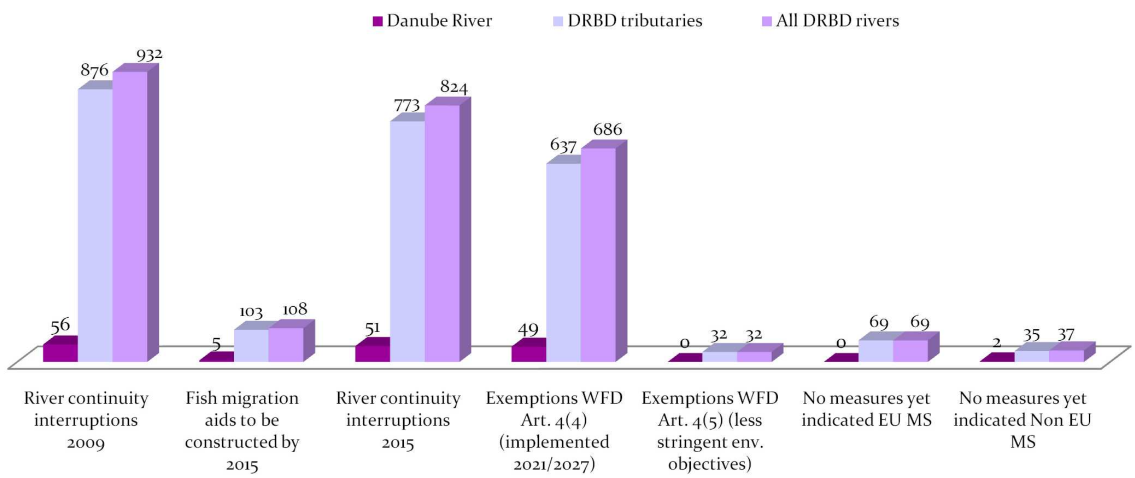

Figure 37: Interruption of river continuity in the DRBD as of 2015 (including the number of exemptions according to WFD Article 4(4) & 4(5)).

Table 15 shows the information provided in Figure 37 for each Danube country.

[82] Details on those barriers are available in Figure 37 and Map 27.

Table 15: Overview for each Danube country on the number of river continuity interruptions 2009 & 2015, restoration measures (e.g. fish migration aids) and exemptions according to WFD Articles 4(4) and 4(5).

	River continuity interruptions 2009	Fish migration aids to be constructed by 2015	River continuity interruptions 2015	Exemptions WFD Art 4(4)	Exemptions WFD Art 4(5)	No measures yet indicated	
						EU MS	Non EU MS
DE	244	8[83]	236	236	0	0	-
AT	270	71	199	199	0	0	-
CZ	68	2[84]	66	66	0	0	-
SK	98	16	82	82	0	0	-
HU	18	9	9	9	0	0	-
SI	12	0	12	12	0	0	-
HR	2	0	2	0	0	-	2
BA	5	0	5	0	0	-	5
ME	-	-	-	-	-	-	-
RS	30	1	29	0	0	-	29
RO	145	1	144	48	27	69[85]	-
BG	39	0	39	34	5	0	-
MD	1	0	1	0	0	-	1
UA	0	0	0	0	0	-	0
Total	**932**	**108**	**824**	**686**	**32**	**69**	**37**
Danube	**56**	**5**	**51**	**49**	**0**	**0**	**2**

Table 16 indicates the estimated river km to be restored by 2015 for the Danube River. Further, it outlines the respective number of water bodies that will provide free migration routes.

Table 16: Number and percentage of river water bodies restored by 2015 through fish migration aids (referencing to total water body number).

	Total number of water bodies	Water bodies affected by continuity interruptions	Water bodies restored for continuity by 2015
Danube River	45	21 (43%)	3 (7%)
DRBD tributaries	636	275 (43%)	34 (5%)
All DRBD rivers	681	296 (43%)	37 (5%)

[83] A DE national prioritisation of river continuity restoration is in process. In addition to the listed 8 continuity interruptions, DE will make 90 additional passable for fish by 2015, which are relevant for the basin-wide scale. However, those 90 obstacles to be made passable for fish migration by 2015 are not yet localised. For this reason all barriers have been temporarily classified as "Exemptions WFD Art 4(4) - continuity restored by 2021/2027" and appear as such in
Table 15, Figure 37 and Map 27. They are not reflected and visualised as measures to be taken by 2015 but will in fact be implemented by 2015. Those measures are relevant for the future report on the progress of measure implementation on the basin-wide scale. The DE national RBM Plan provides more detailed information.

[84] CZ is currently finalising a national prioritisation concept for river continuity restoration. Five continuity interruptions will be made passable for fish by 2015 and will be displayed in the national RBM Plan. In the DRBM Plan those interruptions are temporarily indicated and illustrated as "Exemptions WFD Article 4(4)".

[85] No measures are needed as the good ecological status/potential is already achieved in 2009. Further, measures for headwater fish species that migrate over comparable short distances are not taken into account on the A-Level.

Results of the ecological prioritisation approach for continuity restoration in the DRB

The ***key findings*** of the ecological prioritisation approach are illustrated in Map 28 and show that some continuity interruptions in the lower (Iron Gate Dams), middle (Gabcikovo Dam) but also the upper Danube River receive utmost ecological priority for measures with Prioritisation Index (PI) values between 13 and 24. The Iron Gate Dams clearly show the highest priority for continuity restoration with PI values larger than 20. In the upper Danube River the PI ranges largely between 8 and 16 based on the fact that this reach is classified as a LDM habitat. The barriers within the LDM habitat of the DE Danube River generally receive higher values for ecological restoration compared to the Austrian reach due to the fact that longer habitats are reconnected and most obstacles are within Natura 2000 areas. The priority for continuity restoration is currently considered as low in the headwater of the Danube River itself. Measured from the Danube's source this headwater reach is only 17 km long (Map 28). For the DRB tributaries it can be concluded that barriers closer to the confluence with the Danube River generally have a higher priority for continuity restoration than those located further upstream.

In total 946[86] continuum interruptions have been considered. Out of the 681 prioritised interruptions, 29 (3%) show utmost priority for ecological restoration, 99 interruptions (10%) are of medium and 543 (58%) of low ecological priority. More than a quarter (27%) of the continuity interruptions are not of ecological priority at all for restoration (PI=0) on the basin-wide scale as they are located in headwaters or artificial canals. However, it has to be stated that the importance to restore upstream/headwater interruptions will increase as soon as downstream continuity interruptions will be restored.

The results of the proposed prioritisation are recommended to be used as a guideline for implementing ecological efficient measures. However, it has to be pointed out that ecological prioritisation is only one aspect in deciding which measures to implement. Several other important aspects (e.g. economic and/or administrative issues) exist alongside ecological prioritisation, which will also be taken into account when deciding where priority measures will be implemented by 2015 and beyond.

7.1.4.1.3.1. Estimated effect of national measures on the basin-wide scale

Water bodies with migration barriers that should be restored by 2015 (and that are not subject to WFD Article 4(4) or 4(5)) are indicated in Figure 37 and highlighted in Map 27. Based on the approach of *ecological prioritisation of measures to restore river and habitat continuity in the DRBD*, Map 28 illustrates where priority measures could be implemented to achieve the estimated highest effectiveness of measures on the basin-wide scale and WFD environmental objectives.

For river and habitat continuity interruption, the WFD environmental objectives on the basin-wide scale will not be achieved in 2015, **but it is likely that these objectives can be achieved after 2015 through implementation of all measures indicated to be undertaken by 2015 and beyond 2015 under WFD Article 4(4).** For these measures, the ecological prioritisation for continuity restoration in the DRBD should be taken into account that are summarised above.

[86] 1,688 barriers are located in the DRBD (see Figure 37and Table 15). For the prioritisation approach specific criteria have been applied for analysis pre-selection of barriers, which resulted in the value of 946 continuity interruptions. Details regarding this pre-selection are outlined in Annex 18.

7.1.4.2. Disconnection of adjacent floodplains / wetlands

7.1.4.2.1. Vision and management objectives - disconnection of adjacent floodplains / wetlands

The ICPDR's basin-wide vision for is that floodplains/wetlands in the entire DRBD are re-connected and restored. The integrated function of these riverine systems ensure the development of self-sustaining aquatic populations, flood protection and reduction of pollution in the DRBD.

As steps towards the vision, the implementation of the following management objectives is foreseen by 2015:

EU Member States, Accession Country and non EU MS:

- ⇨ Protection, conservation and restoration of wetlands/floodplains to ensure biodiversity, the good status in the connected river by 2015, flood protection and pollution reduction.
- ⇨ To determine the implementation steps for restoration and reconnection of lost floodplains and wetlands along the Danube River and its tributaries, a priority ranking needs to be developed and introduced taking flood retention, nutrient reduction and wetland/floodplain re-connection into account (the identified 17 sites identified along the Danube River and tributaries of approximately 330.000 ha should be considered[87]
- ⇨ Implementation of the "*no net-loss principle*"[88]

7.1.4.2.2. JPM approach towards the management objectives - disconnection of adjacent floodplains / wetlands

Floodplains/wetlands play an important part of the ecological integrity of riverine ecosystems and are of significant importance when it comes to ensuring/achieving *good ecological status* of adjacent water bodies (see Chapter 2.1.4. for details). As 80% of the former wetlands in the DRBD are considered to be disconnected[89], major restoration efforts and measures are needed in order to achieve reconnection of floodplains/wetlands in the entire DRBD (although some restoration projects have already been undertaken by the Danube countries in recent years).

The approach chosen for the JPM to protect, conserve and restore wetlands is a pragmatic one, taking into account a background of 80% wetland loss. The Danube countries have provided information on:

- national floodplains/wetlands >500 ha with a potential to be reconnected to the adjacent river;
- respective reconnection measures to be undertaken by 2015 or beyond regarding WFD Art.4(4).

The analysis shows the area of floodplains/wetlands to be reconnected by 2015 for both the Danube River and its tributaries. The inter-linkage with national RBM Plans is vital for wetland reconnection as significant areas are expected to be reconnected to rivers with catchment areas <4,000 km^2 and with surface areas <500 ha having nevertheless positive effects on the water status of larger rivers.

The approach will be further developed during the second RBM cycle as improvements in knowledge are expected. Current activities on the production of flood risk maps will e.g. significantly contribute to the compilation of an inventory of connected and disconnected floodplains/wetlands and therefore increase the knowledge on reconnection potential. Further, activities in the frame of projects such as the IUCN European Green Belt or the WWF Lower Danube Green Corridor will contribute to knowledge increase on wetlands and floodplains in the DRB.

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[87] The 330.000 ha restoration potential refers to findings of the WWF-Danube Pollution Reduction Programme report: Evaluation of Wetland and Floodplain Areas in the DRB (1999). The 330.000 ha restoration potential served as a general orientation but have not been taken into account in the DRBM Plan to compare the factual reconnection area of wetlands/floodplains neither to conclude on the achievement/failing of the WFD environmental objective.

[88] No net loss principle = conservation of floodplains and wetlands whenever possible – if surface areas of wetlands are converted to other uses, the total wetland resource base has to be offset through restoration and creation of other wetlands.

[89] Danube Basin Analysis 2004: Danube Pollution Reduction Programme report: Evaluation of Wetland and Floodplain Areas in the DRB (1999).

7.1.4.2.3. Summary of measures of basin-wide importance - disconnection of adjacent floodplains / wetlands

Figure 38 and Map 6 illustrates that from the 612,745 ha of wetland areas identified in 2009 with potential for reconnection, 62,300 ha are expected to be reconnected to DRBD rivers by 2015 (5 wetlands representing 10% of identified potential). An area of 45,308 ha will be reconnected to the Danube River itself (11 wetlands representing 73%). According to the application of Article 4(4), two wetlands will be reconnected after 2015, within the second and third RBM cycles.

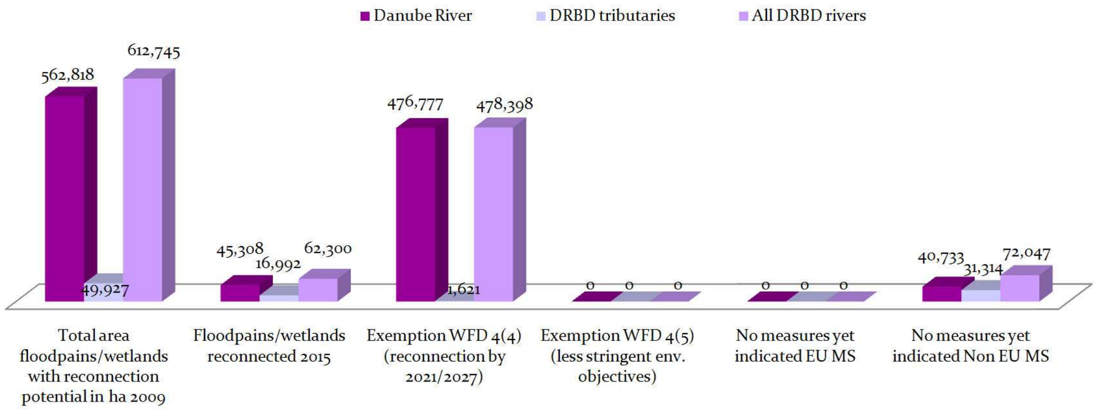

Figure 38: Restored lateral connectivity by total area (ha) by 2015 (areas >500 ha).

Table 17 shows the information provided in Figure 38 for each Danube country.

Table 17: Overview of wetland/floodplain area (ha) to be reconnected by 2015 and/or for which water regime improvements will be made by 2015, as well as WFD exemptions (per country)[90].

	Floodplains/wetlands with reconnection potential 2009 (ha)	Floodplains/wetlands to be reconnected by 2015 (ha)	Exemptions WFD Art 4(4)	Exemptions WFD Art 4(5)	No measures yet indicated	
					EU MS	Non EU MS
DE	5,964	5,964	0	0	0	-
AT	9,554	9,554	0	0	0	-
CZ	0	0	0	0	0	-
SK	4,842	0	4,842	0	0	-
HU	13,330	13,330	-	0	0	-
SI	1,520	1,520	0	0	0	-
HR	0	0	0	0	-	0
BA	0	0	0	0	-	0
ME	-	-	-	-	-	-
RS	31,932	31,932	0	0	-	0
RO	473,556	0	473,556	0	0	-
BG	0	0	0	0	0	-
MD	24,888	0	0	0	-	24,888
UA	47,159	0	0	0	-	47,159
Total	**612,745**	**62,300**	**478,398**	**0**	**0**	**72,047**
Danube	**562,818**	**45,308**	**476,777**	**0**	**0**	**40,733**

[90] Explanation of table content: ‘0’: no basin-wide relevance of issue in Danube country; ‘-‘: no information has been provided by the respective Danube country. However, measures may be taken on the national level.

7.1.4.2.3.1. Estimated effect of national measures on the basin-wide scale

Based on the JPM results, the measures of basin-wide importance for reconnection of wetlands/ floodplains (where *good ecological status/ecological potential* is not achieved or measures are needed to maintain *good ecological status/ecological potential*) are now identified. Their implementation will be crucial to achieve the WFD environmental objectives by 2015 and partly beyond (2021/2027) in the DRBD. It is difficult at this stage to indicate what the exact effect of such measures would be at the basin-wide scale. The installation and application of appropriate control mechanisms at the national level regarding measure implementation will be important in order to achieve this basin-wide aim[91]. A respective feedback mechanism between the national and international level and vice versa will enable the further estimation of the basin-wide effect of the implemented national measures.

7.1.4.3. Hydrological alterations

7.1.4.3.1. Vision and management objectives - hydrological alterations

The ICPDR's basin-wide vision for hydrological alterations is that they are managed in such a way, that the aquatic ecosystem is not influenced in its natural development and distribution.

As steps towards the vision, the implementation of the following management objectives is foreseen by 2015:

EU Member States, Accession Country and non EU MS:

- Performance of a respective analysis as an addendum to the Danube Basin Analysis 2004 to be part of the Danube River Basin Management Plan. Management objectives will be defined as soon as the analysis is finalised.

7.1.4.3.2. JPM approach towards the management objective - hydrological alterations

As shown by the pressure analysis and status assessment, hydrological alterations impact the status of water bodies (see Chapter 3 and Chapter 4). Impoundments, water abstraction and hydropeaking are key pressures that require measures on the basin-wide scale.

The initial management objective, as shown above, only included the execution of a pressure analysis and stated that the definition of management objectives would be undertaken as soon as the analysis has been finalised. Based upon the now completed analysis, the management objective can be supplemented. As steps towards the vision for hydrological alterations, the implementation of the following management objectives by 2015 are foreseen:

EU MS, Accession Country and Non EU MS:

Impoundments: Most of the impounded water bodies are designated to be heavily modified and the good ecological potential (GEP) has to be achieved. Due to this fact the ***management objective*** foresees additional measures on the national level to improve the hydromorphological situation in order to achieve and ensure the GEP.

Water abstractions: The ***management objective*** foresees the ***discharge of a minimum ecological flow,*** ensuring that the biological quality elements are in good ecological status respectively good ecological potential.

Hydropeaking: Most of the water bodies affected by hydropeaking are designated to be heavily modified and the good ecological potential (GEP) has to be achieved. Therefore, the ***management objective*** foresees measures on the national level to improve the situation to achieve and ensure the GEP. Hydropeaking and its effect on water status is a very complex issue. Therefore, further respective investigations and scientific studies are needed.

[91] Exact control mechanisms need to be further defined on national level (e.g. ordinances). See the respective national RBM Plans and Programmes of Measures (see web links in Annex 1).

7.1.4.3.3. Summary of measures of basin-wide importance – hydrological alterations

Figure 39, Maps and 7 a, b & c illustrate that, as of 2009, 697 hydrological alterations are located in the DRBD whereas 558 are reported for 2015 (Map 29). Multiple hydrological pressures (impoundment, water abstraction, hyropeaking) can be bound to one hydrological alteration in Figure 39. The number of individual hydrological pressures can therefore be larger than the total number of hydrological alterations. Table 18 and Annex 20 inform on the detailed number of the individual hydrological pressures. 449 impoundments are located in the DRBD rivers, 44 of them in the Danube River. 140 water abstractions are causing alterations in water flow (4 on the Danube River: one of them in the German reach, one at the Gabcikovo Dam and two in the Hungarian reach). Out of them, 105 are significant alterations with insufficient minimum flows. 89 sites of impacts regarding altered flow regimes through hydropeaking were analysed, 32 being significant alterations with water level fluctuations larger than 1 m/day below a hydropower plant (or less in the case of known negative effects on biology).

Overall, it is foreseen that 139 measures to improve impacts on water bodies caused by hydrological alterations will take place by 2015 (Figure 39 and Map 29). 52 measures will address impoundments and 3 measures the buffering of hydropeaking. 42 measures will be implemented regarding water abstractions and specifically 28 regarding insufficient minimum flows. 236 measures are subject to WFD Article 4(4) and will therefore be implemented after 2015. Only two hydrological alterations (impoundments) will not be addressed with measures as WFD Article 4(5) is applied.

Besides the 44 existing impoundments, for the Danube River itself, water abstraction with insufficient residual water is only relevant for the Gabcikovo hydropower dam. Hydropeaking is not analysed as a significant pressure in the Danube River and occurs in a buffered way over short river stretches downstream of tributary confluences (Enns, AT) or downstream of large dams (Gabcikovo and Iron Gate Dams).

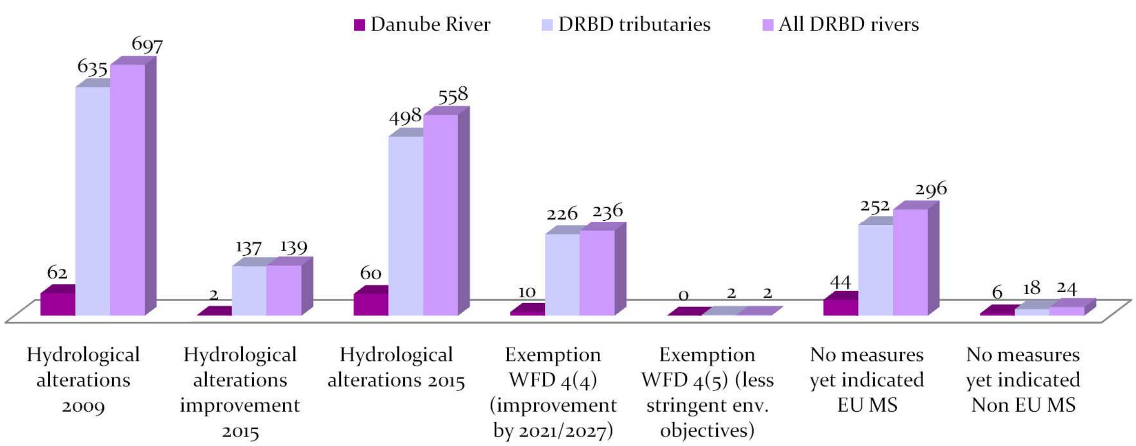

Figure 39: Measures for hydrological alterations by 2015 and exemptions according to WFD Articles 4(4) and 4(5) for the remaining alterations.

Table 18 shows the information provided in Figure 39 for each Danube country. Details on hydrological alterations in the DRB are also provided in Maps 7 a,b & c, Map 29 as well as in Annex 20.

Table 18: Overview for each Danube country on the number of hydrological alterations 2009 & 2015 and exemptions according to WFD Articles 4(4) and 4(5)[92].

	Total no. of hydrological alterations (2009)	Improvement by 2015	Total no. of hydrological alterations 2015	Exemptions WFD Art 4(4)	Exemptions WFD Art 4(5)	Measure not yet indicated	
						EU MS	Non EU MS
DE	180	3	177	0	0	177	-
AT	255	54	201	201	0	-	-
CZ	6	0	6	0	0	0	-
SK	35	8	27	0	0	27	-
HU	27	18	9	9	0	0	-
SI	12	0	12	12	0	0	-
HR	4	0	4	0	0	-	4
BA	-	-	-	-	-	-	0
ME	-	-	-	-	-	-	-
RS	19	0	19	0	0	-	19
RO	58	3	55	8	2	45	-
BG	100	53	47	6	0	41	-
MD	1	0	1	0	0	-	1
UA	-	-	-	-	-	-	-
Total	**697**	**139**	**558**	**236**	**2**	**296**	**24**
Danube	**62**	**2**	**60**	**10**	**0**	**44**	**6**
Imp.[93]	**449**	**52**	**397**	**153**	**1**	**220**	**23**
Abstr.[93]	**140**	**42**	**98**	**71**	**0**	**27**	**0**
HyPe[93]	**89**	**3**	**86**	**38**	**0**	**47**	**1**

7.1.4.3.3.1. Estimated effect of national measures on the basin-wide scale

Based on the results of the JPM, the measures of basin-wide importance for restoration of hydrological alterations are now identified. Their implementation will be crucial in order to achieve the WFD environmental objectives by 2015 and partly beyond (2021/2027) in the DRBD. It is difficult at this stage to indicate what the exact effect of such measures would be at the basin-wide scale. The installation and application of appropriate control mechanisms at the national level[94] regarding measure implementation will be important to achieve this basin-wide aim. A respective feedback mechanism between the national and international level and vice versa will enable the further estimation of the basin-wide effect of implemented national measures.

[92] Explanation of table content: '0': no basin-wide relevance of issue in Danube country. '-': no information has been provided by the respective Danube country. However, measures may be taken on the national level (see national RBM Plans);

[93] Multiple impacts from hydrological pressures (impoundment, water abstraction, hydropeaking) can be bound to one hydrological alteration. The number of individual hydrological pressures can therefore be larger than the total number of hydrological alterations. Explanation of abbreviations: Imp = Impoundments, Abstr = Water abstractions, HyPe = Hydropeaking.

[94] Exact control mechanisms need to be defined further on the national level (e.g. ordinances). See the respective national RBM Plans and Programmes of Measures (see web links in Annex 1).

7.1.4.4. Future infrastructure projects

7.1.4.4.1. Vision and management objective – future infrastructure projects

The ICPDR's basin-wide vision for future infrastructure projects is that they are conducted in a transparent way using best environmental practices and best available techniques in the entire DRBD – impacts on or deterioration of the good status and negative transboundary effects are fully prevented, mitigated or compensated

As steps towards the vision, the implementation of the following management objectives is foreseen by 2015:

EU Member States, Accession Country and non EU MS:

- Conduction of Environmental Impact Assessments and/or a Strategic Environment Assessment in conjunction with the EU Water Framework Directive requirements of Article 4(7) during the planning phase of the respective future infrastructure project if needed.
- Fulfilment of the conditions set out in WFD Article 4, in particular the provisions for new modifications specified in Article 4, Paragraph 7.
- Recommendations for stakeholders for the implementation of best environmental practices and best available techniques.

7.1.4.4.2. JPM approach towards the management objectives – future infrastructure projects

As analysed in Chapter 3, many future DRBD infrastructure projects (navigation, hydropower, flood protection) may have negative impacts on water status by 2015 and need to be addressed accordingly. The DRBD management objectives include precautionary measures (BEP and BAT) that should be implemented to reduce and/or prevent impacts on *good ecological status/ecological potential*.

7.1.4.4.3. Summary of measures of basin-wide importance – future infrastructure projects

In order to prevent and reduce basin-wide and transboundary effects from future infrastructure projects in the DRBD, the development and application of BAT and BEP is crucial. For new infrastructure projects, it is of particular importance that environmental requirements are considered as an integral part of the planning and implementation process right from the beginning of the process. In the framework of the ICPDR, it is intended to develop respective processes/guidance in this regard. Such a process is already taking place in the navigation sector to reduce and prevent effects from new projects, but also current maintenance works – see the Joint Statement described in detail below. Similar approaches could be performed for other sectors in the framework of the ICPDR (e.g. BEP/BAT for hydropower generation).

For 22 FIPs, SEAs have been performed during the planning process. Further, EIAs have already been performed for 31 FIPs, and are planned for another 63 FIPs, whereas no EIAs were performed for 18 projects (see details in Annex 7). 91 FIPs will have a negative transboundary effect on other water bodies and 87 FIPs are even expected to provoke deterioration of water status. Exemptions according to WFD Article 4(7) are applied for 89 planned FIPs and are summarised in Chapter 5 as well as illustrated in Map 16.

Joint Statement on the guiding principles for the development of inland navigation and environmental protection in the DRB.

Inland navigation can contribute to making transport more environmentally sustainable, particularly where it can act as a substitute for road transport. It can, however, also have significant influence on river ecosystems, jeopardizing the goals of the WFD.

Recognising this potential conflict, the ICPDR initiated in cooperation with the Danube Navigation Commission and the International Commission for the Protection of the Sava River Basin, an intense, cross-sectoral discussion process involving all relevant stakeholders and NGOs, which led to a "Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin".

In October 2007, the Joint Statement was concluded and subsequently agreed by the three Commissions involved.

The Joint Statement provides an overview on the legal background regarding both Inland Waterway Transport and environmental issues. Relevant legal documents and action programmes (i.e. TEN-T, NAIADES, etc.) are listed. The Joint Statement summarises principles and criteria for environmentally sustainable inland navigation on the Danube and its tributaries, including the maintenance of existing waterways and the development of future waterway infrastructure. The Joint Statement is a guiding document for:

- - the development of the Programme of Measures requested by the EU WFD;
- - the maintenance of current inland navigation;
- - the planning and investments in future infrastructure and environmental protection projects.

Overall the Joint Statement and its practical implementation will ensure the integration of economic development and environmental standards during the planning/implementation of new navigation infrastructure projects. It provides the basis for potential win-win situations for the navigation sector and the environment.

7.2. Surface waters: lakes, transitional waters and coastal waters[95]

Measures that are currently foreseen regarding the significant hydromorphological alterations in Lake Razim (RO) are an investigation to assess the extent of pressures and also identify the measures that can be taken to achieve improvement and ensure the WFD environmental objective is met.

Regarding two coastal water bodies in RO affected by significant pressures, measures will be pursued according to the philosophy of the Joint Statement on Guiding Principles for the Development of Inland Navigation and Environment in the DRB, which aims for integrated solutions.

7.3. Groundwater

This chapter summarises the measures that are planned for the 11 GWBs of basin-wide importance. An indicative overview of the measures is shown in Table 9 (see Chapter 2.3). Detailed information on the relevant measures for each GWB is given in Annex 11.

7.3.1. Groundwater quality

7.3.1.1. Vision and management objectives

The ICPDR's basin-wide vision is that the emissions of polluting substances do not cause any deterioration of groundwater quality in the Danube River Basin District. Where groundwater is already polluted, restoration to good quality will be the ambition.

The way towards the vision will be achieved through the implementation of the following management objectives by 2015:

EU Member States, Accession Country and non EU MS:

- ⇨ Elimination/reduction of the amount of hazardous substances and nitrates entering the groundwater bodies in the DRBD to prevent deterioration of groundwater quality and to prevent any significant and sustained upward trends in the concentrations of pollutants in groundwater.
- ⇨ Implementation of the management objectives described for organic and nutrient pollution of surface waters (see above).
- ⇨ Increase of the wastewater treatment efficiency and level thereafter.
- ⇨ Implementation of Best Available Techniques and Best Environmental Practices.
- ⇨ Reduction of pesticide/biocides emission in the DRBD.

[95] Further details on coastal water are part of the respective national reports.

In addition, for EU Member States:

- ⇨ Implementation of the principle concerning prevention/limitation of pollutants inputs to groundwater according to the EU Groundwater Directive (GWD, 2006/118/EC).
- ⇨ Implementation of the EU Nitrates Directive (91/676/EEC).
- ⇨ Implementation of the Plant Protection Directive (91/414/EEC) and the Biocides Directive (98/8/EC).
- ⇨ Implementation of Urban Wastewater Treatment Directive (91/271/EEC).
- ⇨ Implementation of the Integrated Pollution Prevention Control Directive (96/61/EC), which also relates to the Dangerous Substances Directive 76/464/EEC.

7.3.1.2. Summary of measures of basin-wide importance – groundwater quality

Taking into account that contamination by nitrates is a key factor against achieving *good chemical status* of a significant portion of the GWBs of basin-wide importance, and in line with the management objectives, it is essential to eliminate or reduce the amount of nitrates entering groundwater bodies in the DRBD. Prevention of deterioration of groundwater quality and any significant and sustained upward trend in concentrations of nitrates in groundwater has to be achieved primarily through the implementation of the EU Nitrates Directive and also the EU UWWTD.

To avoid the presence of hazardous substances in groundwater aquifers, additional measures need to be taken as required under the following Directives:

a. Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC);
b. Plant Protection Products Directive (91/414/EEC);
c. Habitats Directive (92/43/EEC);
d. Integrated Pollution Prevention Control Directive (96/61/EC).

To prevent pollution of GWBs by hazardous substances from point source discharges liable to cause pollution, the following measures are needed: an effective regulatory framework ensuring prohibition of direct discharge of pollutants into groundwater; the setting of all necessary measures required to prevent significant losses of pollutants from technical installations; the prevention and/or reduction of the impact of accidental pollution incidents.

More detailed information on scenarios and specific actions to be taken to reduce or eliminate the presence of polluting substances in surface water bodies, which has a clear effect on the status of groundwaters, is given in other sections in Chapter 7.

It can be concluded that in agreement with the ICPDR's basin-wide vision, emissions of nitrates and relevant hazardous substances need to be sufficiently controlled so not to cause any deterioration of groundwater quality in the DRBD. Where groundwater is already polluted, restoration to good quality by a thorough implementation of the respective EU legislation is essential.

7.3.2. Groundwater quantity

7.3.2.1. Vision and management objectives

The ICPDR's basin-wide vision is that the water use is appropriately balanced and does not exceed the available groundwater resource in the Danube River Basin District, considering future impacts of climate change.

The way towards the vision will be achieved through the implementation of the following management objectives by 2015:

EU Member States, Accession Country and Non EU MS:

- ⇨ Over abstraction of GW-bodies within DRBD is avoided by sound groundwater management.

In addition, for EU Member States:

- ⇨ Implementation of WFD (2000/60/EC) requirements that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction.

7.3.2.2. Summary of measures of basin-wide importance – groundwater quantity

The ICPDR vision for groundwater quantity stipulates that water use in the DRBD has to be appropriately balanced taking into account the conceptual models for particular GWBs and should not

exceed the available groundwater resource in the DRBD. In line with this vision, the over-abstraction of GWBs within the DRBD should be avoided by effective groundwater and surface water management. Therefore, appropriate controls regarding abstraction of fresh surface water and groundwater and impoundment of fresh surface waters (including a register or registers of water abstractions) must be put in place as well as the requirements for prior authorisation of such abstraction and impoundment. In line with the WFD, it must be ensured that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction.

The concept of registers of groundwater abstractions is well developed throughout the DRBD. The Ministry of Environment and Water in Bulgaria maintains a national register of abstraction permits. A central register of groundwater abstractions based on the National Water Law is updated annually in Slovakia. In Hungary, a Groundwater Abstractions register is published yearly and it contains data on the withdrawals of the operating, monitoring and reserve wells. In Bavaria, water suppliers are obliged to report annual data to local authorities on overall water abstraction and specific abstractions from spring sources. Bavaria and Austria cooperate on the annual preparation of a register of abstractions from the thermal water of the Lower Bavarian - Upper Austrian molasses basin (GWB1). In Romania, the national administration “Romanian Waters” maintains the national register of abstraction permits according to the National Water Law.

To prevent deterioration of groundwater quantity as well as the deterioration of dependent terrestrial ecosystems, solutions for the rehabilitation have to be explored. These should include restoration of wetland areas which are in direct contact with aquifers.

7.4. Financing the JPM

Although some measures in the DRBM Plan and the JPM are able to be achieved without major investment of financial resources, it is clear that significant financial resources are needed to put in place the full range of measures necessary to achieve the management objectives.

The WFD implementation is a national responsibility and as such the financing of measures is the responsibility of each national government (or private owners and operators of facilities which influence water quality).

A number of EU-supported funding programmes are available for some of the measures. This is particularly important for new EU MS which will clearly rely upon EU funding for measures with regard to wastewater treatment, agriculture or hydromorphological alterations. As far as possible, funds available for other programmes (CAP, Life, etc.) have in the past, and can be in the future, utilised by EU MS to address a number of specific problems and to implement necessary measures. Fortunately as well, some of the necessary measures are not expensive and can be funded through existing programmes or by applying legislation or policy initiatives.

The DRB is composed of both EU MS and Non EU MS. In general the funding of measures in Non EU MS is more difficult than for those countries which have the legal obligation to fulfil the WFD. This is particularly the case because the general level of economic well-being in Danube countries varies significantly from west to east. In addition, Non EU MS do not have Cohesion Funds which they can draw upon to finance wastewater treatment or other necessary measures. Consideration has therefore been given, within the framework of preparing the DRBM Plan, as to how the financing of necessary measures in Non EU MS could be supported.

In particular, the potential of International Financial Institutions to fund investment needs at the basin-wide scale, or in those countries where external financing may be needed, will be explored by initiating a targeted dialogue with key institutions EU, European Investment Bank, European Bank for Reconstruction and Development, World Bank, DABLAS etc. The ICPDR would be the forum under which such a dialogue would take place. The dialogue would ensure that the overall actions needed are presented and possibilities discussed for funders to support these actions and the mechanisms needed to facilitate the support.

In addition, specific actions in individual countries will be developed and explored. Cooperation with funders needs to take place via initiatives of individual countries but will also be facilitated where possible by the ICPDR.

In order to respond to uncertainties and fill existing knowledge gaps regarding various management issues highlighted in this DRBM Plan, joint actions should be undertaken to enable access to EU and international funding, particularly for research projects relevant at the basin-wide scale.

7.5. Key conclusions

The key conclusions focus on aspects of water management and the implementation of the WFD at the basin-wide scale. Complementary information on the considerable and important work taking place at the national level can be obtained from the national river basin management plans.

Status assessment

- At this stage, the status assessment of water bodies is not yet directly linked to the measures and the effects of the measures at the basin-wide scale. A follow-up is needed in order to better understand the linkage between the effects of the measures and the water status at the basin-wide scale.
- The assessment of biological quality elements will be further improved to enable complete intercalibration as well as assessment of the ecological status and potential.
- The improvement in status assessment will also increase confidence levels for ecological status.

Organic pollution

- Measures identified for the baseline scenario regarding organic pollution will result in a considerable reduction of BOD_5 and COD loads but will not ensure the achievement of the WFD environmental objectives on the basin-wide scale by 2015.
- Significant further efforts for the next RBM cycles will still be necessary. In the long-run, the technical implementation of the UWWTD requirements as well as the IPPC Directive by EU MS and an equal level of measures in Non EU MS would be sufficient to solve the problem of organic pollution.

Nutrient pollution

- Compared to the present state (averaging the years 2000-2005), nitrogen emissions to surface waters in 2015 will, through the planned measures, be approx. 12% lower. The load to the Black Sea will reach a level that is below the present state but still far above (40%) that of the 1960's. This means that the situation in the DRBD and the Black Sea regarding nitrogen pollution will improve but not ensure the achievement of the management objectives and the WFD environmental objectives on the basin-wide scale by 2015.
- Compared to the present state (avg. 2000-2005) the P emissions to surface waters will, through the planned measures, be in 2015 about 21 % lower. The load to the Black Sea will reach a level, which is still 15 % above the level in the 1960‘s. Therefore, for Phosphorous the respective management objective on the basin-wide scale will not achieved by 2015, and this is most likely also the case for the WFD environmental objectives.
- The implementation of the Nitrates Directive in the EU MS and an improved implementation of the concept of BAP in Non EU MS are expected to contribute to reductions in nutrient pollution from agriculture. Nevertheless the reduction potential for the agricultural sector is difficult to quantify due to uncertainties in the future economic development of this sector, mainly in the middle and lower DRB.
- Reductions in nutrient pollution will be achieved as soon as more stringent UWWT obligations with N and P removal for agglomerations >10,000 PE are applied for EU MS. This could reduce the discharged emissions in EU MS of N_{tot} by 37% – 43% and of P_{tot} by 45% - 56% compared to the reference situation.
- The introduction of limitations on P in detergents, i.e. a P ban in laundry detergents in 2012 and in dishwasher detergents in 2015, is seen as a cost effective and necessary measure to complement the efforts of implementing urban wastewater treatment.
- As an important share of nutrient pollution stems from atmospheric deposition of nitrogen (currently estimated at 41%), coordinated measures on a wider scale are needed to tackle this source of nitrogen pollution.
- The knowledge and understanding of the interlinkages between Danube loads and the ecological response in the NW shelf of the Black Sea still need to be refined and improved.

Hazardous substances pollution

- The implementation of the Dangerous Substances Directive, the IPPC Directive, the UWWT Directive and the widespread application of BAT/BEP will improve but not solve the problem of hazardous substances.
- It is estimated that the management objectives and WFD environmental objectives will not be achieved in 2015 regarding hazardous substances, however there is a need for more monitoring data on hazardous substances, as well as information on sources and relevant pathways.
- Further measures are the appropriate treatment of priority substances from industrial discharges and further strengthening of prevention and safety measures at contaminated sites. In addition, the continued upgrade of WWTPs with biological treatment (which results in some hazardous substances accumulating in the sewage sludge) as well as increases in the number of WWTPs will contribute to reduce the load of hazardous substances. Finally, additional reduction through product related measures should be considered.
- The present lack of knowledge on the sources, pathways, discharges and losses of hazardous substances will be reduced by monitoring, PRTR reports and reporting of EU REACH, as well as by the results of the inventory on the new EU Priority Substances Daughter Directive. For the DRB, this inventory should be the basis for ICPDR actions to achieve comparable results.

Hydromorphological alterations

- Measures will be taken to improve river continuity, reconnection of floodplains/wetlands and hydrological alterations by 2015. However, a significant number of respective pressures will still remain in 2015 and *good ecological status/ecological potential* will not be achieved by 2015.
- In many cases an extension of the deadline to achieve *good ecological status/ecological potential* (WFD Article 4(4)) will be applied. In a few cases, a less stringent objective in line with WFD Article 4(5) will be applied.
- Significant further efforts for the next RBM cycles will be necessary to address the pressures from all hydromorphological components. For further specifications, see below.

River and habitat continuity interruption

- By 2015, it is expected that 108 barriers will be made passable for fish, whereas 824 river and habitat continuity interruptions will remain. This means that the self-sustainability of sturgeon species and other migratory species in the DRB will be enhanced but impacts will remain. Remaining continuity interruptions will be addressed by 2021 and 2027.
- In order to achieve the WFD environmental objectives in an ecologically effective way on the basin-wide scale, it is recommended that initial measures focus on defined ecological priority river stretches.
- The implementation of measures for the migration of sturgeon and medium distance migratory fish species needs to be improved (starting with securing funding to proceed with the planned feasibility study on the re-opening of the Iron Gate Dams).

Disconnection of adjacent floodplains/wetlands

- By 2015 62,300 ha will be reconnected and/or the hydrological regime improved, and additional restoration efforts will be taken beyond 2015.
- Although there is a positive cumulative effect of connected wetlands/floodplains and improvement of the water regime to adjacent water bodies, further investigation is required as to the extent that these reconnections will improve the water status at the basin-wide level, in order to better target measures.

Restoration of hydrological alterations

- Measures will be taken to improve the ecological status of water bodies impacted by significant hydrological alterations on the basin-wide scale.
- A part of the significant pressures will be reduced as a consequence of measures implemented by 2015, but a larger part will only be addressed by 2021 or 2027.
- Although data gaps on hydrological alterations still exist, it is quite likely that more measures need to be taken to ensure the achievement of WFD environmental objectives, taking into account eventual future effects of climate changes and related adaptation measures.

Future infrastructure projects

- According to developed criteria for future infrastructure projects that may have effects at the basin-wide scale, there are 25 such projects identified in EU MS, which may be subject to analysis according to Article 4(7). 19 future infrastructure projects are located in Non EU MS.

Groundwater

Groundwater quality

- Preliminary findings show that nitrate contamination is a key hindrance to achieving *good chemical status*. Measures regarding SWMIs for surface waters will also help to achieve *good chemical status* of groundwater bodies. Although it is difficult to quantify, the amount of nitrates will be reduced, primarily through the implementation of the EU Nitrates Directive and the EU UWWTD.
- Where it is not yet the case, an effective regulatory framework has to be put in place at the national level ensuring prohibition of direct discharge of pollutants into groundwater.
- Prevention of significant losses of pollutants from technical installations and prevention and/or reduction of the impact of accidental pollution incidents is needed.

Groundwater quantity

- For groundwater bodies of basin-wide importance that show poor quantitative status, groundwater use has to be properly balanced, taking into account the conceptual models for particular groundwater bodies, and should not exceed the available groundwater resource.
- Where it is not yet the case, appropriate controls over the abstraction of fresh surface water and groundwater and impoundment of surface waters (including registers of water abstractions) must be put in place.
- Where it is not yet the case, an effective policy of authorisation of abstractions must be provided.

Other relevant issues

More investigations are needed on the significance of other relevant issues such as the quality and quantity of sediments, invasive species, water quantity issues and climate change.

8. Flood risk management and climate change

8.1. Interlinkage of the DRBM Plan and flood risk management

Aware of the basin-wide relevance of flood issues, the ICPDR decided to develop its flood protection policy, which was formalised by adoption of the ICPDR Action Programme on Sustainable Flood Protection in the DRB in 2004.

The overall goal of the Action Programme is to achieve a long-term and sustainable approach for managing the risks of floods to protect human life and property, while encouraging conservation and improvement of water related ecosystems. The Action Programme has been designed in line with the provisions of the EU Flood Directive (2007/60/EC).

The river basin approach belongs to key principles of the ICPDR Action Programme on Sustainable Flood Protection in the DRB. Respecting this principle, the Action Programme stipulates that the development of the action plans for sub-basins should be based on an integrated approach, taking into account the EU WFD and its daughter directives, as well as river basin management plans under the WFD at all levels. The synergy between river basin management and flood risk management in preparation of action plans for sub-basins is also emphasised in the targets of the Action Programme.

The ICPDR Action Programme on Sustainable Flood Protection in the DRB stresses that human interference into the processes of nature should be reversed as much as possible, compensated for and,

in the future, prevented. The Action Programme encourages the promotion and harmonisation of changes in water policies and land-use practices, as well as environmental protection and nature conservation, in order to improve flood management and also meet the targets and measures of Integrated River Basin Management. The results of the flood action plans should be integrated into the River Basin Management Plans (RBMP) at an appropriate stage for information purposes.

Being aware of the necessity of visualisation of the risks stemming from flood events and making this information available for the public, the Action Programme includes the recommendation for a common approach in assessment of flood-prone areas and flood risk mapping. The general objectives of flood maps are to increase public awareness of the areas at risk from flooding, to provide information of areas at risk to give input to spatial planning and to support management and reduction of the risk to people, property and the environment.

In practical terms, the synergy between river basin management and flood risk management will be achieved through the following concerted actions:

- Ensuring a coordinated approach in land-use planning;
- Reactivation of former wetlands and floodplains to achieve increased water retention along with *good surface water status*. As start-up actions, available data should be collected on e.g. inventory of floodplains; floodplains which are dis- or reconnected to their rivers; potential flood retention areas; future flood infrastructure projects etc.;
- Prevention of accidental pollution during floods affecting the storage facilities of dangerous substances;
- Preparation of an overview of the implementation of future measures to achieve the WFD environmental objectives while ensuring appropriate level of flood protection.

8.2. Climate change and the DRBD

8.2.1. Reasons for integrating climate change adaptation issues into river basin planning

The EC Green Paper[96] "Adapting to Climate Change in Europe – Options for EU Action" (June 2007), acknowledged that the WFD provides a consistent framework for integrated water resource management but does not directly address climate change. However, the Green Paper recognised that the challenge for the EU MS will be to incorporate consideration of climate change issues in the first river basin management planning cycle by 2009. This also concerns the DRB. The European Commission's White Paper on climate change adaptation[97] proposes that guidance needs to be developed to ensure that the next generation of River Basin Management Plans due in 2015 are fully climate proofed, and to ensure that climate change is taken into account in the implementation of the EU Floods Directive.

In preparation for the DRBM Plan, an international conference on Climate Change in the Danube River Basin was held in Vienna in December 2007. The conclusions from the Conference were:

- Climate change impacts:
  - Are an issue of Danube basin-wide significance;
  - Will be addressed by a step-wise approach;
  - Will be addressed respecting all SWMIs for the DRB;
  - Will address the issues of flood protection, low water discharges, drought and land use;
- Climate change signals for the DRB are sufficient to act beyond existing scientific uncertainties;

[96] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52007DC0354:EN:NOT
[97] Adapting to Climate Change: Towards a European Framework for Action (April 2009).

- Ongoing DRB related scientific projects and their outcomes should have a guiding role. Therefore, existing DRB scientific activities are the basis for the further development of measures (see Annex 21. for a selected list of projects on climate change relevant for the DRB);
- Future infrastructure projects need to be *climate proof*:
  - Holistic and coherent in their approach (linking all relevant sectors);
  - Provide flexible management tools and no regret measures.

8.2.2. Responses to climate change and potential effects within the DRBM Plan / JPM

Climate change in the DRB are a significant threat to the DRB environment and further actions need to be taken as a consequence. The priority at this stage is to identify eventual future pressures on the aquatic environment (see Annex 21 for a summary on such eventual pressures) and to ensure that aquatic ecosystems are climate resilient. Furthermore, future measures implemented in the DRB, that might have additional negative impacts on water status, are to be made *climate proo*f or *no/low regret measures*.

It is clear that there is still much work needed to clearly understand the scale and magnitude of pressures and impacts, but it is obvious that there are actions that can and must be taken now and this should be a priority for the overall management of the DRB.

Following this DRBM Plan and in the framework of the ICPDR, the Danube countries will develop an approach and strategy to ensure that the DRBM Plan will be followed-up by specified actions regarding climate change adaptation. On this basis, the second and third cycles of WFD implementation in the DRB will collect and ensure more evidence, enable greater precision on the impacts of climate change and will fully integrate climate issues within DRBM planning.

Concluding, the following list summarises the perceived future issues for investigation to be addressed in subsequent RBM cycles of the WFD:

- Ensure that monitoring systems used in the DRB have the ability to detect climate change impacts on *ecological and chemical water status* as well as the effects of climate change adaptation measures;
- Investigate on the effects of climate changes on ecoregions, typologies and reference sites as well as proposals for solutions;
- Foster the improvement of models (climate and hydrological aspects) and of scenarios for the DRB as well as ensure the improvement regarding the presentation on climate fluctuations;
- Investigate on effects of climate change on the various sectors active in the DRB and the evaluation of indirect increases in impacts on water status;
- Conduct a climate vulnerability assessment of basin ecosystems;
- Promote and apply methodologies and standards for climate-proofing infrastructure projects and integrating climate considerations into EIA and SEA procedures,
- Enhance the sharing of research information on climate change in the DRB;
- Ensure that scientific information is ‘translated’ to water managers;
- Integrate all knowledge, results and lessons learnt related to climate change threats in the next DRBM Plan;

9. Public information and consultation

In the context of the implementation of Article 14 of the WFD, the ICPDR has put a special emphasis on the promotion of public participation and the implementation of certain activities on the international level. These activities were carried out on the basis of the guidelines described in the Danube River Basin Strategy for Public Participation in River Basin Management Planning 2003-2009[98] and compliment the efforts undertaken at the national level.

Providing information to the general public

During the entire process, the ICPDR website www.icpdr.org has been used as the main information tool, providing access to all relevant documents (such as the DBA and the document on SWMI´s in the DRB) as well as further information. In addition, articles have been issued in internal and external communication tools (e.g. the magazine "Danube Watch"). Also, special outreach activities, the annual celebration of International Danube Day on June 29 (see www.danubeday.org) and several public events including press events during the Joint Danube Survey 2 (www.icpdr.org/jds2), have been used to communicate the goals of the WFD. Special effort has been put into raising awareness about the Danube and the goals of the WFD amongst children by developing the "Danube Box" education tool (available for Austria, Germany, Hungary and Romania; under preparation the Czech Republic, Bulgaria and Serbia). The education material is also available online www.danubebox.org.

Consultation of the interested public

The ICPDR has organised several round-table discussions on selected topics with relevant organisations, such as on the use of phosphates in detergents with representatives from the detergent industry or on the issue of navigation on the Danube with representatives from the navigation sector. In order to have an in-depth discussion on the DBA, the First ICPDR Stakeholder Forum was organised in 2005. The two-day conference provided the opportunity to consult the relevant stakeholders. The draft DRBM Plan has been available to the wide public for comments from May 18 until July 31 2009 via the ICPDR website www.icpdr.org/participate. An on-line questionnaire has also been developed and offered to the public. The Second ICPDR Stakeholder Forum on the draft DRBM Plan was organised on 29-30 June 2009 in Bratislava. The comments received during the Stakeholder Forum and the public consultation process have been evaluated and are reflected in this DRBM Plan as far as possible.

Active involvement of stakeholder groups

According to the DRPC, stakeholder groups can be granted observer status to the ICPDR. Organisations holding this status have the possibility to actively participate at the meetings of the ICPDR and its expert groups. During recent years, the ICPDR has spent considerable effort in including representatives of relevant stakeholders as observers. Today, 21 organisations are holding observership status and can therefore actively shape the decisions made by the ICPDR.

[98] www.icpdr.org

Danube River Basin District: Overview

www.icpdr.org

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Internationale Kommission zum Schutz der Donau

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Vienna, November 2009

Danube River Basin District: Ecoregions

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Vienna, November 2009

Danube River Basin District: Delineated Surface Water Bodies

LEGEND

- Nodes of transboundary water bodies
- Nodes of water bodies
- Nodes of tributary water bodies at confluences or bifurcations
- Danube River Basin District (DRBD)
- Danube River
- Tributaries (with catchment area > 4,000 km²)
- Lake water bodies (with surface area > 100 km²)
- Transitional water bodies
- Coastal water bodies
- Canals
- National borders

Cities:

- 100,000 - 250,000 inhabitants
- 250,000 - 1,000,000 inhabitants
- > 1,000,000 inhabitants

0 50 100 200 Kilometers

Scale: 1 : 4,500,000

(Scale 1: 6,000,000 in A4 landscape paper format)

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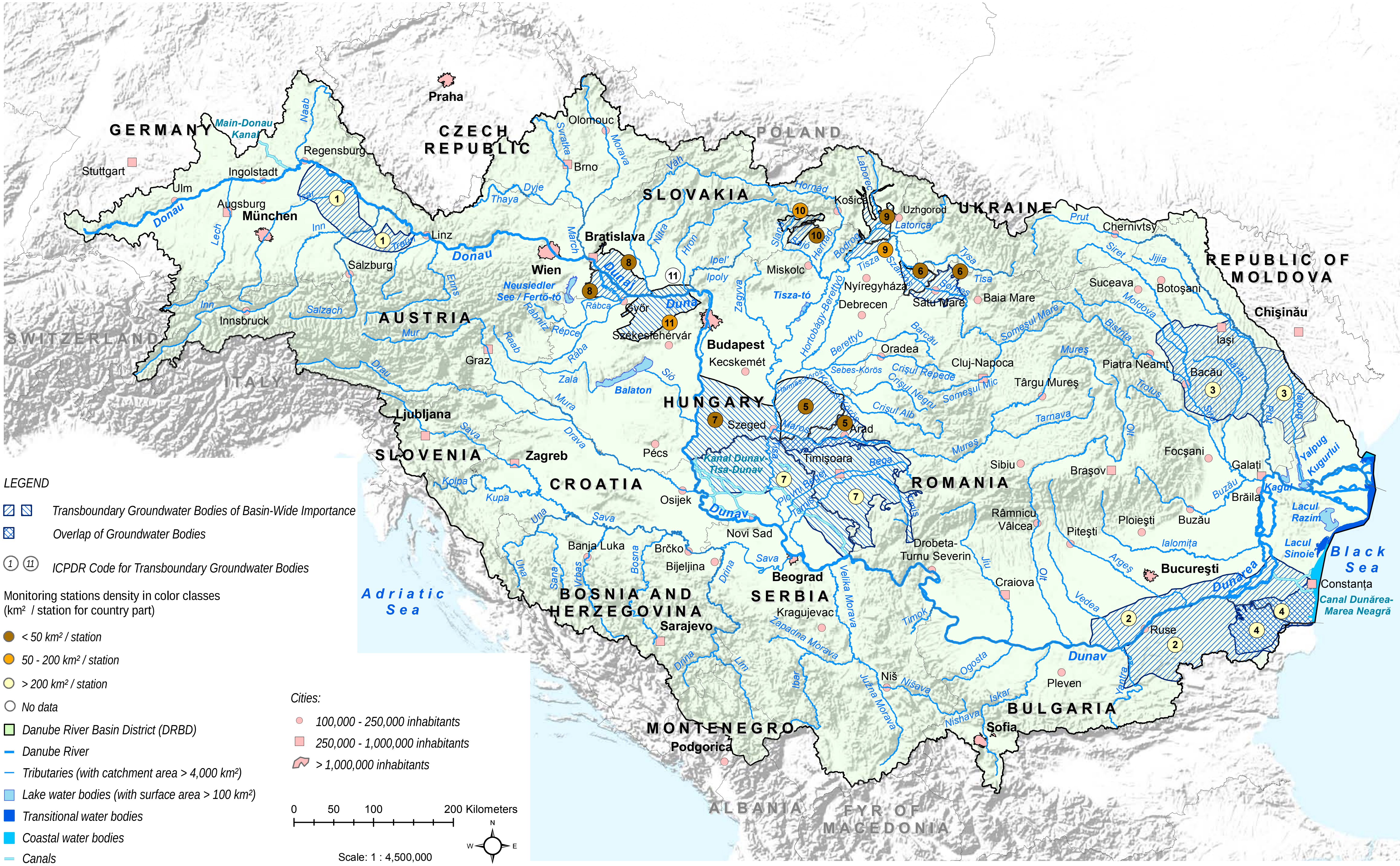
Vienna, November 2009

Danube River Basin District:
Transboundary Groundwater Bodies of Basin-Wide Importance and their Transnational Monitoring Network*

MAP 4



*The groundwater body delineation between RO and BG is not yet final. Discussion is still ongoing between the two countries on the re-delineation of GWBs 2 & 4 between the DRBD and the Black Sea RBD. Clarification is expected soon.

www.icpdr.org

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, MD, RO, RS, SI, SK, UA) and CH, except for the following: EuroGlobalMap v2.1 from EuroGeographics was used for national borders of AT, CZ, DE, HR, HU, MD, RO, SI, SK and UA; ESRI datsets was used for AL, ME, MK; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as topographic layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

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Vienna, November 2009

Danube River Basin District: River and Habitat Continuity Interruption - Current Situation (2009)

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Vienna, November 2009

Danube River Basin District:
Wetlands/Floodplains (>500 ha) with Reconnection Potential (2009) and Expected Improvment by 2015

LEGEND

- Wetlands/floodplains with reconnection potential 2009
- Wetlands/floodplains to be reconnected by 2015
- Danube River Basin District (DRBD)
- Danube River
- Tributaries (with catchment area > 4,000 km²)
- Lake water bodies (with surface area > 100 km²)
- Transitional water bodies
- Coastal water bodies
- Canals
- National borders

Cities:

- 100,000 - 250,000 inhabitants
- 250,000 - 1,000,000 inhabitants
- > 1,000,000 inhabitants

0 50 100 200 Kilometers

Scale: 1 : 4,500,000

(Scale 1: 6,000,000 in A4 landscape paper format)

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Vienna, November 2009

Danube River Basin District: Hydrological Alterations/Impoundments* - Current Situation (2009)

* This map illustrates full water bodies which are affected by impoundments. The exact location of individual impoundments is not visualised. Annex 20 of the DRBM Plan indicates respective details per country.

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Vienna, November 2009

Danube River Basin District: Hydrological Alterations/Water Abstractions * - Current Situation (2009)

MAP 7b

* This map illustrates full water bodies which are affected by water abstractions. The exact location of individual water abstractions is not visualised. Annex 20 of the DRBM Plan indicates respective details per country.

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Vienna, November 2009

Danube River Basin District:
Hydrological alterations/hydropeaking & altered flow regime – Current Situation (2009)

MAP 7c

* This map illustrates full water bodies which are affected by hydopeaking. The exact location of individual hydropeaking is not visualised. Annex 20 of the DRBM Plan indicates respective details per country.

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Danube River Basin District: Future Infrastructure Projects Planned by 2015

MAP 8

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Danube River Basin District: Protected Areas (Natura 2000 and Others)

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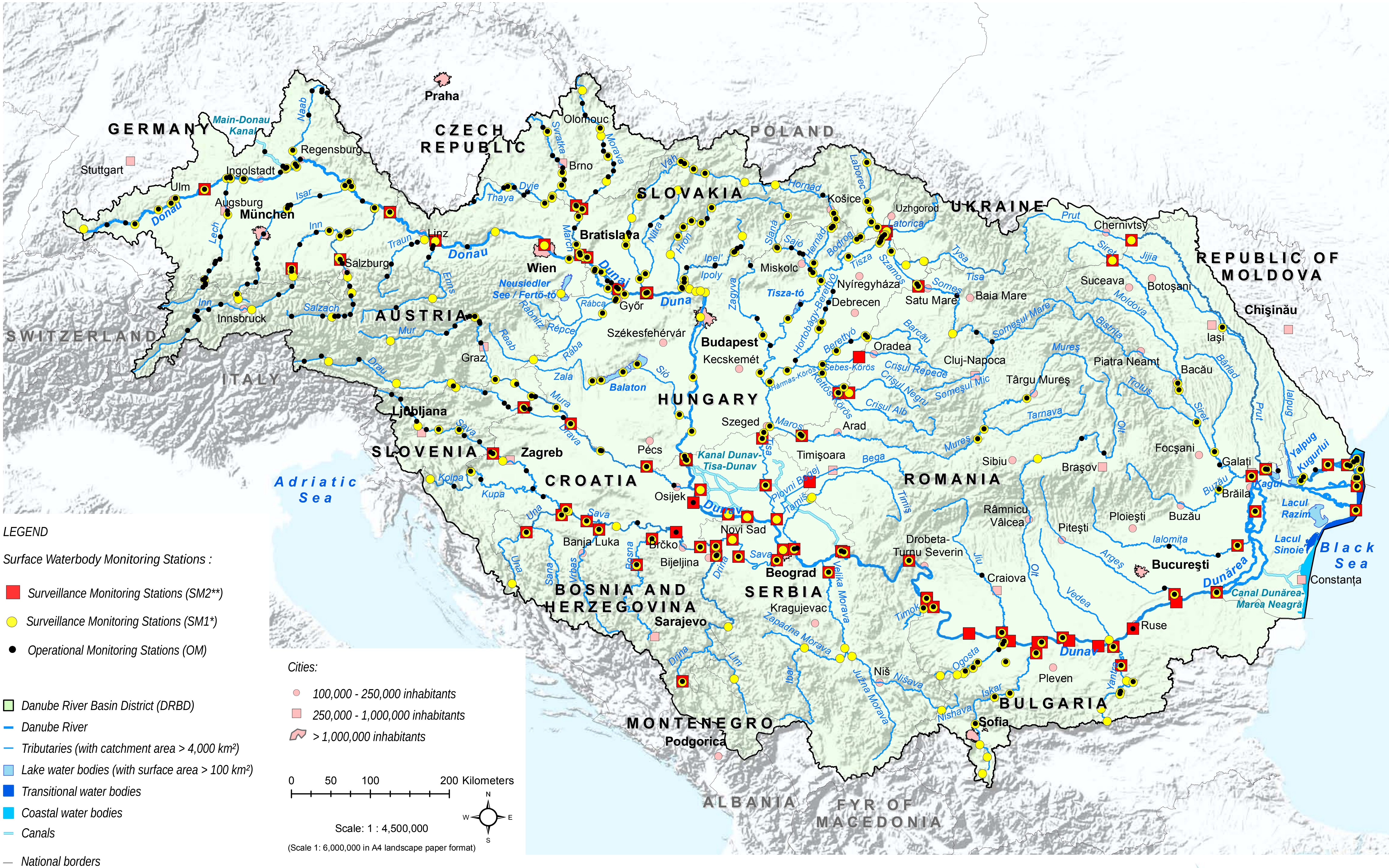
Vienna, November 2009

Danube River Basin District: Transnational Monitoring Network - Surface Waters



*Surveillance Monitoring 1 provides an assessment of the overall surface water status in the Danube River Basin District.
**Surveillance Monitoring 2 provides an assessment of long-term trends of specific pollutants and of loads of substances transferred downstream the Danube.

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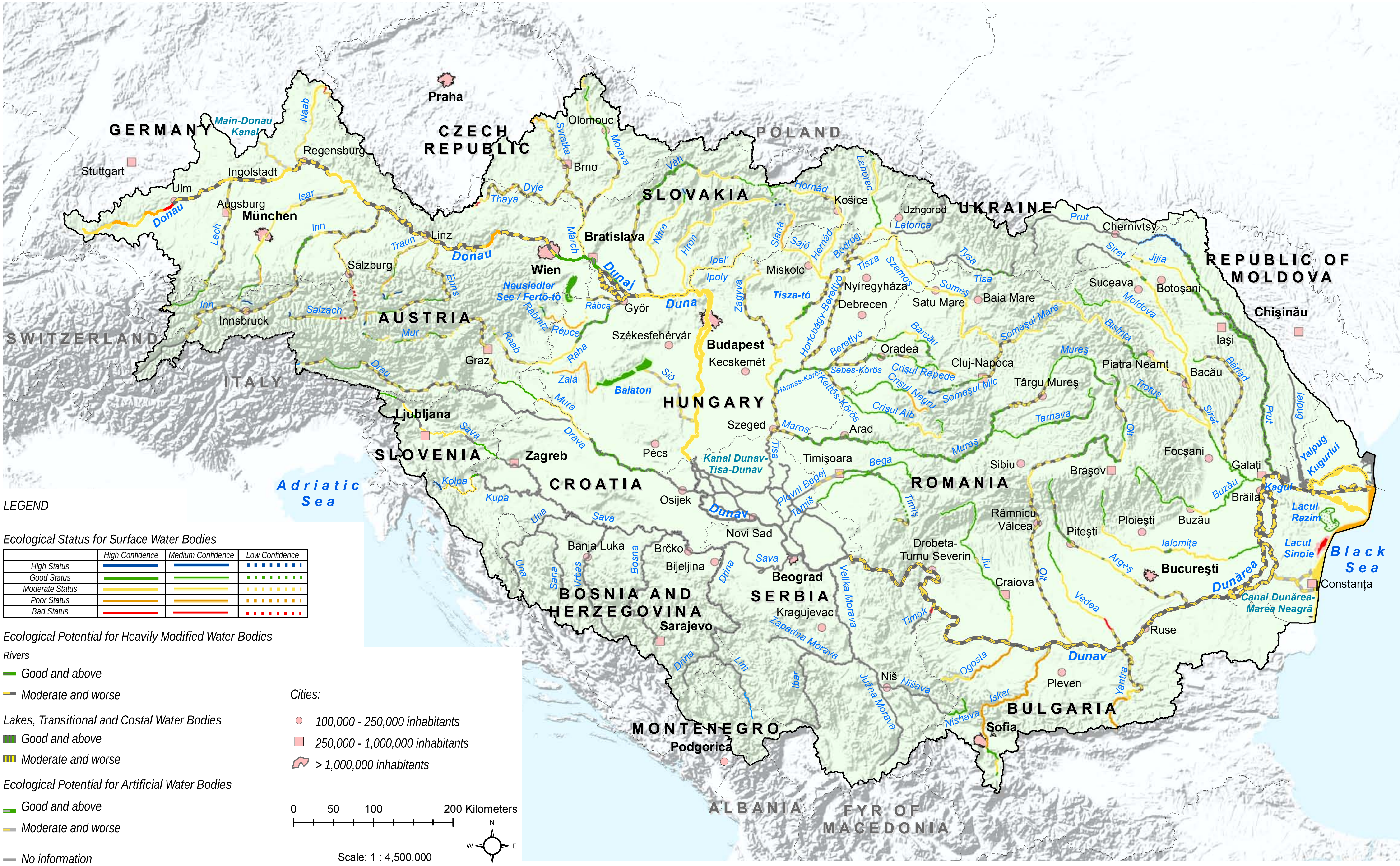
Danube River Basin District: Ecological Status and Ecological Potential of Surface Water Bodies



LEGEND

Ecological Status for Surface Water Bodies

	High Confidence	Medium Confidence	Low Confidence
High Status			
Good Status			
Moderate Status			
Poor Status			
Bad Status			

Ecological Potential for Heavily Modified Water Bodies

Rivers

- Good and above
- Moderate and worse

Lakes, Transitional and Costal Water Bodies

- Good and above
- Moderate and worse

Ecological Potential for Artificial Water Bodies

- Good and above
- Moderate and worse
- No information
- National borders

Cities:

- 100,000 - 250,000 inhabitants
- 250,000 - 1,000,000 inhabitants
- > 1,000,000 inhabitants

0 50 100 200 Kilometers

N W E S

Scale: 1 : 4,500,000

(Scale 1: 6,000,000 in A4 landscape paper format)

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Danube River Basin District: Chemical Status of Surface Water Bodies

* Details on risk assessment performed by the Non EU Member States are part of the DRBM Plan Annex 14.

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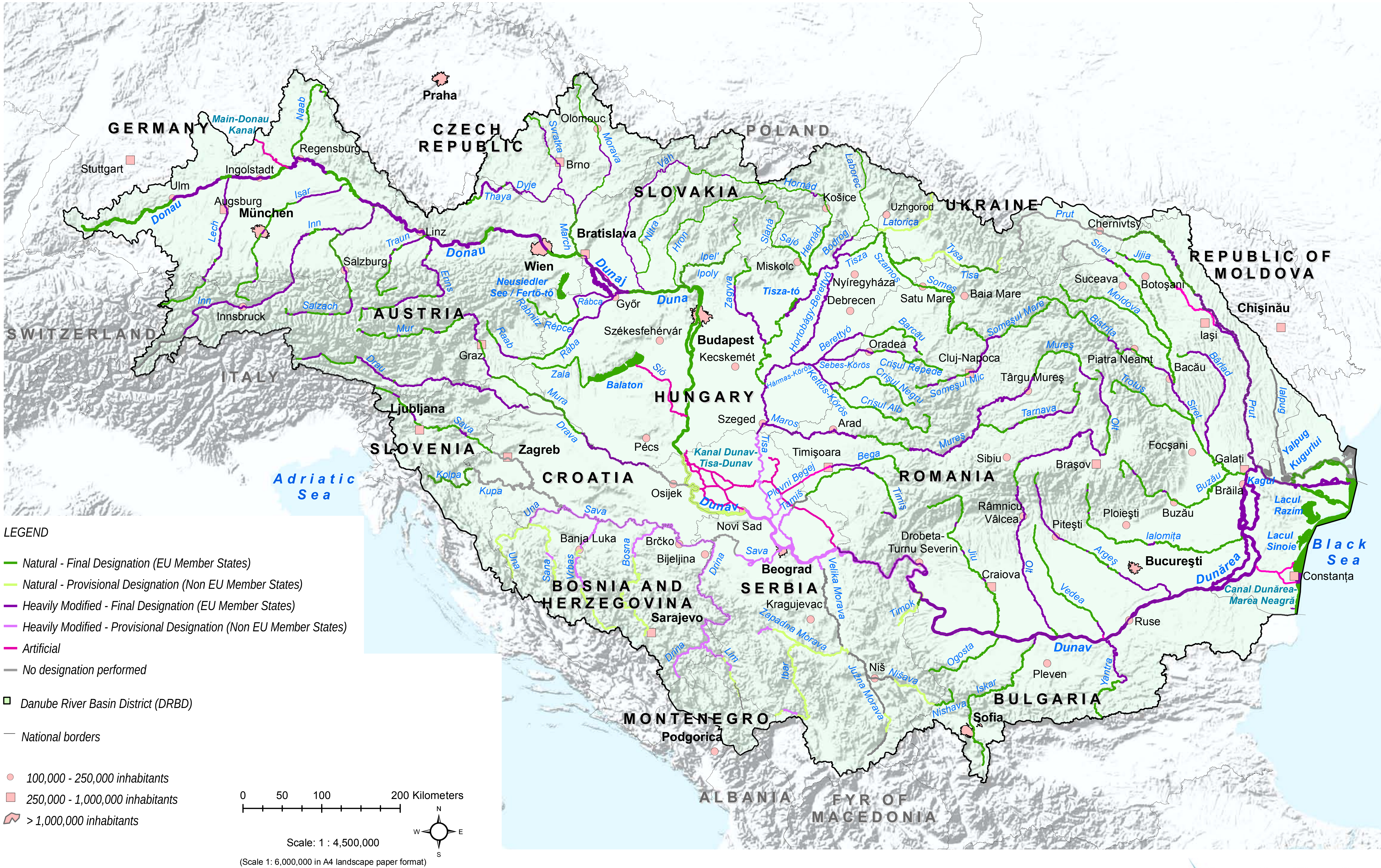
Danube River Basin District: Heavily Modified and Artificial Water Bodies

MAP 13



* The designation of HMWBs of the Danube river is based on an agreed and harmonised designation procedure between the Danube countries (see DRBM Plan Chapter 4.14.1)

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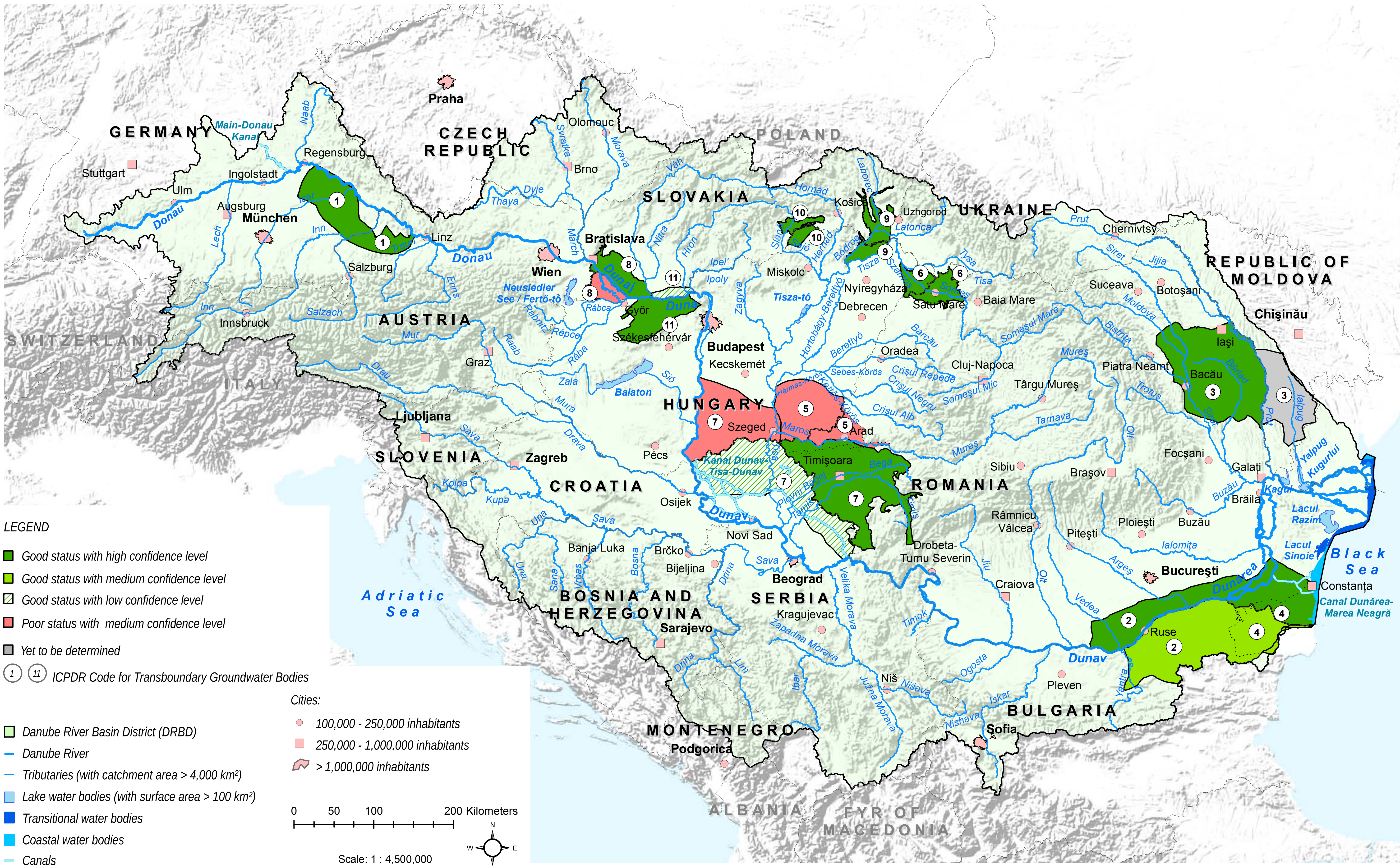
Danube River Basin District: Chemical Status - Groundwater*

MAP 14



*The groundwater body delineation between RO and BG is not yet final. Discussion is still ongoing between the two countries on the re-delineation of GWBs 2 & 4 between the DRBD and the Black Sea RBD. Clarification is expected soon.

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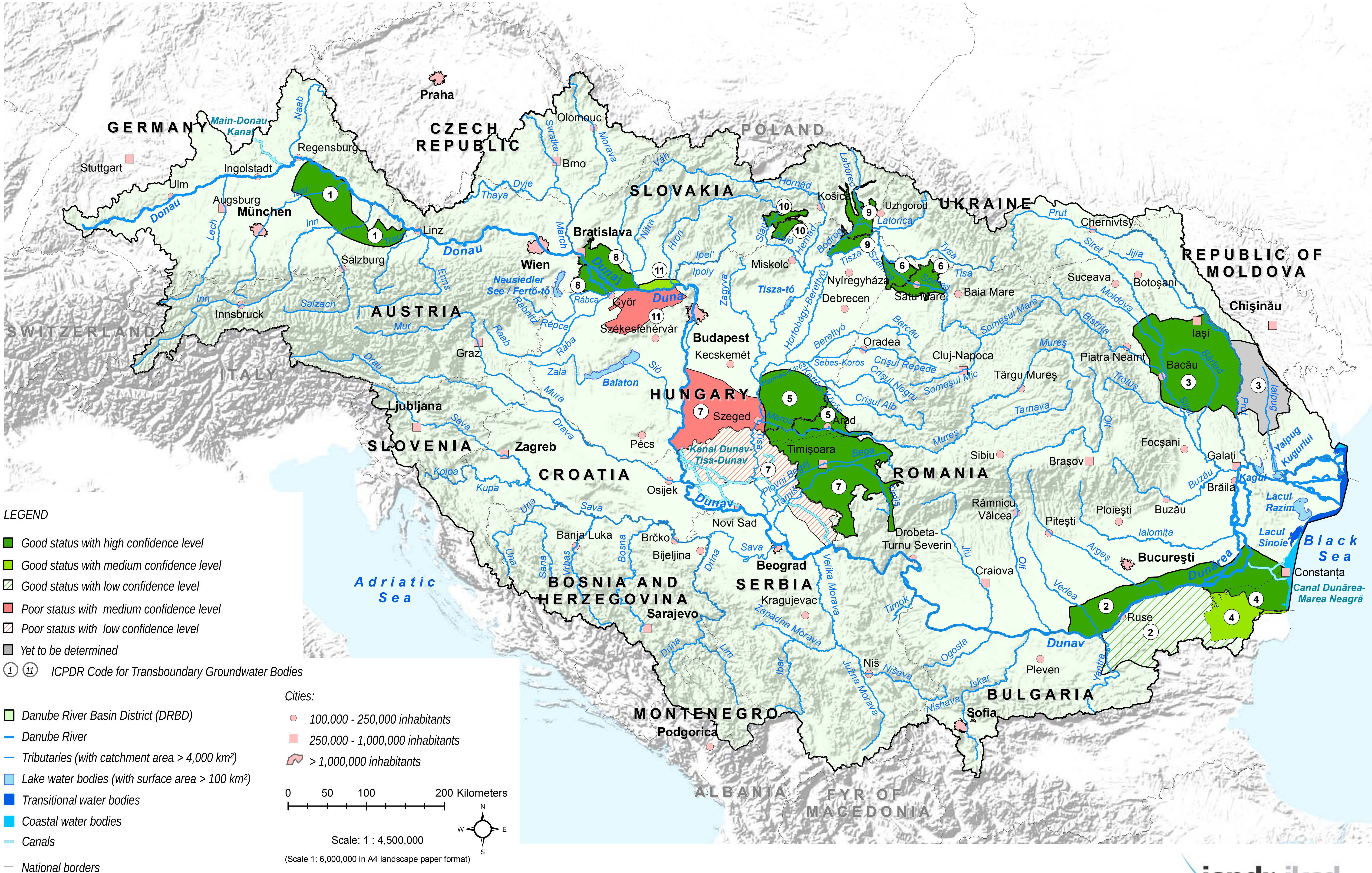
Danube River Basin District: Quantitative Status - Groundwater*



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Danube River Basin District: Exemptions according to EU WFD Article 4(4) and 4(5) - Surface Waters

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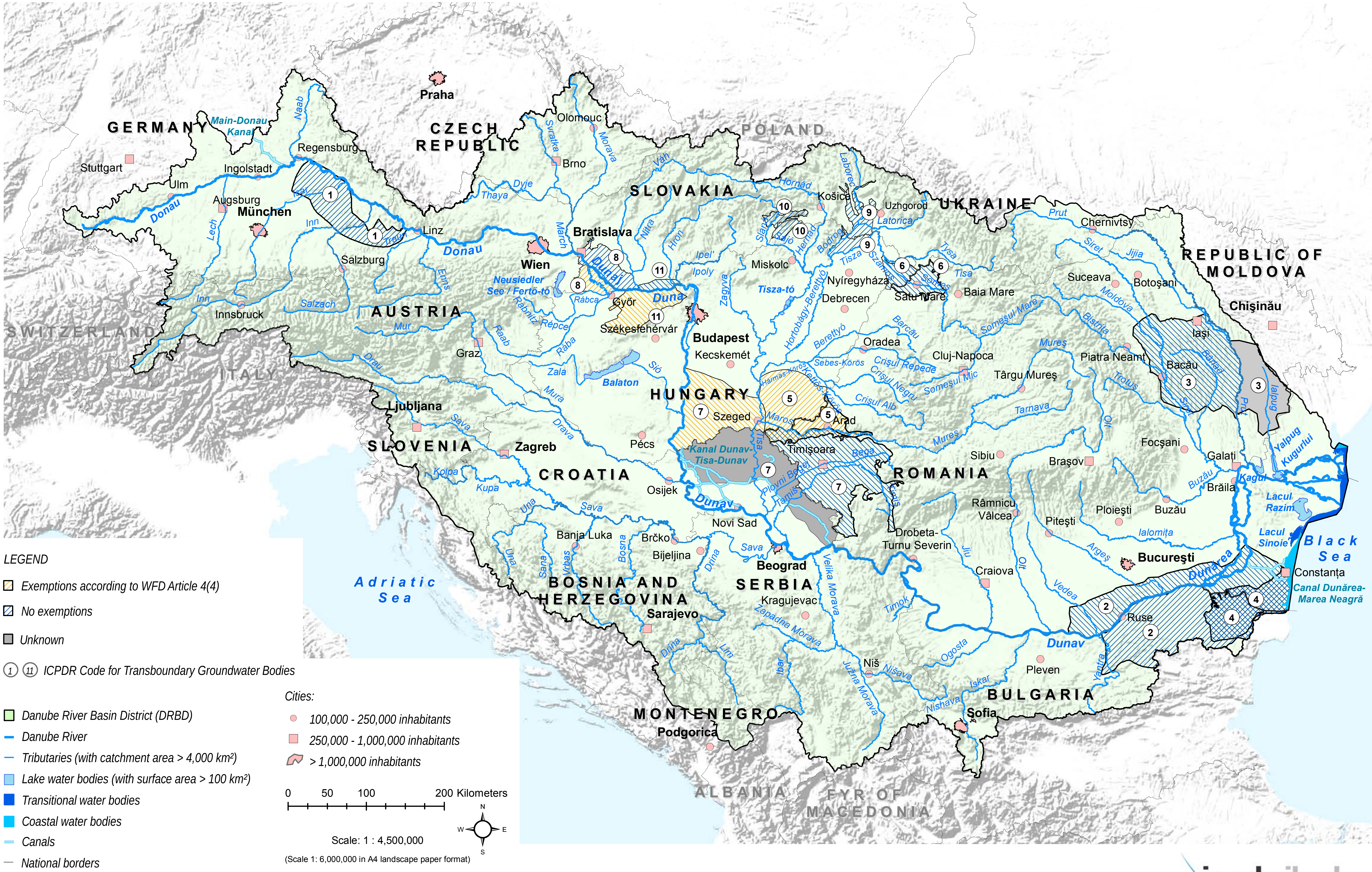
Danube River Basin District: Exemptions according to EU WFD Article 4(4) and 4(5) - Groundwater*



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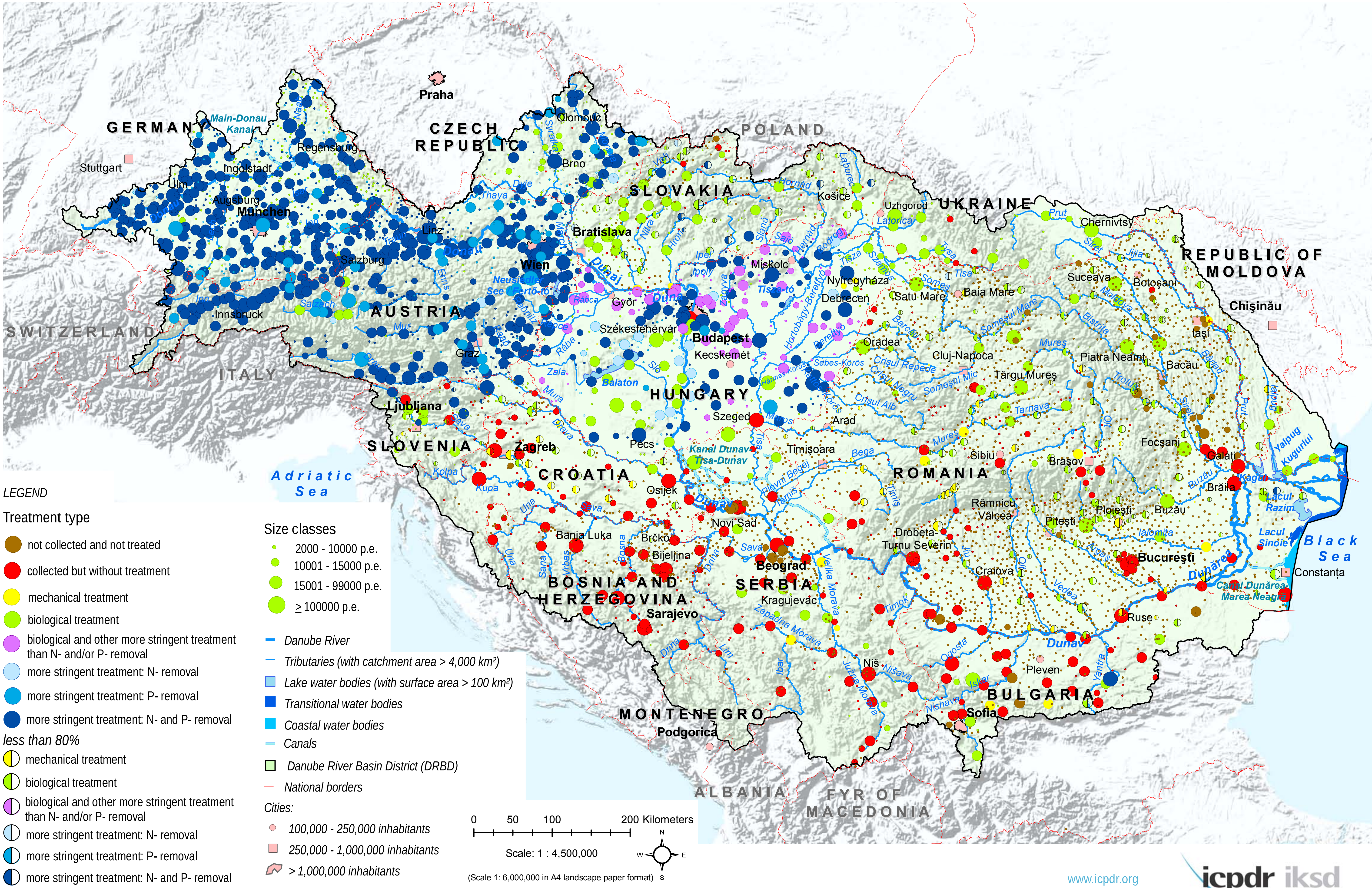
Danube River Basin District : Urban Wastewater Discharges – Reference Situation - UWWT 2005/2006 (Ref Sit-UWWT)



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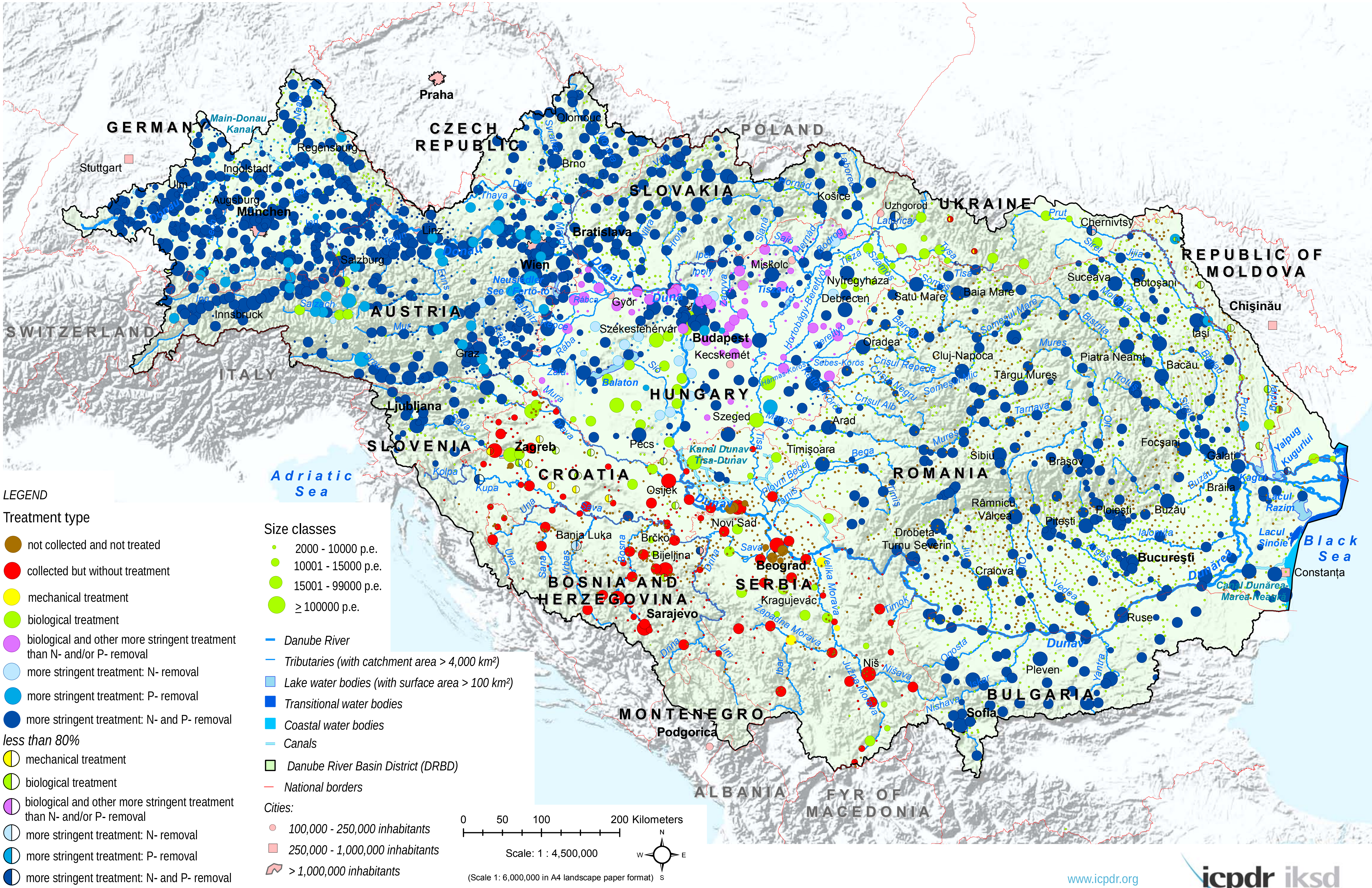
Danube River Basin District : Urban Wastewater Discharges – Baseline Scenario-UWWT 2015 (BS-UWWT 2015)



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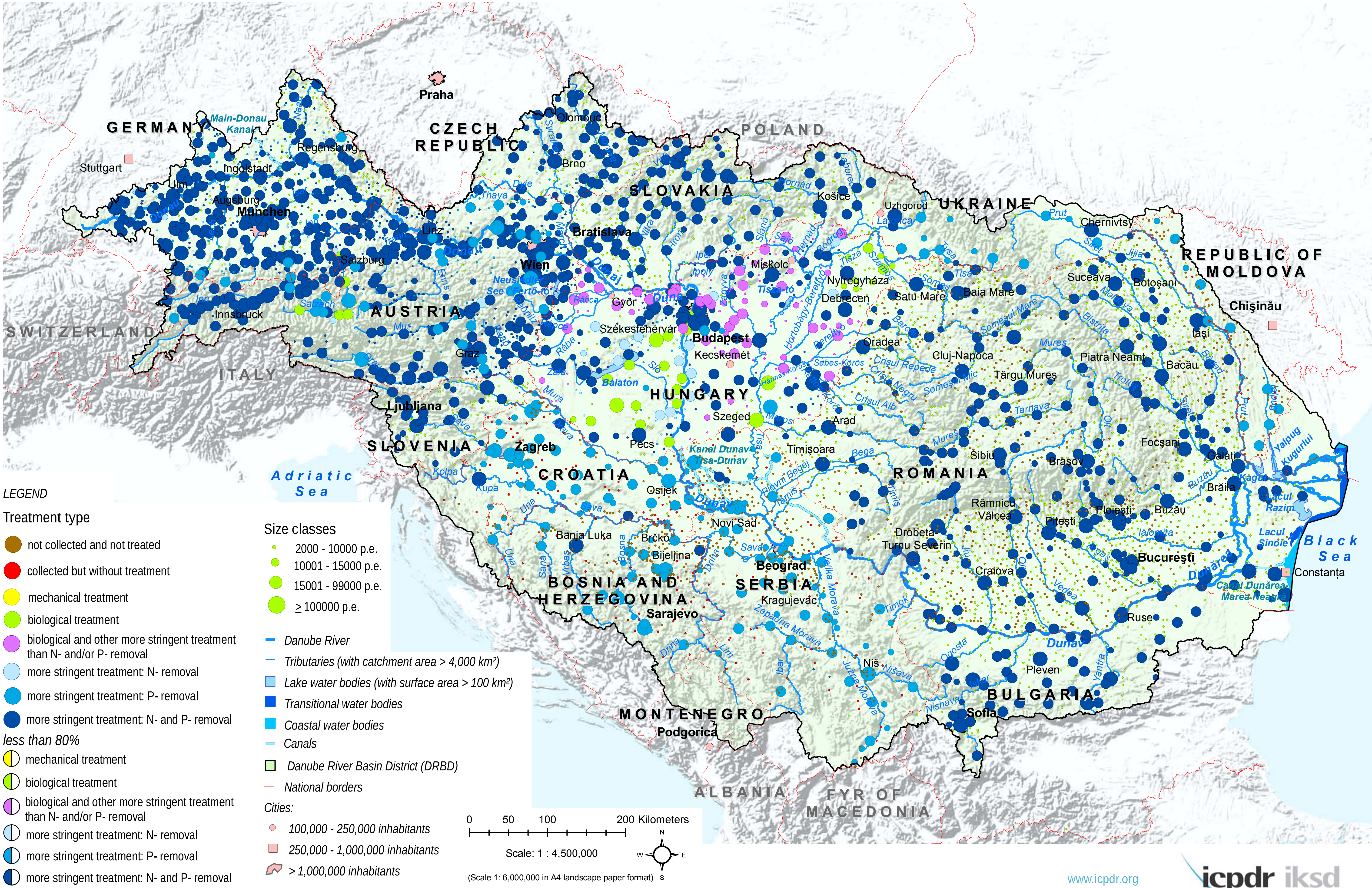
Danube River Basin District : Urban Wastewater Discharges – Midterm Scenario- (MT-UWWT)



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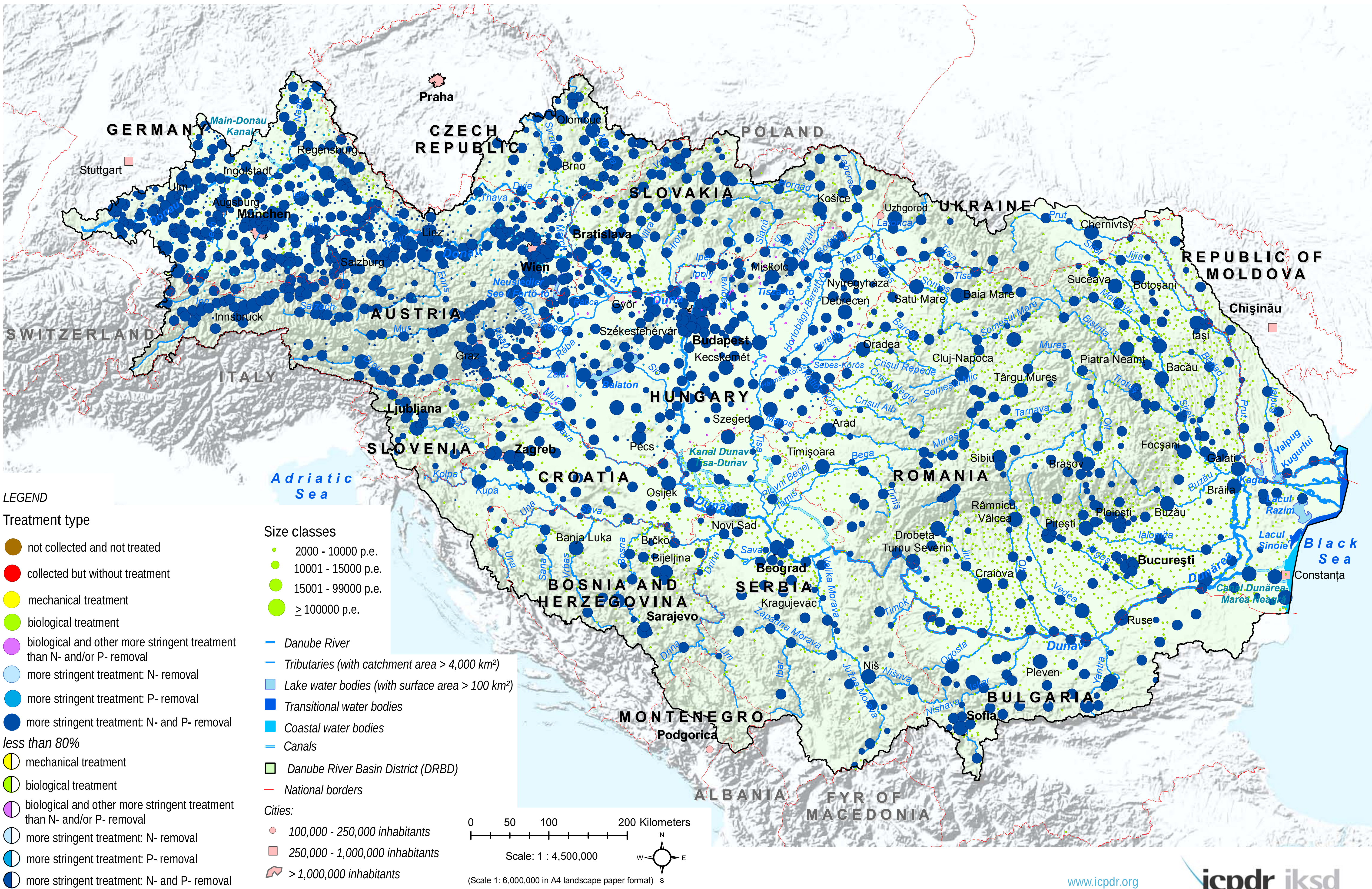
Danube River Basin District : Urban Wastewater Discharges – Vision Scenario - UWWT (VS-UWWT)



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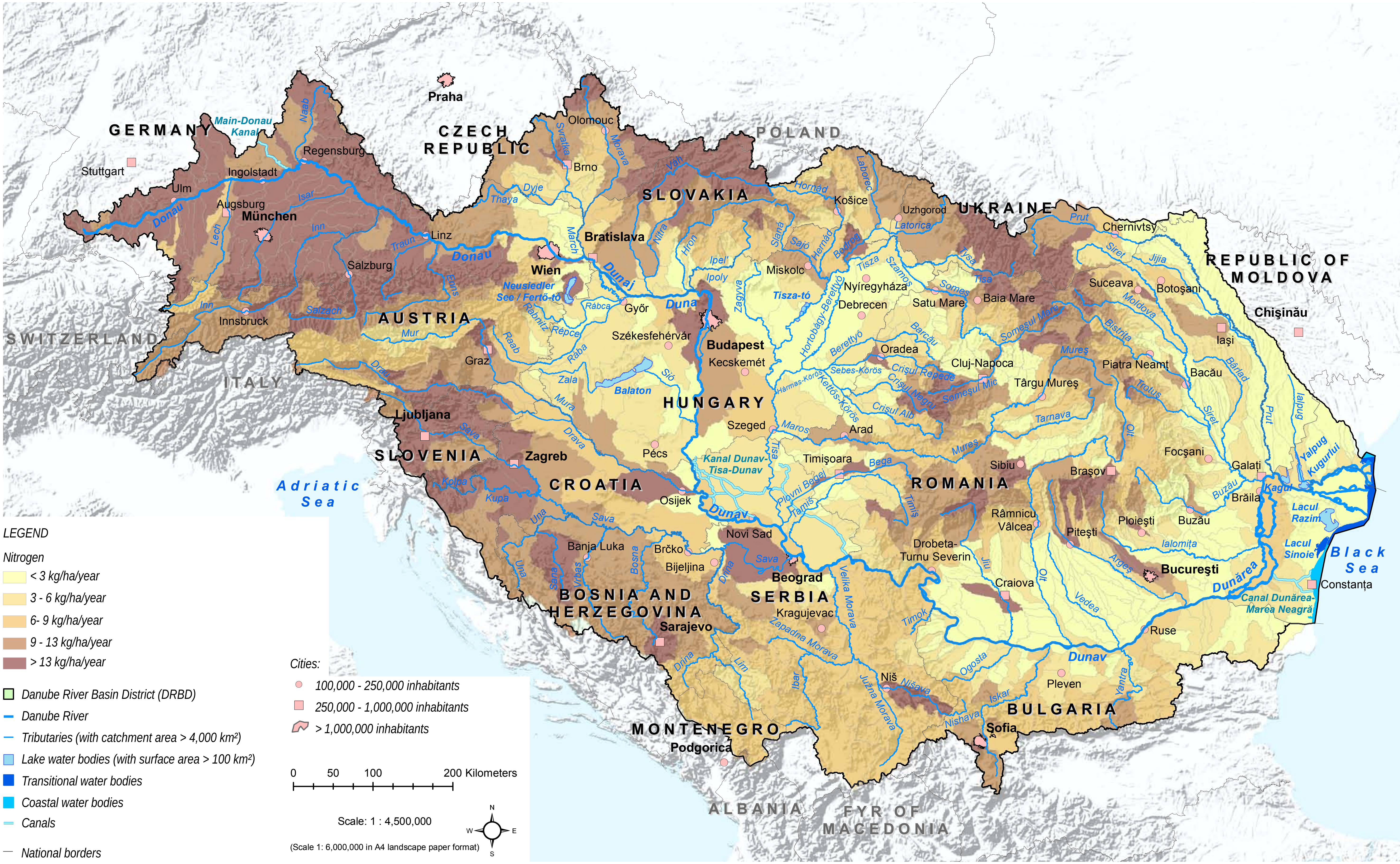
Danube River Basin District:
Nutrient Pollution from Point and Diffuse Sources - Reference Situation for Nitrogen*

MAP 22



* Significant efforts have been undertaken so far in the DRBD regarding diffuse source pollution and its illustration using the MONERIS Model System (Behrend et al. - 2007) . However, further research and monitoring is needed, as well as a continuous improvement and calibration of the MONERIS scenarios.
The MONERIS Model integrates the findings of point source analysis with those related to diffuse sources and reflects the overall nutrient input in the DRB in total and per Danube country.
SI is using a method based on the OECD method: Environmental indicators for agriculture. Methods and Results (2006).

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Vienna, November 2009

Danube River Basin District:
Nutrient Pollution from Point and Diffuse Sources - Reference Situation for Phosphorous*

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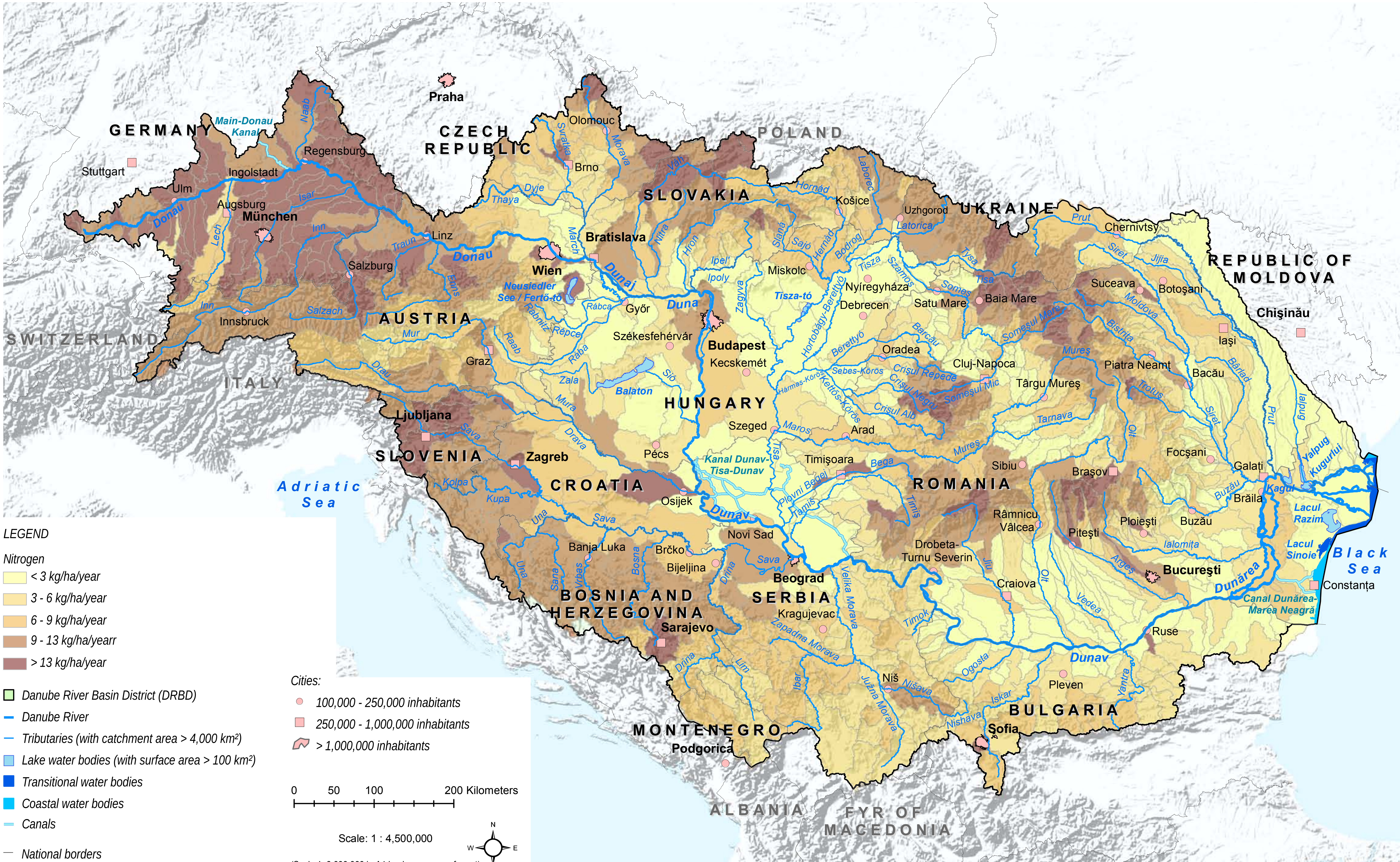
Danube River Basin District:
Nutrient Pollution from Point and Diffuse Sources - Baseline Scenario 2015 for Nitrogen*



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Danube River Basin District:
Nutrient Pollution from Point and Diffuse Sources - Baseline Scenario 2015 for Phosphorous*

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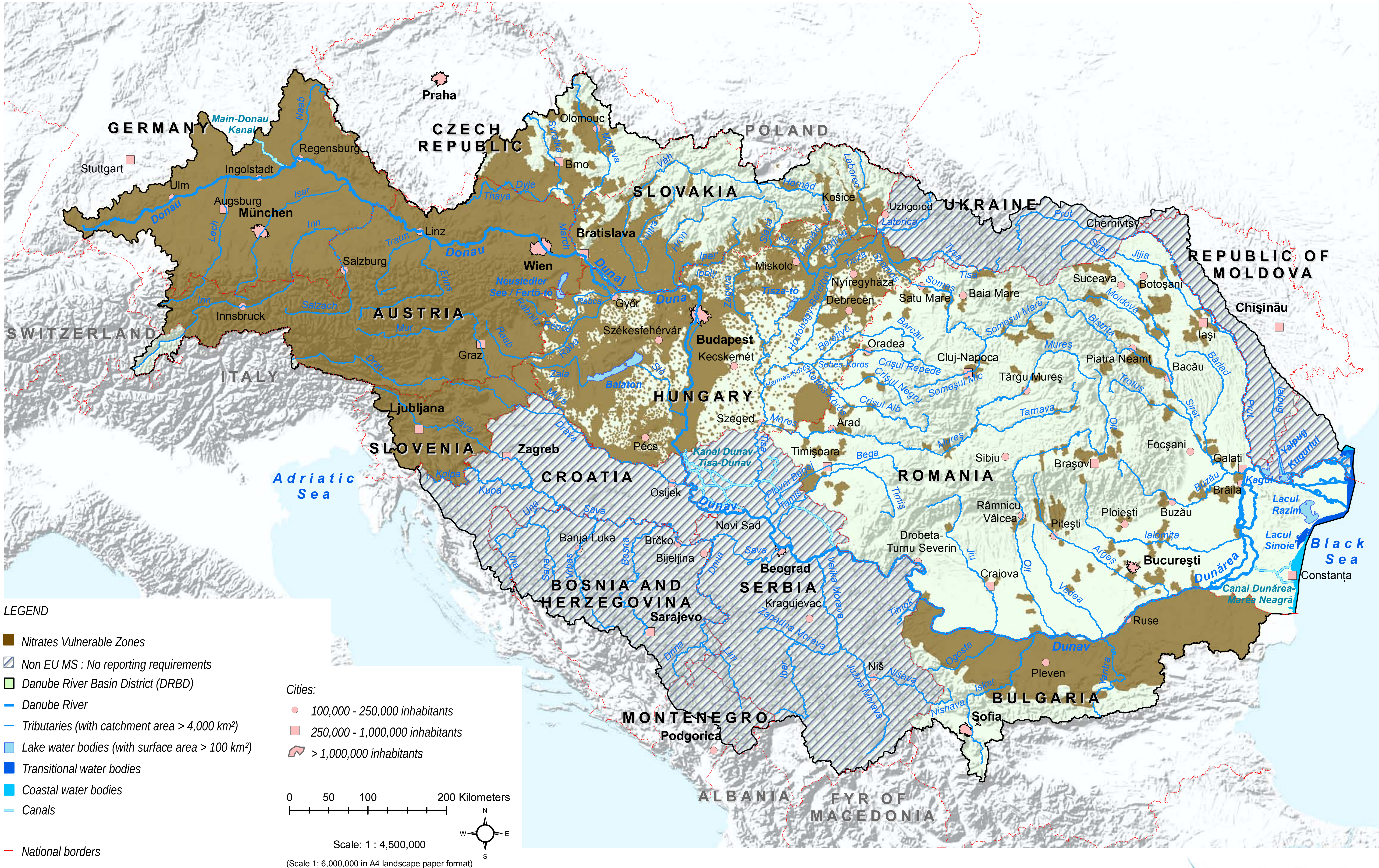
Danube River Basin District: Nitrates Vulnerable Zones*



*The map illustrates data provided by the countries under the European Commission's reporting requirements for the EU Nitrates Directive (period 2004 - 2007). In December 2008, RO re-designated the vulnerable zones and informed the European Commission in August 2009. According to the last updates the RO vulnerable zones area has increased from 7 % to 58 %.

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Vienna, November 2009

Danube River Basin District: River and Habitat Continuity Interruptions 2015 (Expected Improvements)

* CZ is currently finalising a national prioritisation concept for river continuity restoration.Five continuity interruptions will be made passable for fish by 2015 and will be displayed in the national RBM Plan. In the DRBM Plan thouse are temporarily indicated and illustrated as "Continuity restored by 2021/2027". DE is currently elaborating a national prioritisation for river continuity restoration. 90 obstacles will be made for sure passable by 2015 but are not yet localised in this map. They are temporarily visualised as "Continuity restored by 2021/2027"

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Vienna, November 2009

Danube River Basin District:
Ecological Prioritisation Regarding Restoration Measures for River and Habitat Continuity*

*The ecological prioritisation approach (Part A) is not meant to substitute similar national approaches but to outline the basin-wide perspective. Low restoration priority indicated on the basin-wide level does not imply that no measures should be undertaken on the national level as all fish species need open river continuity. On the other hand, ecological prioritisation is only one of many aspects in deciding which measures to adopt and implement. Final decisions will be taken at the national level.

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Vienna, November 2009

Danube River Basin District: Hydrological Alterations - Expected Improvements 2015*

* This map visualises aggregated information regarding the improvement of all three hydrological pressure types of impoundments, water abstractions and hydropeaking.No individual measures are illustrated.

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Competent authorities and Weblinks to National RBM Plans in the DRB

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Annex 1 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Austria
Federal Ministry for Agriculture, Forestry, Environment and Water Management
Stubenring 1
A-1012 Wien
Web link: www.lebensministerium.at
Web link national RBM Plan:
http://wisa.lebensministerium.at

Bosnia and Herzegovina
Ministry of Foreign Trade and Economic Relations
Musala 9
BiH-71000 Sarajevo
Web link: www.mvteo.gov.ba

Federal Ministry of Agriculture, Water Management and Forestry
Marsala Tita 15
BiH-71000 Sarajevo

Ministry of Agriculture, Forestry and Water Management of Republika Srpska
Milosa Obilica 51
BiH-76300 Bijeljina
Web link: www.vladars.net

Bulgaria
Ministry of Environment and Water
22 Maria-Luisa Blvd.
BG-1000 Sofia
Web link: www.moew.government.bg

Danube River Basin Directorate
60, Chataldzha str.
BG -5800 Pleven
Web link: www.dunavbd.org
Web link national RBM Plan:
http://dunavbd.org/index.php?x=204

Croatia
Ministry of Regional Development, Forestry and Water Management
Ulica grada Vukovara 220
HR-10000 Zagreb
Web link: www.mrrsvg.hr

Czech Republic
Ministry of Environment
Vrsovická 65
CZ-10010 Praha 10
Web link: www.mzp.cz
Web link national RBM Plan:
www.mzp.cz/cz/voda

Ministry of Agriculture
Tesnov 17
CZ-117 05 Praha 1
Web link: www.mze.cz

Germany
Bavarian State Ministry for Environment and Public Health
Rosenkavalierplatz 2
D-81925 München
Web link: www.stmug.bayern.de/

Ministry for Environment Baden-Württemberg
Kernerplatz 10
D-70182 Stuttgart
Web link: www.um.baden-wuerttemberg.de/

Hungary
Ministry of Environment and Water
Fő utca 44-50
H-1011 Budapest
Web link: www.kvvm.hu
Web link national RBM Plan: www.euvki.hu

Moldova
Ministry of Ecology, Construction and Territorial Development
9 Cosmonautilor St.
MD-2005 Chisinau
Web link: currently no web link available.

Montenegro
Ministry of Agriculture, Forestry and Water Management
Rimski Trg 46
ME – 81000 Podgorica
Web link: www.minpolj.gov.me

Romania
Ministry of Environment
12 Libertatii Blvd., Sector 5
RO-04129 Bucharest
Web link: www.mmediu.ro/departament_ape/gospodarirea_apelor/directiva_cadru.htm

National Administration “Apele Romane”
6 Edgar Quinet St., Sector 1
RO-010018 Bucharest
Web link: www.rowater.ro/default.aspx

Serbia
Ministry of Agriculture, Forestry, and Water Management
Nemanjina 22-26
RS-11000 Beograd
Web link: www.minpolj.gov.rs

Slovak Republic
Ministry of the Environment
Námestie L’ Stúra 1
SK-81235 Bratislava
Web link:
www.enviro.gov.sk/servlets/page/868?c_id=5384

Slovenia
Ministry of the Environment and Spatial Planning
Dunajska 48
SI-1000 Ljubljana
Web link: www.mop.gov.si/en/
Web link national RBM Plan:
http://www.mop.gov.si/si/splosno/cns/novica/article/7621/7169/cfb4028d23/

Ukraine
Ministry for Environmental Protection of Ukraine
35, Uritskogo str.
UA-03035 Kyiv

State Committee of Ukraine for Water Management
8, Chervonoarmiyska Str.
UA-01601 Kyiv
Web link: www.menr.gov.ua

DBA update on DRBD surface water typology

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Annex 2 of the DRBM Plan

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Typology of the Danube River

For the Danube River, ten section types were delineated in a joint activity by the countries sharing the Danube (Moog et al., 2008). This typology was based on a combination of abiotic factors, among which, ecoregion, mean water slope, substratum composition, geomorphology and water temperature are the most important. Figure 1 displays the ten section types along the entire course of the Danube. Further details including the characterisation of individual section types are given in the DBA 2004.

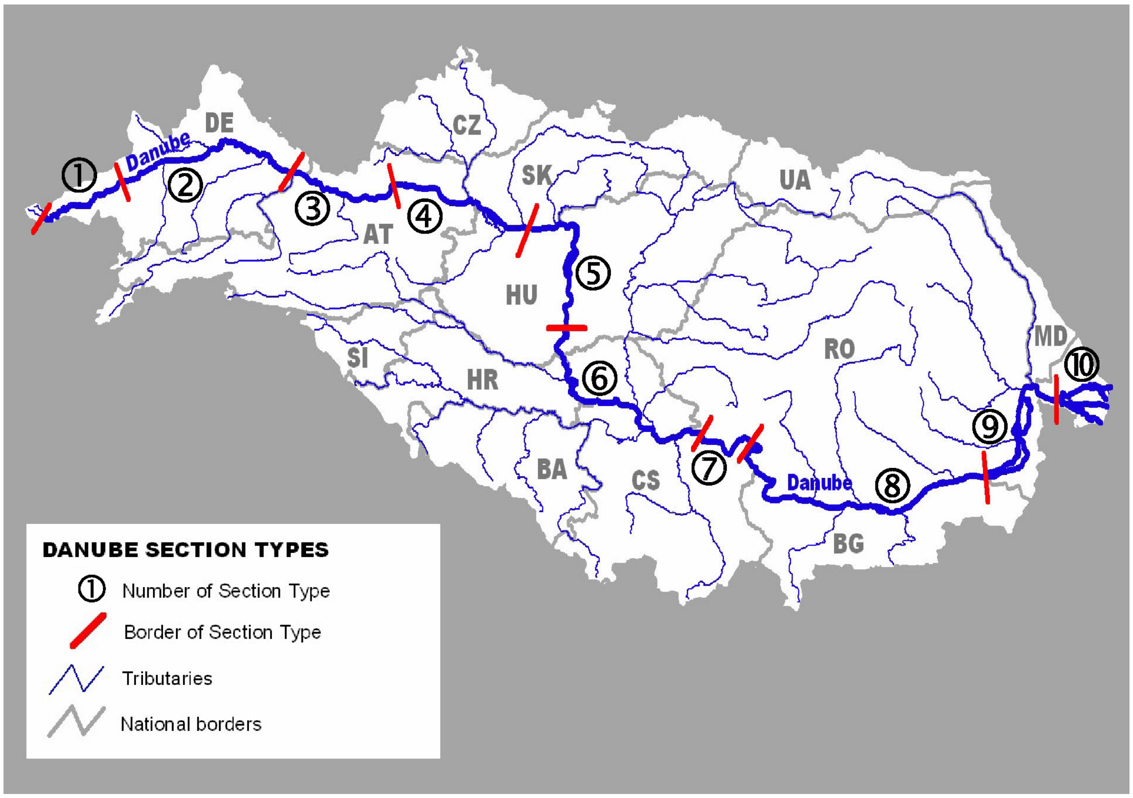

Figure 1: Danube section types; the dividing lines refer only to the Danube River itself.

National surface water typologies

Rivers and lakes

An overview of national surface water typologies was given in the DBA 2004. However since this analysis, several countries have amended their national typologies. Consequently, this annex contains an update of national typologies based on the information collated in the Danube GIS and Pottgiesser & Birk (2007).

Table 1. provides an update on the number of national river types defined at the DRBD overview level. A total of 160 national types were reported. Most countries in the DRB (Germany, Austria, Slovak Republic, Hungary, Slovenia, Bosnia and Herzegovina, Serbia, Croatia, Romania, Bulgaria and Ukraine) have applied System B (Annex II, 1.2.1 WFD) for establishing their river typology. Only the Czech Republic has used System A. The Danube River has been subdivided into 17 national section types.

Table 2. gives an overview of the class boundaries used by the DRB countries for the common descriptors: altitude, catchment area and geology.

Table 1: Number of national river types defined at the DRBD overview level

Country	Number of national types	
	River (total)	Danube
Germany	6	1
Austria	21	2
Czech Republic	12	-
Slovak Republic	11	1
Hungary	25	3
Slovenia	7	-
Bosnia and Herzegovina	13	-
Serbia	15	3
Croatia	13	1
Bulgaria	12	1
Romania	11	4
Moldova	2	-
Ukraine	12	1
Total number	**160**	**17**

In total, four lakes were reported at the DRB overview level: Neusiedler/Fertö-to (Austria/Hungary), Balaton (Hungary), Ialpug (Ukraine) and Razim (Romania). Lake Sinoe (Romania) is identified as a transitional water body and any details on typology can therefore be found in Table 3. All lakes form distinct types defined following System A. Details are given in the DBA 2004.

Table 2: Obligatory factors used in river typologies (Systems A and B)

Descriptor	Country	Class boundaries				
Altitude [m]	Germany	0-200	200-800	>800		
	Austria	0-200	200-500	500-800	800-1600	>1600
	Czech R.	0-200	200-800	>800		
	Slovak R.	0-200	200-500	500-800	>800	
	Hungary	0-200	200-500	>500		
	Slovenia	0-200	200-800	>800		
	Bosnia and H.	0-200	200-500	500-800	>800	
	Serbia	0-200	200-500	500-800	>800	
	Croatia	0-200	200-800	>800		
	Bulgaria	0-200	200-1000	>1000		
	Romania	0-200	200-500	500-800	>500	
	Ukraine	0-200	200-800	>800		
Catchment area [km²]	Germany	10-100	100-1000	1000-10,000	>10,000	
	Austria	10-100	100-1000	1000-10000	>10,000	
	Czech R.	10-100	100-1000	1000-10,000	>10,000	
	Slovak R.	10-100	100-1000	1000-10,000	>10,000	
	Hungary	10-200	100-2000	1000-12,000	>10,000	
	Slovenia	10-100	100-1000	1000-2500		
	Bosnia and H.	10-100	100-1000	1000-4000	4000-10,000	>10,000
	Serbia	10-100	100-1000	1000-4000	4000-10,000	>10,000
	Croatia	100-1000	1000-10,000	>10,000		
	Romania	10-100	100-1000	1000-10,000	>10,000	
	Bulgaria	10-100	100-1000	1000-10,000	>10,000	
	Ukraine	10-100	100-1000	1000-10,000	>10,000	
Geology	Germany	siliceous	calcareous	organic		
	Austria	crystalline	tertiary and quaternary sediments	flysch and helveticum	limestone and dolomite	
	Czech R.	siliceous	calcareous			
	Slovak R.	siliceous	mixed			
	Hungary	siliceous	calcareous	organic		
	Slovenia	siliceous	calcareous	organic		
	Bosnia and H.	siliceous	calcareous			
	Serbia	siliceous	calcareous	organic		
	Croatia	siliceous	calcareous			
	Romania	siliceous	calcareous	organic		
	Bulgaria	siliceous	calcareous	mixed		
	Ukraine	calcareous	organic			

Coastal and transitional waters

The coastal and transitional waters of the DRB are located in the coastal area of the Black Sea in Romania. The coastal typology of Romania was not modified. The two existing types are described in the DBA 2004.

For the DRBM Plan, two types of transitional waters were reported by Romania. Both types are listed in Table 3.

Table 3: Types of transitional waters in the DRBD

Name	Salinity	Tidal range	Type
TT02 - Lacul Sinoe	oligohaline	<2 m	Transitional lacustrine type
TT03 - Chilia-Periboina	mesohaline	<2 m	Transitional marine type

References:

1. Moog, O., M. Sommerhäuser, S. Robert, T. Battisti, S. Birk, D. Hering, T. Ofenböck, U. Schmedtje, A. Schmidt-Kloiber & B. Vogel, 2008. Typology of Danube River Sections Based on Environmental Characteristics and Benthic Invertebrate Assemblages. Arch. Hydrobiol. Suppl. "Large Rivers" 166: 127-144.
2. Pottgiesser, T. & S. Birk, 2007. River Basin Management Tools: River Typologies. Harmonisation of DRB Typologies. Umweltbüro Essen, Essen.

Technical Report: ICPDR Municipal Emission Inventory 2006 / 2007 (agglomerations ≥2000)

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Annex 3 of the DRBM Plan

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Results of the ICPDR Municipal Emission Inventory 2006 - 2007

on

Agglomerations ≥2000 Population Equivalents

Reference date: 31/12/2005 or 31/12/2006

Technical report
23/07/2009

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umweltbundesamt

Contents

1. Executive summary

The Water Framework Directive (WFD; 2000/60/EC) requires Member States to regularly publish river basin management plans, which should include a summary of significant anthropogenic pressures and impacts of human activity on the status of surface water and groundwater. One fraction of these anthropogenic pressures is wastewater emissions from municipal sources that include significant loads of organic pollutants (BOD_5 (5-day biochemical oxygen demand) and COD (chemical oxygen demand)) and nutrients (nitrogen (N) and phosphorus (P)).

Since 1997, the ICPDR has prepared inventories on point source emissions including emissions from municipal sources, with the existing wastewater treatment plant being the core element of the inventory. In 2006, the ICPDR Municipal Emission Inventory was modified in order to be consistent with the collection of data under the Urban Wastewater Treatment Directive (UWWT Directive; 91/271/EEC). In contrast to former Emission Inventories, it is now the *agglomeration*[1], which represents the core element of the inventory. This approach has the advantage of including those municipal areas where no collecting system and/or wastewater treatment plant is yet in place, which is still the case in many downstream countries of the Danube River Basin (DRB).

The first emission inventory under the new concept was elaborated in 2006/2007 with the objective of describing the present situation of wastewater treatment and emissions of BOD_5, COD, N_{tot} (total nitrogen) and P_{tot} (total phosphorus) from agglomerations ≥2000 Population Equivalents (PE) in the DRB (*reference situation*). In addition, focus was placed on the elaboration of different future scenarios for 2015, taking into account that the Black Sea has been designated as a *sensitive area* due to the need to protect against eutrophication. According to Article 5(5) of the UWWT Directive, it is necessary to identify the catchment area of the Black Sea, and hence the DRB, as the *catchment of a sensitive area*, thereby requiring more stringent wastewater treatment in agglomerations with more than 10,000 PE.

In brief, the different scenarios can be summarised as follows:

- **Reference Situation UWWT 2005/2006 (RefSit-UWWT):** This scenario gives an overview of the current situation regarding wastewater treatment (reference date 31/12/2005 or 31/12/2006) and treatment efficiency in the DRB.
- **Baseline scenario UWWT 2015 (BS-UWWT):** As the Black Sea has been designated as a *sensitive area* due to the need to protect against eutrophication, it is necessary to identify the catchment area of the Black Sea, and hence the DRB, as the *catchment of a sensitive area* according to Article 5(5) of the UWWT Directive. This scenario describes the agreed measures for the first cycle of implementation of the WFD on the basin-wide scale (until 2015). It is based on the assumption that all EU Member States (EU MS) comply with Directive 91/271/EEC, as far as individual transitional periods require the implementation. For Non EU Member States (Non EU MS), the scenario considers the reported number of wastewater treatment plants with secondary or more stringent treatment to be constructed by 2015.
- **Midterm scenario (MT-UWWT):** This scenario is based on BS-UWWT but assumes that for Non EU MS, P removal is in place for agglomerations >10,000 PE.
- **Vision scenario (VS-UWWT):** This scenario goes beyond the BS-UWWT and the MT-UWWT and therefore far beyond the requirements of UWWT Directive. It is based on the assumption that the full technical potential of wastewater treatment regarding the removal of organic influents and nutrients is exploited for both EU and Non EU MS. If such a scenario was to be realised, it is assumed that agglomerations >10,000 PE are equipped with N and P removal (secondary/tertiary wastewater treatment) and all agglomerations ≥2000 PE are equipped with secondary treatment.

Figure 1 summarises the emissions of BOD_5, COD, N_{tot} and P_{tot} as assessed for the different scenarios. In all scenarios, differentiation was made between emissions originating from

[1] 'Agglomeration' means an area where the population and/or economic activities are sufficiently concentrated for urban wastewater to be collected and conducted to an urban wastewater treatment plant or to a final discharge point (Directive 91/271/EEC).

agglomerations where at least part of the generated load is collected in a collecting system and treated in a wastewater treatment plant (darker coloured part of the columns) and emissions from agglomerations where the entire generated load is not collected in a collecting system (lighter coloured part of the columns). As, at the reference date 2005/2006, several countries in the DRB were still using P-containing detergents, two versions of the future scenarios on P_{tot} emissions were calculated. One version assumed the further use of P-containing detergents in 2015, whereas the second approach assumed the use of P-free detergents.

For the reference date 2005/2006, 6224 agglomerations ≥2000 PE were reported in the DRB, of which 4969 agglomerations (21,137,842 PE) were of the size class 2000-10,000 PE and 1255 agglomerations (73,593,220 PE) had a size >10,000 PE. There were 137 agglomerations with a size of ≥100,000 PE, which produce about 46% of the total generated wastewater.

A considerable number of agglomerations, reflecting approx. 13% of the total generated load, are not connected to either a collecting system or treatment plant. Approximately 15% of the total generated load is collected in a collecting system but discharged without treatment. These two categories result in the highest discharged loads of BOD_5, COD, N_{tot} and P_{tot}, contributing approx. 69% of BOD_5, 66% of COD, 50% of N_{tot} and 54% of P_{tot}. From the 137 agglomerations ≥100,000 PE (43,621,842 PE), 21 agglomerations (reflecting 21% of the generated load) had no wastewater treatment.

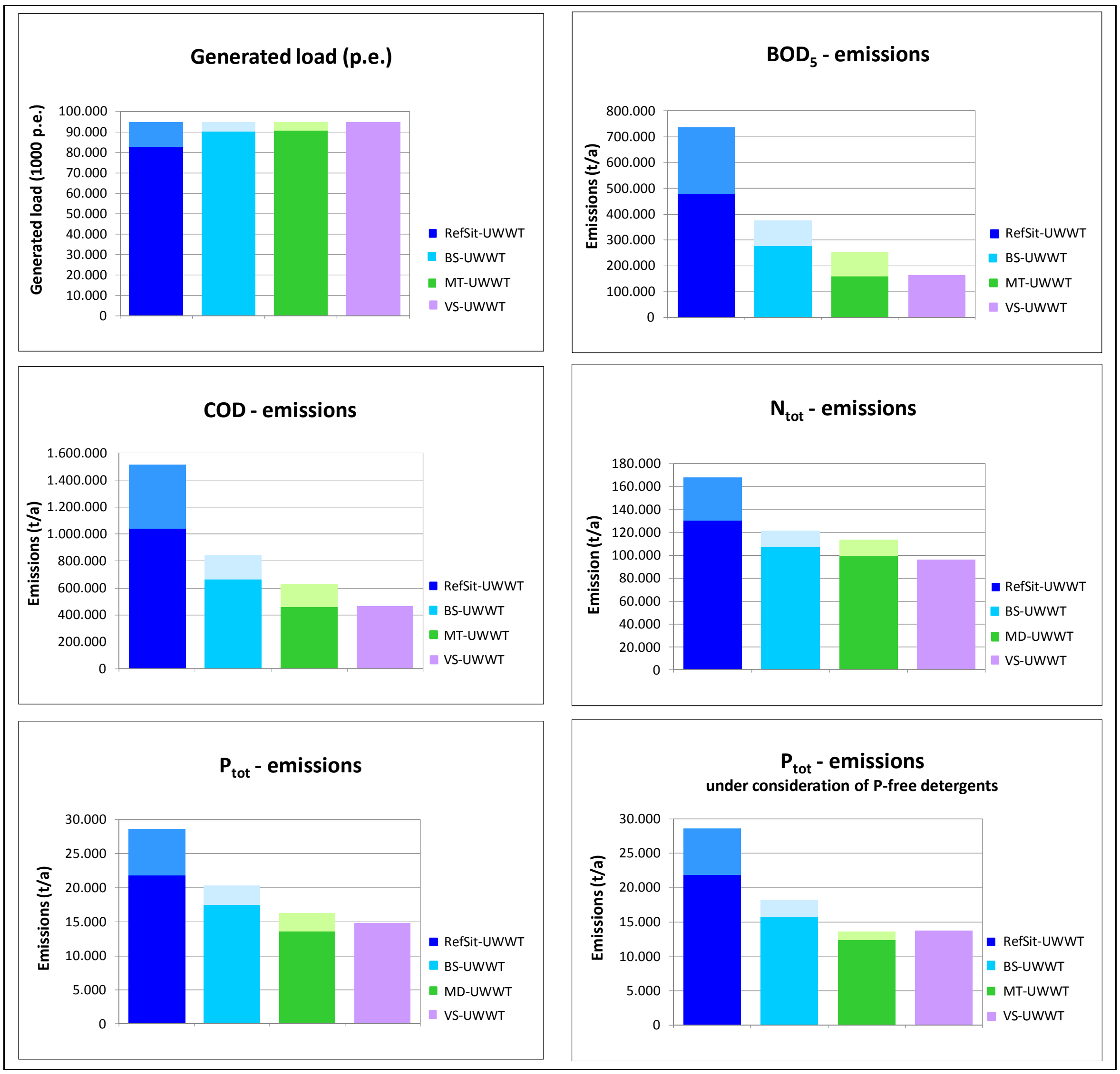


Figure 1: Emissions (t/a) of BOD_5, COD, N_{tot} and P_{tot} under different scenarios

Implementation of the *baseline scenario* would require the upgrade of wastewater treatment for 444 agglomerations (29,842,478 PE) in order to provide N and P removal for the entire generated load and also the establishment of secondary treatment for 1997 agglomerations (11,647,840 PE) that are not served by any wastewater treatment, (partially) primary or (partially) secondary treatment, for the reference years 2005/2006.

Compared to the *reference scenario*, emissions of BOD_5 would be reduced by 49% and emissions of COD by approx. 44%. For N_{tot} a reduction of 28% could be achieved, and for P_{tot} emissions, a 29% reduction. In addition, when taking into consideration the use of P-free detergents in the entire DRB, the reduction of Ptot emissions would amount to as high as 36%.

The establishment of the *midterm scenario* would require the upgrade of wastewater treatment for 152 agglomerations (7,774,872 PE) in order to provide P removal for the entire generated load and also the provision of N and P removal for the entire generated load of 8 agglomerations (871,221 PE). Compared to the *reference scenario*, these measures would decrease the emissions of BOD_5 by 66%, COD by 58%, N_{tot} by 32% and P_{tot} by 43%. Under the assumption of P-free detergent use in the entire DRB, the *midterm scenario* would decrease P_{tot} emissions by 52% compared to the *reference scenario*.

Finally, the implementation of the *vision scenario* would require the establishment of N and P removal for the entire generated load of a further 308 agglomerations (14,188,970 PE) additional to those identified for secondary treatment, N removal or P removal in the *midterm scenario*, and the provision of secondary treatment in an additional 1664 agglomerations (5,344,016 PE). Compared to the *reference scenario*, the emissions would be reduced by approx. 78% and 69% for BOD_5 and COD respectively, 43% for N_{tot} and 48% for P_{tot}. The stringent use of P-free detergents would decrease emissions of P_{tot} by 52%.

2. Background

2.1 General framework of the Municipal Emission Inventory

Emission inventories are fundamental requisites to assess human influences on the environment. In addition to international reporting requirements, information on emissions to water is of essential importance for national authorities and international organisations dealing with water resource planning and management. For the ICPDR, emission inventories serve as a valuable basis for:

- River Basin Management Plans
- Joint Action Programme
- DABLAS (Danube Black Sea Task Force)

For the reference years 1997, 2000 and 2002, the ICPDR has prepared inventories on point source emissions including: emissions from municipal sources (2000: existing wastewater treatment plants; 2002: untreated and treated municipal sources), industrial sources and agro-industrial point sources (2002 only) (ICPDR, 2000).

In the year 2006, the ICPDR Municipal Emission Inventory was modified in such a way as to be consistent with the collection of data under the UWWT Directive (Council Directive 91/271/EEC). The reason for this modification was the need to design a systematic approach for the collection and compilation of emission data in line with EU obligations. As the EU MS and accession countries already have to fulfil the extensive reporting requirements of the UWWT Directive, which cover most of the information required for the ICPDR tasks, this information forms the basis for the data collection for the ICPDR.

The main difference between the ICPDR Municipal Emission Inventory 2006 (EMIS 2006) and former emission inventories on point sources is the central object of the inventory. The central concept in the Emission Inventory 2006 is the agglomeration (i.e. an area where the population and/ or economic activities are sufficiently concentrated for urban wastewater to be collected and conducted to an urban wastewater treatment plant (UWWTP) or to a final discharge point), whereas the former emission inventories were based on already existing urban wastewater discharges (existing pressures). The agglomeration approach has the advantage of presenting pressures from those human settlements where the actual connection rate to public sewer systems and wastewater treatment plants is still low (which is the case for the lower Danube countries).

The collection of data on municipal emissions was designed as a two-step approach. In the first phase (EMIS 2006), the methodology was developed and data on agglomerations with a size of more than 10,000 PE was collected (reference date 31/12/2005). In the second phase (EMIS 2007), data on agglomerations between 2000 PE and 10,000 PE was requested, offering the countries the additional possibility to up-date information on agglomerations >10,000 PE (reference date 31.12.2005 or 31.12.2006 in the case of one dataset delivered for all agglomerations ≥2000 PE). Due to changes of the data model for reporting under Article 15 of Directive 91/271/EEC in December 2006, the data model for EMIS 2007 had to be changed accordingly. Under EMIS 2006 the data model foresaw that one agglomeration can be connected to one or several UWWTPs, whereas one UWWTP could only serve one agglomeration (relation agglomeration: UWWTP = 1:n). In contrast, the data model under EMIS 2007 presented the additional situation where one UWWTP can serve one or more agglomerations (relation agglomeration: UWWTP = m:n).

The present report summarizes the results of EMIS 2006 and EMIS 2007, describing the wastewater treatment of all agglomerations ≥2000 PE in the DRB for the reference year 31/12/2005 or 31/12/2006 (*reference scenario*). Besides this description of the present situation, three possible future scenarios of wastewater treatment in 2015 are given.

2.2 Description of scenarios

The scenarios presented in this report include a description of the current situation of wastewater treatment in agglomerations with at least 2000 PE in the DRB at reference date 31/12/2005 or 31/12/2006 (*reference scenario*).

At reference date 2005/2006, 8 EU MS were contributing to the DRB. In two of these countries, the UWWT Directive had to be fully implemented by 31st December 2005, whereas for the remaining 6 Member States, different transitional periods for implementation of the Directive apply. In general, the final deadline for compliance is 31st December 2015 (for smaller agglomerations in Romania only - 2000 PE – 10,000 PE - a final deadline of 31st December 2018 applies). Under Article 5 of the UWWT Directive, three EU MS designated their entire territory, or their national part of the DRB, as a *sensitive area*, a further three EU MS implemented more stringent treatment in their entire territory according to Article 5(8) and the two remaining EU MS designated 8 water bodies as *sensitive areas* / *catchment areas of sensitive areas*. The non EU countries have normal areas only.

The present report additionally describes three future scenarios of wastewater treatment. The *baseline scenario* (BS-UWWT) describes the agreed measures for the first cycle of implementation of the WFD on the basin-wide scale until 2015. Two additional scenarios, the *midterm scenario* (MT-UWWT) and the *vision scenario* (VS-UWWT) have been developed describing further steps toward the vision for organic pollution as an orientation for future policy decisions.

In brief, the scenarios can be described as follows:

- **Reference Situation UWWT 2005/2006 (RefSit-UWWT):** This scenario gives an overview of the current situation of wastewater treatment (reference date 31/12/2005 or 31/12/2006) and treatment efficiency in the DRB.
- **Baseline scenario UWWT 2015 (BS-UWWT):** This scenario describes the agreed measures for the first cycle of implementation of the WFD on the basin-wide scale (until 2015). Measures that are legally required for EU MS and other measures that can be realistically taken by the Non EU MS have been taken into account.

  As the Black Sea has been designated as a *sensitive area* due to the need to protect against eutrophication, it is necessary to identify the catchment area of the Black Sea as the *catchment of a sensitive area* according to Article 5(5) of the UWWT Directive. Accordingly, the *baseline scenario* was based on the consideration that, under the UWWT Directive, the entire Danube Basin is a *'catchment of a sensitive area*', with N and P sensitivity. Hence, the following assumptions for measures to be implemented by 2015 were taken:

  - ***EU MS with a final deadline of 31st December 2005 to comply with Directive 91/271/EEC*** (Austria, Germany): Both EU MS apply Article 5(8) and Article 5(4) of Directive 91/271/EEC (minimum percentage of the reduction of the overall load entering all UWWTPs is at least 75% for total N and total P) and have already complied with the Directive at reference date 31/12/2005 or 31/12/2006. Hence, from a legal point of view, no need for further improvement of wastewater treatment is identified. However, both Member States indicated that wastewater treatment for several agglomerations will be further improved by 2015. In order to give the most realistic picture, forecasted wastewater treatment in 2015 was taken into account for the *baseline scenario*, in the case that this information was available at the agglomeration-level.
  - ***EU MS with a final deadline of 31st December 2015 to comply with Directive 91/271/EEC:*** For these Member States, it was assumed that Directive 91/271/EEC would be implemented by 2015. Several EU MS apply Article 5(4) in their entire country or in their national parts of the DRB. For these areas, it is required that the minimum percentage of the reduction of the overall load entering all UWWTPs is at least 75% for total N and total P and hence, a forecast of wastewater treatment at the agglomeration-level is difficult. In the cases where no other information was available from the countries, it was assumed for the purpose of this report that, in order to achieve the required removal-rates, N and P removal will be implemented for all agglomerations >10,000 PE, whereas secondary treatment will be implemented in

agglomerations ≥2000 PE–10,000 PE. It has to be stressed that this approach does not necessarily reflect the treatment requirements for implementation of Directive 91/271/EEC (the 75% reduction-rate for total N and total P loads may be achieved in the case where not all agglomerations >10,000 PE are treated by N and P removal). However, it serves as interim assumption for the present report in order to calculate forecasted emissions.

- ***EU MS with a final deadline of after 31st December 2015 to comply with Directive 91/271/EEC*** (Romania): While agglomerations with a size >10,000 PE have to comply with Article 3, Article 4 and Article 5(2) by 31st December 2015 at the latest, agglomerations ≤10,000 PE are subject to a transitional period until 31st December 2018. The interim target date to comply with Article 3 (80% of the total biodegradable load of agglomerations of 2000 PE-10,000 PE) and Article 4 (77% of the total biodegradable load of agglomerations of 2,000 PE-10,000 PE) is 31st December 2015. For the purpose of this data evaluation, it was assumed that agglomerations >10,000 PE are served by N and P removal. For agglomerations 2000 PE–10,000 PE, it was assumed that secondary treatment is in place for 77% of the total biodegradable load of agglomerations.
- ***Non EU MS:*** Non EU countries were asked for forecasted improvements until the year 2015. In the cases where information was available on agglomeration-level, these data were taken into account for the *baseline scenario*. In the cases where no data was available on agglomeration-level, it was assumed that the situation for wastewater treatment in 2015 would be identical to that in the reference year 2005 or 2006.

- **Midterm scenario (MT-UWWT):** This scenario is based on the baseline scenario. In addition, it assumes for Non EU MS that P removal is in place for agglomerations >10,000 PE in order to achieve the management objectives.

  In the framework of the daNUbs project (http://danubs.tuwien.ac.at), consistent removal of P from all water treatment plants (larger than 1000 PE) was assessed as sensible for the sake of protecting water in river basins, economically justified and technically simple. In contrast to N removal, which requires a specific size of wastewater treatment plant and hence structural measures, P removal can be realised more easily by adding P precipitants to the wastewater treatment process. In order to draft the scenario for the reference year 2015 as realistic as possible, P removal was only considered for agglomerations >10,000 PE.

- **Vision scenario (VS-UWWT):** This scenario goes beyond the BS-UWWT and the MT-UWWT and therefore far beyond the requirements of UWWT Directive. It is based on the assumption that the full technical potential of wastewater treatment regarding the removal of organic influents and nutrients is exploited for both EU and Non EU MS. If such a scenario was to be realised, it is assumed that agglomerations >10,000 PE are equipped with N and P removal (secondary/tertiary wastewater treatment), whereas all agglomerations ≥2000 PE are equipped with secondary treatment.

3. Method of data evaluation

3.1 Basic concept

According to the data model of the UWWT Directive, the data model of the ICPDR Municipal Emission Inventory 2007 considers the following relation between agglomeration, UWWTP / collecting system without treatment and discharge point (see also Figure 2):

- **One agglomeration** can be served by **one or no UWWTP / Collecting system without treatment** (relation 1:1);
- **One agglomeration** can be served by **several UWWTPs / Collecting systems without treatment** (relation 1:n);
- **Several agglomerations** can be connected to **one UWWTP / Collecting system without treatment** (relation m:1)
- **One UWWTP Collecting system without treatment** discharges wastewater by **one** (relation 1:1) **or several discharge points** (relation 1:n)

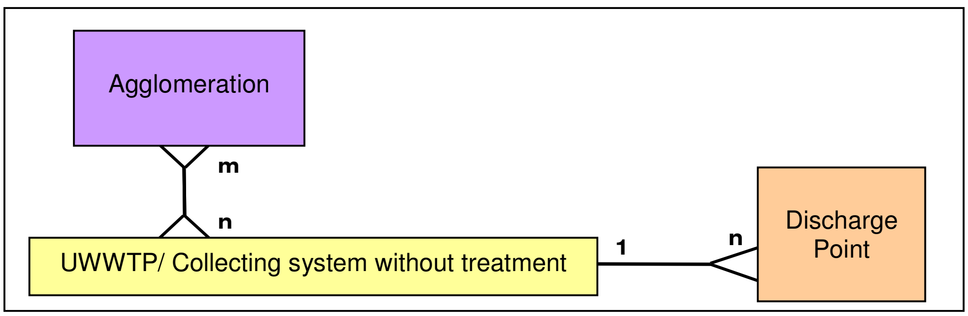


Figure 2: Data model under EMIS 2007 (according to the data model under Article 15 of Directive 91/271/EEC)

Besides this general relation between agglomeration, UWWTP / Collecting system without treatment and discharge point, the second important parameter to consider is the pathway of wastewater from the agglomeration to discharge to the environment. The main pathways of wastewater from an agglomeration can be described as follows:

- Collection in a collecting system (= system of conduits) and treatment in an UWWTP;
- Collection in a collecting system (= system of conduits) and discharge without treatment (in the ICPDR Municipal Emission Inventory 2007 this situation is presented by so called “NOWWTP” referring to a “Collecting system without treatment”);
- Collection in individual and appropriate systems (e.g. cesspools) and transport to an UWWTP by truck;
- Discharge without collection and treatment.

These possible pathways are described in Figure 3 in more detail:

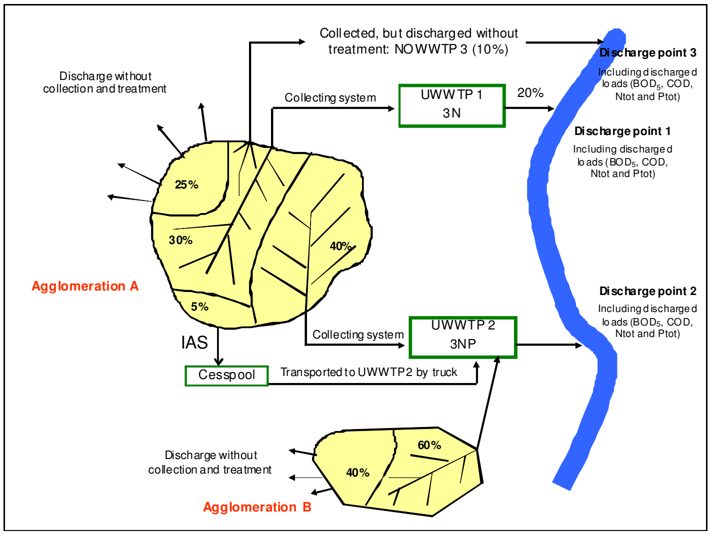


Figure 3: Major pathways of wastewater from agglomerations as covered by the Municipal Emission Inventory 2007

The ICPDR Municipal Emission Inventory 2007 templates considered the principal data model and the different possible pathways in the following way: the link between agglomerations, UWWTPs/NOWWTPs and discharge points is provided by defining unique codes (IDs) for each object and linking these IDs in the different templates. The different wastewater pathways are covered by the following parameters:

- Template agglomerations: % of generated load collected in a collecting system (estimate);
  % of generated load collected but discharged without treatment;
  % of generated load addressed through individual and appropriate systems (IAS);
  % of generated load not collected in collecting system and not addressed through individual and appropriate systems (IAS).
- Template UWWTPAgglo.: % of the generated load of the agglomeration treated in this UWWTP.

Example: The situation described in Figure 3 is reflected in the templates as follows:

Template agglomerations:

ID of agglo-meration	Name of agglomeration	Generated load (p.e.)	% of generated load collected in a collecting system	% of generated load collected in a collecting system, but discharged without treatment	% of generated load adressed through individual and appropriate systems (IAS)	% of generated load not collected through collecting systems and not adressed through IAS
MS_AG_A	Agglomeration A	31.000	70	10	5	25
MS_AG_B	Agglomeration B	20.000	60			40

Template UWWTPs:

ID of UWWTP/ collecting system without treatment	Name of UWWTP/ collecting system without treatment	Type of treatment	Organic design capacity (p.e.)	Primary treatment	Secondary treatment	More stringent treatment with N-removal	More stringent treatment with P-removal
MS_UW_1	UWWTP 1	UWWTP	50.000	Y	Y	Y	N
MS_UW_2	UWWTP 2	UWWTP	70.000	Y	Y	Y	Y
MS_NOW_3	NOWWTP 1	NOWWTP		N	N	N	N

Template UWWTPAgglo:

ID of UWWTP/ collecting system without treatment	ID of agglomeration served	% of the generated load of the agglomeration treated in this UWWTP
MS_UW_1	MS_AG_A	20
MS_UW_2	MS_AG_A	45
MS_UW_2	MS_AG_B	60
MS_NOW_3	MS_AG_A	10

3.2 Data evaluation for the Municipal Emission Inventory 2007: situation as of 31/12/2005 or 31/12/2006

1. Only agglomerations with a generated load ≥2000 PE were considered for data evaluation.
2. For EU MS, data reported under EMIS 2007 for the DRB was identical to information reported under the UWWT Directive Article 15 (Questionnaire 2007). Most countries provided information under EMIS 2007 by the 31/12/2007.

   In the framework of reporting under Article 15 of the UWWT Directive (Questionnaire 2007), the European Commission had set up a helpdesk that elaborated a first screening of completeness and technical correctness of reported information (e.g. investigations as to whether IDs were unique, the data model was correctly established and reported coordinates were located within the borders of the EU MS). After this first screening of data, some corrections were required and Member States sent an update of the UWWT Directive Questionnaire 2007 to the European Commission. Hence, data reported under the Questionnaire 2007 may sometimes diverge from information reported under EMIS 2007.

   In order to minimise the requests to countries during data evaluation of EMIS 2007, the EMIS datasets were updated with information reported under the UWWT Questionnaire 2007 as far as possible. Data which were taken over from the UWWT Questionnaire 2007 are described in detail in the Annex.
3. It was investigated whether all agglomerations (where a specific % is collected in a collecting system) were linked to at least one UWWTP/NOWWTP and whether all UWWTPs/NOWWTPs were linked to at least one discharge point via IDs. In cases where the link via IDs was not established, efforts were taken to define the link via names of agglomerations, UWWTPs/NOWWTPs and discharge points.

   In cases where a UWWTP/NOWWTP could not be linked to a discharge point, the discharged loads from this UWWTP/NOWWTP were estimated according to the method described under point 7.

   In cases where an agglomeration could not be linked to any UWWTP/NOWWTP and where the parameter "*% of generated load collected in a collecting system*" was 0, then it was assumed that the total generated load of this agglomeration was not collected and discharged without treatment.

   In cases where an agglomeration could not be linked to any UWWTP/NOWWTP where the parameter "*% of generated load collected in a collecting system*" was not 0, then it was assumed that the generated load of this agglomeration collected in a collecting system is discharged without treatment. In this case, a NOWWTP was created and discharged loads were calculated for this NOWWTP.
4. Besides the link between agglomerations, UWWTPs/ NOWWTPs and discharge points via IDs, it is crucial to know which fractions (=% of the generated load) enter the different wastewater pathways. In cases where this parameter was not reported in EMIS 2007 by EU MS, this information was taken over from the UWWT Questionnaire 2007. In cases where the parameter *"% of the generated load of the agglomeration treated in this UWWTP"* was not given for a UWWTP/NOWWTP in the Non EU MS, this parameter was considered as identical to the parameter "*% of generated load collected in a collecting system" and/ or "% of generated load collected but discharged without treatment"* (in cases where NOWWTPs were reported).

In cases where these parameters were also not reported, then the parameter *"% of population connected to combined sewage network*" and/or the parameter *"% of population connected to separate sewage network*" were taken into consideration. In cases where no information was reported for all the above mentioned parameters, a default value of 75% was used for the parameter "% of generated load collected in a collecting system".

5. Under the UWWT Directive, one wastewater pathway covers the generated load addressed through individual and appropriate systems (IAS). Wastewater addressed through IAS can be treated locally (e.g. domestic sewage treatment plant) or transported to a treatment plant (e.g. collected in a cesspool and then transported to a UWWTP by truck). In EMIS 2007, it was foreseen that the fraction of the generated load collected in a cesspool and transported to an UWWTP by truck is included in the parameter "% of the generated load of the agglomeration treated in this UWWTP" in the template UWWTPAgglo. In cases where this parameter was not reported but a specific fraction of the generated load was reported to be addressed through IAS, then it was assumed that the emissions from the UWWTP already covered the generated load of the connected agglomeration addressed through IAS. In cases where no UWWTP / Collecting system without treatment was connected to one agglomeration, but a specific fraction of the generated load was reported to be addressed through IAS, emissions of BOD_5, COD, N_{tot} and P_{tot} were calculated separately.

6. In cases where more than one agglomeration was connected to one UWWTP/NOWWTP, the emissions (BOD_5, COD, N_{tot} and P_{tot}) reported for the discharge-point connected to this UWWTP/NOWWTP were allocated to the different agglomerations. Allocation was done under consideration of the generated load of the agglomerations (PE) and the percentage of the generated load treated in the UWWTP/NOWWTP.

7. In cases where emissions for BOD_5, COD, N_{tot} and/or P_{tot} were missing, this data was calculated by using estimation factors, considering the generated load of the agglomeration (PE), the percentage of the generated load treated in the UWWTP/NOWWTP connected to this discharge point and the type of treatment in the UWWTP/NOWWTP.

   In a first step, the generated loads were calculated based on estimation coefficients (Zessner & Lindtner, 2005):

   BOD_5 60 g/PE/day
   COD 110 g/PE/day
   N_{tot} 8.8 g/PE/day

   Calculation of generated loads of total P for reference date 31/12/2005 or 31/12/2006 took into account the fact that most countries in the DRB have not yet introduced P-free detergents. For this reason, country specific coefficients were used to estimate the generated loads of P_{tot} per population equivalent. On the basis of country-specific P emissions per inhabitant and per day (Van Gils et al., 2005 in: Kroiss et al., 2008), the following estimation coefficients were taken into account for population equivalents (PE). The coefficient for Serbia was reported in the update of information delivered in April 2009.

Country	Coefficient (g P/ (PE d)
Austria	1.5
Bosnia and Herzegovina	Coefficient from HR was used
Bulgaria	Coefficient from RO was used
Croatia	2.05
Czech Republic	1.7
Germany	1.5
Hungary	1.7

Country	Coefficient (g P/ (PE d)
Moldova	2.05
Romania	1.5
Serbia	1.8
Slovakia	1.55
Slovenia	1.9
Ukraine	Coefficient from MD was used

   For the calculation of future scenarios for the reference year 2015, the use of P-free detergents was assumed for all countries in the DRB. For this reason, total generated loads of total P for the year 2015 were calculated by the use of an estimation coefficient of 1.5 g/PE/day. This value was

reported by Zessner & Lindtner (2005) for Austria, where P-free detergents have been used for several years.
In a second step, discharged loads were calculated on the basis of generated loads and treatment type:

No treatment	Generated loads are reported as discharged ones.
Primary treatment	BOD_5 reduction: 20% (UWWT Directive [91/271/EEC]) COD reduction: 25% (ATV A131 [2000]) N_{tot} reduction: 9% (ATV A131 [2000]) P_{tot} reduction: 10% (ATV A131 [2000])
Secondary treatment	BOD_5 reduction: 70% (UWWT Directive [91/271/EEC]) COD reduction: 75% (UWWT Directive [91/271/EEC]) N_{tot} reduction: 35% (Zessner & Lindtner, 2005) P_{tot} reduction: 20% (ATV A202 [1992])
More stringent treatment	BOD5 reduction: 95% (Austrian Wastewater Emission Ordinance for Urban Wastewater[2]) COD reduction: 85% (Austrian Wastewater Emission Ordinance for Urban Wastewater) N_{tot} reduction: 70% (UWWT Directive [91/271/EEC]) P_{tot} reduction: 80% (UWWT Directive [91/271/EEC])

As result of these calculations, discharged loads of BOD_5, COD, N_{tot} and P_{tot} were available for all UWWTPs/NOWWTPs.

8. The type of treatment was defined for each agglomeration. In cases where an agglomeration was served by more than one UWWTP/NOWWTP, UWWTPs/NOWWTPs with the same treatment level were grouped together and the respective percentage values for the *generated load of the agglomeration treated in this UWWTP* were summarised.

Example: Agglomeration 1:

The generated load (PE) is served by

UWWTP 1	primary treatment	4%	→	primary treatment	64%
UWWTP 2	secondary treatment	20%		secondary treatment	20%
UWWTP 3	primary treatment	60%		no treatment	16%
UWWTP 4	no treatment	16%			

After grouping treatment levels for each agglomeration, the definition of treatment types was undertaken as described in the table below. In each case, the highest treatment type available was considered for the purpose of definition of the treatment type.

≥80% of an agglomeration treated in a UWWTP with 3NP, 3N or 3P	More stringent treatment
<80% of an agglomeration treated in a UWWTP with 3NP, 3N or 3P	Partial more stringent treatment
≥80% of an agglomeration treated in a UWWTP with 2	Secondary treatment
<80% of an agglomeration treated in a UWWTP with 2	Partial secondary treatment
≥80% of an agglomeration treated in a UWWTP with 1	Primary treatment
<80% of an agglomeration treated in a UWWTP with 1	Partial primary treatment
Agglomeration treated in UWWTP with no treatment	No treatment

The following example illustrates this approach:

Example: Agglomeration 2:

50% collected and given primary treatment 10% collected and given secondary treatment 40% not collected / no treatment	→	Partial secondary treatment

[2] 1. Abwasseremissionsverordnung für kommunales Abwasser (BGBl 1996/210)

9. The emissions of BOD_5, COD, N_{tot} and P_{tot} were summarised for all treatment types in a country.
10. For all large agglomerations (≥100,000 PE) in a country, a more detailed analysis of the treatment levels was provided, in that the generated load (PE) treated in UWWTPs/NOWWTPs with different treatment levels was indicated.

3.3 Data evaluation for the Municipal Emission Inventory 2007: future scenarios for 2015

1. Most Non EU MS provided information on forecasted size and treatment of agglomerations or UWWTPs for the year 2015. For those UWWTPs where no information was available on agglomeration or UWWTP level, the size and treatment type available in the reference year 31/12/2005 or 31/12/2006 was taken into account.
2. The calculation of emissions for future scenarios was elaborated based on estimation coefficients (see chapter 3.2) and reduction efficiencies for the different types of wastewater treatment. In cases where the calculated emissions of an assumed "higher" treatment type exceeded the emissions reported for reference year 2005 or 2006, then the latter data were taken into account and not the calculated ones.

3.4 Presentation of results

The presentation of results was undertaken in the following way:

3.4.1 Presentation of the situation as of 31/12/2005 or 31/12/2006

For the presentation of the current situation regarding wastewater treatment, all agglomerations were attributed to the dominant treatment category according to the methodology described in chapter 3.2, point 8, and the emissions of BOD_5, COD, N_{tot} and P_{tot} were summarised for all pathways from the agglomeration (see Table 1).

Table 1: Example of the presentation of wastewater treatment (reference date 31/12/2005 or 31/12/2006)

Name of country	Number of agglomerations	generated load (PE)	Emissions BOD (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus other tertiary treatment*						
Collected plus tertiary treatment (3NP)	457	15,286,504	4629	24,434	6810	570
Collected plus tertiary treatment (3N)	10	87,450	31	206	55	19
Collected plus tertiary treatment (3P)	120	2,255,725	1023	4109	1952	114
Collected plus partial other tertiary treatment*						
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	25	619,378	489	1784	678	83
Collected plus partial secondary treatment						
Collected plus primary treatment						
Collected plus partial primary treatment						
Collection plus treatment - total	***612***	***18,249,057***	***6172***	***30,533***	***9495***	***786***
Collection and no treatment						
Not collected and not treated						
Total	**612**	**18,249,057**	**6172**	**30,534**	**9,496**	**786**

*Other more stringent treatment than N and/or P removal (e.g. chlorination, sand filtration, etc.)

The following example illustrates the methodology: 85% of agglomeration A (50,000 PE) was treated in a UWWTP with N and P removal, whereas the remaining fraction was discharged without treatment. Emissions of BOD_5 from the UWWTP providing N and P removal amounts to 9.8 t/a, whereas emissions from the fraction that is discharged without treatment amounts to 164 t/a. In the results table, agglomeration A is presented as follows:

	Number of agglomerations	generated load (PE)	Emissions BOD (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus more stringent treatment (3NP)	1	50,000	173.8			

It is always the highest treatment type that is considered in the results table (e.g. an agglomeration is treated by a UWWTP that provides primary and secondary treatment. The agglomeration is only counted once for secondary treatment and not for primary and secondary treatment).

3.4.2 Presentation of the situation for agglomerations ≥100,000 PE as at 31/12/2005 or 31/12/2006

To present the wastewater treatment situation for agglomerations ≥100,000 PE, the absolute PE amount entering the different wastewater pathways is depicted (see Figure 4).

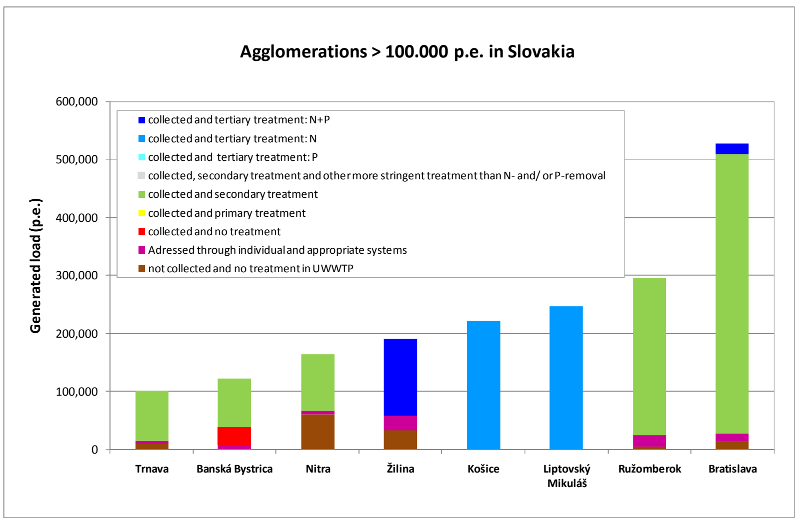


Figure 4: Example of the presentation of wastewater treatment in agglomerations ≥100,000 PE

3.4.3 Presentation of future scenarios for each country

For the presentation of future scenarios, the emissions to the environment from agglomerations ≥2000 PE are given separately for BOD_5, COD, N_{tot} and P_{tot}. For those countries that are using P-containing detergents in the reference year 2005/2006, an additional future scenario is presented involving the use of P-free detergents.

The figures (see example in Figure 5) represent the decrease in emissions due to improved wastewater treatment in 2015 in relation to the current situation (*reference scenario* = column 1). As it represents the *reference scenario*, the emissions reported for reference year 2005/2006 in column 1 always represent 100%. In each column, the emissions of BOD_5, COD, N_{tot} and P_{tot} are differentiated into emissions resulting from i) agglomerations where at least part of the generated load is collected in collecting systems (darker coloured parts of the columns), and ii) agglomerations where none of the generated load enters a collecting system (lighter coloured parts of the columns). The latter fraction reaches the environment as diffuse pollution and hence effects the aquatic environment of the DRB less directly than point sources. However, as the *agglomeration* including *all* generated loads represents the central concept of the Emission Inventory and as the collection of all wastewater in a collecting system is foreseen in Article 3 of Directive 91/271/EEC, this fraction is also presented in Figure 5.

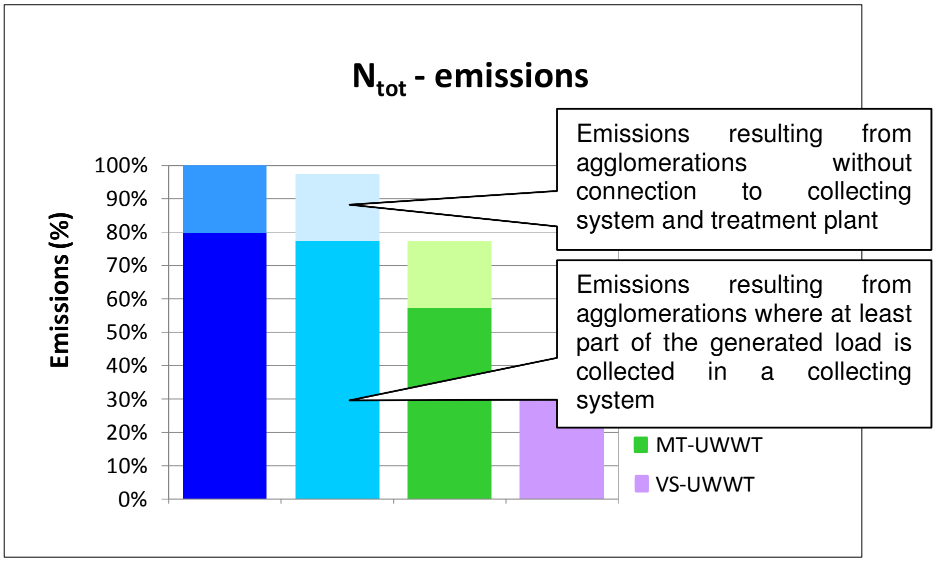


Figure 5: Example of the presentation of emissions under different scenarios

4. Results and conclusions

The results of the ICPDR Emission Inventory 2006/2007, as well as the future scenarios, are presented in the following way. Separated into agglomerations served by each different treatment type, Table 2 to Table 5 present the annual emissions of BOD_5, COD, N_{tot} and P_{tot} from DRB agglomerations ≥2000 PE under consideration of each of the different scenarios. (N.B. The agglomerations are always attributed to the highest level of treatment type available.) The tables give a rough overview of the present situation on wastewater treatment in the DRB, reflecting that in 2005/ 2006 there was still a high number of agglomerations ≥2000 PE which were neither connected to a collecting system nor to a sewage treatment plant. In Table 2 to Table 5, the entire agglomeration and all associated emissions are allocated to the highest treatment type available.

Figure 6 summarises the influence of the different scenarios on emissions of BOD_5, COD, N_{tot} and P_{tot}. As many countries were still using P-containing detergents in the reference year 2005/2006, two different approaches were laid down for calculating P-emissions from agglomerations: in the first approach, emissions of P_{tot} were based on estimation coefficients as presented in chapter 3.2, point 7; the second approach was based on the assumption that P-free detergents are used in the entire DRB.

All scenarios in Figure 6 differentiate between emissions originating from those agglomerations where at least part of the generated load is collected in collecting systems and emissions from agglomerations where the generated load is not collected in a collecting system. This differentiation was undertaken as emissions not yet collected in a collecting system do not directly enter surface waters. As they either drain into the ground or are used for agricultural purposes, they enter the aquatic environment mainly via groundwater. However, as the central object of the UWWT Directive is the agglomeration, emissions from the not collected fraction of wastewater were also considered in Figure 6.

Table 2: Reference scenario: wastewater treatment in agglomerations ≥2000 PE in the DRB and emissions of BOD_5, COD, N_{tot} and P_{tot} into the environment (reference date 31/12/2005 or 31/12/2006)

RefSit-UWWT	**Number of agglomerations**	**Generated load (PE)**	**Emissions BOD_5 (t/a)**	**Emissions COD (t/a)**	**Emissions N_{tot} (t/a)**	**Emissions P_{tot} (t/a)**
collected plus other tertiary treatment*	123	2,803,699	5,272	13,048	4,542	695
collected plus tertiary treatment (3NP)	1,007	31,508,769	15,860	70,240	20,606	1,941
collected plus tertiary treatment (3N)	172	2,760,176	2,639	10,720	2,796	618
collected plus tertiary treatment (3P)	217	4,562,463	2,634	11,559	5,221	329
collected plus partly other tertiary treatment*						
collected plus partially tertiary treatment (3NP)	68	1,264,228	5,620	12,744	2,388	427
collected plus partially tertiary treatment (3N)	49	270,230	2,487	4,922	530	102
collected plus partially tertiary treatment (3P)	5	17,178	133	264	31	6
collected plus secondary treatment	486	13,132,976	50,117	119,345	20,876	3,827
collected plus partially secondary treatment	420	8,086,726	103,703	188,746	19,713	3,342
collected plus primary treatment	24	529,721	3,093	9,946	1,423	192
collected plus partially primary treatment	129	3,310,190	33,841	76,726	6,347	1,653
collected and treatment - total	***2,700***	***68,246,355***	***225,398***	***518,258***	***84,472***	***13,132***
collected and no treatment	613	14,587,070	253,447	519,455	45,584	8,719
not collected and not treated	2,911	11,897,637	258,503	473,710	37,932	6,776
Total	**6,224**	**94,731,062**	**737,348**	**1,511,423**	**167,988**	**28,627**

*Other more stringent treatment than N and/or P removal (e.g. chlorination, sand filtration, etc.)

As can be seen from Table 2, 6,224 agglomerations ≥2000 PE were reported for the reference date 2005/2006 in the DRB. Of these, 4,969 agglomerations (21,137,842 PE) are of the size class 2000 PE–10,000 PE and 1,255 agglomerations (73,593,220 PE) are >10,000 PE There are 137 agglomerations with a size ≥100,000 PE, which produce about 46% of the total generated wastewater.

The considerable number of 2,911 agglomerations, reflecting around 13% of the total generated load, is not connected to either a collecting system or treatment plant. The generated load of agglomerations where wastewater is collected in collecting systems but discharged without treatment amounts to approximately 15% of the total generated load. These two fractions result in the highest emissions of BOD_5, COD, N_{tot} and P_{tot}, contributing around 69% of BOD_5, 66% of COD, 50% of N_{tot} and 54% of P_{tot}.

Of the 137 agglomerations ≥100,000 PE (43,621,842 PE), 21 agglomerations (reflecting 21% of the generated load) had no wastewater treatment.

Table 3: Baseline scenario: wastewater treatment in agglomerations ≥2000 PE in the DRB and emissions of BOD_5, COD, N_{tot} and P_{tot} into the environment for 2015

BS-UWWT 2015	**Number of agglomerations**	**Generated load (PE)**	**Emissions BOD_5 (t/a)**	**Emissions COD (t/a)**	**Emissions N_{tot} (t/a)**	**Emissions P_{tot} (t/a)**	**Emissions P_{tot} - 1,5 g P/d (t/a)**
collected and other tertiary treatment*	122	1.970.348	4.545	9.411	2.602	573	531
collected and tertiary treatment (3NP)	1.447	61.419.401	46.596	228.969	47.570	5.181	4.876
collected and tertiary treatment (3N)	163	1.607.348	1.081	4.303	1.178	356	348
collected and tertiary treatment (3P)	206	3.024.228	1.920	7.755	3.332	230	208
collected and partly other tertiary treatment*	0						
collected and partially tertiary treatment (3NP)	58	923.284	5.180	9.829	1.759	524	337
collected and partially tertiary treatment (3N)	45	281.663	3.072	5.989	589	149	124
collected and partially tertiary treatment (3P)	5	17.178	51	127	28	4	4
collected and secondary treatment	2.389	14.910.630	82.573	133.811	28.402	6.271	5.987
collected and partially secondary treatment	20	443.874	6.779	13.357	1.264	279	210
collected and primary treatment	3	104.565	747	1.362	269	55	57
collected and partially primary treatment	27	271.646	4.255	8.688	777	181	135
collected and treatment - total	***4.485***	***84.974.165***	***156.800***	***423.601***	***87.769***	***13.802***	***12.817***
collected and no treatment	259	5.430.456	119.932	240.038	19.454	3.712	2.969
not collected and not treated	1.468	4.504.780	98.227	180.083	14.407	2.784	2.454
Total	**6.212**	**94.909.402**	**374.959**	**843.722**	**121.629**	**20.298**	**18.240**

*Other more stringent treatment than N and/or P removal (e.g. chlorination, sand filtration, etc.)

The *baseline scenario* (Table 3) describes the agreed measures for the first cycle of implementation of the WFD on the basin-wide scale until 2015. For the EU MS, it was assumed that Directive 91/271/EEC is implemented in the countries, as far as foreseen by the final deadlines or transitional periods for implementation. For the Non EU MS, improvements in wastewater treatment in committed UWWTPs were taken into account. Several countries indicated that in 2015 the number of agglomerations and/or the generated load of agglomerations will change, which is clear when comparing Table 2 and Table 3.

Compared to the *reference situation*, implementation of the *baseline scenario* would require the upgrade of wastewater treatment of 444 agglomerations (29,842,478 PE) in order to provide N and P removal for the entire generated load and the establishment of secondary treatment for 1997 agglomerations (11,647,840 PE) that are not served by any wastewater treatment, (partial) primary or (partial) secondary treatment in the reference years 2005/2006.

The *baseline scenario* implies that 1445 agglomerations (covering around 8% of the total generated load in 2015) that had not been connected to a collecting system in reference year 2005/2006, will be

equipped with a collecting system, which means that the load entering wastewater treatment plants will significantly increase. In order to avoid a deterioration of the actual situation, it is therefore required to combine the establishment of collecting systems with the establishment of wastewater treatment plants, as shown in the *baseline scenario*.

However, under the *baseline scenario* there will still be a considerable number of agglomerations for which no collecting system is in place for the entire generated load (including 10 agglomerations with a size >10,000 PE) and also for which a collecting system but no wastewater treatment is available for the entire generated load (including 77 agglomerations >10,000 PE).

The improvement in wastewater treatment results in a clear shift in the relevance of the wastewater fraction not connected to collecting systems and/or wastewater treatment plants. In contrast to the *reference scenario*, only 58% of total BOD_5 emissions, 50% of total COD emissions, 28% of total N_{tot}emissions and 32% of total P_{tot} emissions originate from this fraction.

Table 4: Midterm scenario: wastewater treatment in agglomerations ≥2000 PE in the DRB and emissions of BOD_5, COD, N_{tot} and P_{tot} into the environment in 2015

MT-UWWT	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)	Emissions P_{tot} - 1,5 g P/d (t/a)
collected and other tertiary treatment*	122	1.970.348	4.545	9.411	2.602	573	531
collected and tertiary treatment (3NP)	1.455	62.290.622	47.545	233.897	48.544	5.309	4.970
collected and tertiary treatment (3N)	163	1.607.348	1.081	4.303	1.178	356	348
collected and tertiary treatment (3P)	358	10.799.100	10.068	52.377	18.911	1.278	1.049
collected and partly other tertiary treatment*	0						
collected and partially tertiary treatment (3NP)	51	177.063	651	1.421	235	46	46
collected and partially tertiary treatment (3N)	44	156.663	439	1.141	198	56	56
collected and partially tertiary treatment (3P)	5	17.178	51	127	28	4	4
collected and secondary treatment	2.350	12.547.064	70.047	112.596	24.038	5.097	4.952
collected and partially secondary treatment	6	34.891	305	578	75	16	12
collected and primary treatment	0	0	0	0	0	0	0
collected and partially primary treatment	18	99.871	1.732	3.481	281	69	50
collected and treatment - total	***4.572***	***89.700.148***	***136.464***	***419.332***	***96.091***	***12.805***	***12.019***
collected and no treatment	182	857.261	21.970	41.030	3.518	714	465
not collected and not treated	1.458	4.351.993	94.881	173.948	13.916	2.680	1.131
Total	**6.212**	**94.909.402**	**253.315**	**634.311**	**113.525**	**16.199**	**13.615**

*Other more stringent treatment than N and/or P removal (e.g. chlorination, sand filtration, etc.)

The *midterm scenario* (Table 3) reflects the situation where - in addition to the *baseline scenario* - P removal is supplied for all agglomerations >10,000 PE in the Non EU MS. Compared to the *baseline scenario*, implementation of this scenario would require the upgrade of wastewater treatment for an additional 152 agglomerations (7,774,872 PE) in order to provide P removal for the entire generated load and also provision of N and P removal for the entire generated load of 8 agglomerations (871,221 PE). The wastewater fraction not connected to collecting systems and/or wastewater treatment plants only amounts to 46% of BOD_5 loads, 34% of COD loads, 15% of N_{tot} loads and 21% of P_{tot} loads.

Finally, the *vision scenario* (Table 5) aims to present the results of the full use of the technical potential for wastewater treatment concerning the removal efficiencies of nutrients and goes beyond the treatment requirements for implementation of Directive 91/271/EEC. Compared to the *midterm scenario*, implementation of the *vision scenario* would require the establishment of N and P removal for the entire generated load of the 308 agglomerations (14,188,970 PE) that were considered with

secondary treatment, N removal or P removal in the *midterm scenario*, and the provision of secondary treatment in 1664 agglomerations (5,344,016 PE).

Table 5: Vision scenario: wastewater treatment in agglomerations ≥2000 PE in the DRB and emissions of BOD_5, COD, N_{tot} and P_{tot} into the environment in 2015

VS-UWWT	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)	Emissions P_{tot} - 1,5 g P/d (t/a)
collected and other tertiary treatment*	71	364.092	756	1.605	480	109	92
collected and tertiary treatment (3NP)	1.763	76.479.592	60.122	297.351	60.447	6.949	6.359
collected and tertiary treatment (3N)	141	606.321	560	1.886	497	171	168
collected and tertiary treatment (3P)	157	707.306	548	2.426	999	91	71
collected and partly other tertiary treatment*	0						
collected and partially tertiary treatment (3NP)	51	177.063	651	1.421	235	46	46
collected and partially tertiary treatment (3N)	44	156.663	439	1.141	198	56	56
collected and partially tertiary treatment (3P)	5	17.178	51	127	28	4	4
collected and secondary treatment	3.980	16.401.187	101.193	158.573	33.382	7.417	6.924
collected and partially secondary treatment	0	0	0	0	0	0	0
collected and primary treatment	0	0	0	0	0	0	0
collected and partially primary treatment	0	0	0	0	0	0	0
collected and treatment - total	***6.212***	***94.909.402***	***164.319***	***464.529***	***96.266***	***14.844***	***13.720***
collected and no treatment	0	0	0	0	0	0	0
not collected and not treated	0	0	0	0	0	0	0
Total	**6.212**	**94.909.402**	**164.319**	**464.529**	**96.266**	**14.844**	**13.720**

*Other more stringent treatment than N and/or P removal (e.g. chlorination, sand filtration, etc.)

The effects of the implementation of the different future scenarios is also clear in Figure 6. Under consideration of the *baseline scenario* emissions of BOD_5 could be reduced by 49% and emissions of COD by around 44%. For N_{tot}, a reduction of 28% could be achieved and the reduction of P_{tot} emissions would amount to 29%. When additionally taking into consideration the use of P-free detergents in the entire DRB, the reduction of P_{tot} emissions would increase to 36%.

Compared to the *reference scenario*, implementation of the *midterm scenario* would decrease the emissions of BOD_5 by 66%, COD by 58%, N_{tot} by 32% and P_{tot} by 43%. Under the assumption of the use of P-free detergents in the entire DRB, the *midterm scenario* would decrease P_{tot} emissions by 52%.

Compared to the *reference scenario*, establishing the *vision scenario* would reduce the emissions of BOD_5 and COD by 78% and 69%, respectively. Furthermore, emissions for N_{tot} would be reduced by 43% and the emissions of P_{tot} by around 48%. The stringent use of P-free detergents would decrease emissions of P_{tot} by 52% in the DRB.

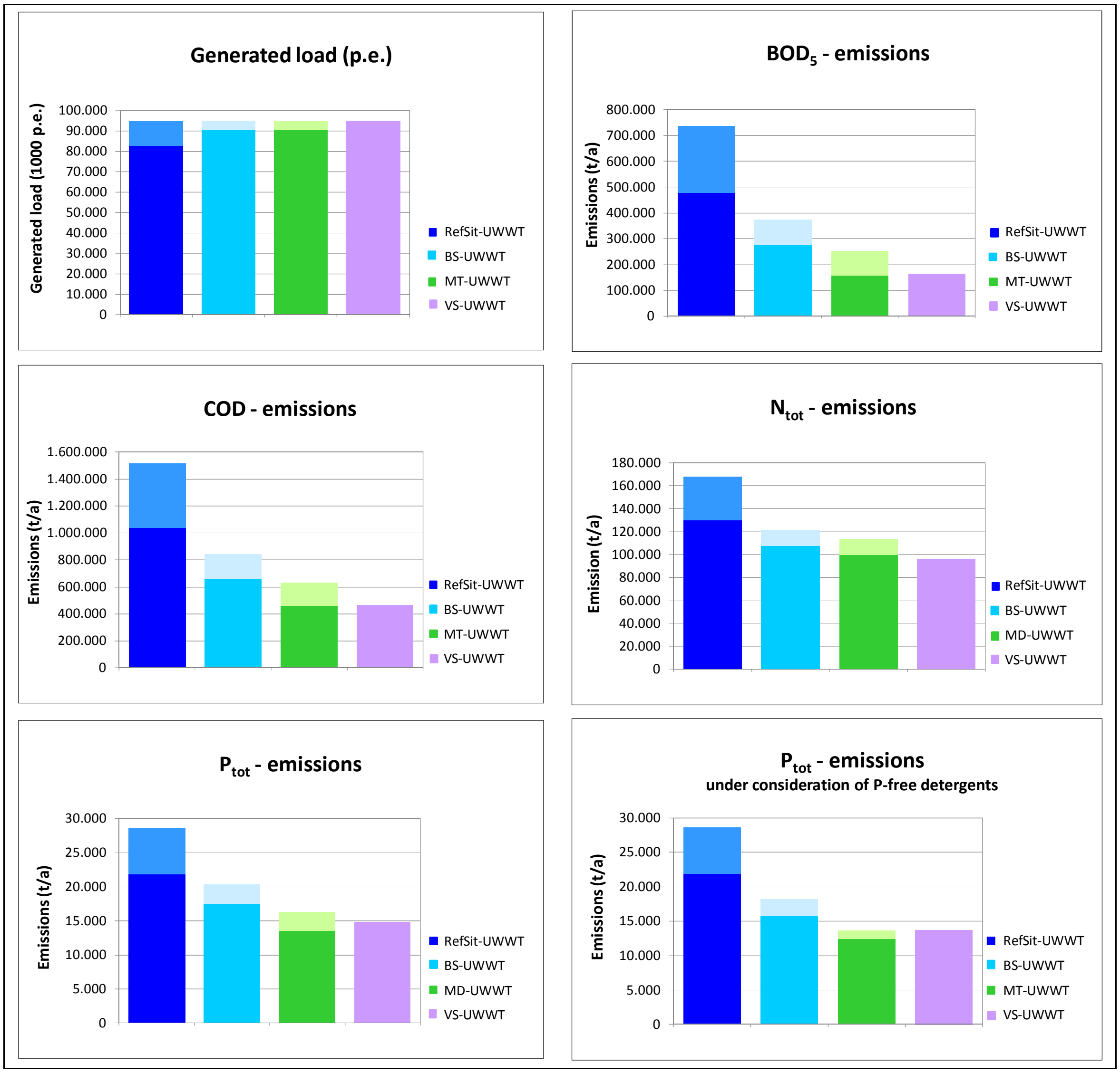


Figure 6: Emissions (t/a) of BOD_5, COD, N_{tot} and P_{tot} under different scenarios

In 2006, the structure of the ICPDR Emission Inventory was modified to become consistent with the reporting requirements under Article 15 of the UWWT Directive. This approach was chosen in order to ease the work load under different reporting exercises and to obtain one homogenous picture and dataset concerning wastewater treatment in the DRB. However, for a few countries, the dataset delivered under the EMIS 2006/2007 differed from information reported in the year 2007 under Article 15 of the UWWT Directive, mainly concerning the size of agglomerations. As both data collections were elaborated for the first time in 2007/2008, it is assumed that this difficulty will be overcome during subsequent data collections.

The size of the agglomeration as the "new" core element of the data collection should be defined in a way that is independent from the existence of a collecting system / wastewater treatment plant. In the future, the definition of the size of the agglomeration should be similar in the DRB to ensure the comparability of data. The document "Terms and Definitions of the Urban Waste Water Treatment Directive (91/271/EEC)"[3] could provide guidance on the definition of agglomerations.

Considerable differences in the emissions from single countries may result from the different national approaches to provide data in the EMIS templates. The parameter on the percentage of generated load collected in a collecting system was interpreted in various ways, which may lead to an artificially different result for two countries with similar situations regarding wastewater treatment. It is assumed

3 http://circa.europa.eu/Members/irc/env/wfd/library?l=/working_groups/u-uwwtd-rep/02-meetings&vm=detailed&sb=Title

that the provision of information will be harmonised by countries in the framework of future emission inventories.

The results of the current report may differ from national computations of emissions / discharged loads for BOD_5, COD, N_{tot} or P_{tot} in national River Basin Plans elaborated under Article 13 of the WFD (European Commission, 2009). The reason for these discrepancies is the use of different estimation coefficients and also the fact that countries considered direct discharge loads into surface water instead of emissions from the entire agglomeration into the environment. For this reason, the results of this report cannot be directly compared with the results of national computation.

Once again, it should be stressed that the provision of a sound, homogenous and complete dataset from the countries is a crucial prerequisite for the results elaborated under the different scenarios. In the cases where emissions are not measured for a particular treatment plant, these figures should be estimated by national experts and country–specific coefficients in order to reflect the specific situation in the countries in the most realistic way. Particularly in those cases where emissions for one parameter (e.g. BOD_5) were frequently given for UWWTPs, whereas emissions for another parameter (e.g. N_{tot}) had to be estimated during data evaluation, the *baseline scenarios* may give different trends for the future developments.

5. Literature

ATV (2004). Verfahren zur Elimination von Phosphor aus Abwasser. [Methods for Phosphorus Removal from Wastewater]. Abwassertechnische Vereinigung e.V. (ATV), Arbeitsblatt A 202

ATV (2000). Bemessung von einstufigen Belebungsanlagen ab 5.000 Einwohnerwerten. [Dimensioning of Single-stage Activated Sludge Plants ≥ 5.000 PE]. Abwassertechnische Vereinigung e.V. (ATV), Arbeitsblatt A 131

Austrian Wastewater Emission Ordinance for Urban Wastewater [1. Abwasseremissionsverordnung für kommunales Abwasser (BGBl 1996/210)]

European Commission (1991). Council Directive concerning Urban Wastewater Treatment (91/271/EEC), Brussels, 1991

European Commission (2009). Draft River Basin Management Plans. Plans and related documents available at: http://ec.europa.eu/environment/water/participation/map_mc/map.htm

ICPDR (International Commission for the Protection of the Danube River) (1994). Convention on Co-operation for the Protection and Sustainable Use of the River Danube (Danube River Protection Convention), 29 June 1994, Sofia (available at http://www.icpdr.org/icpdr-pages/drpc.htm)

ICPDR (International Commission for the Protection of the Danube River) (2000). Emission Inventories, Pressures and Measures Expert Group data/ reports available at: http://danubis.icpdr.org/pls/danubis/DANUBIS_DB.DYN_NAVIGATOR.show

Van Gils, J., Behrendt, H., Constantinescu, A., Iskermann, K., Iskermann, R., Zessner, M. (2005). Assessment Results for Scenarios, Deliverable D5.12 of the Project “Nutrient Management in the Danube Basin and its Impact on the Black Sea” (daNUbs) supported under contract EVK1-CT-2000-00051 by the Energy, Environment and Sustainable Development (EESD) Programme of the 5th EU Framework Programme in: Kroiss, H., Zessner, M., Lampert, C. (2008). The Importance of Phosphorus in Residential Water Management as demonstrated in the Danube Basin. Österreichische Wasser- und Abfallwirtschaft, Heft 3 – 4, März/ April 2008

Zessner, M.; Lindtner, S. (2005). Estimation of Municipal Point Source Pollution in the Context of River Basin Management. Water Sci technol. 52(9), 175 – 182

6. Annex: Detailed evaluation for each country

6.1 Germany

6.1.1 General information about the data evaluation

- In the framework of the ICPDR Emission Inventory 2007, two datasets from Germany were considered for the data evaluation: Baden-Württemberg had already reported data on all agglomerations ≥2000 PE in EMIS 2006. As no update of information was delivered under EMIS 2007, this dataset was considered for data evaluation. Bavaria provided updated information on all agglomerations ≥2000 PE in the context of EMIS 2007. The reference date of both datasets was 31/12/2005.
- As a Member State of the European Union, Germany applies Art. 5(2,3) of the UWWT Directive. In July 1991, Germany designated the entire drainage area of the North Sea and Baltic Sea as a *sensitive area*, applying Article 5(4) of the Directive in both *sensitive areas* from January 1999 onwards. Concerning water bodies in the Danube catchment, Bavaria designated the important Bavarian lakes (and their catchments) as *sensitive areas* in an August 1992. Since the Danube infiltrates to a considerable degree at the city of Fridingen, (the water eventually flowing via Lake Constance to the North Sea), Baden-Wuerttemberg designated the respective uppermost Danube stretch and its catchment as sensitive in a December 1993 Act. In all the cases addressed above, the designation criterion of *eutrophication* was applied.
- In September 2007, Germany applied Art. 5(8) of the UWWT Directive because it was shown that, from 2005 onwards, the minimum percentage reduction of overall load entering all UWWTPs was at least 75% for total P and total N.
- In the DRB of Germany, one agglomeration is served by one UWWTP / collecting system without treatment, so the ratio [agglomeration : UWWTP] = [1 : 1] was used.

6.1.2 Country specific considerations for data evaluation

- 15 agglomerations were reported with a generated load of less than 2000 PE: DE_AG_BW_1355100000046, DE_AG_BW_1355100000048, DE_AG_BW_1355100000062, DE_AG_BW_1365100000085, DE_AG_BW_1365100000095, DE_AG_BW_1365100000123, DE_AG_BW_1365100000131, DE_AG_BW_4155100000030, DE_AG_BW_4175100000022, DE_AG_BW_4255100000002, DE_AG_BW_4255100000007, DE_AG_BW_4255100000020, DE_AG_BW_4375100000031, DE_AG_BW_4375100000040 and DE_AG_BW_4375100000044). In order to be consistent with the threshold value of agglomerations under EMIS 2007, these agglomerations were not considered in the data evaluation.
- Coordinates of agglomerations, UWWTPs and discharge points from Baden-Württemberg were not reported in the correct format (ETRS89). Hence coordinates reported under Art. 15 of the UWWT Directive Questionnaire 2007) were taken into account.

6.1.3 Results of data evaluation for the situation as of 31/12/2005

Germany reported 681 agglomerations ≥2000 PE for the reference year 2005, of which 469 agglomerations (2,111,608 PE) were ≤10,000 PE and 212 agglomerations (10,364,084 PE) were >10,000 PE. In the reference year 2005, 99.9% of the generated load of 212 agglomerations >10,000 PE were already served by UWWTPs with more stringent treatment (84.2% with 3NP, 15.5% with 3P and 0.2% with 3N). All agglomerations with a size of ≥2000 PE–10,000 PE were reported to be served by at least secondary treatment.

In September 2007, Germany applied Art. 5 (8) of the UWWT Directive because it was shown that, from 2005 onwards, the minimum percentage reduction of the overall load entering all UWWTPs was at least 75% for total P and total N. This means that for the reference year 2005, Germany is in full compliance with Directive 91/271/EEC.

Table 6: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the German part of the DRB

Germany	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus tertiary treatment (3NP)	354	9,665,030	4297	23,187	8708	624
Collected plus tertiary treatment (3N)	93	377,053	272	1067	321	106
Collected plus tertiary treatment (3P)	69	1,877,138	869	5057	2488	143
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	165	556,471	507	2382	792	161
Collected plus partial secondary treatment						
Collected plus primary treatment						
Collected plus partial primary treatment						
Collection and treatment - total	***681***	***12,475,692***	***5946***	***31,693***	***12,308***	***1034***
Collected and no treatment						
Not collected and not treated						
Total	**681**	**12,475,692**	**5946**	**31,693**	**12,308**	**1034**

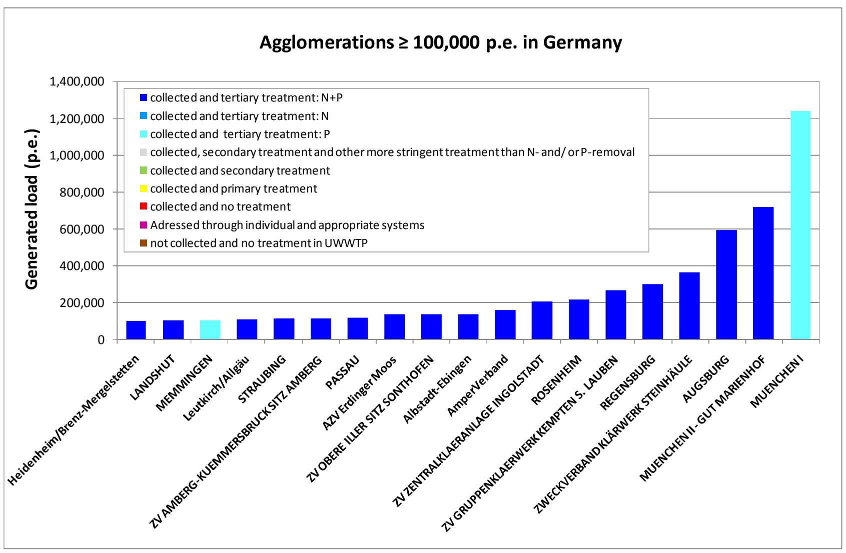


Figure 7: Wastewater treatment in agglomerations ≥100,000 PE in the German part of the DRB

6.1.4 Outlook for wastewater treatment in Germany until 2015

Germany applies Article 5(8) and - for a part of the Danube catchment - Article 5(4) of Directive 91/271/EEC and was in full compliance with the Directive in the reference year 2005. Implementation of the *baseline scenario* would hence require no need for further improvement of wastewater treatment. However, Germany indicated that by 2015, several modifications concerning wastewater treatment are planned. In this context it needs to be stressed that "planned" does not necessarily mean that a decision to upgrade an UWWTP has already been made. For this reason, only the upgrades of 8 wastewater treatment plants were considered, for which it was indicated that the up-

grade had already been finalised in 2005 or will be finalised by 2009 (Feuchtwangen, Simbach/Inn, Memmingen, Babenhausen, Bad Abbach, Dingolfing, München I and Peissenberg).

German authorities further indicated that 13 agglomerations will be merged with other agglomerations by 2015 (Muhr am See, Hunderdorf, Ortenburg, ZV Burtenbach-Muensterhausen S. Burtenba, Illertissen Ot Tiefenbach, Durach, Ainring, Gerstetten, Gerstetten-Dettingen, Herbrechtingen, Steinheim-Söhnstetten, Nereheim-Tiefes Tal and Neufra). For this reason, these agglomerations are no longer considered in future scenarios. At the same time, it was indicated that the size of 33 agglomerations is expected to increase by 2015, which was also taken into account for all future scenarios.

For Germany, the implementation of the *midterm scenario* is identical to the *baseline scenario*.

The *vision scenario* aims at making use of the full technical potential of wastewater treatment as concerns the removal efficiencies of nutrients, even when Directive 91/271/EEC does not require stricter standards than reflected in the *baseline scenario*. This means that the *vision scenario* goes beyond the requirements of Directive 91/271/EEC. Accordingly, it was assumed in this scenario that all agglomerations >10,000 PE are treated by N and P removal, and agglomerations ≥2000 PE-≤10,000 PE are served by at least secondary treatment. For Germany, implementation of the *vision scenario* would require an upgrade of the wastewater treatment of one agglomeration (10,030 PE) served by secondary treatment in 2005, two agglomerations (21,250 PE) served by N removal in 2005 and 11 agglomerations served by P removal in 2005, in order to provide N and P removal.

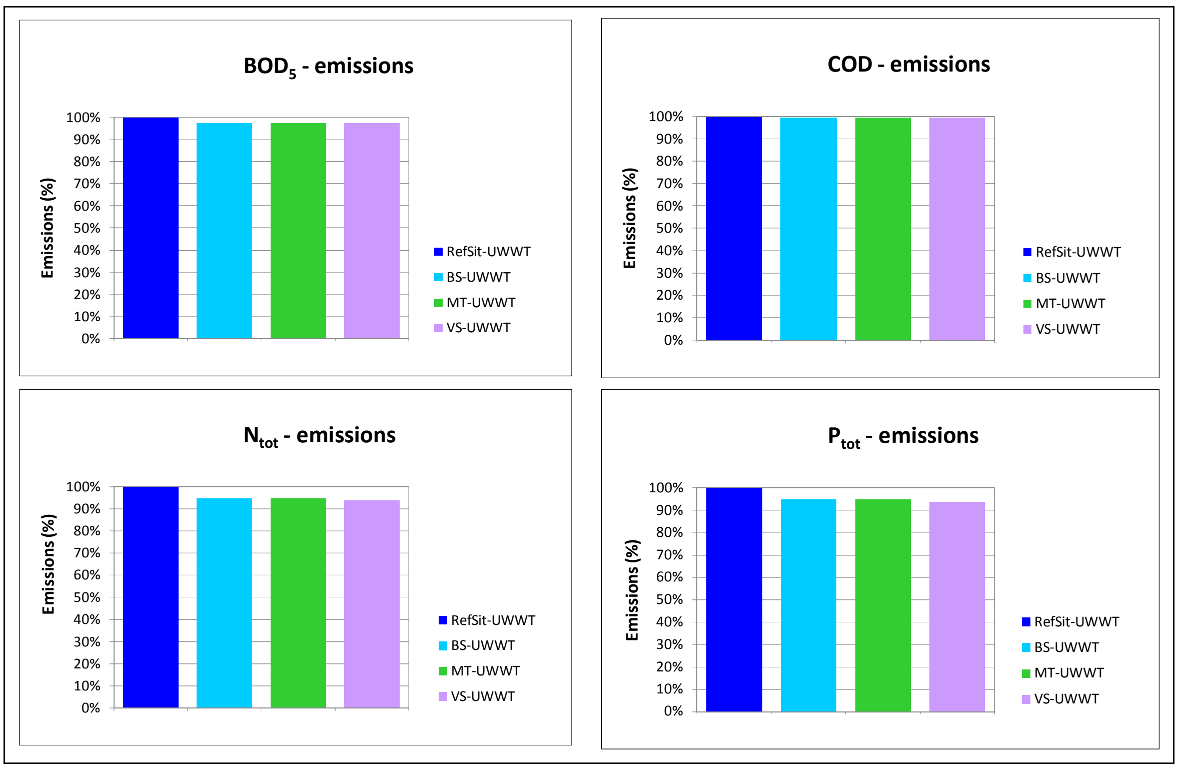


Figure 8: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.2 Austria

6.2.1 General information about the data evaluation

- In 2007, Austria reported information on all agglomerations ≥2000 PE with the reference date 31/12/2006 for the ICPDR Emission Inventory 2007. The data delivery included an update of information on agglomerations >10,000 PE.
- As an EU MS, Austria applies Article 5(8) and Article 5(4) of the UWWT Directive (91/271/EEC). This means that the minimum percentage reduction of the overall load entering all UWWTPs in the entire country has to be at least 75% for total P and at least 75% for total N.
- In Austria, one agglomeration is served by one UWWTP / collecting system without treatment which means that the ratio [agglomeration : UWWTP] = [1 : 1] is used.

6.2.2 Results of data evaluation for the situation as of 31/12/2006

As can be seen from Table 7, Austria reported 612 agglomerations ≥2000 PE for the reference year 2006. Of these, 370 agglomerations (1,749,396 PE) were in the class ≤10,000 PE and 242 agglomerations (16,499,661 PE) were in the class >10,000 PE. A high fraction of the total generated load was already treated by N and P removal (84%), N removal (0.5%) or P removal (12%) in 2006.

As an EU MS, Austria applies Article 5(8) and Article 5(4) of the UWWT Directive. For the reference year 31/12/2006, the percentage reduction of the overall load entering all UWWTPs >50 PE in Austria was 77% for total N and 88% for total P, which means that Directive 91/271/EEC was fully implemented in the reference year 2006. In the DRB of Austria (which covers 96% of the area of Austria), the percentage reduction also amounted to 77% for total N and 88% for total P as well[4].

Table 7: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD_5, COD, N_{tot} and P_{tot} into the environment in the Austrian part of the DRB

Austria	**Number of agglomerations**	**Generated load (PE)**	**Emissions BOD_5 (t/a)**	**Emissions COD (t/a)**	**Emissions N_{tot} (t/a)**	**Emissions P_{tot} (t/a)**
Collected plus tertiary treatment (3NP)	457	15,286,504	4629	24,434	6810	570
Collected plus tertiary treatment (3N)	10	87,450	31	206	55	19
Collected plus tertiary treatment (3P)	120	2,255,725	1023	4109	1952	114
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	25	619,378	489	1784	678	83
Collected plus partial secondary treatment						
Collected plus primary treatment						
Collected plus partial primary treatment						
Collection and treatment - total	***612***	***18,249,057***	***6172***	***30,534***	***9496***	***786***
Collected and no treatment						
Not collected and not treated						
Total	**612**	**18,249,057**	**6172**	**30,534**	**9496**	**786**

4 BMLFUW, 2008. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft. Kommunale Abwasserrichtlinie der EU -91/271/EWG Österreichischer Bericht 2008 [Federal Ministry of Agriculture, Forestry, Environment and Water Management, Situation Report on the disposal on urban wastewater and sludge 2008].

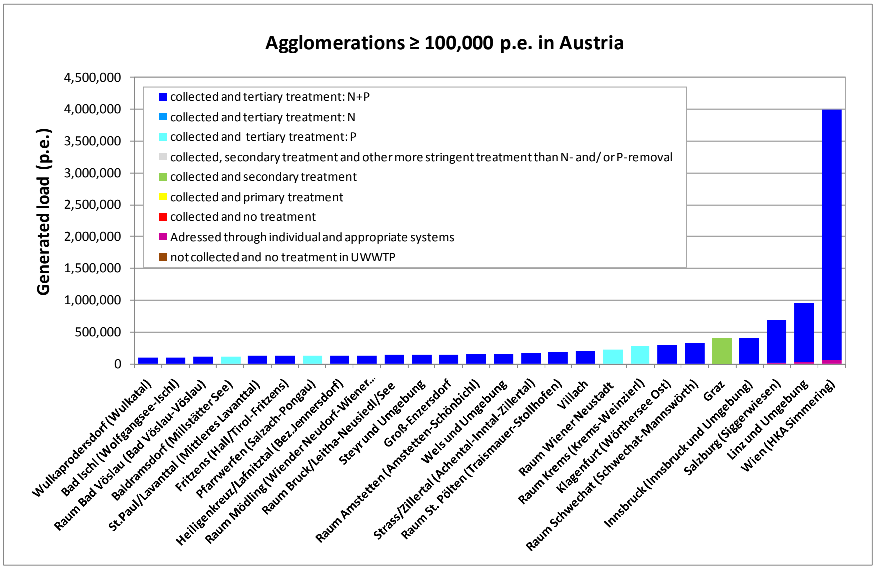
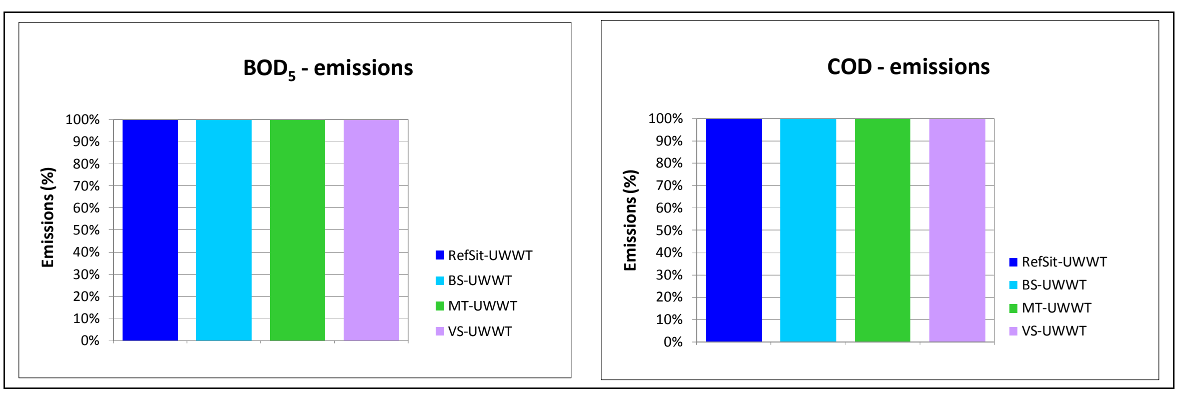


Figure 9: Wastewater treatment in agglomerations ≥100,000 PE in the Austrian part of the DRB

6.2.3 Outlook for wastewater treatment in Austria until 2015

Applying Article 5(8) and 5(4) of Directive 91/271/EEC, Austria already complies with the UWWT Directive in the reference year 2006. However, some wastewater treatment plants are still expected to be upgraded by 2015. Although no detailed information on forecasted wastewater treatment in 2015 was available at the agglomeration-level, the upgrade in wastewater treatment for the agglomeration Graz (400,000 PE) to N and P removal, which took place in 2007, was taken into consideration for the *baseline scenario* and the *midterm scenario*. Accordingly, emissions of N_{tot} and P_{tot} are expected to decrease slightly under both scenarios.

The *vision scenario* aims at making use of the full technical potential of wastewater treatment as concerns the removal efficiencies of nutrients, even though Directive 91/271/EEC does not require stricter standards than reflected in the *baseline scenario*. This means that the *vision scenario* goes beyond the requirements of Directive 91/271/EEC. Accordingly, under the *vision scenario*, it was assumed that all agglomerations >10,000 PE are treated with N and P removal, and agglomerations ≥2000 PE-≤10,000 PE are served by at least secondary treatment. For Austria, implementation of the *vision scenario* would require an upgrade of the wastewater treatment of 7 agglomerations (546,500 PE) reported to have secondary treatment in 2006, to N and P removal. Furthermore, the *vision scenario* would require that three agglomerations (51,500 PE) additionally establish P removal at their wastewater treatment plants and that 37 agglomerations (1,907,970 PE) additional remove N.



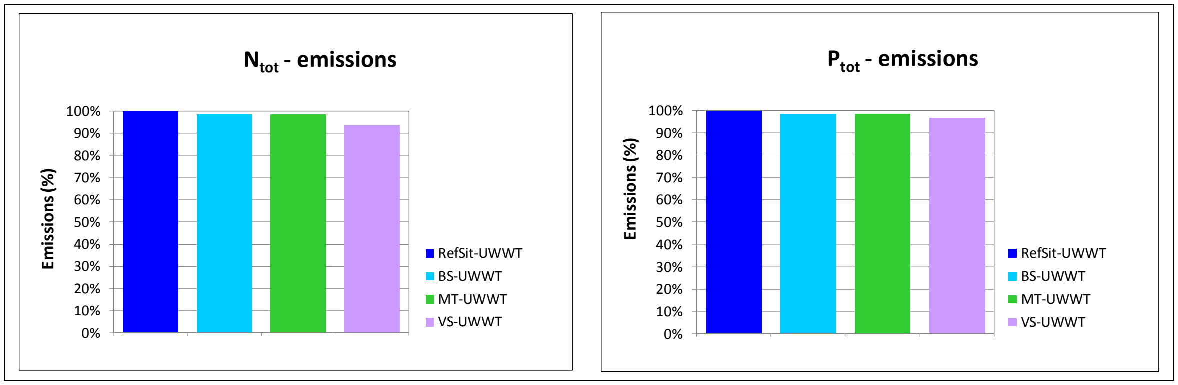


Figure 10: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.3 Czech Republic

6.3.1 General information about the data evaluation

- In the framework of the ICPDR Emission Inventory 2007, the Czech Republic reported information on all agglomerations ≥2000 PE–10,000 PE and an update on information for agglomerations >10,000 PE with the reference date 31/12/2005. In July 2008, the dataset for agglomerations ≥2000 PE–10,000 PE was updated once more.
- As an EU MS, the Czech Republic has designated its entire area as one *sensitive area* under Article 5(4) of the UWWT Directive (91/271/EEC). This means that the minimum percentage reduction of the overall load entering all UWWTPs in the entire country has to be at least 75% for total P and at least 75% for total N.
- In the Czech Republic, one agglomeration can be served by one or more UWWTP / collecting system without treatment, while at the same time one UWWTP can serve more than one agglomeration. This means that the ratio [agglomeration : UWWTP] = [m : n] is used.

6.3.2 Country specific considerations for data evaluation

- For one agglomeration (CZ_AG_124, Olsany), no link to a UWWTP / collecting system without treatment was reported as the agglomeration is connected to an industrial WWTP. For the purpose of this data evaluation, emissions were calculated under consideration that 99% of the generated load of the agglomeration is connected to a treatment plant providing more stringent treatment with N and P removal.
- In the template “UWWTPAgglo”, several agglomerations were listed but not linked to any UWWTP / collecting system without treatment. In order to establish the full linkage from agglomeration to UWWTP / collecting system without treatment to discharge point, new IDs were assigned by the Umweltbundesamt Vienna.
- Information about the percentage of the generated load collected in a collecting system was only reported for some agglomerations. In cases where this parameter was not reported, but the parameter “% of generated load collected but discharged without treatment” was given, this parameter was taken into account. In cases where no information was given, it was assumed that 75% of the generated load of this agglomeration is connected to a UWWTP / collecting system without treatment.
- Some UWWTPs / collecting systems without treatment were reported to be connected to different agglomerations (of various size classes). In cases where one UWWTP was connected to an agglomeration >10,000 PE and at the same time to an agglomeration ≥2000 PE–10,000 PE, discharged loads (resulting from all connected agglomerations) were sometimes reported twice. In order to avoid double-counting, the discharged loads were reallocated to the different agglomerations.

6.3.3 Results of data evaluation for the situation as of 31/12/2005

As can be seen from Table 8, the Czech Republic reported 237 agglomerations ≥2000 PE for the reference year 2005. Of these, 188 agglomerations (655,006 PE) were classed ≤10,000 PE and 49 agglomerations (2,076,094 PE) were classed >10,000 PE.

Only a small number of agglomerations (19 agglomerations, representing 1.7% of the total generated load) was reported to have a collecting system but no wastewater treatment plant. The majority of agglomerations (or at least parts of them) are already served by wastewater treatment plants providing various treatment levels. The main fraction of the total generated load in PE (around 73%) originates from agglomerations where either N removal, P removal or N and P removal is in place for major parts (at least 80% of the generated load of the agglomeration).

Table 8: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the Czech part of the DRB

Czech Republic	Number of agglomerations	generated load (p.e.)	Emissions BOD (t/a)	Emissions COD (t/a)	Emissions Ntot (t/a)	Emissions Ptot (t/a)
collected plus tertiary treatment (3NP)	37	1.740.952	2.066	6.269	1.205	136
collected plus tertiary treatment (3N)	13	71.839	203	492	92	23
collected plus tertiary treatment (3P)	10	178.566	515	1.283	313	29
collected plus partially tertiary treatment (3NP)	37	155.251	949	1.919	210	40
collected plus partially tertiary treatment (3N)	34	113.967	715	1.453	185	41
collected plus partially tertiary treatment (3P)	4	14.788	103	209	24	5
collected plus secondary treatment	31	225.066	491	1.311	342	59
collected plus partially secondary treatment	52	183.514	1.164	2.347	337	60
collected plus primary treatment						
collected plus partially primary treatment						
collected and treatment - total	***218***	***2.683.943***	***6.206***	***15.284***	***2.708***	***392***
collected and no treatment	19	47.157	945	1.734	141	27
not collected and not treated						
Total	**237**	**2.731.100**	**7.150**	**17.018**	**2.849**	**419**

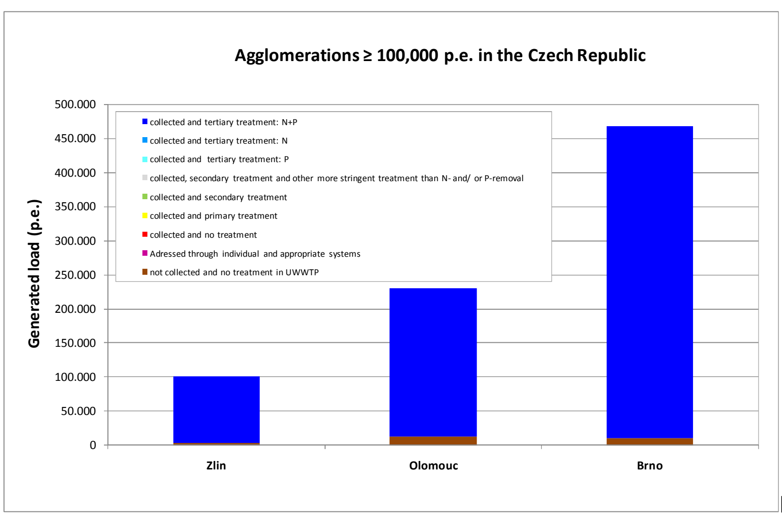


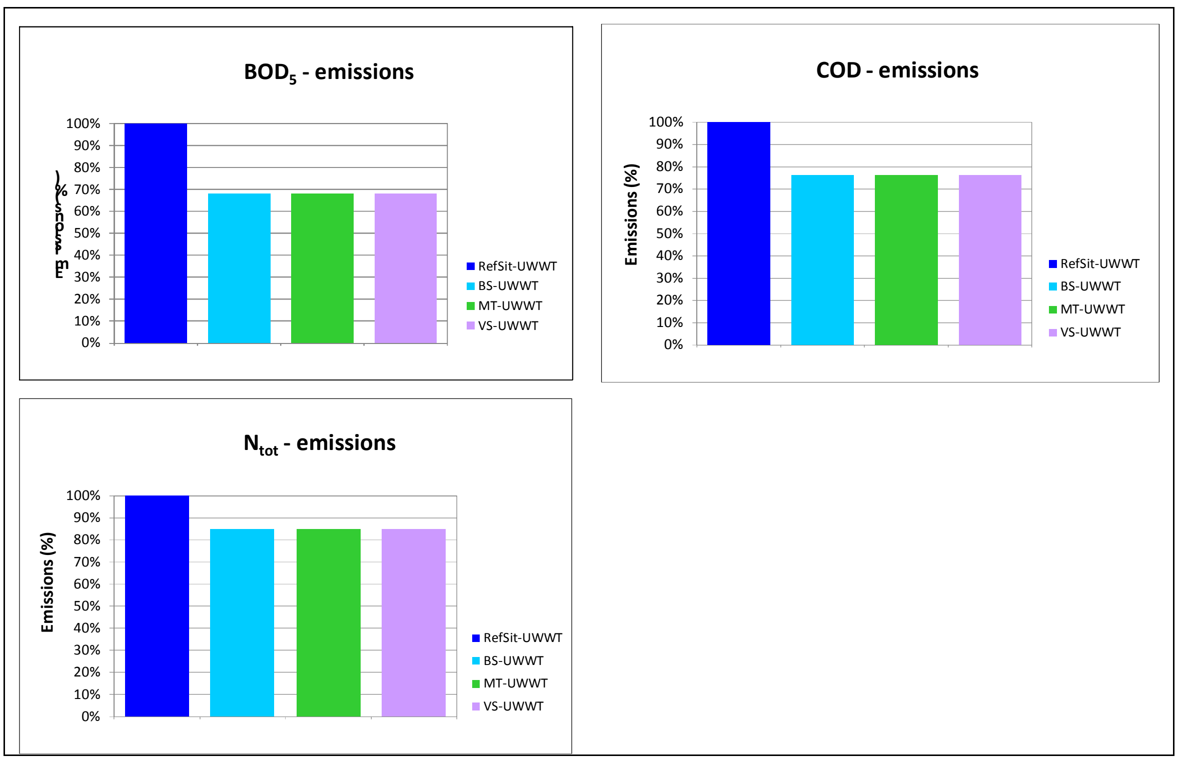
Figure 11: Wastewater treatment in agglomerations ≥100,000 PE in the Czech part of the DRB

6.3.4 Outlook for wastewater treatment in the Czech Republic until 2015

As part of the EU, the Czech Republic has to comply fully with the UWWT Directive by 31st December 2010. The Czech Republic has designated its entire country as one *sensitive area* applying Article 5(4) of the UWWT Directive.

The *baseline scenario* was based on the assumption that at least 75% of the total P load and at least 75% of the total N load entering all UWWTPs in the Czech Republic will be removed. As a prerequisite to achieve the reduction rates demanded under Article 5(4), a minimum requirement of secondary treatment was taken into account for all agglomerations of 2000 PE–10,000 PE; while more stringent treatment with N and P removal was taken into account for agglomerations >10,000 PE In detail, the calculation was undertaken as follows: for all agglomerations ≥2000 PE–10,000 PE with less than secondary treatment for the reference year 2005, secondary treatment was assumed for 2015 and the emissions were calculated accordingly. In cases where calculated emissions for 2015 were higher than the emissions reported for reference year 2005, the emissions from 2005 were taken into account. For agglomerations ≥2000 PE–10,000 PE with secondary or more stringent treatment for the reference year 2005, the treatment type was assumed to be the same in 2015. For agglomerations >10,000 PE, more stringent treatment with N and P removal was considered to be in place by 2015. The expected emissions were calculated accordingly.

The implementation of the *baseline scenario* is identical to the *midterm scenario* and the *vision scenario*, requiring the upgrade of wastewater treatment for the 13 agglomerations (195,670 PE) that were reported with no treatment, secondary or partial N and P removal, in order to provide N and P removal for the entire generated load and also the upgrade of wastewater treatment of the 8 agglomerations (192,177 PE) that were reported with either N or P removal in 2005. In addition, the *baseline scenario* would require the extension of wastewater treatment for the 70 agglomerations (208,043 PE) reported to have no or partial secondary treatment in 2005, in order to provide secondary treatment for the entire generated load. The use of P-free detergents would result in a further decrease of P emissions.



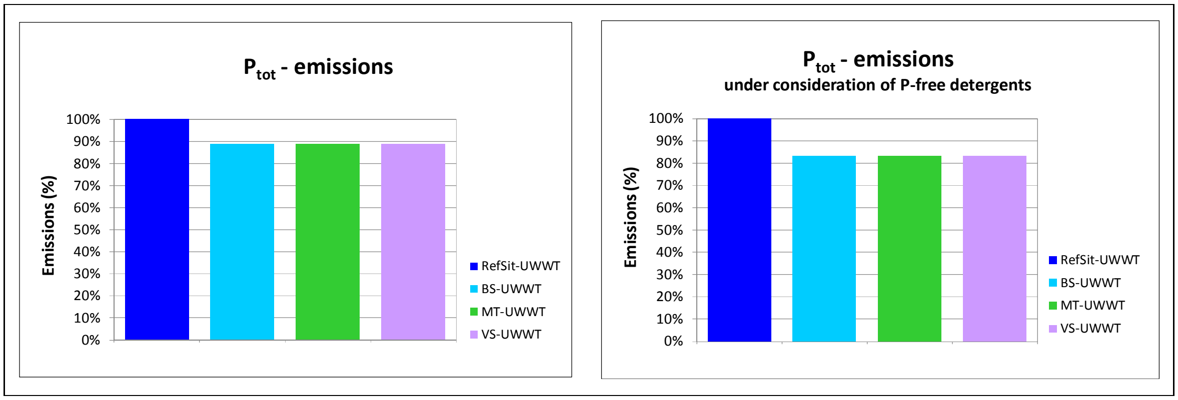


Figure 12: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.4 Slovakia

6.4.1 General information about the data evaluation

- In the framework of EMIS 2007, Slovakia provided an update of information on agglomerations >10,000 PE. In addition, data on agglomerations 2000 PE–10,000 PE was reported in a separate file. The reference date of both datasets was 31/12/2005.
- As an EU MS, Slovakia applies Article 5(2, 3) of the UWWT Directive (91/271/EEC). In August 2003, the entire area of Slovakia was designated as one *sensitive area* due to sensitivity for nitrogen and phosphorus.
- In Slovakia, one agglomeration can be served by one or more UWWTPs / collecting system without treatment while at the same time one UWWTP can serve more than one agglomeration. This means that the ratio [agglomeration : UWWTP] = [m : n] is used.
- **The results of the current report differ from the national computation for Slovakia. The reason for these discrepancies is the use of different estimation coefficients and the fact that Slovakia considered direct discharge loads into surface water instead of emissions from the entire agglomeration into the environment. For this reason, the results of this report cannot be directly compared with the results of the national computation.**

6.4.2 Country specific considerations for the data evaluation

- For two agglomerations (Modra and Pezinok), a wrong identifier was reported in the template "UWWTPAgglo". The identifier was corrected by the Umweltbundesamt Vienna.
- Several UWWTPs were reported to serve agglomerations >10,000 PE as well as agglomerations of 2000 PE–10,000 PE. The difficulty during data evaluation was that these UWWTPs were sometimes reported with different treatment types in the template on agglomerations >10,000 PE and for 2000 PE–10,000 PE. In these cases, the higher treatment level was taken into account.
- Some UWWTPs / collecting systems without treatment were reported to be connected to different agglomerations (of different size classes). In one case, one UWWTP was connected to an agglomeration >10,000 PE and at the same time to an agglomeration ≥2000 PE–10,000 PE, so that discharged loads (resulting from all connected agglomerations) were sometimes reported twice. In order to avoid double-counting, the discharged loads were reallocated to the different agglomerations.

6.4.3 Results of data evaluation for the situation as of 31/12/2005

For the reference year 2005, the Slovakian authorities reported 345 agglomerations ≥2000 PE (see Table 9). Of these, 269 (988,680 PE) were of ≤10,000 PE and 76 agglomerations (3,878,450 PE) of >10,000 PE. For 128 agglomerations (around 9% of the total generated load), no collecting system and/or wastewater treatment plant was in place, whereas for 210 agglomerations (90% of the total

generated load) N and/or P removal or secondary treatment is in place for at least parts of the agglomeration.

Table 9: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the Slovakian part of the DRB

Slovakia	**Number of agglomerations**	**Generated load (PE)**	**Emissions BOD_5 (t/a)**	**Emissions COD (t/a)**	**Emissions N_{tot} (t/a)**	**Emissions P_{tot} (t/a)**
Collected plus tertiary treatment (3NP)	3	104,260	247	698	163	21
Collected plus tertiary treatment (3N)	4	480,820	570	1466	886	79
Collected plus tertiary treatment (3P)	1	2700	99	530	172	16
Collected plus partial tertiary treatment (3NP)	15	997,540	3456	8186	1903	324
Collected plus partial tertiary treatment (3N)	11	108,720	1208	2329	247	45
Collected plus partial tertiary treatment (3P)	1	2390	30	55	6	1
Collected plus secondary treatment	53	1,371,230	4706	13,896	2525	411
Collected plus partial secondary treatment	122	1,309,480	14,708	28,881	3849	548
Collected plus primary treatment	3	51,320	844	1916	311	47
Collected plus partial primary treatment	4	16,840	351	650	54	10
Collection and treatment - total	***217***	***4,445,300***	***26,219***	***58,606***	***10,116***	***1501***
Collected and no treatment	43	167,180	2757	5142	507	87
Not collected and not treated	85	254,650	5577	10,224	818	144
Total	**345**	**4,867,130**	**34,553**	**73,972**	**11,441**	**1732**

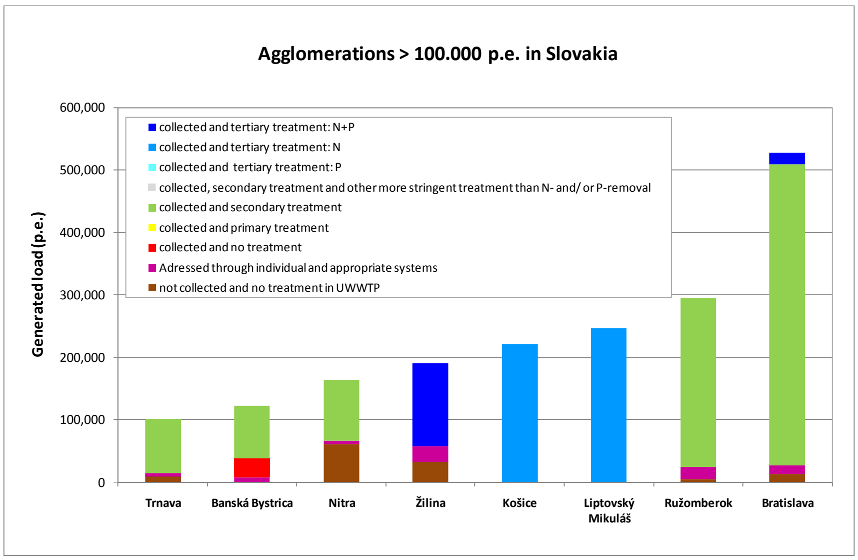


Figure 13: Wastewater treatment in agglomerations ≥100,000 PE in the DRB of Slovakia

6.4.4 Outlook for wastewater treatment in Slovakia until 2015

As part of the EU, Slovakia has to comply fully with the UWWT Directive by 31st December 2015. In August 2003, the entire area of Slovakia was designated as a *sensitive area* due to sensitivity for nitrogen and phosphorus. For this reason the *baseline scenario* was based on the assumption that all

agglomerations ≥2000 PE–10,000 PE are served by at least secondary treatment, whereas agglomerations >10,000 PE are served by more stringent treatment with N and P removal. For agglomerations ≥2000 PE–10,000 PE that were already reported to be served by UWWTPs with more stringent than secondary treatment at the reference date 31/12/2005, this treatment type was also considered for 2015. To achieve the situation described in the *baseline scenario*, the wastewater treatment of 74 agglomerations (3,776,690 PE) would have to be upgraded to provide N and P removal, whereas the treatment plants of 222 agglomerations (796,720 PE) require an extension to secondary treatment level.

For Slovakia, the *midterm scenario* and the *vision scenario* are identical to the *baseline scenario*. In the case of the application of P-free detergents in 2015, P emissions originating from agglomerations could further decrease.

In 2005, 12% of the total generated load (592,501 PE) was reported to be not collected in collecting systems but addressed through individual and appropriate systems (e.g. cesspools, small-scale wastewater treatment plants). This means that in 164 agglomerations (of which 149 were of ≤10,000 PE and 15 were of >10,000 PE) more than 25% of the total generated load is not yet collected in collecting systems (i.e. system of conduits). As Article 3 of Directive 91/271/EEC foresees that "…all agglomerations are provided with collecting systems for urban wastewater…", the implementation of all future scenarios would require the extension of the collecting system.

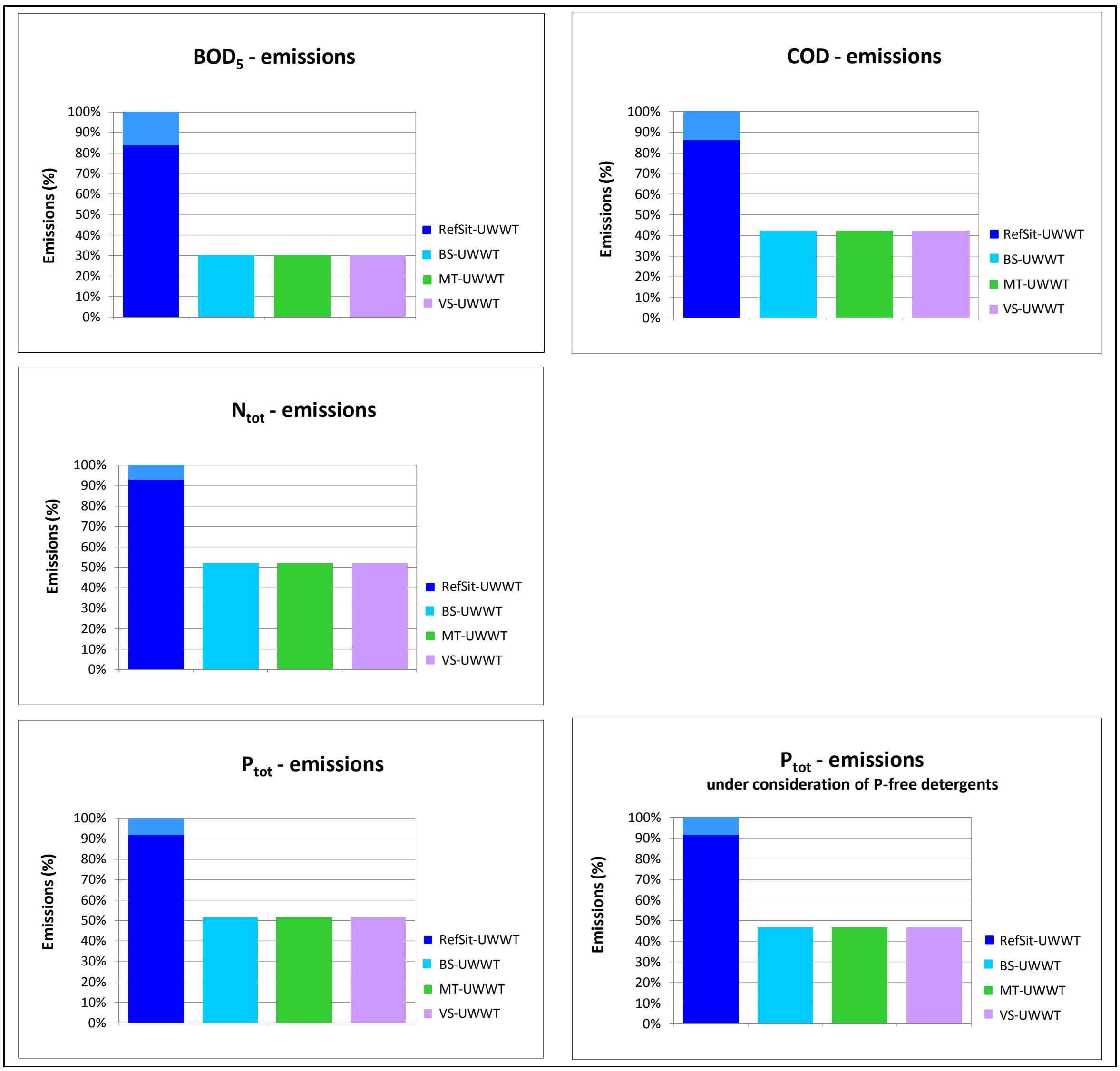


Figure 14: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.5 Hungary

6.5.1 General information about the data evaluation

- In the framework of the ICPDR Emission Inventory 2007, Hungary reported one dataset for all agglomerations ≥2000 PE, which included an update of data for agglomerations >10,000 PE. The reference date of information was 31/12/2005.
- As an EU MS, Hungary applies Art. 5(2,3) of the UWWT Directive. In December 2004, Hungary designated Lake Balaton and its catchment, the Hungarian part of Lake Neusiedl and its catchment and Lake Velence and its catchment as *sensitive areas* under designation criterion a (risk of eutrophication, relevant parameters N and P) and designation criterion b (surface freshwaters intended for the abstraction of drinking water). This means that for the reference date 31/12/2005, there are three *sensitive areas* in Hungary.
- In Hungary, one agglomeration can be served by one or more UWWTPs / collecting systems without treatment, which means that the ratio [agglomeration : UWWTP] = [1 : n] is used

6.5.2 Country specific considerations for data evaluation

- Several UWWTPs in Hungary were reported as having other more stringent treatment than N and/or P removal. In most cases, this referred to chlorination. In cases where discharged loads for N_{tot} and P_{tot} had to be estimated for UWWTPs with chlorination, the same coefficients as used for UWWTPs with secondary treatment were taken into account. Wastewater treatment plants that provide N and/or P removal and, in addition, a form of other more stringent treatment were classified solely under N and/or P removal.

6.5.3 Results of data evaluation for the situation as of 31/12/2005

As can be seen from Table 10, Hungary reported 430 agglomerations ≥2000 PE for the reference year 2005. Of these, 253 agglomerations (1256,932 PE) were of ≤10,000 PE and 177 agglomerations (10,599,562 PE) were of >10,000 PE. A high percentage of the total generated load was already treated by N and P removal (36%), N removal (11%) or P removal (2%) in 2005. In addition, Hungary reported 123 agglomerations (23.6% of the total generated load) as being served by wastewater treatment plants providing other more stringent treatment than N and P removal. For most treatment plants, this type of treatment referred to chlorination. Four agglomerations, representing 15% of the total generated load, were not connected to a wastewater treatment plant, among them considerable parts of Budapest: Budapest (Csepel-Kp szvtp: 1,458,162 PE), Budapest (Dél-Buda: 128,791 PE) and Szeged (230,000 PE).

Table 10: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the Hungarian part of the DRB

Hungary	**Number of agglomerations**	**Generated load (PE)**	**Emissions BOD_5 (t/a)**	**Emissions COD (t/a)**	**Emissions N_{tot} (t/a)**	**Emissions P_{tot} (t/a)**
Collected plus tertiary treatment (3NP)	146	4,306,046	3122	11,946	3245	512
Collected plus tertiary treatment (3N)	51	1,359,014	979	4386	1029	341
Collected plus tertiary treatment (3P)	17	248,334	128	580	296	27
Collected plus secondary treatment and other treatment more stringent than N and/or P removal*	123	2,803,699	5272	13,048	4542	695
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus partial secondary treatment and other treatment more stringent than N and/or P removal*						
Collected plus secondary treatment	81	1,261,676	1913	4583	1220	272
Collected plus partial secondary treatment						
Collected plus primary treatment	8	56,278	673	1209	137	25
Collected plus partial primary treatment						
Collection and treatment - total	***426***	***10,035,047***	***12,087***	***35,752***	***10,469***	***1871***
Collected and no treatment	4	1,821,447	33,671	51,802	4189	968
Not collected and not treated						
Total	**430**	**11,856,494**	**45,758**	**87,554**	**14,658**	**2839**

*This type of treatment was only reported by Hungarian authorities and refers to secondary treatment in combination with e.g. chlorination, ozonation, sand filtration etc.

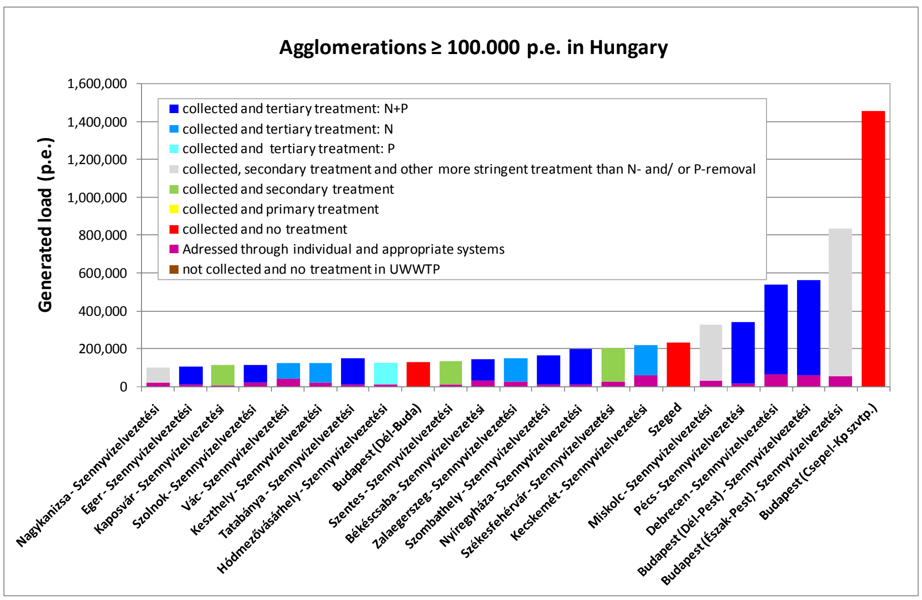


Figure 15: Wastewater treatment in agglomerations ≥100,000 PE in the Hungarian part of the DRB

6.5.4 Outlook for wastewater treatment in Hungary until 2015

As part of the EU, Hungary has to comply fully with the UWWT Directive by 31st December 2015. In the reference year 2005/2006, Hungary applied Art. 5(1) + 5(2,3) of the Directive, which meant that *sensitive areas* and *catchment areas of sensitive areas* had to be designated. In the framework of the ICPDR Municipal Emission Inventory 2007, three *sensitive areas* were reported and indicated with N and P sensitivity.

With the accession of Romania to the EU in January 2007, the necessity to designate *sensitive areas* and *catchments of sensitive areas* has changed. As the Black Sea has been characterised as a *sensitive area* due to eutrophication, the entire catchment area of the Danube (one of the main tributaries of the Black Sea) requires identification as a *catchment of a sensitive area* according to Article 5(5) of the UWWT Directive. As a result, more stringent treatment is required for all agglomerations with >10,000 PE or, alternatively, a minimum reduction rate of 75% for total N and total P (application of Article 5(4) of the Directive) needs to be achieved for the entire generated load entering the wastewater treatment plants.

As the entire territory of Hungary belongs to the DRB, Hungary will take these new requirements into account by applying Article 5(8) and Article 5(4) of the Directive in the future. Authorities from Hungary have indicated that the minimum reduction rate of 75% of total N and total P for the entire territory will be achieved by fulfilling the National Wastewater Implementation Plan, as it was accepted by the Accession Treaty in 2004 and by additionally providing tertiary treatment level for the agglomerations of Budapest (Csepel Kp. Szvtp.) and Budapest (Észak-Pest). Although the deadline for these extra investments may be 2018 (instead of 2015), the year 2015 was taken into account as the date of finalisation of these improvements for the scenario calculation.

The calculation of the *baseline scenario* and *midterm scenario* was based on the following three assumptions:

- Those agglomerations that were reported with no treatment or primary treatment for the reference date 2005/2006 were considered as having secondary treatment for the reference year 2015.
- Budapest (Csepel Kp. Szvtp.) and Budapest (Észak-Pest) were considered as having N and P removal.
- All agglomerations with more than 10,000 PE discharging into a *sensitive area*, as designated in 2004, were assumed to have N and P removal for their entire generated load.

The implementation of the *baseline scenario*, as with the *midterm scenario*, would require the establishment of N and P removal for the total generated load of 6 agglomerations (2,612,599 PE) served by no wastewater treatment, secondary treatment, N removal or other more stringent treatment in 2005. In addition, the *baseline scenario* would require the upgrade of the wastewater treatment of 11 agglomerations (419,563 PE) from primary or no treatment in 2005 to secondary treatment.

The *vision scenario* aims at making use of the full technical potential of wastewater treatment as regards the removal efficiencies of nutrients, even where Directive 91/271/EEC does not require stricter standards than reflected in the *baseline scenario*. This means that the *vision scenario* goes beyond the requirements of Directive 91/271/EEC. Accordingly, the implementation of this scenario would result in a further upgrade of the wastewater treatment for 100 agglomerations (4,044,698 PE) in order to provide N and P removal for their entire generated load.

The use of P-free detergents would lead to a further significant reduction of P emissions from agglomerations.

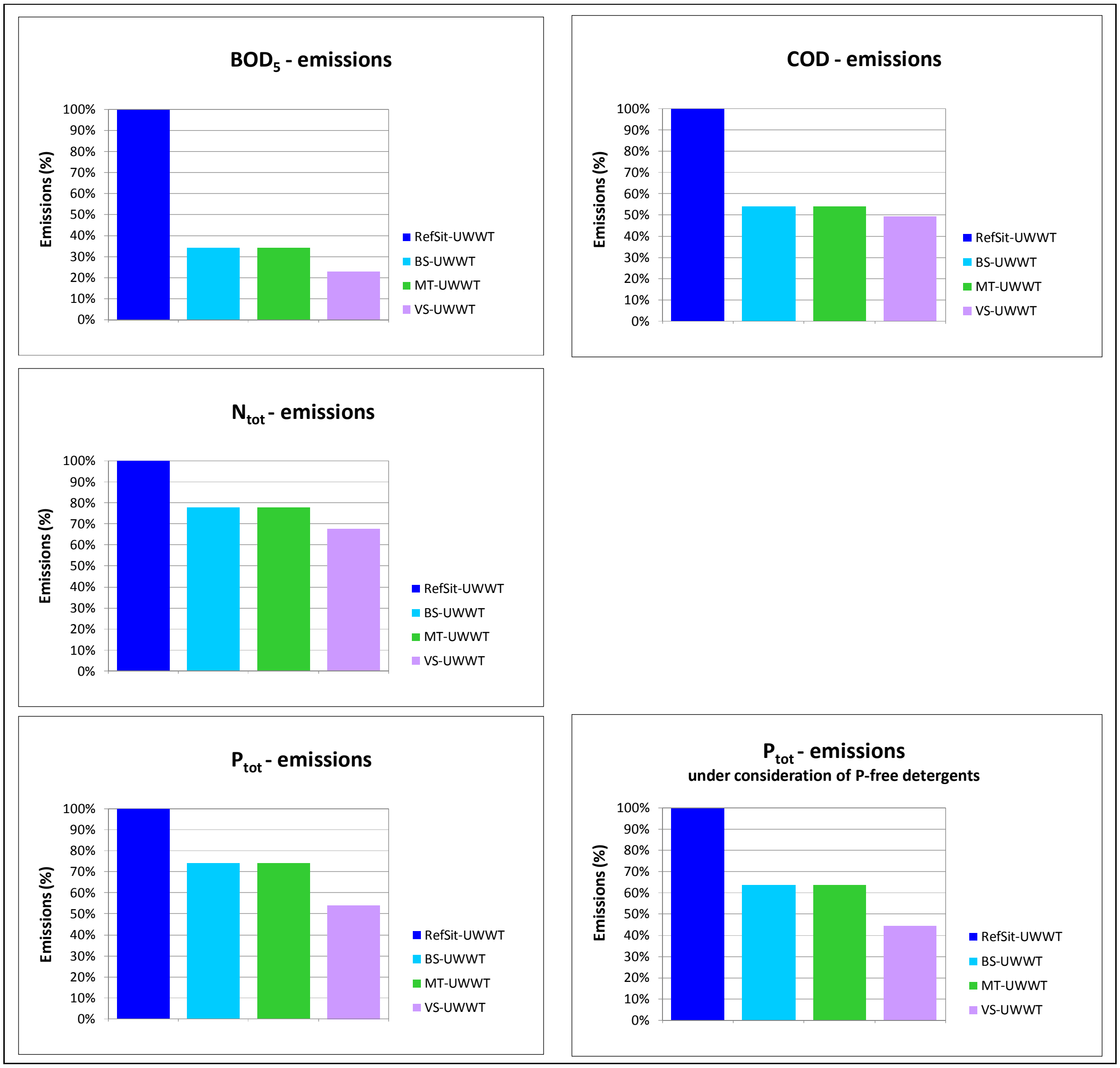


Figure 16: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.6 Slovenia

6.6.1 General information about the data evaluation

- In the framework of the ICPDR Emission Inventory 2007, Slovenia reported information on all agglomerations ≥2000 PE–10,000 PE and an update of information on agglomerations >10,000 PE. The reference date for all agglomerations was 31/12/2006.
- As an EU MS, Slovenia applies Article 5(2,3) of the UWWT Directive (91/271/EEC) and, in May 2001, designated *sensitive areas* and *catchment areas of sensitive areas* (in the Decree on the emission of substances in wastewater discharged from UWWTPs). The decree was replaced and the designation of *sensitive areas* reviewed in 2007. However, as the reference date of the EMIS data collection was 31/12/2006, the *sensitive areas* designated in 2001 are of relevance for this data evaluation. For the DRB in Slovenia, two *sensitive areas* and three *catchment areas of sensitive areas* were reported. All of them were designated sensitive for reason of eutrophication or the risk of eutrophication (N and P) except one *sensitive area* which was designated under the Bathing Water Directive (76/160/EEC) (sensitivity due to carstic area, total N, total P, total coliforms, faecal coliforms and faecal streptococci).

- In Slovenia, one agglomeration can be served by one or more UWWTP / collecting system without treatment while at the same time one UWWTP can serve more than one agglomeration. This means that the ratio [agglomeration : UWWTP] = [m : n] is used.

6.6.2 Country specific considerations for data evaluation

- Slovenia has defined identifiers for collecting systems without treatment for those agglomerations where 0% of the generated load is collected in a collecting system. As the data model of EMIS 2007 (and the data model of the UWWT Directive Questionnaire designed for reporting under Art. 15) does not foresee the definition of a discharge point for the fraction of the generated load not collected in a collecting system, these collecting systems without treatment were not considered in the data evaluation.
- For several agglomerations, the Slovenian authorities indicated that a specific percentage of the generated load of an agglomeration was collected in collecting systems but discharged without treatment, but no identifier was created for this "Collecting system without treatment". For the purpose of the present data evaluation, an ID was created and discharged loads for this fraction were calculated.
- Some UWWTPs / collecting systems without treatment were reported to be connected to different agglomerations (of different size classes). In one case, one UWWTP was connected to an agglomeration >10,000 PE and at the same time to an agglomeration ≥2000 PE–10,000 PE, and so discharged loads (resulting from all connected agglomerations) were sometimes reported twice. In order to avoid double-counting, the discharged loads were reallocated to the different agglomerations.

6.6.3 Results of data evaluation for the situation as of 31/12/2006

As can be seen from Table 11, the Slovenian authorities reported 134 agglomerations ≥2000 PE. Of these, 109 (442,888 PE) were classed as ≤10,000 PE and 25 agglomerations (924,460 PE) classed as >10,000 PE. 24 agglomerations (representing 28% of the total generated load) already had N and P removal for (major) parts of their generated load and 62 agglomerations (around 55% of the total generated load) were (partly) served by secondary treatment. 47 agglomerations (16% of the total generated load) were not connected to a collecting system and/or wastewater treatment plant.

Table 11: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the Slovenian part of the DRB

Slovenia	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus tertiary treatment (3NP)	9	303,442	1344	3017	371	67
Collected plus tertiary treatment (3N)						
Collected plus tertiary treatment (3P)						
Collected plus partial tertiary treatment (3NP)	15	79,047	1050	2111	232	61
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	20	502,883	2391	5978	1079	219
Collected plus partial secondary treatment	42	245,612	3260	6626	769	153
Collected plus primary treatment						
Collected plus partial primary treatment	1	13,257	197	405	80	7
Collection and treatment - total	***87***	***1,144,241***	***8,242***	***18,137***	***2530***	***507***
Collected and no treatment	32	173,602	3802	6970	558	120
Not collected and not treated	15	49,505	660	1240	135	26
Total	**134**	**1,367,348**	**12,704**	**26,347**	**3223**	**653**

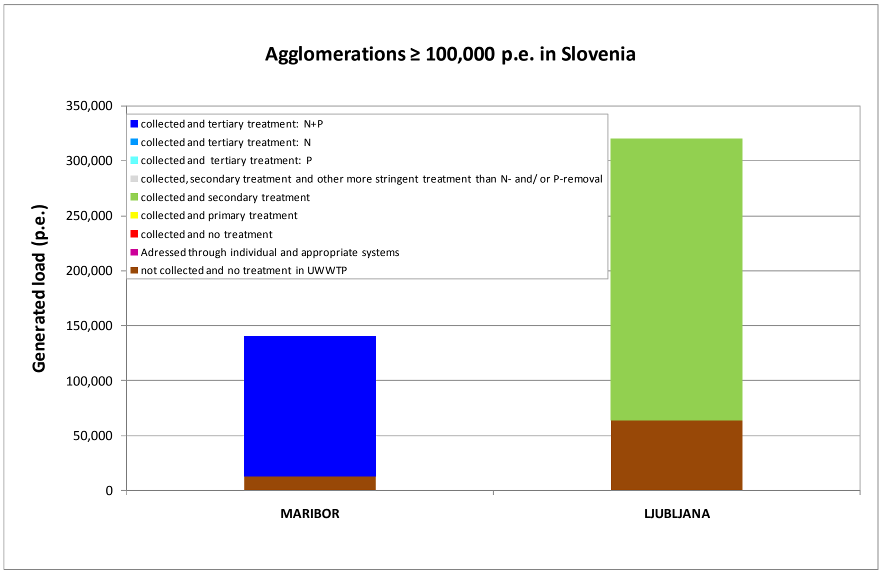


Figure 17: Wastewater treatment in agglomerations ≥100,000 PE in the DRB of Slovenia

6.6.4 Outlook for wastewater treatment in Slovenia until 2015

As part of the EU, Slovenia has to comply fully with the UWWT Directive by 31st December 2015. Slovenia applies Art. 5(2,3) which means that *sensitive areas* and *catchment areas of sensitive areas* have to be designated. In May 2001, Slovenian authorities designated two *sensitive areas* and three *catchment areas of sensitive areas* in the DRB. Four of these areas were designated for reason of (the risk of) eutrophication (N and P), whereas one area was designated *sensitive* under the Bathing Water Directive requirement for further treatment than secondary level.

With the accession of Romania to the EU in January 2007, the necessity of designating *sensitive areas* and *catchments of sensitive areas* has changed. As the Black Sea has been characterised as a *sensitive area* due to eutrophication, the catchment area of the Danube (one of the main tributaries to the Black Sea) requires identification as a *catchment of a sensitive area* according to Article 5(5) of the UWWT Directive. As a result, more stringent treatment is required for all agglomerations with >10,000 PE or, alternatively, that a minimum reduction rate of 75% for total N and total P (application of Article 5(4) of the Directive) needs to be achieved for the entire generated load entering wastewater treatment plants.

For the elaboration of future scenarios, these new requirements for the Slovenian part of the DRB were taken into account. The assumptions were made that in 2015 more stringent treatment with N and P removal will be established in all agglomerations >10,000 PE, and at least secondary treatment will be established for agglomerations ≥2000 PE and ≤ 10,000 PE. The implementation of the *baseline scenario* is identical to the *midterm* and *vision scenarios* requiring the establishment of secondary treatment for the entire generated load of 44 agglomerations (174,231 PE) and an extension of wastewater treatment for 36 agglomerations (153,030 PE) with partial secondary treatment in 2006. Implementation of all future scenarios would further require the construction of wastewater treatment plants providing N and P removal for 16 agglomerations (602,215 PE) and an extension of wastewater treatment for three agglomerations (32,702 PE) served by partial N and P removal in 2006.

In the case of the application of P-free detergents in 2015, P emissions originating from agglomerations would further decrease.

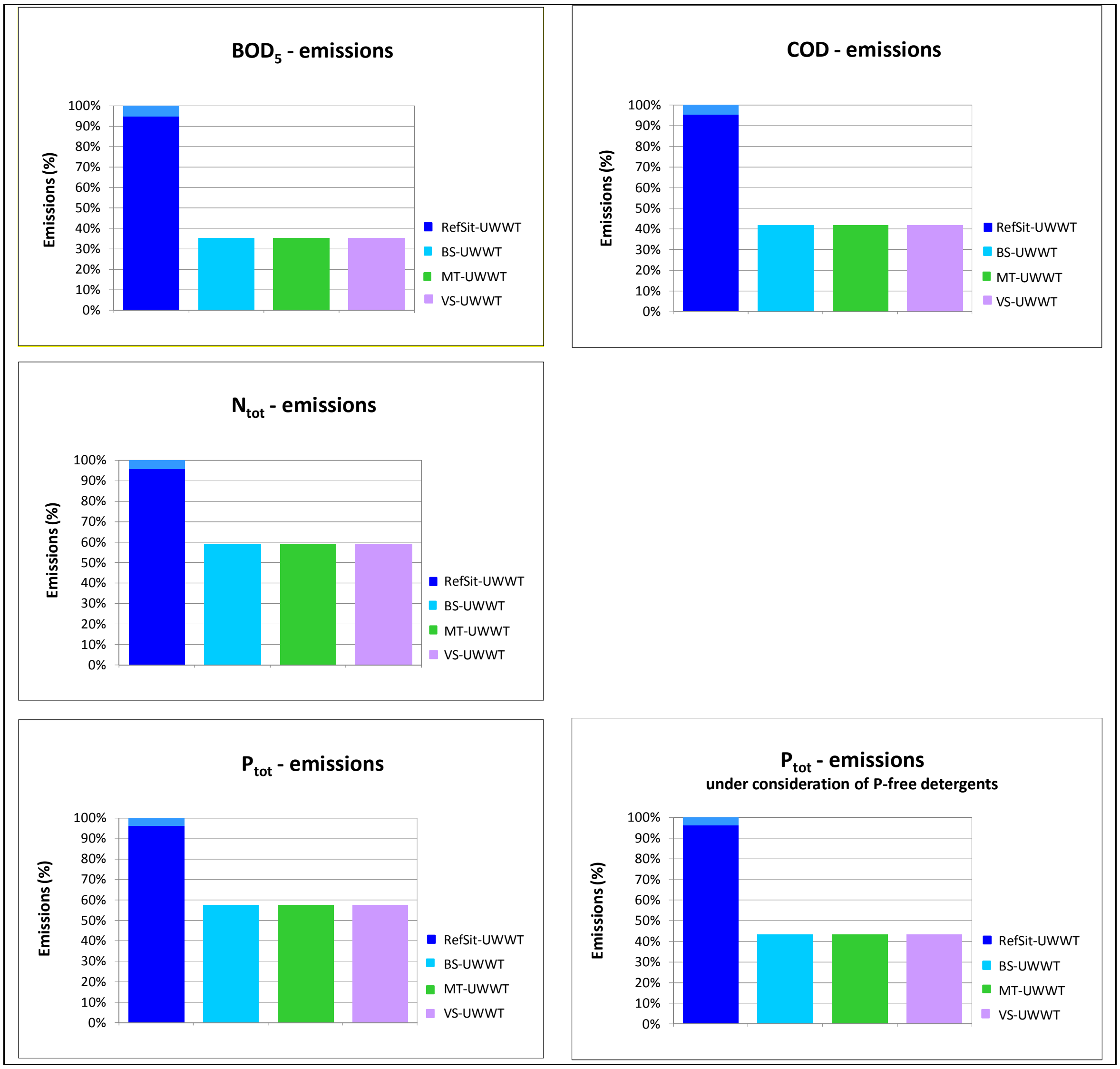


Figure 18: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.7 Croatia

6.7.1 General information about the data evaluation

- In the framework of the ICPDR Emission Inventory 2007, Croatia reported information on all agglomerations ≥2000 PE with the reference date 31/12/2005. In this context, datasets for agglomerations >10,000 PE were additionally updated.
- In Croatia, one agglomeration is served by one UWWTP / collecting system without treatment, which means that the ratio [agglomeration : UWWTP] = [1 : 1] is used.

6.7.2 Country specific considerations for data evaluation

- In the framework of reporting under EMIS 2007, the different pathways of the generated load of an agglomeration were described in the following way in the “Agglomerations” template:

Agglomeration ID	% of generated load collected in a collecting system	% of generated load collected in a collecting system but discharged without treatment	% of population connected to combined sewage network	% of population connected to separated sewage network	% of generated load addressed through individual and appropriate systems (IAS)	% of generated load not collected through collecting systems and not addressed through IAS
HR_2AG_039	18%	24%				

Data was evaluated in such a way that from the 18% reported as being collected in a collecting system, 24% was considered to be discharged without treatment. For the remaining 76% of the 18% collected in collecting system, an additional ID for UWWTP/ collecting system without treatment was defined by Umweltbundesamt (UBA) Vienna and linked to the agglomeration. Consequently, in the template “UWWTPAgglo” two IDs for UWWTPs / collecting systems without treatment were linked to the agglomeration (figures in *italic* indicate the additions from UBA Vienna:

ID of UWWTP/ collecting system without treatment	ID of agglomeration served	% of the generated load of the agglomeration treated in this UWWTP
HR_2CO_039	HR_2AG_039	*13.6 (= 76% of 18%)*
HR_2CO_039a	*HR_2AG_039*	*4 (= 24% of 18%)*

6.7.3 Results of data evaluation for the situation as of 31/12/2005

As can be seen from Table 12, Croatia reported 172 agglomerations ≥2000 PE for the reference year 2005. Of these, 131 agglomerations (530,546 PE) were of a size ≤10,000 PE and 41 agglomerations (2,817,830 PE) of a size >10,000 PE. For 67 agglomerations (covering 7% of the total generated load) no collecting system and no wastewater treatment plant was available, whereas for 79 agglomerations (or 36% of the total generated load) a collecting system but no wastewater treatment was in place for major parts of the agglomeration. 26 agglomerations were reported to deal with (parts of) their generated load by wastewater treatment plants providing various treatment levels. For twelve of these agglomerations (14% of the total generated load), this treatment referred to secondary treatment.

Table 12: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the Croatian part of the DRB

Croatia	**Number of agglomerations**	**Generated load (PE)**	**Emissions BOD_5 (t/a)**	**Emissions COD (t/a)**	**Emissions N_{tot} (t/a)**	**Emissions P_{tot} (t/a)**
Collected plus tertiary treatment (3NP)						
Collected plus tertiary treatment (3N)						
Collected plus tertiary treatment (3P)						
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	1	34,880	218	1196	104	6
Collected plus partial secondary treatment	11	429,794	6495	13,057	1200	267
Collected plus primary treatment						
Collected plus partial primary treatment	14	1,419,735	29,215	65,716	4572	1445
Collection and treatment - total	***26***	***1,884,409***	***35,928***	***79,969***	***5876***	***1719***
Collected and no treatment	79	1,218,755	26,698	54,756	4233	899
Not collected and not treated	67	245,212	5370	9845	788	183
Total	**172**	**3,348,376**	**67,996**	**144,570**	**10,897**	**2800**

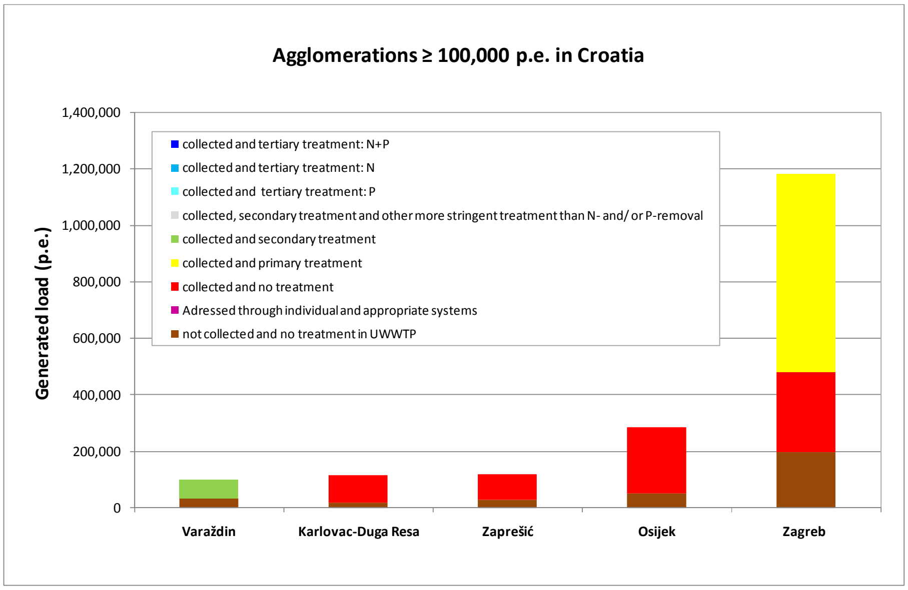


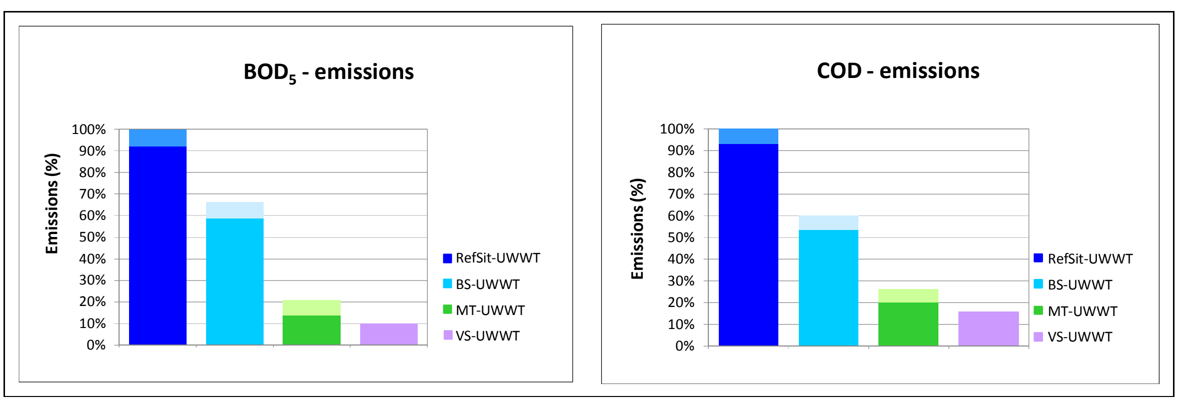
Figure 19: Wastewater treatment in agglomerations ≥100,000 PE in the Croatian part of the DRB

6.7.4 Outlook for wastewater treatment in Croatia until 2015

As regards the *baseline scenario*, Croatian authorities provided detailed information on the expected improvements on the size and treatment type of UWWTPs in 2015. Up until this date, 14 agglomerations with a total generated load of 1,683,321 PE, served by partial primary, secondary or no treatment in 2005, will be extended to a size of 1,764,621 PE providing secondary or more stringent treatment.

The implementation of the *midterm scenario,* would require the establishment of P removal for 38 agglomerations >10,000 PE (2,635,245 PE) that were reported as having no wastewater treatment, (partial) primary or secondary treatment.

The *vision scenario* aims to make use of the full technical potential of wastewater treatment as regards the removal efficiencies of nutrients. Accordingly, this scenario would further require the extension of wastewater treatment plants for 38 agglomerations >10,000 PE (2,635,245 PE) in order to additionally provide N removal and also the extension of treatment plants for 125 agglomerations of the size 2000 PE–10,000 PE (490,810 PE) in order to provide secondary treatment for the entire generated load.



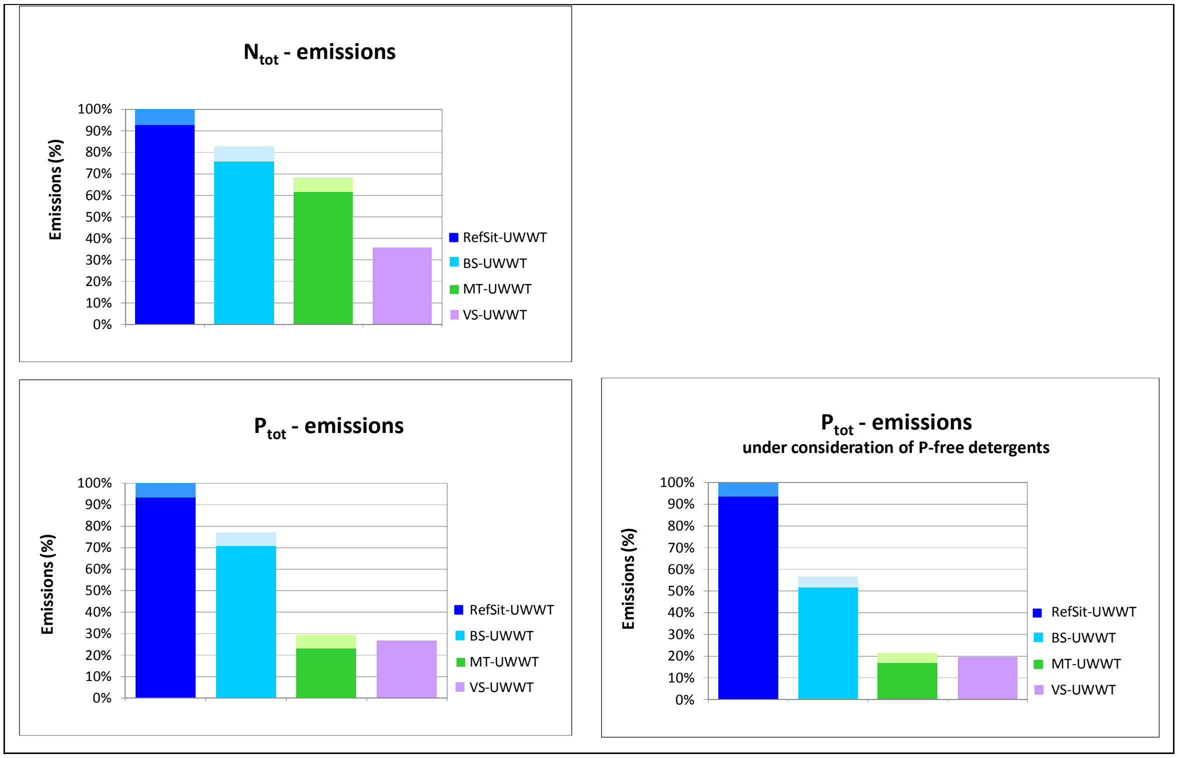


Figure 20: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.8 Bosnia and Herzegovina

6.8.1 General information about the data evaluation

- In 2007, Bosnia and Herzegovina reported information on all agglomerations ≥2000 PE–10,000 PE for part of the country with the reference date 31/12/2005 under the ICPDR Emission Inventory 2007. In 2008, the dataset on agglomerations ≥2000 PE–10,000 PE was completed with information for the missing parts of Bosnia and Herzegovina. Data on agglomerations >10,000 PE had already been reported in the framework of the ICPDR Emission Inventory 2006.
- In Bosnia and Herzegovina, one agglomeration is served by one or more UWWTP / collecting systems without treatment, which means that the ratio [agglomeration : UWWTP] = [1 : n] is used.

6.8.2 Country specific considerations for data evaluation

- Under EMIS 2006 (for agglomerations >10,000 PE), all discharge points were reported with the same ID and no link to UWWTPs/NOWWTPs was given by IDs. For this reason, the link between discharge points and UWWTPs/NOWWTPs was done via the respective names.
- Under EMIS 2006 (for agglomerations >10,000 PE), no link to UWWTPs/NOWWTPs was given for 8 discharge points. However, discharge points for these 8 agglomerations were reported. In this case it was assumed that the agglomeration is connected to a NOWWTP. Hence, 8 NOWWTPs were invented in order to link the agglomerations with the discharge points.
- Under EMIS 2006 (for agglomerations >10,000 PE), three UWWTPs were reported for Bosnia. As one UWWTP (BA_CO_U0026) was reported to have finished operation in April 1992, this UWWTP was considered as “no treatment” in the data evaluation. The two remaining UWWTPs were reported with secondary treatment.
- Under EMIS 2006 (for agglomerations >10,000 PE), no data was reported on the parameter “% of generated load collected in a collecting system”. However, the parameter “% of population connected to combined sewage network” was reported on. For the purpose of data evaluation, data from the latter parameter was used for the former one.

- Under EMIS 2006 (for agglomerations >10,000 PE), emissions were reported for all discharge points. However, as the link to UWWTP/NOWWTP was missing, it was not clear whether the emissions referred only to the fraction of the generated load collected in a collecting system or the total agglomeration. For the purpose of this data evaluation, it was assumed that it referred only to the generated load collected in a collecting system.
- Under EMIS 2007 (for agglomerations ≥2000 PE–10,000 PE), the different pathways of the generated load of an agglomeration were described in the following way in the “Agglomerations” template:

% of generated load collected in a collecting system	% of population connected to combined sewage network	% of population connected to a separated sewage network	% of generated load addressed through individual and appropriate systems (IAS)	% of generated load not collected through collecting systems and not addressed through individual and appropriate systems (IAS)
90	15	60	10	15

Upon further discussions with the Bosnia and Herzegovinan authorities, data was evaluated as follows: of the 90% reported to be collected in a collecting system, 75% was considered to be collected in a collecting system, 10% was considered to be addressed through IAS and 15% was considered to be discharged without treatment. The remaining 10% of the generated load of the agglomeration that was reported as being not collected in a collecting system, was additionally considered to be discharged without treatment.

For the purpose of data evaluation under EMIS 2007, the template was modified in the following way:

% of generated load collected in a collecting system	% of population connected to combined sewage network	% of population connected to separated sewage network	% of generated load addressed through individual and appropriate systems (IAS)	% of generated load not collected through collecting systems and not addressed through IAS
67.5	13.5	54	9	23.5 (= 13.5 + 10)

- Under EMIS 2007 (for agglomerations ≥2000 PE–10,000 PE), no link between agglomerations and UWWTPs was established in the “UWWTPAgglo” template. For this reason, the link was completed by UBA Vienna. For the parameter “% of the generated load of the agglomeration treated in this UWWTP”, the following two parameters were added together: “% of generated load collected in a collecting system” and “% of generated load addressed through individual and appropriate systems (IAS)”.

6.8.3 Results of data evaluation for the situation as of 31/12/2005

As can be seen from Table 13, Bosnia and Herzegovina reported 240 agglomerations ≥2000 PE for the reference year 2005. Of these, 209 agglomerations (778,320 PE) were of a size ≤10,000 PE and 31 agglomerations (1,252,600 PE) of >10,000 PE. For 151 agglomerations (approx. 23% of the total generated load) no collecting system or wastewater treatment plant was available, whereas for 85 agglomerations (or 46% of the total generated load), a collecting system was in place for major parts of the agglomeration. Four agglomerations (around 1.6% of the total generated load) were reported to deal with parts of their generated load by secondary treatment.

Table 13: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the Bosnian part of the DRB

Bosnia and Herzegovina	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus tertiary treatment (3NP)						
Collected plus tertiary treatment (3N)						
Collected plus tertiary treatment (3P)						
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment						
Collected plus partial secondary treatment	4	34,100	630	1098	112	25
Collected plus primary treatment						
Collected plus partial primary treatment						
Collection and treatment - total	***4***	***34,100***	***630***	***1098***	***112***	***25***
Collected and no treatment	85	1,539,220	37,146	68,068	5723	1263
Not collected and not treated	151	457,600	10,021	18,373	1470	342
Total	**240**	**2,030,920**	**47,797**	**87,539**	**7305**	**1630**

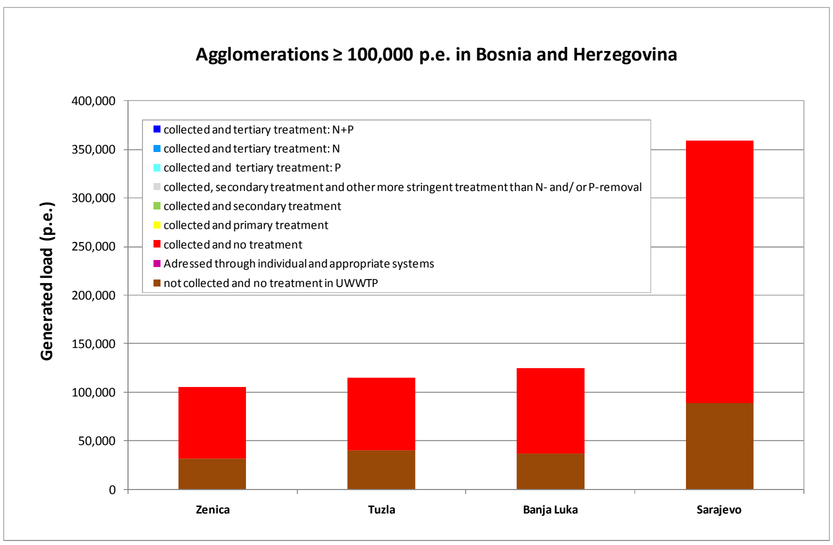


Figure 21: Wastewater treatment in agglomerations ≥100,000 PE in the Bosnian part of the DRB

6.8.4 Outlook for wastewater treatment in Bosnia and Herzegovina until 2015

As regards the *baseline scenario*, authorities from Bosnia and Herzegovina provided information on forecasted wastewater treatment until 2015. They indicated that three agglomerations (36,500 PE) will be served by secondary treatment with a further three agglomerations (34,200 PE) partly connected to treatment plants with secondary treatment. One agglomeration (55,000 PE) is foreseen to be served by partial N and P removal and another agglomeration (125,000 PE) by partial N removal. As regards the remaining agglomerations, 81 of them (1,322,620 PE) were considered to have collecting systems in place by 2015 for major parts of the agglomeration, but treatment plants will still have to be built. 151 agglomerations (457,600 PE) were assumed as having neither a collecting system, nor a wastewater treatment plant, by 2015.

The implementation of the *midterm scenario* would require the establishment of P removal for 29 agglomerations (1,072,600 PE).

The *vision scenario* aims to make use of the full technical potential of wastewater treatment as regards the removal efficiencies of nutrients. Accordingly, under this scenario, N removal would have to be provided for these 29 agglomerations and secondary treatment would be required for the 206 agglomerations (761,920 PE) that have no wastewater treatment in 2005.

The use of P-free detergents, as assumed for the DRB in 2015, would lead to a further considerable reduction of P emissions from agglomerations (see Figure 22).

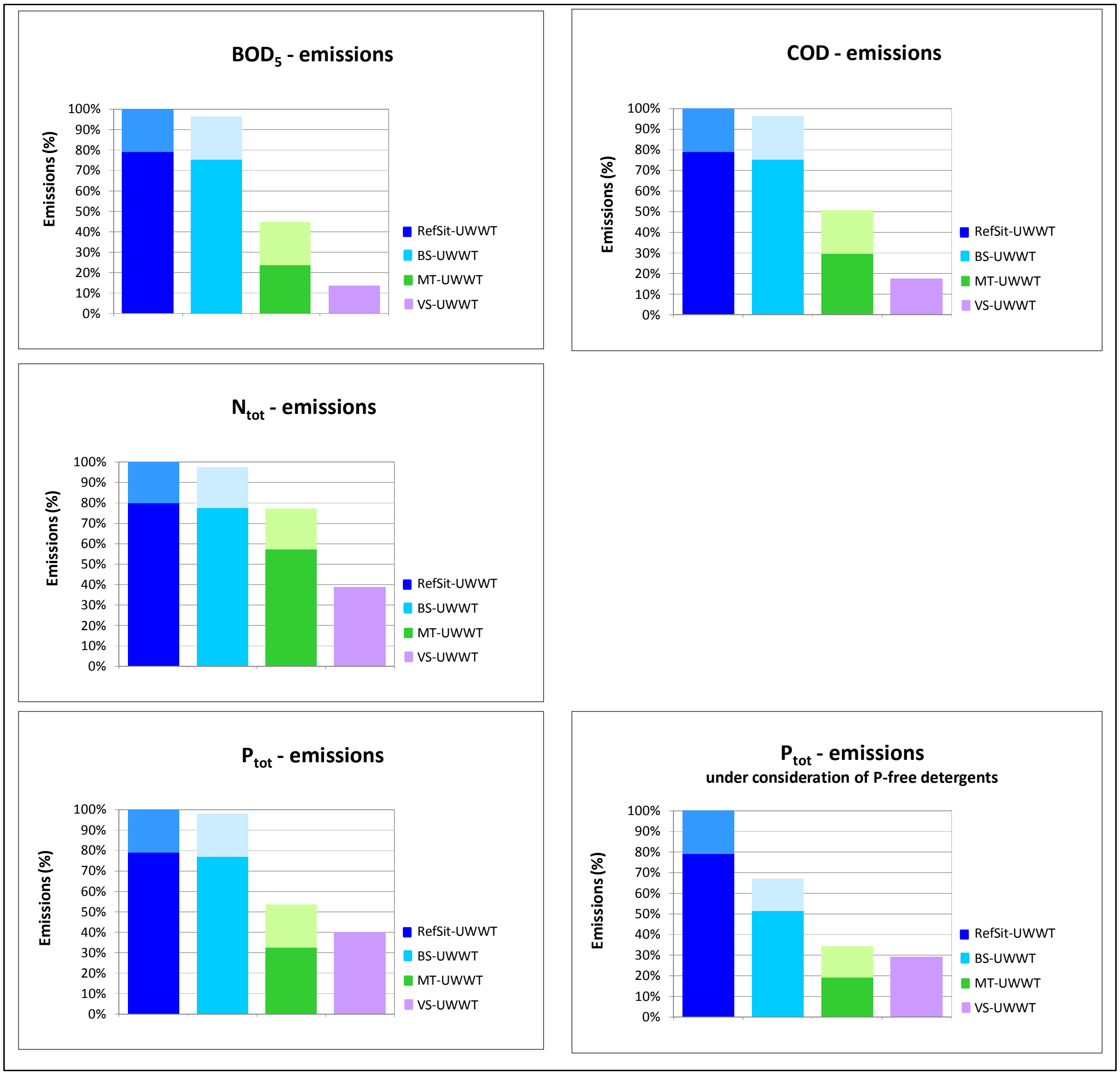


Figure 22: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.9 Serbia

6.9.1 General information about the data evaluation

- In the framework of EMIS 2007, Serbia provided one dataset for all agglomerations ≥2000 PE including an update of information on agglomerations >10,000 PE. The reference date of information was 31/12/2005. In December 2008 and April 2009 further updates were provided.
- In Serbia, one agglomeration is served by one UWWTP / collecting system without treatment which means that the ratio [agglomeration : UWWTP] = [1 : 1] is used.

6.9.2 Country specific considerations for data evaluation

- In the update provided in April 2009, Serbian authorities sent data on 151 agglomerations (partly) connected to sewerage systems and 317 agglomerations without connection to sewerage systems. 33 agglomerations were reported as being in the class <2000 PE and so the number of agglomerations with a size ≥2000 PE amounts to 435. In addition, it was indicated by Serbian authorities that for the agglomerations connected to sewerage systems, the size of an agglomeration (parameter "generated load") was defined based on inhabitants and industry connected to sewerage systems. According to the definition of agglomerations used under the UWWT Directive[5], the existence of an agglomeration should be independent from the existence of collecting systems. For the purpose of this evaluation, the agglomerations were considered with the size (generated load in PE) indicated in the template. Agglomerations with a size of <2000 PE were not taken into account, in order to have a homogenous picture for the entire DRB.
- In the update delivered in April 2009, for each agglomeration, Serbian authorities indicated the fraction (absolute number of PE) which entered the connected sewerage system / wastewater treatment plant. Following the Serbian approach of defining the size of the agglomeration, this number was often identical to the size of the agglomeration. In these cases it was assumed that 100% of the generated load of the agglomeration was connected to sewerage systems / wastewater treatment plants.

6.9.3 Results of data evaluation for the situation as of 31/12/2005

As can be seen from Table 17, Serbia reported 435 agglomerations ≥2000 PE for the reference year 2005. Of these, 375 agglomerations (1,409,365 PE) were of the size ≤10,000 PE and 60 agglomerations (3,662,821 PE) of the size >10,000 PE. 101 agglomerations (covering 63% of the total generated load) were reported to have a collecting system (for parts of their generated load) but no wastewater treatment. 27 agglomerations (covering 14% of the total generated load) were reported as having a collecting system and primary or secondary treatment.

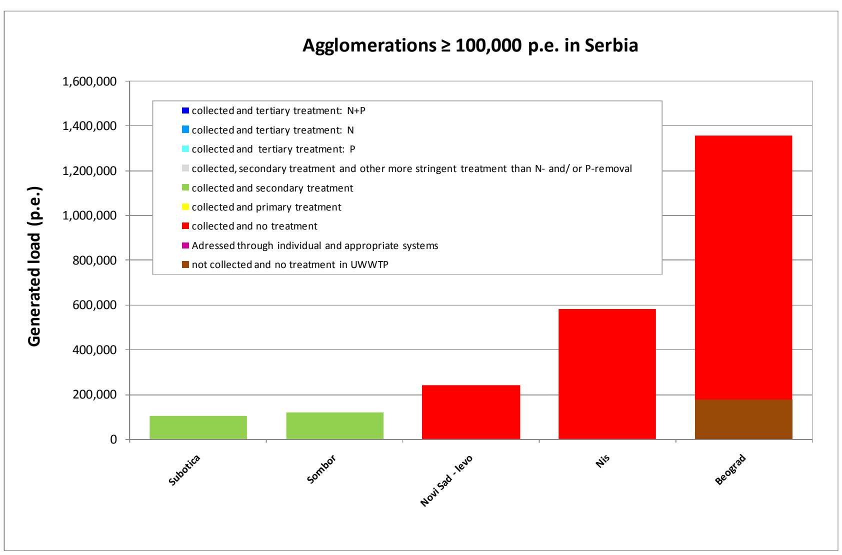


Figure 23: Wastewater treatment in agglomerations ≥100,000 PE in the Serbian part of the DRB

5 http://circa.europa.eu/Members/irc/env/wfd/library?l=/working_groups/u-uwwtd-rep/02-meetings&vm=detailed&sb=Title

Table 14: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot}, and P_{tot} into the environment in the Serbian part of the DRB

Serbia	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus other tertiary treatment						
Collected plus tertiary treatment (3NP)						
Collected plus tertiary treatment (3N)						
Collected plus tertiary treatment (3P)						
Collected plus partial other tertiary treatment						
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	24	614,504	1579	3599	692	153
Collected plus partial secondary treatment						
Collected plus primary treatment	3	104,565	747	1362	269	55
Collected plus partial primary treatment						
Collection and treatment - total	***27***	***719,069***	***2326***	***4961***	***961***	***208***
Collected and no treatment	101	3,180,386	67,358	139,270	11,230	1927
Not collected and not treated	307	1,172,731	25,683	47,085	3767	770
Total	**435**	**5,072,186**	**95,367**	**191,316**	**15,958**	**2905**

6.9.4 Outlook for wastewater treatment in Serbia until 2015

In January 2009, authorities from Serbia provided information on a list of priority projects related to urban wastewater collection and treatment to be implemented by 2015, as well as a list of further projects to be realised by 2015 in the case of favourable conditions. In total, the forecasted improvement of wastewater treatment concerned 15 agglomerations, of which 14 had already been listed in the Emission Inventory 2006/2007. One agglomeration (Kula) was listed for the first time in the forecast. For 13 projects, Serbian authorities indicated the size of the city or the capacity of the planned sewerage system / wastewater treatment plant, but no indication was given of whether this size referred to the forecasted size of the agglomeration or the forecasted capacity of the sewerage system / treatment plant. It was assumed for the purpose of this data evaluation that the indicated size (PE) referred to the forecasted capacity of the sewerage system / treatment plant. For the future scenarios, the 13 agglomerations involved were considered to have the same agglomeration size as reported for the reference date 2005/2006. The agglomeration of Kula was considered to have a forecasted size of 42,000 PE ("generated load" parameter).

For the calculation of the *baseline scenario*, only the upgrade of the 8 UWWTPs mentioned in the list of priority projects was taken into account. The additional 7 UWWTPs that could be realised under favourable conditions were considered in the *midterm scenario*.

Implementation of the *baseline scenario* would require the establishment of tertiary treatment (for the purpose of this data evaluation, it was assumed that tertiary treatment refers to N and P removal) for 6 agglomerations (173,814 PE) and the upgrade of wastewater treatment to secondary treatment for two agglomerations (54,063 PE).

In contrast to the *baseline scenario*, implementation of the *midterm scenario* would require the additional upgrade of wastewater treatment for 58 agglomerations (3,547,844 PE) in order to provide P removal.

The *vision scenario* aims to make use of the full technical potential of wastewater treatment as regards the removal efficiencies of nutrients. Accordingly, this scenario would further require the establishment of N removal in the 58 agglomerations and the provision of secondary treatment for 364 agglomerations (1,344,116 PE) reported as having no treatment in 2005.

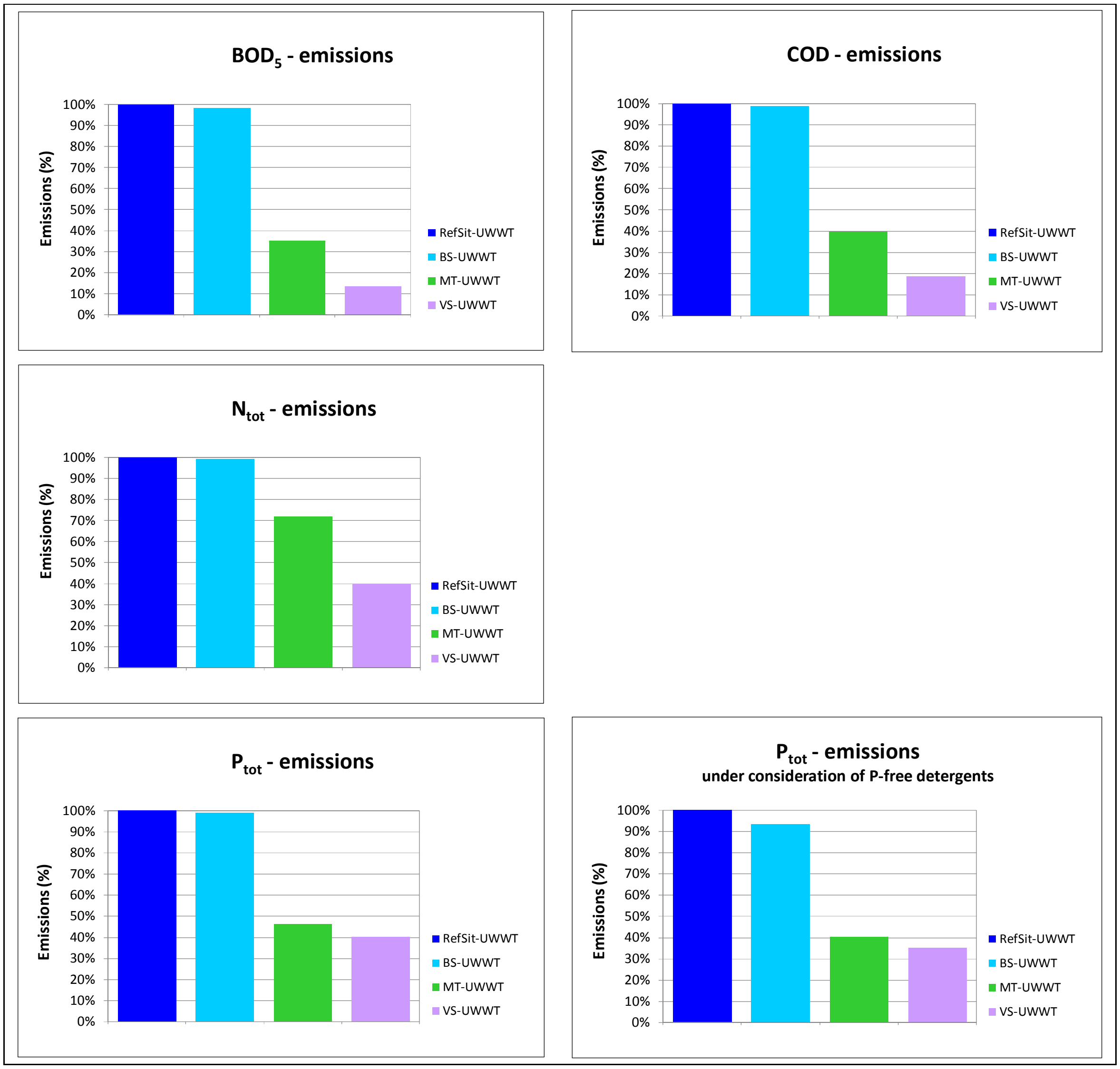


Figure 24: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.10 Romania

6.10.1 General information about the data evaluation

- In the framework of EMIS 2007, Romania provided an updated dataset on agglomerations >10,000 PE and information on agglomerations from ≥2000 PE–10,000 PE. The reference date for information was 31/12/2005.
- As an EU MS, Romania has applied Article 5(8) of the UWWT Directive since May 2005. The parameters subject to more stringent treatment are N and P.

- In Romania, one agglomeration can be served by one or more UWWTP / collecting systems without treatment, while at the same time one UWWTP can serve more than one agglomeration. This means that the ratio [agglomeration : UWWTP] = [m : n] is used.

6.10.2 Country specific considerations for data evaluation

- In the framework of reporting under Article 15 of the UWWT Directive to the European Commission in 2007 (UWWT Directive Questionnaire 2007), several modifications of the Romanian UWWT dataset[6] were required in order to fit the data model of the 2007 Questionnaire. These modifications were elaborated by the Romanian authorities in early 2008. As the dataset for EMIS 2007 was reported to the ICPDR before finalisation of these modifications, the dataset may not be identical to data reported under the 2007 Questionnaire. In order to give a distinct and clear picture of the situation, the dataset reported under EMIS 2007 was updated with information reported under the 2007 Questionnaire.

6.10.3 Results of data evaluation for the situation as of 31/12/2005

As can be seen from Table 17, Romania reported 2605 agglomerations ≥2000 PE for the reference year 2005. Of these, 2343 agglomerations (10,188,011 PE) were of the size ≤10,000 PE and 262 agglomerations (16,230,546 PE) of the size >10,000 PE. For 2108 agglomerations (34.11% of the total generated load), no collecting system or wastewater treatment plant was available in the reference year 2005, whereas for 175 agglomerations (19% of the total generated load) a collecting system was in place for the major part of the agglomeration. 322 agglomerations (47% of the total generated load) were reported to treat (parts of) their generated load by varying levels of wastewater treatment techniques, with secondary treatment covering the main fraction. 25.6% of the entire generated load of agglomerations ≥2000 PE was collected in collecting systems.

Table 15: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} from these agglomerations in Romania

Romania	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus tertiary treatment (3NP)						
Collected plus tertiary treatment (3N)	1	384,000	585	3103	412	50
Collected plus tertiary treatment (3P)						
Collected plus partial tertiary treatment (3NP)	1	32,390	166	528	43	3
Collected plus partial tertiary treatment (3N)	4	47,543	565	1140	98	16
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	35	4,508,330	30,630	69,566	9784	1539
Collected plus partial secondary treatment	177	5,388,077	71,745	124,615	12,081	2069
Collected plus primary treatment	7	211,508	71	2350	551	49
Collected plus partial primary treatment	100	1,774,931	2642	6830	1378	121
Collection and treatment - total	***325***	***12,346,779***	***106,404***	***208,133***	***24,347***	***3847***
Collected and no treatment	172	5,076,339	64,856	161,046	16,298	2790
Not collected and not treated	2108	8,995,439	195,369	357,934	28,634	4854
Total	**2605**	**26,418,557**	**366,629**	**727,113**	**69,279**	**11,491**

[6] Adonis, A. (2007)19287: report received by the European Commission by 12/12/2007

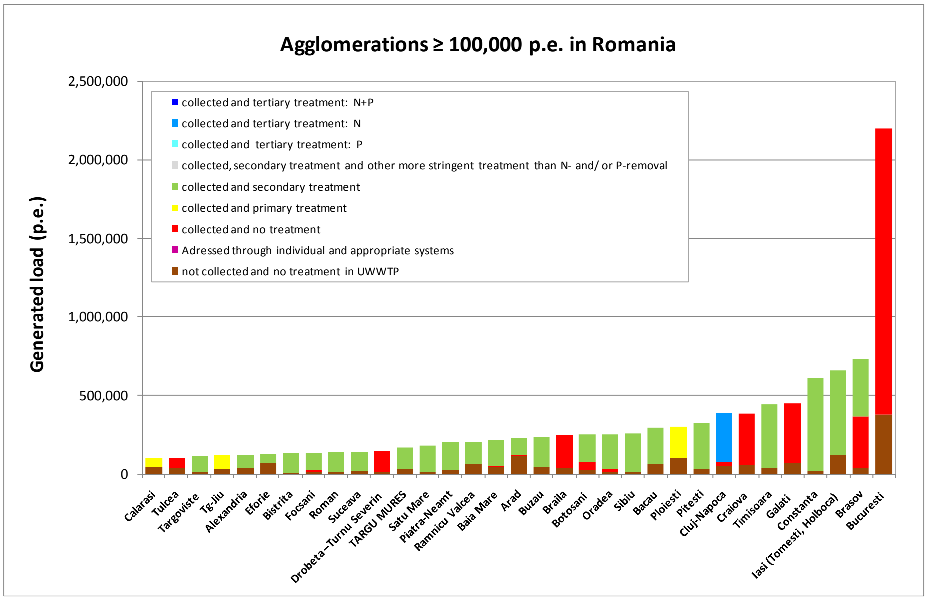


Figure 25: Wastewater treatment in agglomerations ≥100,000 PE in Romania

6.10.4 Outlook for wastewater treatment in Romania until 2015

As an EU MS, Romania has to comply fully with the UWWT Directive by 31st December 2018. Since May 2005, Romania has applied Article 5(8) of the Directive and therefore does not have to designate *sensitive areas*. The parameters subject to more stringent treatment are N and P. While agglomerations with a size of >10,000 PE have to comply with Article 3, Article 4 and Article 5(2) by 31st December 2015 at the latest, agglomerations ≤10,000 PE are subject to a transitional period until 31st December 2018. The interim target date to comply with Article 3 (80% of the total biodegradable load of agglomerations ≤10,000 PE) and Article 4 (77% of the total biodegradable load of agglomerations ≤ 10,000 PE) is 31st December 2015.

Authorities from Romania provided detailed information on the forecasted wastewater treatment for the years 2015 and 2018 on the national level. However, no data was available on agglomeration or UWWTP level. For this reason, it was assumed under the *baseline scenario* that all agglomerations ≤10,000 PE, where at least part of the generated load is connected to a collecting system and wastewater treatment in the reference year 2005, will be served by secondary treatment by 2015. In addition, the largest agglomerations in the size class 2000 PE–10,000 PE were assumed to be served by secondary treatment, so that for 2015, 77% of the total biodegradable load of agglomerations 2000 PE–10,000 PE would be served by secondary treatment. As no information was available on which agglomerations of the size class 2000 PE-10,000 PE would be covered by this improvement in wastewater treatment, the largest agglomerations were considered first (i.e. in the first step all agglomerations with a size of 9000 PE-10,000 PE were considered to have secondary treatment by 2015; in the second step all agglomerations in the size class 8000 PE–9000 PE were considered etc.). This methodology was continued, until 77% of the total generated load of agglomerations ≥2000 PE was covered. It has to be mentioned that, for the purpose of elaborating maps for the *baseline scenario*, this approach may not always cover those agglomerations where an improvement of wastewater treatment will actually be realised by 2015. However, for purpose of a first elaboration of the scenarios, this approach was agreed to be a suitable one. Agglomerations with more than 10,000 PE were considered to be served by N and P removal under the *baseline scenario*.

The *baseline scenario* requires the upgrade of both collecting systems and wastewater treatment plants for 262 agglomerations (16,230,546 PE) in order to provide N and P removal. In addition, collecting systems and treatment plants have to be extended and/or built to provide secondary treatment for 1475 agglomerations (7,834,646 PE) in 2015. For Romania, the *midterm scenario* draws the same picture as the *baseline scenario*.

The *vision scenario* aims to make use of the full technical potential of wastewater treatment as regards the removal efficiencies of nutrients, even where the Directive 91/271/EEC does not require stricter standards than reflected in the *baseline scenario*. This means that the *vision scenario* goes beyond

the requirements of Directive 91/271/EEC. Compared to the *baseline scenario*, the implementation of the *vision scenario* would require the establishment of secondary treatment for an additional 866 agglomerations with a total generated load of 2,336,959 PE.

For the reference year 2005, the country-specific estimation coefficients for P are identical to those coefficients taken into account for countries using P-free detergents (see chapter 3.2), so future scenarios on P-emissions did not differentiate between the use of P- containing and P-free detergents.

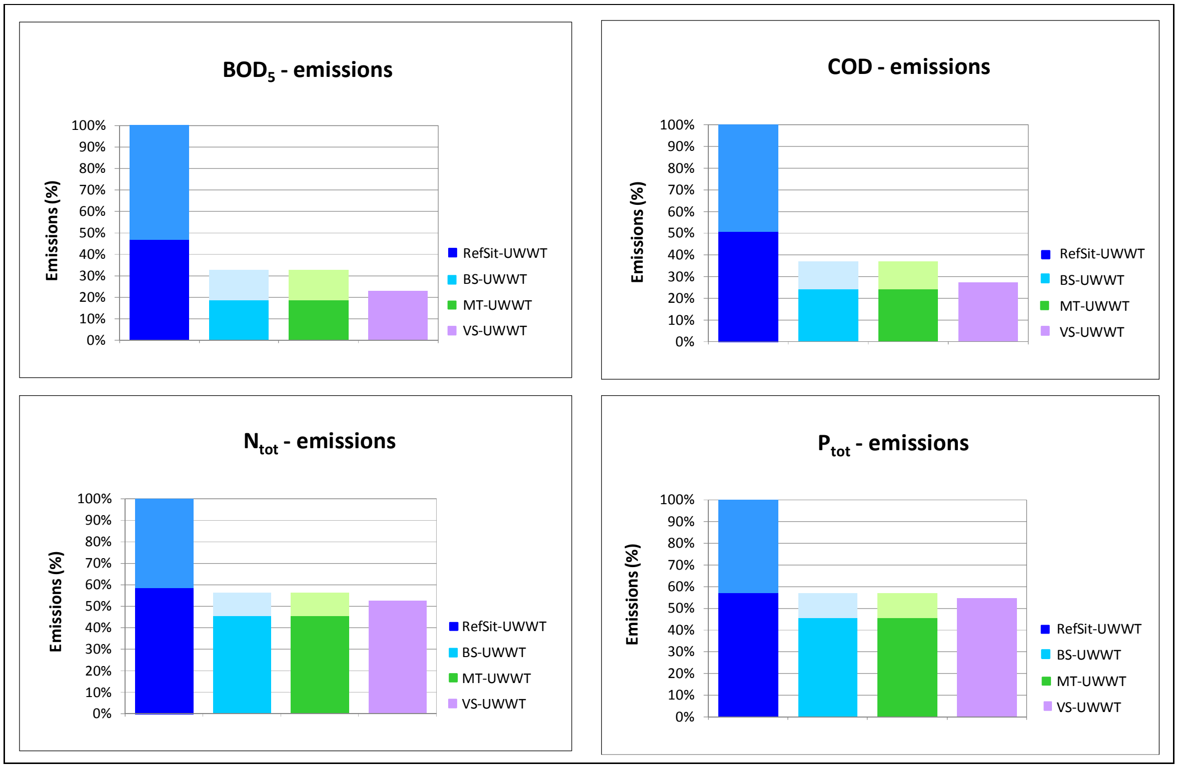


Figure 26: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.11 Bulgaria

6.11.1 General information about the data evaluation

- In 2007, Bulgaria reported information on all agglomerations ≥2000 PE with the reference date 31/12/2006 for the ICPDR Emission Inventory 2007. The data delivery included an update of information on agglomerations >10,000 PE.
- As an EU MS, Bulgaria has applied Article 5(2,3) of the UWWT Directive (91/271/EEC) which means that *sensitive areas* and *catchment areas of sensitive areas* have been designated. The Danube Basin in Bulgaria is designated as the *catchment of a sensitive area* under Article 5(4) of Directive 91/271/EEC. This means that the minimum percentage of reduction of the overall load entering all UWWTPs in this catchment of a sensitive area has to be at least 75% for total P and at least 75% for total N.
- In Bulgaria, one agglomeration is served by one or more UWWTP / collecting systems without treatment so that the ratio [agglomeration : UWWTP] = [1 : n] is used.

6.11.2 Country specific considerations for data evaluation

- Authorities from Bulgaria did not report information on the fraction of the generated load entering different wastewater pathways (i.e. collected in collecting systems, addressed through individual and appropriate systems, percentage of the generated load treated in UWWTPs). For this reason,

information reported from Bulgarian authorities under Art. 15 of the UWWT Directive[7] was used for this data evaluation.

- For 20 agglomerations where more than 0% of the generated load was reported to have been collected in a collecting system, no link to a UWWTP / collecting system without treatment was established. For the purpose of the present data evaluation, it was assumed that these agglomerations were connected to a collecting system without treatment and respective IDs were added by Umweltbundesamt Vienna.
- One agglomeration (BGAG65231_02) was reported to be inactive. For this reason it was not considered in the data evaluation.
- One agglomeration (BGAG68299_00) was reported with a size of less than 2000 PE. For this reason it was not considered in the data evaluation.

6.11.3 Results of data evaluation for the situation as of 31/12/2006

As can be seen from Table 16, Bulgaria reported 175 agglomerations ≥2000 PE for the reference year 2006. Of these, 130 agglomerations (510,419 PE) were classed as ≤10,000 PE and 45 agglomerations (4,082,430 PE) were classed as >10,000 PE. For 100 agglomerations (around 9% of the total generated load), no collecting system or wastewater treatment plant was available; whereas for 58 agglomerations (27% of the total generated load) a collecting system but no wastewater treatment was in place for major parts of the agglomeration. 17 agglomerations were reported to treat (parts of) their generated load using wastewater treatment plants providing different levels of treatment. The main fraction of the total generated load in PE (around 53%) originates from agglomerations where secondary treatment is in place for the major part.

Table 16: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the Bulgarian part of the DRB

Bulgaria	**Number of agglomerations**	**Generated load (PE)**	**Emissions BOD_5 (t/a)**	**Emissions COD (t/a)**	**Emissions N_{tot} (t/a)**	**Emissions P_{tot} (t/a)**
Collected plus tertiary treatment (3NP)	1	102,535	155	688	103	12
Collected plus tertiary treatment (3N)						
Collected plus tertiary treatment (3P)						
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	10	2,431,398	2588	6704	1687	309
Collected plus partial secondary treatment	3	314,249	3368	7531	831	138
Collected plus primary treatment	2	65,050	591	1858	95	10
Collected plus partial primary treatment	1	10,939	151	323	58	25
Collection and treatment - total	***17***	***2,924,171***	***6853***	***17,104***	***2774***	***494***
Collected and no treatment	58	1,247,802	15,006	28,255	2417	570
Not collected and not treated	100	420,877	9217	16,898	1352	230
Total	**175**	**4,592,850**	**31,076**	**62,257**	**6543**	**1294**

[7] Adonis A. (2008) 9045: report received by the European Commission by 19/06/2008

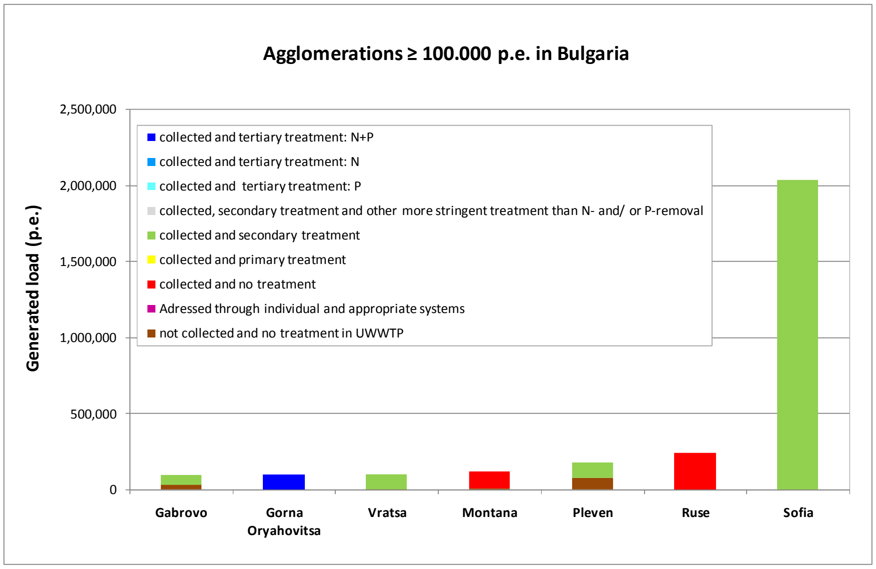


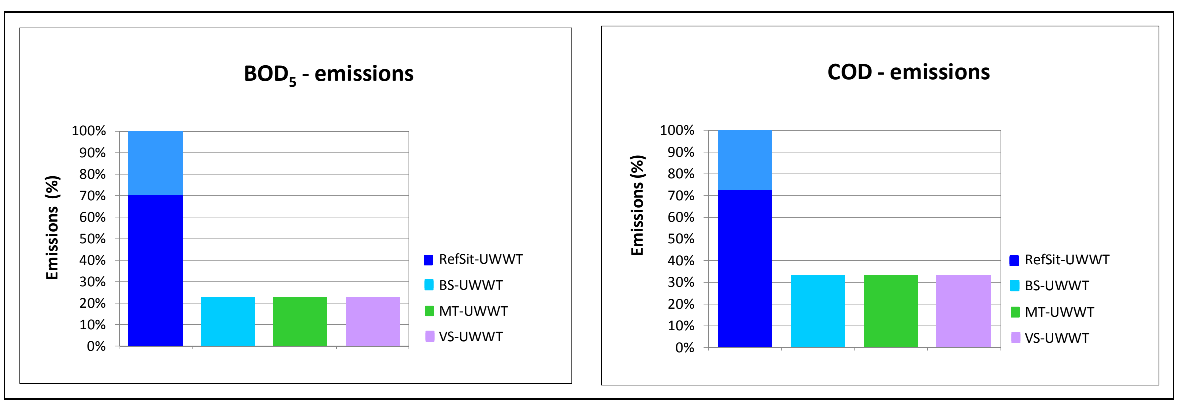
Figure 27: Wastewater treatment in agglomerations ≥100,000 PE in the Bulgarian part of the DRB

6.11.4 Outlook for wastewater treatment in Bulgaria until 2015

As an EU MS, Bulgaria has applied Article 5(4) of the UWWT Directive in the DRB which has been designated as a *catchment area of a sensitive area*. The final deadline to comply with the UWWT Directive in Bulgaria is 31st December 2014.

The *baseline scenario*, which is identical with the *midterm scenario* and the *vision scenario* for Bulgaria, was based on the assumption that at least 75% of the total P load and at least 75% of the total N load entering all UWWTPs of the *catchment of sensitive area* will be removed. As a prerequisite to achieve the reduction rates demanded under Article 5(4), secondary treatment was taken into account for all agglomerations ≥2000 PE–10,000 PE, while more stringent treatment with N and P removal was taken into account for agglomerations >10,000 PE. This approach would require the establishment of N and P removal for the entire wastewater load of 44 agglomerations (3,979,895 PE) reported as having no wastewater treatment, primary or secondary treatment in 2006. It would also require the establishment of secondary treatment for 127 agglomerations (493,260 PE) reported as having no collecting system and/or no wastewater treatment in the reference year 2006.

For the reference year 2005, the country-specific estimation coefficients for P were identical to those coefficients that are used for countries using P-free detergents (see chapter 3.2). Consequently, future scenarios on P-emissions did not differentiate between the use of P- containing and P-free detergents.



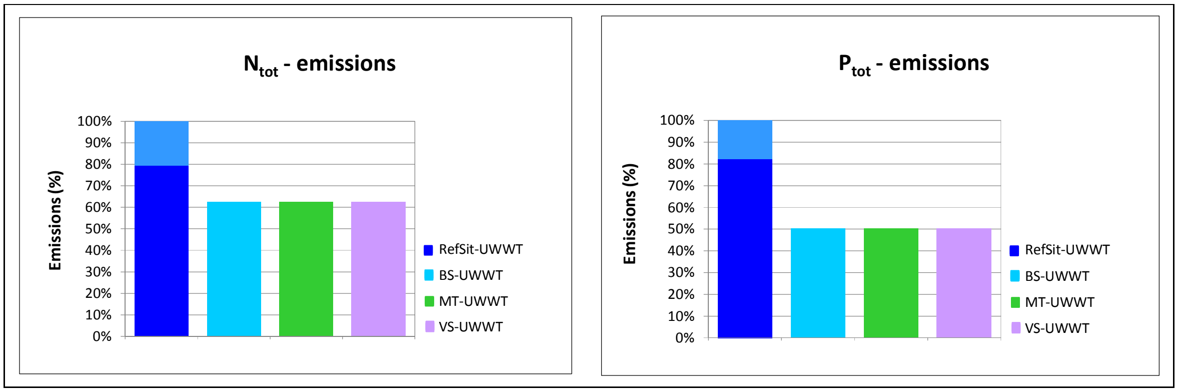


Figure 28: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.12 Moldova

6.12.1 General information about the data evaluation

- In the framework of the ICPDR Emission Inventory 2007, Moldova updated the datasets for agglomerations >10,000 PE and also provided information on agglomerations ≥2000 PE–10,000 PE in an additional template.
- In Moldova, one UWWTP / collecting system without treatment can serve more than one agglomeration. This means that the ratio [agglomeration : UWWTP] = [m : 1] is used.

6.12.2 Country specific considerations for data evaluation

- Moldova has defined identifiers for collecting systems without treatment for those agglomerations where 0% of the generated load is collected in a collecting system. As the data model of EMIS 2007 (and the data model of the Questionnaire designed for reporting under Art. 15 of the UWWT Directive) does not foresee the definition of a discharge point for the fraction of the generated load not collected in collecting system, these collecting systems without treatment were not considered in the data evaluation.
- For some UWWTPs, the identifier was not unique (e.g. the ID MD_WP_Cost referred once to the a collecting system without treatment named "Costesti" and once for a collecting system without treatment named "Costuleni". In these cases, Umweltbundesamt Vienna modified the IDs to make each one unique.

6.12.3 Results of data evaluation for the situation as of 31/12/2005

As can be seen from Table 17, Moldova reported 108 agglomerations ≥2000 PE for the reference year 2005. Of these, 93 agglomerations (352.011 PE) were classed as ≤10,000 PE and 15 agglomerations (305,483 PE) were classed as >10,000 PE. For 78 agglomerations (46% of the total generated load), no collecting system or wastewater treatment plant was available, whereas for 10 agglomerations (6% of the total generated load) a collecting system was in place for major parts of the agglomeration. 20 agglomerations (48% of the total generated load) were reported to treat (parts of) their generated load by primary or secondary treatment in the reference year 2005.

Table 17: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the DRB of Moldova

Moldova	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus tertiary treatment (3NP)						
Collected plus tertiary treatment (3N)						
Collected plus tertiary treatment (3P)						
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	2	28,000	245	428	51	4
Collected plus partial secondary treatment	8	174,000	2332	4589	515	78
Collected plus primary treatment	1	41,000	166	1251	61	7
Collected plus partial primary treatment	9	74,488	1286	2801	206	45
Collection and treatment - total	***20***	***317,488***	***4028***	***9070***	***834***	***134***
Collected and no treatment	10	38,383	843	1545	124	27
Not collected and not treated	78	301,623	6606	12,110	969	226
Total	**108**	**657,494**	**11,477**	**22,725**	**1926**	**386**

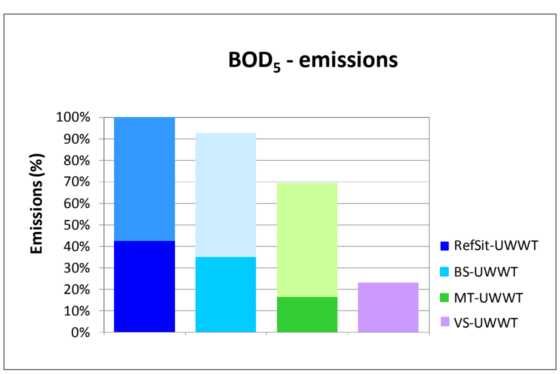
There are no agglomerations ≥ 100,000 PE in the Moldavian part of the DRB.

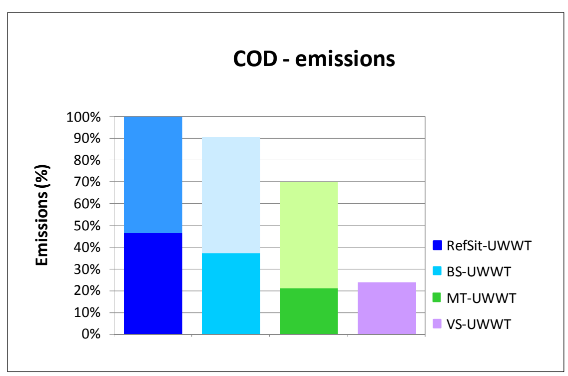
6.12.4 Outlook for wastewater treatment in Moldova until 2015

Moldova provided detailed information on expected wastewater treatment in 2015. For the *baseline scenario*, it was reported by Moldovan authorities that wastewater treatment for four agglomerations (137,000 PE) will be upgraded to provide P removal or secondary treatment for the major parts of their generated load.

Compared with the *baseline scenario*, the *midterm scenario* would require improved connection rates to wastewater treatment plants and upgrades for P removal for 12 agglomerations (194,483 PE).

The *vision scenario* aims to make use of the full technical potential of wastewater treatment as regards the removal efficiencies of nutrients. Accordingly, implementing the *vision scenario* would require not only an improvement in collecting systems, but also an upgrade to provide secondary treatment in 93 agglomerations (352,011 PE) and N and P removal in 15 agglomerations (305,483 PE).





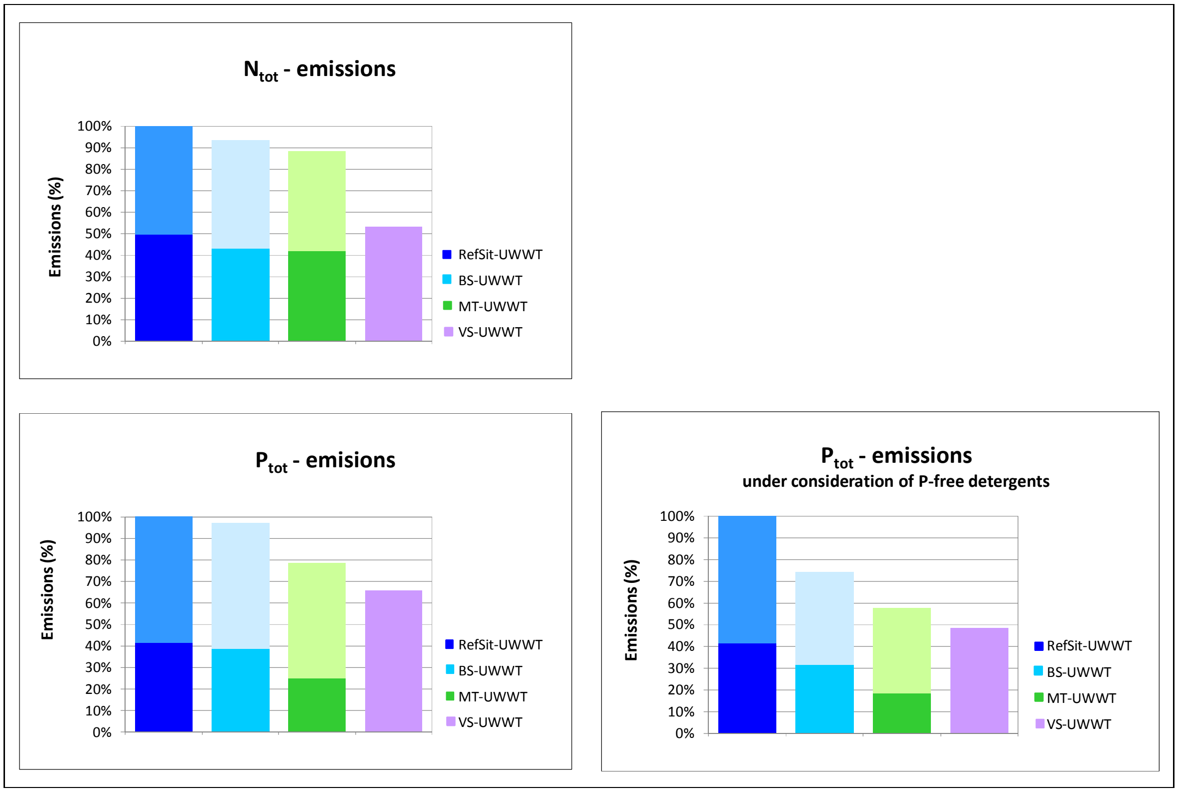


Figure 29: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

6.13 Ukraine

6.13.1 General information about the data evaluation

- In the framework of the ICPDR Emission Inventory 2007, the Ukraine reported information on all agglomerations ≥2000 PE–10,000 PE and an update of information on agglomerations >10,000 PE with the reference date 31/12/2005.
- In the Ukraine, one agglomeration is served by one or more UWWTP / collecting systems without treatment, which means that the ratio [agglomeration : UWWTP] = [1 : n] is used

6.13.2 Country specific considerations for data evaluation

- One UWWTP (UA_WP_CHER2) was not connected to any agglomeration. Hence this UWWTP could not be considered in the data evaluation.

6.13.3 Results of data evaluation for the situation as of 31/12/2005

As can be seen in Table 18, Ukraine reported 50 agglomerations ≥2000 PE for the reference year 2005. Of these, 30 agglomerations (164,660 PE) were classed as ≤10,000 PE and 20 agglomerations (899,200 PE) were classed as >10,000 PE. 40 agglomerations (covering around 93% of the total generated load) were reported as having secondary treatment for the major parts of their generated load. Only 10 agglomerations were indicated as being connected to collecting systems but not to any wastewater treatment.

Table 18: Wastewater treatment in agglomerations ≥2000 PE and emissions of BOD, COD, N_{tot} and P_{tot} into the environment in the Ukrainian part of the DRB

Ukraine	Number of agglomerations	Generated load (PE)	Emissions BOD_5 (t/a)	Emissions COD (t/a)	Emissions N_{tot} (t/a)	Emissions P_{tot} (t/a)
Collected plus tertiary treatment (3NP)						
Collected plus tertiary treatment (3N)						
Collected plus tertiary treatment (3P)						
Collected plus partial tertiary treatment (3NP)						
Collected plus partial tertiary treatment (3N)						
Collected plus partial tertiary treatment (3P)						
Collected plus secondary treatment	39	979,160	4358	7918	1922	611
Collected plus partial secondary treatment	1	7900	1	1	19	3
Collected plus primary treatment						
Collected plus partial primary treatment						
Collection and treatment - total	***40***	***987,060***	***4359***	***7919***	***1941***	***614***
Collected and no treatment	10	76,800	365	867	163	41
Not collected and not treated						
Total	**50**	**1,063,860**	**4724**	**8786**	**2104**	**654**

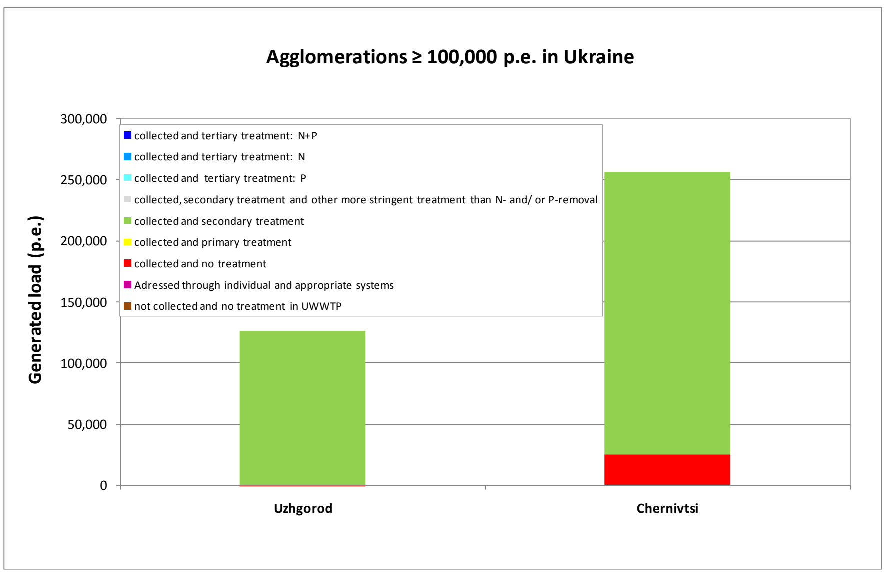


Figure 30: Wastewater treatment in agglomerations ≥100,000 PE in the Ukrainian part of the DRB

6.13.4 Outlook for wastewater treatment in Ukraine until 2015

Ukraine provided detailed information on the forecasted wastewater treatment for 2015. In total, wastewater treatment for 14 agglomerations will be implemented. Upgrades will be undertaken for 10 agglomerations (with collecting systems but no wastewater treatment plants in the reference year 2006) to the level of partial primary, partial secondary or partial more stringent treatment by 2015. In addition, it is planned that four agglomerations with no wastewater treatment or secondary treatment in the reference year 2006 will be served by partial more stringent treatment by 2015. Authorities from the Ukraine did not indicate whether more stringent treatment referred to N and/or P removal.

The implementation of the *midterm scenario* would require the implementation of P removal for 15 agglomerations (324,900 PE) served by partial primary or secondary treatment under the *baseline scenario*, as well as the implementation of N and P removal for the entire generated load of five agglomerations (574,300 PE).

The *vision scenario* aims to make use of the full technical potential of wastewater treatment as regards the removal efficiencies of nutrients. Accordingly, implementing this scenario would further require the extension of wastewater treatment for 15 agglomerations >10,000 PE to provide N removal and also the establishment of secondary treatment for 8 agglomerations (48,300 PE) that were considered with partial primary or secondary treatment under the *midterm scenario*.

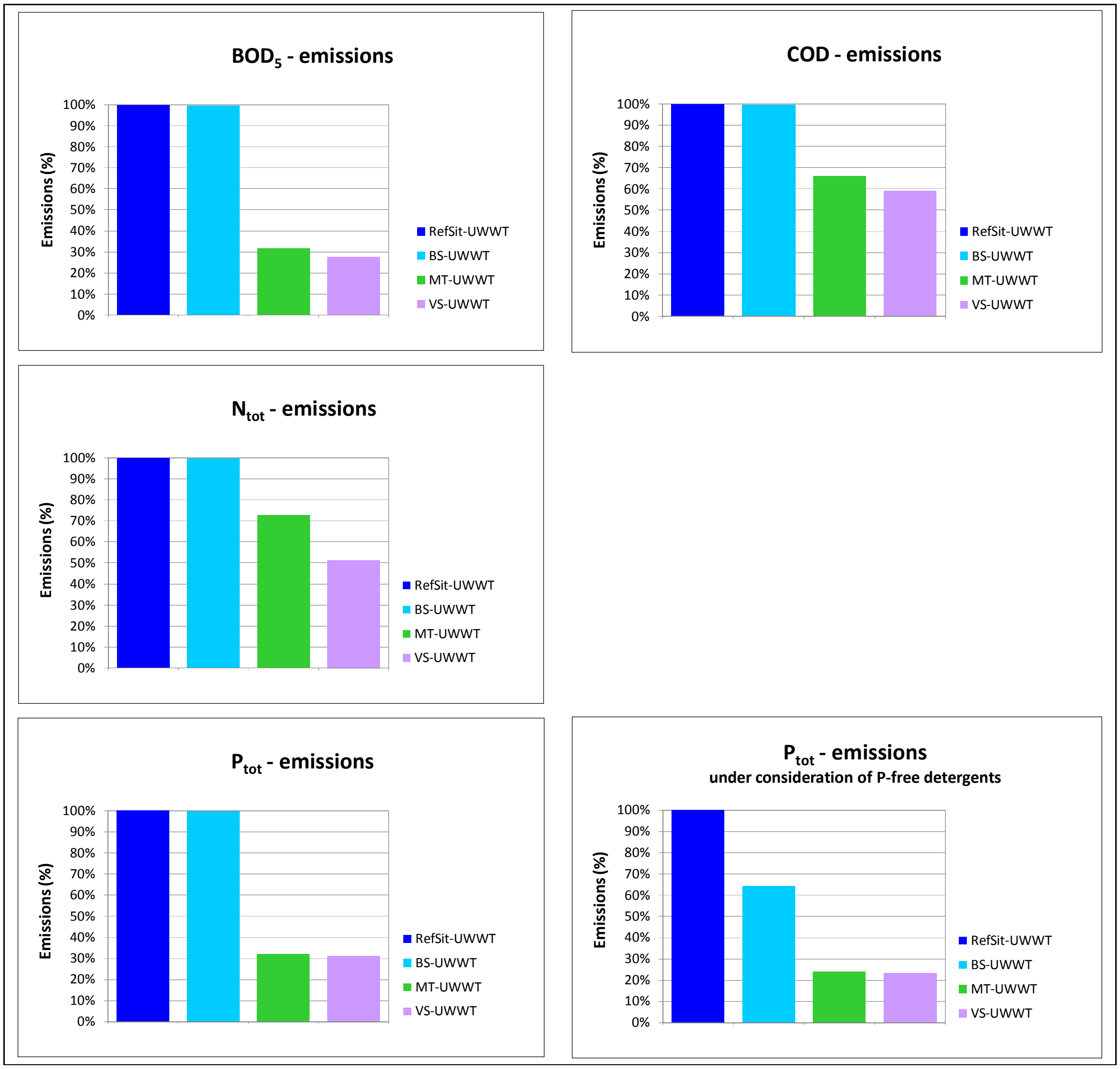


Figure 31: Emissions (%) of BOD_5, COD, N_{tot} and P_{tot} under the different scenarios

ICPDR methodology for reporting on and assessing diffuse nutrient sources

Annex 4 of the DRBM Plan

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1. Background

The methodology used for assessing diffuse sources of pollution and selecting appropriate measures is based on the DPSIR framework (Driving force-Pressure-State-Impact-Response) being the underlying conceptual framework for developing the programme of measures addressing nutrients. The collation of data from Article 5. reports was supplemented by other existing evidence (from the DBS JTWG (Danube-Black Sea Joint Technical Working Group) report on the impact of the Danube on the NW Black Sea; daNUbs (Danube Nutrients Black Sea research project) and the MONERIS (Modelling Nutrient Emissions into River Systems) model etc.). The aim was to identify the scale of the challenge facing Danube countries regarding nutrient pressures to meet EU Water Framework Directive (WFD) objectives (as well as those from other relevant Directives, in particular the Urban Waste Water Treatment Directive (UWWTD) and the Nitrates and Groundwater Directive).

The DPSIR has been extended as a result of the ongoing process regarding scenarios, options, criteria and evaluation as part of the further development of the MONERIS model as a management tool, in order to provide a common structural support for the decision-making processes of the ICPDR. In this context, the nutrient approach can support the Danube countries by introducing a structural system of catchments in which cause-effect chains are formalised and modelled to simulate the expected effects of the proposed courses of action, as the response to nutrient pollution. Scenario calculation considers currently planned and anticipated developments, taking into account different planning decisions (e.g. designation as a *sensitive area*).

2. Basic and supplementary measures

The nutrient loads discharged by the Danube River are an important factor responsible for the deterioration of the Black Sea ecosystem.

The Danube countries have made a commitment to develop nutrient water quality improvement targets to be achieved by 2015. Both the Memorandum of Understanding (ICPBS/ICPDR, 2001) as well as the Danube Declaration (ICPDR, 2005) define the long-term goal: to reduce the nutrient load in the Danube and its tributaries to levels consistent with the achievement of *good ecological status* and to contribute to ensuring the nutrient balance of the Black Sea reaches a sustainable state corresponding to similar conditions observed in the mid 1960s.

These targets are the first examination of the potential for delivering environmental improvements over the first planning cycle of the WFD. The targets will be revised and improved in future years as more information becomes available.

A list of the outstanding *basic measures* and *supplementary measures* related to nutrient pollution in the Danube River Basin (DRB) has been prepared for the Joint Programme of Measures (JPM) of the Danube River Basin District Management Plan (DRBM).

Basic measures (in line with the requirements imposed by the identification of the DRB and its coastal waters as a *sensitive area*) are the implementation of the UWWTD (or for Non EU countries, the appropriate ICPDR Recommendation on wastewater discharges). Measures include the connection of settlements to public sewers and appropriate treatment plants; the upgrading of wastewater treatment plants with respect to nitrogen (N) and phosphorus (P) removal and the implementation of Best Available Techniques (BAT) on agro-industrial units.

Supplementary measures have also been identified. These include the reduction of the volume of wastewater directly discharged from combined sewerage systems into rivers and the introduction of a P-detergent ban.

All river basin district level scenarios should be ones where the competent river basin authority considers they would fit with the requirements of the WFD, transposing regulations and river basin planning guidance. These river basin district (or sub-basin-district) scenarios should relate to the overall approach being taken at the key, upper level of river basin planning, which are currently being made in relation to the Danube River Basin District (DRBD) or the specific sub-basins.

Scenarios with different environmental benefits due to nutrient reduction measures in line with EU policies (*basic/supplementary measures*) and the related timetable of individual countries (respecting agreed transitional periods) are designed and evaluated though MONERIS investigations.

Through the MONERIS model, the nutrient loads within the river network of the DRBD are calculated for the present state and a *baseline scenario* for 2015.

Possible *basic measures*:

1. Implementation of the Nitrates Directive (or for Non EU countries, the appropriate BATs).
2. Implementation of Action Programmes according to the Nitrates Directive - taking vulnerable zones into account in cases where natural freshwater lakes, other freshwater bodies, estuaries, coastal waters or marine waters of the DRBD are found to be eutrophic or may become eutrophic in the near future (or for Non EU countries, the appropriate BATs).
3. Best Environmental Practice (BEP) for farmers linked to the EU Common Agricultural Policy (CAP).
4. Prevention and control of soil erosion.

Possible *supplementary measures*:

1. Instruments and policy measures to support and implement the WFD.
2. Compensation payments for changing land use management etc.
3. Ensuring integration between River Basin Management Plans and Land Use Planning. The achievement of WFD objectives depends fundamentally on the management of land, including the built environment. Factors including pressure from new housing for more water, the management of domestic waste, the impacts of diffuse urban pollution and flood management all affect the water environment and need to be integrated into the deliverable set of measures.
4. Wetland creation and restoration. Pressures on wetlands (e.g. physical modification or pollution) can result in impacts on the ecological status of water bodies. Measures to manage such pressures will need to be considered as part of River Basin Management Plans (RBMP) in order to meet the environmental objectives of the Directive. Further, wetland creation and enhancement should be used within Programmes of Measures to deliver sustainable, cost effective and socially acceptable mechanisms for helping to achieve environmental objectives – e.g. flood management, pollution control, coastal management, groundwater recharge.
5. The Rural Development Regulation (RDR) for the period 2007-2013 is designed to place agriculture within a broader context by covering three major policy objectives. These objectives aim to improve: i) competitiveness of farming and forestry (Axis 1); ii) environment and land management (Axis 2); and iii) quality of life and diversification (Axis 3). Measures under all axes could contribute to reaching WFD objectives as they offer various possibilities to protect and enhance natural water resources. While the measures under Axis 1 and 3 are mainly indirectly linked to water, the measures provided under Axis 2 offer a high potential to support the implementation of the WFD directly. Measures contributing to water protection are mainly contained under Axis 2 of the Rural Development Programmes. In particular, the voluntary agri-environmental measures are used to address diffuse and point sources of agricultural water pollution (nitrates, phosphates, pesticides) as well as soil erosion. Under this second axis, there is also a specific measure allowing farmers to be compensated for income foregone due to WFD implementation (Art. 38).

3. Scenarios for nutrient reduction

Scenarios with different environmental benefits due to nutrient reduction measures and the related timetable of individual countries (respecting agreed transitional periods) are designed and evaluated though MONERIS. Through the model, the nutrient loads within the river network of the DRBD are calculated for the present state and for various different scenarios for 2015.

The requirements and objectives of the WFD are to achieve *good ecological status* by 2015 for all waters. The RBMP will provide the context for setting out a comprehensive programme of measures designed to achieve the objectives set for water bodies.

The measures addressing three of the identified Significant Water Management Issues (SWMI), (namely organic pollution, nutrient pollution and hazardous substances pollution) are strongly interlinked. The selected approach recognises these synergies in the development of the packages of measures in the JPM. For example, the effects of management decisions for urban wastewater development addressing organic pollution have certain positive effects on nutrient reduction in the respective area. These effects - benefits and drawbacks - must be identified and evaluated under different scenarios and based on a wide range of options for development and underlying assumptions that are taken into account and evaluated.

The fundamental assumption made is that there are two types of drivers governing the development of economic, social and environmental conditions in the DRB and which influence scenario building. The first are those drivers that basically operate independently of policy-making i.e. drivers that are not directly influenced by policies, or at least not in the JPM first cycle (up to 2015). These include population growth, environmental conditions and climate change. The second type of drivers involves policies which will have an implementation effect on a 5-10 year horizon.

3.1. Methodological approach

The intention was to use a transparent methodology that consists of four major steps: (i) set out the assumptions for possible developments regarding various sectors, (ii) develop scenarios by combining different sets of assumptions, (iii) map assumptions into load reductions and, in the case of nutrient emissions, into input parameters for MONERIS, and (iv) perform scenario assessments and nutrient scenario calculations with MONERIS using the relevant parameters.

3.2. Setting out assumptions for possible developments regarding various sectors

The assumptions are coherent extrapolations of immediate or medium-term implementation effects of different policy options, such as the implementation of EU or national legislation, changes in agricultural policies etc. For the *baseline scenario* (BLS), which describes developments (considering current, ongoing or planned measures), the assumptions have to be selected accordingly. For example, if we know that a country has to implement the Integrated Pollution Prevention and Control (IPPC) Directive, then they will make investments to ensure compliance with the BAT, and this should be considered as the relevant assumption in the development for industrial wastewater treatment to be used in the BLS. For the non EU Member States (Non EU MS), some future developments appear more likely than others in the EU MS, and therefore the commitment of building a certain number of wastewater treatment plants until 2015 is a parameter of the scenario calculation.

The assumptions have been carefully checked by the Contracting Parties with the view to reduce uncertainties and provide a robust baseline for nutrient reduction analysis as required for developing the JPM.

3.2.1. Example of an assumption related to the use of fertilisers

The European Fertilizer Manufacturers Association (EFMA) assumes an increase in application rates for N fertilizer for the new EU MS of approx. 20% for 2017 (EFMA, 2008). The EFMA forecast also

includes values for individual Danube countries: Austria (+9%), Bulgaria (+30%), Germany (-2%), Hungary (+20%), Romania (+24%) and Slovenia (0%). For the projection of fertilizer application in other Danube countries, we used the EFMA average for the new EU MS of a 20% increase.

3.3. Development of scenarios by combining different sets of assumptions

For the preparation of the scenarios, different assumptions were selected and combined. The combination of the various assumptions conceptualises the respective scenarios. The definition of scenarios is a complex procedure that needs assessment and integration of all interlinkages between those policies and assumptions affected by a particular decision or commitment. Building different scenarios on a range of plausible assumptions provides the basis for a discussion about their effects and is a key element in decision support.

In the context of the strategic planning and decision support for the development of the JPM, the scenarios provide a setting to discuss various options and have the value of offering the CPs an opportunity for dialogue about their respective perspectives on plausible future developments for the successful implementation of the measures.

3.4. Mapping assumptions into load reductions and, in the case of nutrient emissions, into input parameters for MONERIS

After having agreed conceptually on the various scenarios, it is necessary to assess quantitatively the influence on the DRB. For point sources, the load reductions can be derived, for example, by means of suitable emission factors. Regarding nutrient fluxes, the ICPDR is using the MONERIS model, which depends on the wide variety of input parameters. To be able to assess the quantitative effect, the results of the assumptions have to be mapped into changes of the input parameters of the model. For example, it is well established that the introduction of P-free detergents will decrease the specific P input per capita by approximately 50% (e.g. in Germany from 4g P/inh.d to approx. 2g P/inh.d). This decreased input will be further used in the scenario calculation.

3.5. Performing scenario assessments and nutrient scenario calculations with MONERIS using relevant parameters

All previous steps are used to define measures and to combine the modelling of different measures or packages of measures. In the case of SWMIs that are mainly caused by point sources, the available regionalised emission information has to be compared to water quality information.

In the case of the nutrient SWMI, which is characterised by a complex emissions situation caused by point and diffuses sources and negatively impacted water bodies (Black Sea coastal areas) situated far away from the sources, such a straightforward analysis isn't possible. In order to facilitate the nutrient pollution analysis, the scenarios are calculated based on modelling - for the DRB countries, the MONERIS model is used. The overall application of MONERIS allows a regionally differentiated quantification of nutrient emissions via different pathways describing point and diffuse sources discharging into river systems.

4. The MONERIS approach

The emission model MONERIS uses spatially and temporally varying input data regarding the natural system and human activities in the Danube River. This comprises among other factors data on: soil characteristics, meteorological factors, land use, population and degree of urbanisation, connection to sewerage systems and degree of wastewater treatment, N surplus on agricultural soils, P accumulation in soils and atmospheric deposition. It uses this information to calculate the emissions of N and P to surface water, by seven different pathways. The results can be shown as tables and maps.

The pathways are:
1. Point sources (waste water treatment plants and industry);
2. Overland flow;
3. Ground water flow;
4. Tile drainage;
5. Erosion;
6. Urban systems;
7. Atmospheric deposition on surface waters.

The MONERIS model was developed to estimate nutrient inputs by point and various diffuse sources into rivers with catchments on a larger scale. The model uses Microsoft Access databases. The average size of basic catchments (analytical units) used in the Danube Basin calculations is 2000 km², but based on data availability and required detail level, can be reduced to approx. 100 km² or even lower.

MONERIS was also conceived as a system for identifying reduction needs to meet applicable water quality standards (target concentrations) by using different scenario options. It is also used to examine a number of scenarios to demonstrate impacts of reducing wastewater loads alone and in combination with measures to reduce diffuse inputs for phosphates e.g. through the use of P-free detergents.

For the use of MONERIS for the Danube, a complete new version of the model was developed. Besides implementation of new scientific approaches regarding retention of nutrients in the river system and erosion, the model now has a user interface (see Figure 1). This allows access to the model at different levels. Modellers can change input data and viewers can select results of the calibrated model for selected years and calculate scenarios. The user interface includes the calibrated model for the DRDB; the scenario manager for certain measures in the field of agricultural, urban and wastewater treatment plants; the possibility to present results for selected years as figures and tables and the export functions to use the model results within further work.

For the MONERIS upgrade of the Danube, a manual was developed that will be published and used by ICPDR experts. This manual includes a detailed description of the methodology and a description of how to use the user interface, as well as maps and data used as input data for the DRBD modelling.

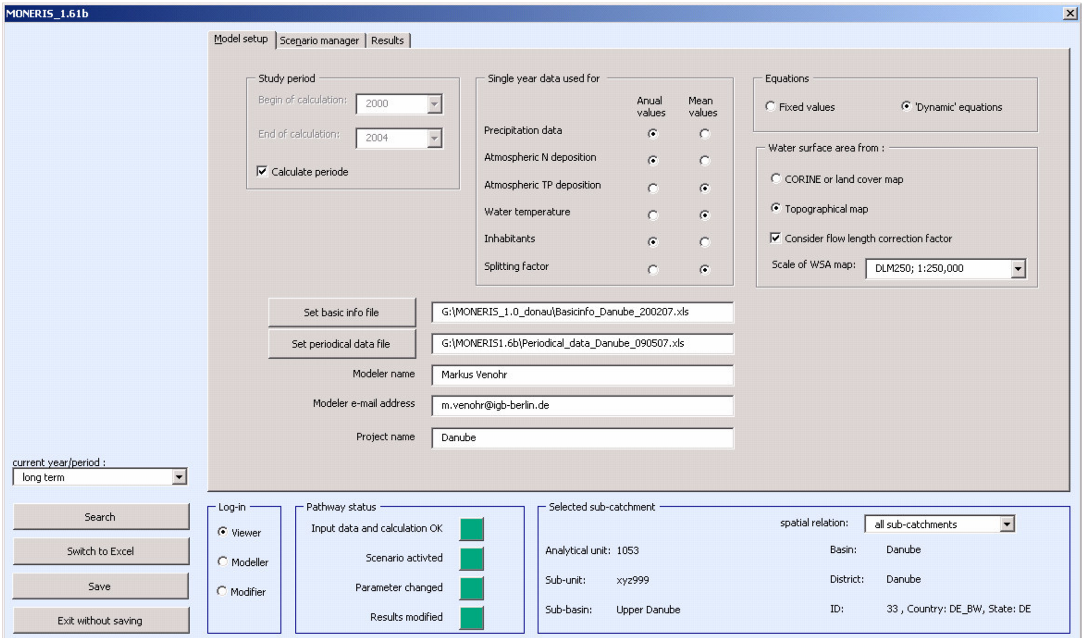

Figure 1: Overview of the user interface of the MONERIS model

The MONERIS model was produced by the Leibniz Institute of Freshwater Ecology and Inland Fisheries in the Forschungsverbund Berlin, Germany.

ICPDR methodology for reporting on and assessing industrial wastewaters

icpdr iksd
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

Annex 5 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Table of Contents

1 Introduction

The purpose of this methodology is to provide a general overview of the industrial point sources of pollution within the Danube River Basin (DRB), as well as to present results from the assessment of the reported data needed for the development of the Danube River Basin District Management (DRBM) Plan.

Since 1997, the ICPDR has prepared Emission Inventories on municipal, agricultural and industrial emissions in the DRB, which contain basic information on pollution and supporting data such as the methods used for measurement, type of wastewater treatment and expected reduction in pollution. The industrial emission inventories deal with selected industries that are grouped into 11 sectors following a classification system developed for the inventory. Data from the inventory helped to identify industrial pollution sources in the Danube Basin by industrial sector, pollutant impact, location or other criteria.

Annex VI of the Water Framework Directive (WFD) stipulates that the Programmes of Measures should include measures under the 96/61/EC Integrated Pollution Prevention Control (IPPC) Directive. The EU set of common rules for permitting and controlling industrial installations in the IPPC Directive (Directive 1996/61/EC) aims to minimise pollution from various industrial sources throughout the EU. The permit conditions, including emission limit values, must be based on Best Available Techniques (BAT). This has resulted in the adoption and publication of the BAT Reference Documents (the so-called BREFs) by the ICPDR. The purpose of the Directive is to ensure a high level of protection of the environment taken as a whole.

The IPPC Directive is considered to be the most significant challenge facing the industrial sector in recent years and in the future. Pollution coming from point industrial units is partly addressed by the IPPC and partly by a number of specialised directives covering specific sectors. The IPPC Directive takes an integrated approach, which means that authorities need to take into account: transboundary effects, costs and advantages of pollution prevention and control and the best available techniques reference documents.

The main reporting requirement of the IPPC is the publication of an inventory of chemical emissions and sources called the European Pollutant Emission Register (EPER). It was established by Commission Decision 2000/479/EC to implement the provisions of article 15 (3) of the IPPC Directive on public accessibility of the results of monitoring. EPER requires reporting from all installations that fall under the IPPC. It covers 50 air and water pollutants and the data is reported on the basis of threshold limit values of parameters. In EPER, emission data reported by EU Member States (EU MS) are made accessible in a public register that is intended to provide environmental information on major industrial activities. As of 2007, EPER has been replaced by the European Pollutant Release and Transfer Register (E-PRTR).

The ICPDR Emission Inventory data from industry is currently updated using EPER II data and the EPER methodology in order to achieve more comparable results.

The tasks include:

⇒ identification of the data form required by the ICPDR;
⇒ integration of relevant EPER II data into the ICPDR database;
⇒ organisation of relevant EPER-like data collection activities for the Non EU countries.

2 EPER reporting requirements and ICPDR Emission Inventories

The EPER is considered to be an effective tool for monitoring releases from larger industrial facilities and for comparing releases from similar industrial sources or sectors. Not all existing industrial plants are considered for EPER reporting – only those activities which are listed in Annex A3 of the EPER Decision are included.

IPPC Annex I activities	
1.	**Energy industries**
1.1	Combustion installations > 50 MW
1.2	Mineral oil and gas refineries
1.3	Coke ovens
1.4	Coal gasification and liquefaction plants
2.	**Production and processing of metals**
2.1/2.2/2.3/ 2.4/2.5/2.6	Metal industry and metal ore roasting or sintering installations; installations for the production of ferrous and non-ferrous metals
3.	**Mineral industry**
3.1/3.3/3.4/ 3.5	Installations for the production of cement klinker (>500t/d), lime (>50t/d), glass (>20t/d), mineral substances (>20t/d) or ceramic products (>75t/d)
3.2	Installations for the production of asbestos or asbestos-based products
4.	**Chemical industry and chemical installations for the production of:**
4.1	Basic organic chemicals
4.2/4.3	Basic inorganic chemicals or fertilisers
4.4/4.6	Biocides and explosives
4.5	Pharmaceutical products
5.	**Waste management**
5.1/5.2	Installations for the disposal or recovery of hazardous waste (>10t/d) or municipal waste (>3t/h)
5.3/5.4	Installations for the disposal of non-hazardous waste (>50t/d) and landfills (>10t/d)
6.	**Other Annex I activities**
6.1	Industrial plants for pulp from timber or other fibrous materials and paper or board production (>20t/d)
6.2	Plants for the pre-treatment of fibres or textiles (>10t/d)
6.3	Plants for the tanning of hides and skins (>12t/d)
6.4	Slaughterhouses (>50t/d), plants for the production of milk (>200t/d), other animal raw materials (>75t/d) or vegetable raw materials (>300t/d)
6.5	Installations for the disposal or recycling of animal carcasses and animal waste (>10t/d)
6.6	Installations for poultry (>40,000), pigs (>2000) or sows (>750)
6.7	Installations for surface treatment or products using organic solvents (>200t/y)
6.8	Installations for the production of carbon or graphite

Table 1: List of activities with production capacity relevant for EPER reporting

According to the EPER Decision, there are 26 pollutants selected for reporting for water with a specified threshold value for each of the substances. The threshold values have been chosen in order to include about 90% of the emissions of the industrial facilities looked at, so as to prevent an unnecessarily high burden on all industrial facilities.

No.	Pollutant name	Threshold values for releases (in kg/y)
1	Total nitrogen (N)	50,000
2	Total phosphorus (P)	5000
3	Arsenic and compounds (as As)	5
4	Cadmium and compounds (as Cd)	5
5	Chromium and compounds (as Cr)	50
6	Copper and compounds (as Cu)	50
7	Mercury and compounds (as Hg)	1
8	Nickel and compounds (as Ni)	20
9	Lead and compounds (as Pb)	20
10	Zinc and compounds (as Zn)	100
11	Dichloroethane – 1,2 (DCE)	10
12	Dichloromethane (DCM)	10
13	Chloro-alkanes, C10-C13	1
14	Hexachlorobenzene (HCB)	1
15	Hexachlorobutadiene (HCBD)	1
16	Hexachlorocyclohexane(HCH)	1
17	Halogenated organic compounds (as AOX)	1000
18	Benzene, toluene, ethylbenzene, xylenes (as BTEX)	200
19	Brominated diphenylethers (PBDE)	1
20	Organotin compounds(as total Sn)	50
21	Polycyclic aromatic hydrocarbons (PAHs)	5
22	Phenols (as total C)	20
23	Total organic carbon (TOC) (as total C or COD/3)	50,000
24	Chlorides (as total Cl)	2,000,000
25	Cyanides (as total CN)	50
26	Fluorides (as total F)	2000

Table 2: List of pollutants to be reported if threshold values are exceeded

For the reference years 1997, 2000 and 2002, the ICPDR has prepared inventories on point source emissions including industrial and agro-industrial sources. The results show that the degree of industrial development and the amount of pollution caused by the industrial sector varies within every country in the DRB. All industrial branches are represented: chemical, electrical, engineering, metallurgical and galvanic, textile, sugar, papermaking and pulp-mills.

The inventories of 2004 served as the basis of pressures assessment for the Danube Analysis Roof Report 2004 (RR 2004). Within this report, the focus of analysis was on the significant point sources of pollution. The criteria for the identification of the significant point sources of pollution from industrial sites for the basin-wide overview are given in Table 3.

Industrial wastewater	Significant if at least one parameter is exceeded: – COD >2 t/d – pesticides >1 kg/a – heavy metals and compounds*: As total >5 kg/a Cd total >5 kg/a Cr total >50 kg/a Cu total >50 kg/a Hg total >1 kg/a Ni total >20 kg/a Pb total >20 kg/a Zn total >100 kg/a
Wastewater from agricultural point sources (livestock farms)	Significant if at least one parameter is exceeded: N total** >50,000 kg/a P total** >5000 kg/a

* Thresholds in water in kg/year as in the EPER.
** Threshold as given in the EPER.

Table 3: Definition of significant point source pollution on the basin-wide level

The ICPDR emission inventory for the reference year 2004 includes 1371 sources of pollution, of which 306 are industrial point sources. The overview per country is given in Table 4 along with a comparison of the identified significant point sources.

	DE	AT	CZ	SK	HU	SI	HR	BA	RS	BG	RO	MD	UA
Industrial point sources as from the Emission Inventory	11	13	3	7	50	9	29	62	8	22	87	0	5
Significant point sources (RR 2004)	5	10	9	6	24	2	10	5	14	4	49	0	5

Table 4: Point sources of pollution in the Danube River Basin District (2004)

As shown in Table 3 and Table 4, the ICPDR Emission Inventory and the identification of significant point sources of pollution from industry has been carried out taking into account the pollutants and threshold values for EPER.

3 Data collection templates for industrial emissions to water (direct and indirect)

In 2007, the ICPDR Municipal Emission Inventory was modified in a way to be consistent with the collection of data under the EPER Decision. The methodology for reporting on industrial discharges allowed the separation of reporting only to water (direct and indirect discharges) from the reporting for emissions into the air and land. Thus, the new database will allow the identification of how much of a certain chemical from a certain facility has been discharged into water.

For the purposes of identification of industrial point sources of pollution in the DRB, the data from EU MS and non Member States (non EU MS) should be collected in a harmonised way. New templates for data collection were prepared for all Danube countries, which cover most of the information required for the implementation of the IPPC Directive.

To facilitate reporting on the measures addressing industrial discharges, information on basic measures were included in the templates for data collection for the status of IPPC/BAT or ICPDR/BAT implementation.

Thus, a combined template was designed aiming to provide information on the sources of pollution from industrial facilities in Danube countries to water – both direct and indirect discharges are taken into account. Values indicated under "direct to water" are emissions by facilities directly into the water environment. Values indicated under "indirect to water" are releases by facilities via a sewerage system into an off-site municipal or industrial wastewater treatment plant (WWTP). The MS Excel file consists of 5 templates in which data were filled in.

3.1 General information: report ID, reference date and contact person

This sheet provided general, related information on competent authority and person responsible for reporting in the country and contact details.

In addition, in order to gain information on the required measures, a table was included with the aim of specifying the number of sites where measures are needed and their estimated costs.

Country-based (Danube part) information		
Number of facilities where measures are needed in compliance with the IPPC/BREF (where transitions periods exist)	Number	
Estimated overall costs associated with the measures at those facilities	Million Euro	

3.2 Facilities: name of the facility, ID of the facility, address, coordinates

The sheet contains full information on industrial facilities carrying out one or more of the E-PRTR activities. The parent company is a company that owns or controls the company operating the facility (for example by holding more than 50% of the company's share capital or a majority of voting rights of the shareholders or associates). Each facility is listed with its identification name and number. Address, coordinates of the location and main economic activity are listed, using a drop down list of NACE code activities.

In addition, for EU MS, information is included on the existence of an IPPC permit for the facility; whether the facility is in compliance with IPPC/BREF with regard to wastewater emissions; and if it is not BAT compliant within the reporting deadline, whether there are plans for the facility to be compliant with the IPPC/BREF by 2015.

For non EU MS, this template gives a general overview of whether the installation is in compliance with the ICPDR BAT recommendation and, if it is not compliant at the reporting deadline, information on whether it is planned that the facility be in compliance with the ICPDR BAT by 2015.

3.3 Direct releases to water

This sheet is connected with general information on the facilities via the facility ID code. The sheet indicates the value of loads due to direct discharges to water. Reported releases to water of any pollutant specified in Table 2 above, for which the applicable threshold value is exceeded, are reported. All releases are expressed in kg/year. The reported release data must include reference to the determination of methodology used for the reported release data: M (measured), C (calculated) or E (estimated).

Any data that relate to the accidental releases are also specified. The quantity of accidental releases is included in the total quantity of releases (example: accidental release = 1 kg/y, routine release = 10 kg/y, total release = 11 kg/y). In addition, information on the river basin district and ID of the receiving water body are requested.

3.4 Indirect releases to water

The off-site transfers of any pollutant specified in Table 2 for which the threshold value is exceeded are also reported. All facilities and pollutants emitted indirectly to water and exceeding threshold

values are listed in the table. An off-site transfer of pollutants in wastewater means the movement beyond the boundaries of a facility of pollutants in wastewater destined for wastewater treatment (including industrial wastewater treatment). The off-site transfer may be carried out via sewer or any other means such as containers or tankers.

3.5 Total emissions

In this sheet, all pollutants specified by the separate activities in the whole territory of the country within the DRB are summarised.

4 Current results from data collection

For the purpose of the development of a complete overview of emission inventories, data on industrial discharges for EU MS countries in the Danube Basin were downloaded from the EPER II web site in Access format for the years 2001 and 2004 respectively.

As only part of the territory of Germany and Czech Republic belong to the DRB, only the respective facilities located on the Danube part were included using GIS and the provided coordinates.

In June 2007, according to Article 1, 2 and 3 of the EPER Decision, Romania has voluntarily decided to provide a "National EPER Report 2005 of Romanian Emission Data for Individual Facilities", having in view the format of Annex 2 of the EPER Decision.

In addition, all other Danube countries were asked to fill in the designed templates with data on industrial facilities, emissions to water, compliance with the European legislation and ICPDR BAT.

Bulgaria reported data with a reference year of 2007. Non EU MS also reported on the main industrial point sources of pollution. Bosnia and Herzegovina (B&H) did not provide the information in the required format but sent an updated Emission Inventory with no information on the compliance of facilities with the ICPDR/BAT. For the purpose of an integrated overview of the results, the reported facilities are considered to have direct discharges to water. As the respective activities are not specified, the number of activities is not presented as a table. Only four pollutants are relevant for the overall analysis for B&H.

Table 5. presents the final results of the Danube countries reporting in line with the EPER Decision, on both direct and indirect discharges into water for the years 2001 to 2006. There are a total number of 253 facilities emitting directly into water and 215 facilities making indirect emissions to water.

	Direct emissions to water						Indirect emissions to water					
	2001			by 2006			2001			by 2006		
	No. of facilities	No. of activities	No. of pollu-tants	No. of facilities	No. of activities	No. of pollu-tants	No. of facilities	No. of activities	No. of pollu-tants	No. of facilities	No. of activities	No. of pollu-tants
AT	38	13	17	33	12	16	29	13	16	31	14	15
CZ				4	3	6				1	1	1
DE	17	7	13	14	4	13	41	9	9	48	9	10
HU	17	10	13	20	9	14	19	10	13	26	8	12
SK				17	10	18				12	9	9
SI				15	8	13				16	6	8
RO				46	13	20				32	14	12
BG				15	5	8				9	4	11

	Direct emissions to water						Indirect emissions to water					
	2001			by 2006			2001			by 2006		
	No. of facilities	No. of activities	No. of pollu-tants	No. of facilities	No. of activities	No. of pollu-tants	No. of facilities	No. of activities	No. of pollu-tants	No. of facilities	No. of activities	No. of pollu-tants
HR				6	4	4				1	1	1
MD				18	2	2				39	8	5
UA				4	2	10						
BA				61		4						
RS												
DRB	**72**	**14**	**17**	**253**	**16**	**21**	**89**	**13**	**18**	**215**	**17**	**18**

Table 5: Overview of the current status of EPER reporting in the DRB

The following tables present information on the Danube basin-wide scale for industrial activities and pollutant loads. Detailed information and assessments per country are also available.

Table 6: Direct emissions per activity and pollutant in the DRB for 2001

Danube Basin	Pollutants; loads (in t/a)																
Annex 1 activity	N total	P total	As and compounds	Cd and compounds	Cr and compounds	Cu and compounds	Hg and compounds	Ni and compounds	Pb and compounds	Zn and compounds	Halogenated organic compounds (AOX)	Benzene, toluene, ethylbenzene, xylenes (as BTEX)	Phenols	Total organic carbon (TOC)	Cl	CN	F
1.1 Combustion installations >50 MW			0.01			2.29				0.59							
1.2 Mineral oil and gas refineries	72.9	6.7	0.01			0.2806		0.26		2.22			1.54	664.2	3110		
1.3 Coke ovens	150												0.03	118			
2.1/2.2/2.3/2.4/2.5/2.6 Metal industry and metal ore roasting or sintering installations, installations for production of ferrous and non-ferrous metals	90.9				1.21	0.37		0.35	1.486	11.7			0.36	287.3		0.45	30.13
4.1 Basic organic chemicals	182.8	6.8				0.054	0.00169	0.0299		17.523	11.1	0.78	0.68	1362	29270	0.069	48.4
4.2/4.3 Basic inorganic chemicals or fertilisers	1506	159.3	0.018	0.63	0.77	0.862	0.1021	0.64	0.3081	0.672				423	155070	0.4	33.88
4.5 Pharmaceutical products		5.23						0.05		0.33			0.16	468.4			
5.1/5.2 Installations for the disposal or recovery of hazardous waste (>10t/d) or municipal waste (>3t/h)	612		0.32	0.17	0.32	0.5	0.16	0.2	0.35	0.35			0.06	216	2010		
5.3/5.4 Installations for the disposal of non-hazardous waste (>50t/d) and landfills (>10t/d)			0.01					0.12		3.21	3.42			474	3420		10.91
6.1 Industrial plants for pulp from timber or other fibrous materials and paper or board production (>20t/d)	58	39.8		0.02	0.25	0.477		0.4	0.16	5.39	82.8			13908.1	4480		2.13
6.2 Plants for the pre-treatment of fibres or textiles (>10t/d)					0.07									65.3			
6.3 Plants for tanning of hides and skins (>12t/d)					0.14									122			
6.4 Slaughterhouses (>50t/d), plants for the production of milk (>200t/d), other animal raw materials (>75t/d) or vegetable raw materials (>300t/d)	306	21.15								2.04				1297	5030	2.55	
6.6 Installations for poultry (>40000), pigs (>2000) or sows (>750)	118	37															
DRB	**3096.6**	**275.98**	**0.3681**	**0.82**	**2.76**	**4.8336**	**0.2638**	**2.0499**	**2.304**	**44.025**	**97.32**	**0.78**	**2.83**	**19405.3**	**202390**	**3.469**	**125.5**

Table 7: Indirect emissions per activity and pollutant in the DRB for 2001

Danube Basin	**Pollutants; loads (in t/a)**																		
Annex 1 activity	N total	P total	As and com-pounds	Cd and com-pounds	Cr and com-pounds	Cu and com-pounds	Hg and com-pounds	Ni and com-pounds	Pb and com-pounds	Zn and com-pounds	Dichloro-methane (DCM)	Halo-genated organic com-pounds (AOX)	Benzene, toluene, ethyl-benzene, xylenes (as BTEX)	Phenols	Total organic carbon (TOC)	Cl	CN	F
2.1/2.2/2.3/2.4/2.5/2.6 Metal industry and metal ore roasting or sintering installations, production of ferrous and non-ferrous metals	387	7.64			3.08	0.8		0.37	3.06	1.92				227	578.7		24.3	12.51
3.1/3.3/3.4/3.5 Installations for pro-duction of cement klinker (>500t/day), glass (>20t/d), mineral substances (>20t/d) or ceramic products (>75t/d)									0.03									4.78
4.1 Basic organic chemicals	1110.9	144.3			0.15	0.41		0.2276		0.43		10.2	0.3	0.98	3088.7	4740		
4.2/4.3 Basic inorganic chemicals or fertilisers	311																	
4.4/4.6 Biocides and explosives												4.74	0.37		299	2880		
4.5 Pharmaceutical products	135.9			0.01	0.48	0.09		0.08	0.03	0.11	0.02			0.3	2498		0.16	
5.1/5.2 Installations for the disposal or recovery of hazardous waste (>10t/d) or municipal waste (>3t/h)			0.03	0.02		0.06	0.02		0.05	0.64				0.275				
5.3/5.4 Installations for the disposal of non-hazardous waste (>50t/d) and landfills (>10t/d)	278.6		0.012					0.106	0.03	0.12				3.78	336.5			
6.1 Industrial plants for pulp from timber or other fibrous materials and paper or board production (>20t/d)		16.6		0.02		0.4		0.03	0.03	2.21					7295			
6.2 Plants for the pre-treatment of fibres or textiles (>10t/d)						0.02		0.04		0.11					472			
6.4 Slaughterhouses (>50t/d), plants for the production of milk (>200t/d), other animal raw materials (>75t/d) or vegetable raw materials (>300t/d)	109	269.42				0.05		0.13	0.05	0.34					4910.3			
6.5 Installations for the disposal or recycling of animal carcasses and animal waste (>10t/d)															146			
6.7 Installations for surface treatment or products using organic solvents (>200t/y)			0.0077			0.053		0.0664		0.11					1113.6			31.3
DRB	**2332.4**	**437.96**	**0.0497**	**0.05**	**3.71**	**1.883**	**0.02**	**1.05**	**3.28**	**5.99**	**0.02**	**14.94**	**0.67**	**232.335**	**20737.8**	**7620**	**24.46**	**48.59**

Table 8: Direct emissions per activity and pollutant in the DRB by 2006

Danube Basin	Pollutants; loads (in t/a)																				
Annex 1 activity	N total	P total	As and compounds	Cd and compounds	Cr and compound	Cu and compounds	Hg and compounds	Ni and compounds	Pb and compound	Zn and compounds	Dichloroethane-1,2 (DCE)	Dichloromethane (DCM)	Hexachlorobenzene (HCB)	Halogenated organic compounds (AOX)	Benzene, toluene, ethylbenzene, xylenes (as BTEX)	PAHs	Phenols	Total organic carbon (TOC)	Cl	CN	F
1.1 Combustion installations >50 MW	0.68	0.08	0.0184	0.001	16.191	18.49	0.0023	0.017	0.011	67.021				0.017				56.14	9.17		6.34
1.2 Mineral oil and gas refineries	588.1	25.73	0.01	0.12	0.567	1.39	0.064	0.494	0.716	2.36				1.95	0.249	0.03	4.71	1094.6		0.362	
2.1/2.2/2.3/2.4/2.5/2.6 Metal industry and metal ore roasting or sintering installations, installations for the production of ferrous and non-ferrous metals	409	6.02	0.24	0.19	3.73	1.21	0.15	1.96	3.14	21.8						0.03	0.58	1696.8	4940	1.64	45.36
3.1/3.3/3.4/3.5 Installations for the production of cement klinker (>500 t/day), glass (>20t/d), mineral substances (>20t/d) or ceramic products (>75t/d)			0.01			0.06			0.13	0.19											
4.1 Basic organic chemicals	763	10.54		0.001	0.07	0.27	0.551	1.4739		14.493	30.9			111.87	0.85		0.46	6218.38	196000	0.269	43.66
4.2/4.3 Basic inorganic chemicals or fertilisers	3879.1	60.5	0.483	0.16	0.3992	0.82	0.22	0.94	0.8776	3.16				2.62		0.04	1.81	3158	338540	0.35	203.89
4.5 Pharmaceutical products	60	19	0.06			0.36		0.14	0.03	1.4								140.77			
5.1/5.2 Installations for the disposal or recovery of hazardous waste (>10t/d) or municipal waste (>3t/h)	721	169.6		32.7091	0.191	0.041		0.0372	0.114	17.254								366.1	6438.5		
5.3/5.4 Installations for the disposal of non-hazardous waste (>50t/d) and landfills (>10t/d)				0.927				0.11	0.08	7.99				3.07				539	3580		7.29
6.1 Industrial plants for pulp from timber or other fibrous materials and paper or board production (>20t/d)	491.203	70.8362		65.23	0.17	1.15		0.947	132.41	9.48	196	326	0.021	377.26			0.134	26918.4	8786		
6.2 Plants for the pre-treatment of fibres or textiles (>10t/d)	105				1.96	0.53				23.3								148.9			
6.3 Plants for tanning of hides and skins (>12t/d)					0.13													128			

Danube Basin	**Pollutants; loads (in t/a)**																				
Annex 1 activity	N total	P total	As and com-pounds	Cd and com-pounds	Cr and com-pound	Cu and com-pounds	Hg and com-pound s	Ni and com-pounds	Pb and com-pound	Zn and com-pounds	Dichloro-ethane-1,2 (DCE)	Dichloro-methane (DCM)	Hexachloro-benzene (HCB)	Haloge-nated organic com-pounds (AOX)	Benzene, toluene, ethyl-benzene, xylenes (as BTEX)	PAHs	Phe-nols	Total organic carbon (TOC)	Cl	CN	F
6.4 Slaughterhouses (>50t/d), plants for the production of milk (>200t/d), other animal raw materials (>75t/d) or vegetable raw materials (>300t/d)	337.105	0.555				0.32				1.35								875.2	3820	4.93	
6.5 Installations for the disposal or recycling of animal carcasses and animal waste (>10t/d)														4.34				200			
6.6 Installations for poultry (>40000), pigs (>2000) or sows (>750)	493	91.5															0.311	190			
6.7 Installations for surface treatment or products using organic solvents (>200t/y)		0.073	0.002	0.0002		0.004	0.0001	0.129		0.864				0.03				5.59	81.42		1.61
DRB	**7855.5**	**454.43**	**0.8234**	**99.338**	**23.408**	**24.875**	**0.9874**	**6.2481**	**137.51**	**171.122**	**226.9**	**326**	**0.021**	**501.157**	**1.099**	**0.1**	**8.005**	**43951.68**	**562195.1**	**7.551**	**308.2**

Table 9: Indirect emissions per activity and pollutant in the DRB by 2006

Danube Basin	**Pollutants; loads (in t/a)**																		
Annex 1 activity	N -total	P total	As and com-pounds	Cd and com-pounds	Cr and com-pounds	Cu and com-pounds	Ni and com-pounds	Pb and com-pounds	Zn and com-pounds	Dichloro-ethane-1,2 (DCE)	Dichloro-methane (DCM)	Halo-genated organic com-pounds (AOX)	Benzene, toluene, ethyl-benzene, xylenes (as BTEX)	Phenols	Total organic carbon (TOC)	Cl	CN	F
1.1 Combustion installations >50 MW		10.5										11.7						
1.2 Mineral oil and gas refineries	116													1.87	327			
2.1/2.2/2.3/2.4/2.5/2.6 Metal industry and metal ore roasting or sintering installations, installations for the production of ferrous and non-ferrous metals	557.211	45.514	0.08	0.02	10.82	10.01	0.32	1.21	920.11					341.53	718.4	2190	57.1	14.12
3.1/3.3/3.4/3.5 Installations for the production of cement klinker (>500 t/day), glass (>20t/d), mineral substances (>20t/d) or ceramic products (>75t/d)	0.006							0.63	0.22					0.04				
4.1 Basic organic chemicals	881	102.8			0.54	1.11	0.3205	0.39	0.48			6.38	0.87	108.64	4670.6	3650		5.82
4.2/4.3 Basic inorganic chemicals or fertilisers	0.731	0.007								70.4			0.25	0.03	807			
4.4/4.6 Biocides and explosives						0.31			0.13			5.01	11.79		425.1	3350		
4.5 Pharmaceutical products	310.21	14.52					0.004		0.62		0.04	0.031		0.03	4527.26	43.98	0.08	
5.1/5.2 Installations for the disposal or recovery of hazardous waste (>10t/d) or municipal waste (>3t/h)	82						0.0209		1.14					0.2658				2.15
5.3/5.4 Installations for disposal of non-hazardous waste (>50t/d) and landfills (>10t/d)	261.2		0.029				0.0539							0.425	461.7			
6.1 Industrial plants for pulp from timber or other fibrous materials and paper or board production (>20t/d)	53.851	19.101				0.158		0.02	1.79			1.56			10682.5			
6.2 Plants for the pre-treatment of fibres or textiles (>10t/d)	1.839	0.033				0.35			3.5						1196.2			
6.3 Plants for tanning of hides and skins (>12t/d)					0.35										304			

Danube Basin	**Pollutants; loads (in t/a)**																	
Annex 1 activity	N -total	P total	As and com-pounds	Cd and com-pounds	Cr and com-pounds	Cu and com-pounds	Ni and com-pounds	Pb and com-pounds	Zn and com-pounds	Dichloro-ethane-1,2 (DCE)	Dichloro-methane (DCM)	Halo-genated organic com-pounds (AOX)	Benzene, toluene, ethyl-benzene, xylenes (as BTEX)	Phenols	Total organic carbon (TOC)	Cl	CN	F
6.4 Slaughterhouses (>50t/d), plants for the production of milk (>200t/d), other animal raw materials (>75t/d) or vegetable raw materials (>300t/d)	242.446	343.61			0.0002	0.0502			0.0002					0.04	10488.4			
6.5 Installations for the disposal or recycling of animal carcasses and animal waste (>10t/d)	52.2											2.17			73.3			
6.6 Installations for poultry (>40000), pigs (>2000) or sows (>750)	816.014	314.00												0.15	216			
6.7 Installations for surface treatment or products using organic solvents (>200t/y)	2.268	16.546					0.0908							0.1101	427.6			9.67
DRB:	**3377**	**866.64**	**0.11**	**0.02**	**11.71**	**11.99**	**0.81**	**2.25**	**927.99**	**70.4**	**0.04**	**26.85**	**12.91**	**453.13**	**35325.06**	**9233.98**	**57.18**	**31.76**

5 Future activities in relation to E-PRTR implementation

For the third reporting year, EPER was replaced by the European Pollutant Release and Transfer Register (E-PRTR) in 2007. Since the E-PRTR Regulation includes more pollutants and activities than those contained in EPER and, since, in addition to releases into air and water, releases to land and off-site transfers of waste have to be reported by the facilities, it is necessary to upgrade and extend the EPER into a fully comprehensive E-PRTR.

For the development of industrial and agricultural wastewater treatment, the national PRTR systems compatible with the E-PRTR approach is the basis for future pressure analysis.

An update of the templates for data collection is needed in accordance with the new E-PRTR Regulation.

For most Danube countries, emission data is provided along with information on technical performance based on IPPC BAT (for EU MS) or ICPDR BAT Recommendations (for non EU MS). Most of the facilities are owned by private companies and it is difficult to obtain the information on possible measures and estimated costs.

Full compliance with IPPC/BREFs and ICPDR BAT; strengthening of self-monitoring and control by authorities, and full implementation of the “polluter pays principle” in all Danube countries are possible measure to reduce water pollution caused by industry.

Evaluation of EPER, E-PRTR and IPPC implementation in the Danube River Basin

icpdr iksd

International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Annex 6 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Evaluation of EPER, E-PRTR and IPPC implementation in the Danube River Basin*

Country	EPER status	PRTR preparation (status, responsibility, deadlines)	IPPC	Problems identified
AT	EPER was implemented in line with the EPER Ordinance (26th July 2002). Since 2005, Austria has collected the data for EPER II that were published in 2006. In 2003 (EPER I), 368 reports were made by the industry, from which 128 exceeded the threshold values for air or water. The EPER I data are at: www.umweltbundesamt.at.	The PRTR as further development of EPER is currently under preparation in Austria. According to the timeframe of the PRTR Protocol, it will take several more years before the PRTR is available via internet for the public.	The IPPC Directive demands the adaptation of existing facilities to its requirements by 30th October 2007 at the latest and intends regular inspection and updating of approval conditions by competent authorities. The IPPC fully implements: the Industrial Code 1994, the Waste Management Act 2002, the Mineral Materials Act 1999 and the Water Act 1959 as being in the framework of some provincial laws. Operating permits for industrial plants apply to production sites and include provisions for environmental protection and procedural regulations, as well as rules to ensure health and safety. Demands on plants and any established emission standards are based on the implementation of BAT.	
DE	Germany is now collecting the data for the EPER 2 round. At the end of 2005, the data were transferred from the Federal State authorities to the UBA and its consultant LfU BW where the complete dataset will be generated. The work is on schedule.	Germany is currently preparing the PRTR. Presentation of the EPER data is improving as a prototype for the PRTR. Preparation of legal implementation in accordance with the EPER Protocol and the E-PRTR Regulation is taking place as well as: the streamlining of data collection and data flows with the E-PRTR, using the experiences of EPER as much as possible (see www.eper.de and www.prtr.de); and integration of available information on diffuse sources.	IPPC Directive has been fully implemented into national legislation. Details can be taken from the last article 16(1) and 16(3) reports to the European Commission (EC).	
CZ	In 2003, Act No. 76/2002 Coll. on IPPC and the Integrated Register of Pollution entered into force. It has been supplemented by the Government Decree No. 368/2003 Coll. On the Integrated Pollution Register which already considers provisions of the Protocol	In 2008, Act No. 25/2008 Coll. entered into force. This Act has regulated the conditions of the Integrated Pollution Register (IRZ) and at the same time implements EC Regulation No. 166/2006. First data according to regulation No. 166/2006 has been reported for the reporting	The IPPC Directive has been fully implemented in the CZ by Act No. 76/2002 Coll. on Integrated Pollution Prevention and Control and on the Integrated Register of Pollution which entered into force in 2003 and has been supplemented by other executive legislation.	

Country	EPER status	PRTR preparation (status, responsibility, deadlines)	IPPC	Problems identified
	on PRTR. The legislation also covers issues of release of information to the public, penalties etc. The Report for 2004 has been sent to EC. The Report for the year 2007 will be sent to EC in June 2009.	year 2007. Also in 2008, new government regulation No. 145/2008 Coll. was adopted. This regulation contains thresholds for air pollutants (styrene, formaldehyde) and pollutants in waste, which does not contain EC Regulation No. 166/2006. All reported data are available on Integrated pollution register website: www.irz.cz.	Details can be taken from the last article 16 (1) and 16 (3) reports to the EC (September 2006). The second implementation report will be sent to the EC in September 2009 (covering years 2006-2008).	
HU	Hungary took part in the first EPER reporting on a voluntary basis as the first representative of the new Member States. Hungary prepared for the second reporting of EPER data for reporting year 2004 in June 2006. The 2004 emission data was reported by the facilities in the first quarter of 2005 and they are checked and recorded to the databases by the responsible authorities. The quality assessment of the data was finalised in 2005.	The final text of the new EU regulation on E-PRTR was published in September 2005 and reviewed in 2006. The databases concerning waste transfers and emissions to land already exist; they need to be slightly modified and included to the integrated software system. The whole system will be established for 2007 as the first year of reporting.	The Directive was transposed into national law by October 2001 and established the necessary institutional framework for the permitting procedure ensuring that new installations cannot start their operation without an integrated permit from that date. The number of installations falling under the IPPC is approx. 1000; the number of permits issued by the end of July 2005 is more than 300. All installations will be operated according to the integrated permits by October 2007.	Some difficulties still exist concerning data collection. The software tool containing data on emissions to surface water still does not exist. New software tools querying data for EPER purposes are being tested. Problems occur with the calculations of agricultural diffuse emissions. For July 2004 onwards: http://eper-prtr.kvvm.hu.
SK	Data and information concerning facilities and emissions to air and water from 2004 were reported to EPER. The register of facilities and their emissions to air and water are publicly accessible at the national level on the web site of the Ministry of the environment and Slovak Hydrometeorological Institute .	The Slovak Republic is in the accession process for the PRTR Protocol (Slovakia is not a signatory country). Activities on the implementation of the requirements for the "Regulation of the European Parliament and of the Council 166/2006 concerning the establishment of a PRTR and amending Council Directives 91/689/EEC and 96/61 EC" (IPPC Directive) into national legislative are finalised. This relevant legislation came into force in September 2007. SHMI, as the responsible institution for data collection, validation and data reporting, is at the stage of preparing first reporting to E-PRTR.	The IPPC Directive is fully implemented into national legislation in Law No. 245/2003 Coll. regarding IPPC and public notice. For integrated permitting process in the Slovak Republic, the Slovak Inspectorate of Environments is responsible. This process was finalised in October 2007.	Waste disposal operators have problems providing emission data into air and water. There is a need to prepare a methodology at the national level and inform operators with the calculation methodology for the amount of emissions. SHMI has experience with IPCC methodology (EC methodology for National Greenhouse Gas Inventories). SHMI states insufficient range of monitored and logically

Country	EPER status	PRTR preparation (status, responsibility, deadlines)	IPPC	Problems identified
				provided information about pollution substances at some point sources. Operators mainly provide data from self-monitoring (M-measured) and do not use expert judgement (E-estimation).
SI	Data for the reference year 2004 were reported in June 2006 to EPER II on 93 facilities that exceeded threshold values for air and water emissions. From those reported, 72 facilities had emissions to air, 15 direct to water and 17 had indirect emissions to water.	Slovenia was active in the process of adopting the E-PRTR regulation. The E-PRTR Protocol (Regulation 166/2006/EC) has been fully implemented into national legislation. Regulation on implementing Regulation 166/2006/ES (O.J. of the Republic of Slovenia, No. 77/06) was adopted. Slovenia will make its first E-PRTR report in 2009 for the reference year 2007. The national E-PRTR database is already established and is in the testing phase.	The IPPC Directive was fully implemented in national legislation through the Environment Protection Act (O.J. of the Republic of Slovenia, No. 39/06, 49/06, 66/06 in 33/07) and the Regulation on Activities and Facilities that can cause Environment Pollution of a Greater Extent (O.J. of the Republic of Slovenia, No. 97/04 and 71/07). The IPPC permits are issued for approx. 170 installations. For 17, a transitional period up to 2015 was allowed during accession negotiations. See: www.arso.gov.si/ippc	
HR	The Agency for Environmental Protection is responsible for establishing a reporting system for emissions to air. The Ministry of Agriculture, Forestry and Water Manage-ment will be responsible for establishing a reporting system for emissions to water. The register to collate all individual reports will be established by the Agency for Environmental Protection on the basis of a governmental order. Target date for implementation: 2009.	The Agency for Environmental Protection is responsible for establishing the Register. At the moment, the target date is 2009.	The Ministry of Environmental Protection, Physical Planning and Construction is responsible for transposing and implementing the Directive. The State Inspectorate and inspectorate departments in various ministries will be involved in enforcement. A first inventory of the installations covered by the IPPC Directive was carried out by the Croatian Centre for Cleaner Production under the supervision of the Ministry of Environmental Protection, Physical Planning and Construction during 2006. The timing of the full implementation of the obligation to identify all relevant installations is approx. 2013. A draft timetable for the technical assessment of	

Country	EPER status	PRTR preparation (status, responsibility, deadlines)	IPPC	Problems identified
			installations covered will be prepared during 2008/2009. A new Regulation on the Procedure for Establishing Integrated Environmental Requirements (OG No. 114/08) is planned - permitting for existing installations will be phased over several years.	
BA	No obligation to provide data for EPER.	No obligation to provide data for EPER.	The IPPC is conditionally reflected thorough the Law on Environmental Protection (LEP). This Law is harmonized for both Entities and Brcko District (BD). The Law is adopted in RS in 2002, B&H in 2003 and in BD in 2004. LEP introduces the concept of the “environmental permit” and “environmental permitting”, equivalents of the terms “IPPC permit” and “IPPC permitting”. Principles of the IPPC are mentioned in Article 12 of each entity’s LEP defining integrated environmental protection. The EU CARDS project estimated 55 installations under IPPC, of which 3 were granted.	
RS	No obligation to provide data for EPER.	A new Law on IPPC was adopted in Dec 2004. Permits are to be issued at the latest by 2015. (A program and time schedule exists for harmoni-sing industrial sectors with this law.) There is still no national database on pollution emission either to water, air or land. At present there is a project under implementation on the national register of polluters (database with innovated data).		
RO	The EPER Decision was transposed into Romanian law by the Order of the Minister of Waters and Environment Protection no. 1144/2002. In order to facilitate the application of the EPER Decision provisions,	From a legal point of view, the Ministry of Environment is implementing Regulation 166/2006 of the European Parliament and European Council on the setting up of the European Pollutant Release and Transfer	The IPPC Directive is fully transposed into Romanian legislation by Emergency Governmental Ordinance no. 152/2005 amended and approved by Law no. 84/2006. Related to the Best Available Techniques	

Country	EPER status	PRTR preparation (status, responsibility, deadlines)	IPPC	Problems identified
	"The EPER Implementation Guide" was transposed into Romanian law through the Order of the Ministry no. 1440/2003 for approving the National Guide for completion of the Pollutant Emission Register (RPE), in accordance with the provisions of Article 3 of the EPER. In June 2007, according to Article 1, 2 and 3 of the EPER Decision, Romania has voluntarily decided to provide the "National EPER Report 2005 of Romania Emission Data of Individual Facilities" having in view the format of Annex 2 of the EPER Decision. The Ministry, in cooperation with the National Environmental Protection Agency (NEPA), has prepared the report and it has been sent to the DG ENV (EC) - EEA. This report is available to the public (on the internet). The total number of installations which have been reported under EPER is 260, representing approximately 40% of the total number of 638 IPPC installations inventoried. Out of a total of 260 reported EPER installations, 75 have reported emissions to water. Responsibility: Technical Secretariat for the elaboration of the EPER - Ministry of Environment and Sustainable Development, Interministerial Committee, Environmental authorities.	Register (European PRTR). The EU Regulation has been transposed into Romanian legislation through Governmental Decision no.140/2008. Also, in the framework of Twining Projects for technical assistance, some efforts are being made for the drafting of the database and software endowment. Like all other MS, Romania is preparing the first E-PRTR report, using data and information for 2007. The deadline for reporting is 30th June 2009. The process is on-going.	(BAT), there have been three Orders (37/2003, 566/2003 and 169/2004) issued for the approval of the Guidelines on BAT and Reference Documents on BAT in some industry categories/types. In 2005, according to Minister Order no. 249/2005, the "National Centre for Coordination, Information and Updating of BAT Guidelines and Communication with the European IPPC Bureau and European Forum of Information" has been set up. In January 2008, Romania sent to EC the first report regarding the status of the environmental integrated permitting process for existing installations. Yearly, the inventory of IPPC installations is updated and the updated document is available on the website of the National Agency for Environmental Protection. In 2008 the total number of IPPC installations was 693.	
BG	In September 2002, Bulgaria adopted the Environment Protection Act (EPA), which brought the requirement of integrated permitting for a wide range of installations. Article 130 of the EPA requires the Executive Environment Agency to maintain a public	The information provided should be assimilated into databases that allow Bulgaria to meet its commitments under the IPPC Directive, the European Pollution Emission Register Decision and the Protocol on Pollution Release and Transfer Registers.	In March 2003, the Bulgarian Council of Ministries issued a Regulation setting out the conditions and procedure for the issuing of IPPC permits for the construction of new, and the operation of both new and existing, industrial installations and equipment. These	

Country	EPER status	PRTR preparation (status, responsibility, deadlines)	IPPC	Problems identified
	register of the results of emissions monitoring as provided for in integrated permits and to transmit this data to the European Register of Noxious Substance Emissions.		two pieces of legislation are designed to bring the EU IPPC Directive 61/96 into full force in Bulgaria. Article 125 (5) of the EPA obliges operators of installations to "prepare and publish an annual report on implementation of the activities for which an integrated permit has been granted". Article 21 of the IPPC Regulation requires an operator of an installation to submit an annual report.	
MD	Currently some attempts to establish a national PRTR for the energy sector are being made. However, to establish the Register there is a need to review the national monitoring parameters and environmental quality standards: (1) to substantially limit the number of regulated parameters by making the remaining ones consistent with international standards and guidelines; (2) to introduce additional parameters and standards monitoring as required by multilateral environmental agreements and EU environmental directives, and to set time schedules for phasing-in of the new parameters and standards that could not be introduced immediately; and (3) to focus on a core set of parameters and standards when planning the upgrade of monitoring stations, equipment and devices, and analytical laboratories including relevant staff retraining; (4) to draft legislation and necessary by-laws to introduce an integrated permitting system for installations which have significant impact on the environment, following the approach of the EU IPPC Directive as a benchmark; (5) to ensure that	The country signed the PRTRs to the Aarhus Convention in Kiev in 2003. Preparations for the protocol ratification need to be intensified by involving key monitoring institutions, compliance authorities, sectoral ministries, business and industry and NGOs in the development of a plan of action to set a legal, institutional and technical framework for the establishment of a national PRTR.	There is widespread agreement on the need to introduce integrated permitting for large industry within the framework of convergence with the EU environmental legislation, in particular, the IPPC Directive. There have been several attempts in recent years to study and plan a transition to integrated permitting e.g. in 2000-2001, an EC project on the country's prospective approximation to EU legislation produced a draft strategy and recommendations and, also in 2001-2002, another EU-funded project on environmental approximation in the western NIS (Newly Independent States). A group of Ministry of Ecology officials and local experts developed a draft law on integrated environmental permitting ("On Regulation of Economic and Social Activities with an Environmental Impact") in 2001. However, the draft was not put in the context of other necessary legislative changes to enable the new system; it faced significant opposition from various key stakeholders, and as a result, was not approved by the government.	There is a lack of integrated indicators on the industrial impact on the environment. Emissions of pollutants into the atmosphere and surface waters from industry are not reported in any official statistical data source. Industrial pollution is not being analysed and reduction targets are not established in industrial development programmes or environmental documents. Though enterprises must report annually on their air emissions, wastewater discharges and waste generation, industry does not always fulfil its obligations. Only waste generated by industries is reported on a regular basis in official information sources. The lack of

Country	EPER status	PRTR preparation (status, responsibility, deadlines)	IPPC	Problems identified
	self-monitoring requirements for enterprises are included in the permits etc.			environmental indicators to monitor pollution in industry is related to environmental standards inherited from the past. A gradual implementation of the IPPC Directive would help improve the situation. The few existing data on industrial pollution, water and energy use show a slight increase in environmental efficiency - decreases in air polluting emissions and industrial waste generation have been sharper than the decrease in total industrial output.
UA	No obligation to provide data for EPER.	The Committee on Water Management is responsible for the National Register on Pollutant Emissions to Water Bodies. At present these data are closed to the public.	The major piece of legislation is the Water Code, June 1995. Article 70 of the Water Code mandates conditions of pollution emission to water bodies. Regulations concerning IPPC Directive include: Hygienic Requirements to Content and Properties of Waters at Sites of Industrial and Drinking, Cultural and Domestic Water Use (4.7.1988); The Maximum Permissible Concentrations of Hazardous Substances in Water of Water Bodies, Used for Industrial, Drinking, Cultural and Domestic Water Use (4.71988); Regulation on Protection of Surface Water (typical provisions) (1.3.1991); List of Maximum Permissible Concentrations (MPC) and Approximately Safe Impact Levels of Hazardous Substances on the Water of Fishery Water Bodies (relating to	The software tool containing data on emissions to surface water is out-of-date (in DOS format). The national legislation on statistical data prohibits publishing data on pollution emission for the community.

Country	EPER status	PRTR preparation (status, responsibility, deadlines)	IPPC	Problems identified
			Regulation on Protection of Surface Waters. 1991); Rates of Maximum Permissible Discharges of Polluting Substances where Content is Normalized; Rules on the Protection of Surface Waters from Pollution by Return Waters. Operating permits for industrial plants are given by the State Ecological Inspection which is subordinated to the Ministry.	

* EPER: European Pollutant Emission Register; E-PTR: European Pollutant Release and Transfer Register; IPCC: Directive for Integrated Pollution Prevention and Control.

List of the Future Infrastructure projects in the DRBD

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International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Annex 7 of the DRBM Plan

//////////////// Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна ////////////////

Explanations

SEA=Strategic Environmental Assessment
EIA= Environmental Impact Assessment

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
AT	Donau	Donau, unterhalb von Freudenau	Flussbauliches Gesamtprojekt - Freudenau - Austrian border	Navigation	Flussbauliches Gesamtprojekt - Freudenau - Austrian border	Officially planned	No	No	No	Intended	No
HU	Tisza	Tisza Kiskörétõl Hármas-Körösig	Tisza hullámtér projekt	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Planning under preparation	Yes	No	No	Already done	Yes
HU	Tisza	Tisza Tiszabábolnától Kiskõréig	Komplex Tisza-tó projekt	Others	The main purpose of the project is water quality and environment development on the lake Tisza and the related river.	Officially planned	No	No	No	Intended	No
HU	Duna	Duna Szob-Baja között	Duna-projekt	Flood protection	The main purpose of the project is flood protection on the river Duna.	Planning under preparation	Yes	Yes	No	Intended	Yes
HU	Bodrog	Bodrog	A bodrogközi Tisza-felsõ és a Bodrog balparti árvízvédelmi rendszer fejlesztése	Flood protection	The main purpose of the project is flood protection on the river Tisza and Bodrog.	Officially planned	Yes	Yes	No	Intended	Yes
HU	Tisza	Tisza Szipa-fõcsatornától Belfõ-csatornáig	A bodrogközi Tisza-felsõ és a Bodrog balparti árvízvédelmi rendszer fejlesztése	Flood protection	The main purpose of the project is flood protection on the river Tisza and Bodrog.	Officially planned	Yes	No	No	Intended	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
HU	Tisza	Tisza Keleti-fõcsatornától Tiszabábolnáig	Tisza védvonal fejlesztése a Tisza bal parton Tiszafüred–Rakamaz között	Flood protection	The main purpose of the project is flood protection on the river Tisza.	Officially planned	Yes	No	No	Intended	Yes
HU	Tisza	Tisza Belfõ-csatornától Keleti-fõcsatornáig	Tisza védvonal fejlesztése a Tisza bal parton Tiszafüred–Rakamaz között	Flood protection	The main purpose of the project is flood protection on the river Tisza.	Officially planned	Yes	No	No	Intended	Yes
HU	Berettyó	Berettyó	Berettyó védtöltések fejlesztése a Kis-Sárréti és Berettyóújfalui ártéri öblözetekben	Flood protection	The main purpose of the project is flood protection on the river Berettyó.	Officially planned	Yes	No	No	Intended	Yes
HU	Berettyó	Berettyó	Berettyó védtöltések fejlesztése a Kis-Sárréti és Berettyóújfalui ártéri öblözetekben	Flood protection	The main purpose of the project is flood protection on the river Berettyó.	Officially planned	Yes	No	No	Intended	Yes
HU	Maros	Maros torkolat	11.06. árvízvédelmi szakasz védelmi képességének komplex fejlesztése	Flood protection	The main purpose of the project is flood protection on the river Tisza.	Officially planned	Yes	Yes	No	Intended	Yes
HU	Tisza	Tisza Hármas-Köröstõl déli országhatárig	11.06. árvízvédelmi szakasz védelmi képességének komplex fejlesztése	Flood protection	The main purpose of the project is flood protection on the river Tisza.	Officially planned	Yes	Yes	No	Intended	Yes
HU	Tisza	Tisza Szipa-fõcsatornától Belfõ-csatornáig	Árvízvédelmi töltések komplex fejlesztése Vásárosnamény és Lónya között	Flood protection	The main purpose of the project is flood protection on the river Tisza.	Officially planned	No	Yes	No	No	No

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
HU	Dráva	Dráva alsó	Drávaszabolcs–Kémes öblözet projekt	Flood protection	The main purpose of the project is flood protection on the river Dráva.	Planning under preparation	Yes	Yes	No	Intended	Yes
HU	Duna	Duna Gönyü-Szob között	Komárom - Almásfüzítõ árvízvédelmi öblözet árvízvédelmének javítása	Flood protection	The main purpose of the project is flood protection on the river Duna.	Officially planned	Yes	Yes	No	Already done	Yes
HU	Tisza	Tisza Túrtól Szipa-fõcsatornáig	Beregi komplex árapasztási és ártér revitalizációs fejlesztés	Flood protection	The main purpose of the project is to engineer flood protection reservoir that reconstruction of Bereg polder system.	Officially planned	No	No	No	Intended	No
HU	Tisza	Tisza Túrtól Szipa-fõcsatornáig	Beregi komplex árapasztási és ártér revitalizációs fejlesztés	Flood protection	The main purpose of the project is to engineer flood protection reservoir that reconstruction of Bereg polder system.	Officially planned	No	No	No	Intended	No
HU	Tisza	Tisza Keleti-fõcsatornától Tiszabábolnáig	Tiszai védvonal fejlesztés a Tisza bal parton, Tiszagyulaháza környékén	Flood protection	The main purpose of the project is flood protection on the river Tisza.	Planning under preparation	Yes	No	No	Intended	Yes
HU	Hármas-Körös	Hármas-Körös	Árvízvédelmi fõvédvonal fejlesztése a Hármas-Körös folyó jobbparti körösszugi térségben	Flood protection	The main purpose of the project is flood protection on the river Hármas-Körös.	Officially planned	Yes	No	No	Intended	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
HU	Tisza	Tisza Kiskörétõl Hármas-Körösig	Árvízvédelmi fõvédvonal fejlesztése, Szolnok város térségi fejlesztése a jobbparti szakaszon	Flood protection	The main purpose of the project is flood protection on the river Tisza.	Officially planned	Yes	No	No	Intended	Yes
HU	Tisza	Tisza Kiskörétõl Hármas-Körösig	Csongrádi partfal rekonstrukciója és a mederrézsû állékonyságának növelése	Flood protection	The main purpose of the project is flood protection on the river Tisza.	Officially planned	Yes	No	No	Intended	Yes
HU	Hármas-Körös	Hármas-Körös	A Békésszentandrási duzzasztómû járulékos kisvízerõmûve	Hydropower	The main purpose of the project is to development the hydropower plant	Planning under preparation	Yes	No	No	Already done	Yes
HU	Mosoni-Duna	Mosoni-Duna alsó	Mosoni-Duna és Lajta folyó térségi vízgazdálkodási rehabilitációja	Water supply	The main purpose of the project is ecological rehabilitation of the river Mosoni-Duna.	Officially planned	No	Yes	No	Intended	No
HU	Mosoni-Duna	Mosoni-Duna felsõ	Mosoni-Duna és Lajta folyó térségi vízgazdálkodási rehabilitációja	Water supply	The main purpose of the project is ecological rehabilitation of the river Mosoni-Duna.	Officially planned	No	Yes	No	Intended	No
HU	Mosoni-Duna	Mosoni-Duna középsõ	Mosoni-Duna és Lajta folyó térségi vízgazdálkodási rehabilitációja	Water supply	The main purpose of the project is ecological rehabilitation of the river Mosoni-Duna.	Officially planned	No	Yes	No	Intended	No
HU	Dráva	Dráva alsó	Oldi öblözet projekt	Flood protection	The main purpose of the project is flood protection on the river Dráva.	Planning under preparation	No	Yes	No	No	No

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
HU	Mura	Mura	Dráva–Mura torkolati szakasz rendezése	Flood protection	The main purpose of the project is settlement the mouth of river Mura.	Planning under preparation	No	Yes	No	Intended	No
HU	Rába	Rába (határtól)	Duzzasztók átjárhatósága a határvízi Rábán	Others	The main purpose of the project is to insure the fish migration of the veir on the transboundary river Raba.	Planning under preparation	No	Yes	No	Intended	No
HU	Tisza	Tisza Hármas-Köröstõl déli országhatárig	Tisza hullámtér projekt II.	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Planning under preparation	Yes	Yes	No	Intended	Yes
HU	Tisza	Tisza Kiskörétõl Hármas-Körösig	Tisza hullámtér projekt II.	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Planning under preparation	Yes	Yes	No	Intended	Yes
HU	Tisza	Tisza Kiskörétõl Hármas-Körösig	Hanyi-Tiszasülyi árvízszint csökkentõ tározó	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Officially planned	No	No	Already done	Already done	No

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
HU	Mura	Mura	Murai árvízvédelmi szakasz fejlesztése	Flood protection	The main purpose of the project is flood protection on the river Mura.	Officially planned	Yes	Yes	No	Intended	Yes
HU	Duna	Duna Szigetköznél	A Duna szigetközi szakaszának rehabilitációja	Water supply	The main purpose of the project is the rehabilitation of the ecological functions of the part of Danube in Szigetköz.	Planning under preparation	Yes	Yes	Inte nde d	No	No
HU	Duna	Duna Szigetköznél	A Duna hajózhatóságának vizsgálata	Navigation	The project aims to solve the shipping problems of the Hungarian Danube stretch.	Planning under preparation	Yes	Yes	Inte nde d	No	Yes
HU	Duna	Duna Gönyü-Szob között	A Duna hajózhatóságának vizsgálata	Navigation	The project aims to solve the shipping problems of the Hungarian Danube stretch.	Planning under preparation	Yes	Yes	Inte nde d	No	Yes
HU	Duna	Duna Szob-Baja között	A Duna hajózhatóságának vizsgálata	Navigation	The project aims to solve the shipping problems of the Hungarian Danube stretch.	Planning under preparation	Yes	Yes	Inte nde d	No	Yes
HU	Duna	Duna Bajától délre	A Duna hajózhatóságának vizsgálata	Navigation	The project aims to solve the shipping problems of the Hungarian Danube stretch.	Planning under preparation	Yes	Yes	Inte nde d	No	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
HU	Tisza	Tisza Kiskörétõl Hármas-Körösig	Nagykunsági árvízszint csökkentõ tározó	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Officially planned	No	No	Already done	Already done	No
HU	Szamos	Szamos	Szamos-Kraszna-közi árvízszint csökkentõ tározó	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Officially planned	No	No	Already done	Already done	No
HU	Fekete-Körös	Fekete-Körös	Mályvádi árvízi szükségtározó fejlesztése	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Planning under preparation	Yes	Yes	No	No	Yes
HU	Tisza	Tisza Belfõ-csatornától Keleti-fõcsatornáig	Taktaköz-felsõ árvízvédelmirendszer fejlesztése	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Planning under preparation	Yes	No	No	Intended	Yes
HU	Kettõs-Körös	Kettõs-Körös	Kettõs-Körös árvízvédelmi fejlesztése	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Planning under preparation	Yes	No	No	No	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
HU	Fehér-Körös	Fehér-Körös	Kisdelta árvízi szükségtározó korszerûsítése	Flood protection	The project is part of the Vasarhelyi Plan. The main purpose of the Vasarhelyi Plan is flood protection on the river Tisza.	Planning under preparation	No	No	No	No	No
SI	Sava	VT Sava Krško – Vrbina	Hidroelektrarna Brežice	Hydropower	Hydropower plant	Implementation of project	Yes	Yes	Already done	Intended	Yes
SI	Sava	VT Sava Krško – Vrbina	Hidroelektrarna Mokrice	Hydropower	Hydropower plant	Implementation of project	Yes	Yes	Already done	Intended	Yes
HR	Sava	BID_T0001	Danube-Sava Canal	Navigation	Construction of 60 km artificial canal (category VII) from Vukovar to Samac on the Sava River; will shorten the waterway	Implementation of project	No	Yes	No	Intended	No
HR	Sava	CES_T0001	Reconstruction of Sava waterway	Navigation	Reconstruction of the waterway, and upgrading it to Category Va	Officially planned	No	Yes	No	Intended	No
RS	Dunav	Dunav uzvodno od usca Drave	Apatin	Navigation	Navigation	Planning under preparation	No	Yes	Already done	Intended	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
RO	Dunarea	Dunarea PF II	Salcia	Navigation	4 groins right bank; 3 groins left bank; Mehedinti; ISPA 2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II - Chiciu	Bala	Navigation	Bala;ISPA 1	Officially planned	Yes	Yes	No	Already done	Yes
RO	Dunarea	Dunarea PF II	Basarabi	Navigation	1 right closure branch + islet protection at the corresponding level QD ˜ 2000 m3/s; Dolj; ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II - Chiciu	Epurasu	Navigation	Epurasu;ISPA 1	Officially planned	Yes	Yes	No	Already done	Yes
RO	Dunarea	Dunarea PF II	Bogdan / Sceanu Island	Navigation	1 right closure branch + islet protection at the corresponding level QD ˜ 2000 m3/s; Dolj; ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II - Chiciu	Seica	Navigation	Seica;ISPA 1	Officially planned	Yes	Yes	No	Already done	Yes
RO	Dunarea	Dunarea PF II	Dolj 1	Navigation	3 closure branches QD ˜ 2000 m3/s; Dolj; ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II - Chiciu	Ceacaru	Navigation	Ceacaru;ISPA 1	Officially planned	Yes	Yes	No	Already done	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
RO	Arges	ARGES: SECTOR AVAL AC. MIHAILESTI - AMONTE CONFLUENTA DAMBOVITA	Canal Dunare - Bucuresti: Am. R. Arges pe sector Mihailesti - cf Dambovita	Navigation	43km total, regularizare albie, indiguire, biefare prin 4 Noduri hidrotehnice, Realizare port 1Decembrie 300mil Euro	Planning under preparation	Yes	Yes	No	No	Yes
RO	Dunarea	Dunarea PF II	Dolj 2	Navigation	1 branch closure + islet protection; Dolj; ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II - Chiciu	Fasolele	Navigation	Fasolele;ISPA 1	Officially planned	Yes	Yes	No	Already done	Yes
RO	Arges	ARGES: SECTOR AMONTE CONFLUENTA DAMBOVITA - CONFLUENTA DUNAREA	Canal Dunare - Bucuresti: Am. R. Arges pe sector cf Dambovita - Dunare	Navigation	30km total, amenajarea caii navigabile pe Arges: regularizare albie, indiguire si biefare. 200mil Euro	Planning under preparation	Yes	Yes	No	No	Yes
RO	Dunarea	Dunarea PF II	Dolj 3	Navigation	2 closure of branches; Dolj; ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Atarnati	Navigation	Atarnati; ISPA 1	Officially planned	Yes	Yes	No	Already done	Yes
RO	Dunarea	Dunarea PF II	Lom - Linovo Island	Navigation	2 groins; 2 closure of branches (QD ˜ 2000 m3/s); Dolj; ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
RO	Dunarea	Dunarea PF II - Chiciu	Varsaturii	Navigation	Varsaturii;ISPA 1	Officially planned	Yes	Yes	No	Already done	Yes
RO	Dunarea	Dunarea PF II	Arcer Outlet - Alimanu	Navigation	3 groins right bank;Dolj; ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Dolj 4	Navigation	2 closure of branches + head bank consolidation	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Dolj 5	Navigation	1 branch closure + head bank consolidation	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Carabulea: Bechet / Oriahovo	Navigation	1 branch closure + 2 groins	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Dolj 6	Navigation	Variant I - 2 (3) groins right bankVariant II – 3 groins left bank Preferably Variant II;	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Corabia - Baloiu branch (Bulgarian)	Navigation	1 groin; 3 closure branches (QD ˜ 2000 m3/s)	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Calnovat	Navigation	2 closure branches (QD ˜ 2000 m3/s); Olt; ISPA 2	Planning under preparation	Yes	Yes	No	Intended	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
RO	Dunarea	Dunarea PF II	Teleorman 1	Navigation	3 groins+ (eventually) consolidation right bank	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Lakat / Paletz Island - Belene Island upstream	Navigation	Variant1-branch closure left bank + head bank consolidation(Km 594+700) 1left branch closure+head bank consolidation(Km 589)3 groins right bank2 secondary closure branches left bank583+500–Km 585 II Variant 1branch closure left bank	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Lakat / Paletz Island - Belene Island upstream 2	Navigation	1branch closure right bank (Km 576+500)4 groins right bank (Km 576-574)1 groin left bank (Km 573+800)2 closure branches right bank 1branch closure left bank + head bank consolidation	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Vardim Island	Navigation	1branch closure left bank + (eventually) consolidation left bank	Planning under preparation	Yes	Yes	No	Intended	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
RO	Dunarea	Dunarea PF II	Gasca	Navigation	4 groins left bank	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Batin Island - Stilpiste	Navigation	10 groins right bank; 1 branch closure; 4 groins right bank;	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Cama Island	Navigation	2 closure thresholds (QD ˜ 2000 m3/s) + heads banks consolidation	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Giurgiu 1	Navigation	1 closure with threshold - Ara branch3 groins left bank downstreamright bank consolidation1 closure with threshold – branch left bank(Km 485+500)	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Giurgiu 2	Navigation	1 right branch closure (QD ˜ 2000 m3/s) + consolidation bank head	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Gostinu Island	Navigation	1 left branch closure (QD ˜ 2000 m3/s) (Km 475+500)1 right branch closure (QD ˜ 2000 m3/s) (Km 472+500)1 left branch closure (Km 469+500)	Planning under preparation	Yes	Yes	No	Intended	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
RO	Dunarea	Dunarea PF II	Michka Island	Navigation	1 threshold on branch (Km 465+500) – left bank1 threshold closure branch (Km 460+500) - right bank	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Calarasi 1	Navigation	1 branch closure Radetki3 groins (Km 436+500 – 434+500)	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Kosul	Navigation	2 closure branches right bank 3-4 groins right bank 3-4 groins left bank (Km 419 – 421+500)	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Calarasi 2	Navigation	3 groins left bank; 1 left arm close;Calarasi; ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Calarasi 3	Navigation	1 threshold closure right branch + consolidation bank head; Calarasi;ISPA2	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Calarasi 4	Navigation	2 thresholds closure branches (Km 384=800 and Km 384) + works for banks consolidation	Planning under preparation	Yes	Yes	No	Intended	Yes
RO	Dunarea	Dunarea PF II	Calarasi 5	Navigation	3 (at least) depth thresholds (Km 374); Calarasi; ISPA 2	Planning under preparation	Yes	Yes	No	Intended	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
BG	Dunav	DUNAV RWB01	Integrated Water Project - Town of Rousse	Others	ISPA MEASURE 2005/BG/16/P/PE/004 - integrated water project in the town of Rousse. T. T,including :rehabilitation and extension of the Inner Water Supply Network; construction of UWWTP. ˆ 47, 8 million	Implementation of project	No	Yes	No	Already done	No
BG	Dunav	DUNAV RWB01	Danube bridge - II	Others	Design and construction of a combined (road and rail) bridge over the Danube River with four road lanes and single track railway line plus a bicycle lane; 226 million EU	Implementation of project	Yes	Yes	No	Already done	Yes
BG	Dunav	DUNAV RWB01	WWTP-Lom	Others	Integrated project for water treatment and water management in Lom	Planning under preparation	No	Yes	No	No	No

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
BG	Dunav	DUNAV RWB01	WWTP-Vidin	Others	Construction of WWTPs, reconstruction and completion of the sewerage network, reconstruction and completion of the water-supply network in Vidin and its agglomeration area - 3 398 400 BGN for preparation of investment project	Planning under preparation	No	Yes	No	No	No
BG	Dunav	DUNAV RWB01	WWPT - Silistra	Others	Construction of WWTP, completion of construction of sewerage network and partial reconstruction of water-supply network,Silistra;- 11,5 millionEU	Planning under preparation	No	Yes	No	No	No
BG	Dunav	DUNAV RWB01	Construction of WWTP-Belene	Others	Partial construction of a sewerage network with Waste Water Treatment Plant and rehabilitation of the existing water-supply network in Belene	Planning under preparation	No	Yes	No	No	No

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
BG	Dunav	DUNAV RWB01	Construction of WWTP-Tutrakan	Others	Design, reconstruction of the sewerage network and water-supply networks and building of WWTP in Tutrakan - 4.8 million EU	Officially planned	No	Yes	No	No	No
BG	Dunav	DUNAV RWB01	Construction of WWTP-Kozloduy	Others	Construction of a wastewater treatment plant in Kozloduy - 4.07 millionEU	Implementation of project	No	Yes	No	No	No
UA	Danube	Danube	Bystroe	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe01	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe02	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe03	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
UA	Danube	Danube	Bystroe04	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe05	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe06	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe07	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe08	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe09	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes

Country	River	Waterbody	Project title	Main purpose	Description	Project Status	Expected deterioration of the waterbody status	Transboun-dary Impact	SEA	EIA	Exemption 4.7
UA	Danube	Danube	Bystroe10	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe11	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe12	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe13	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Danube	Bystroe14	Navigation	Dredging for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes
UA	Danube	Black sea	Bystroe15	Navigation	Protective dam for creation of deep navigation waterway Danube-Black Sea	Implementation of project	Yes	Yes	Already done	Already done	Yes

Pressures and impacts related to quantity and quality aspects of sediments

International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Annex 8 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

1. General overview

Sediments are particulate inorganic materials transported by water from upstream sources to the downstream areas of deposition. Sediments are produced by the weathering and erosion of mountains/rocks and soils and are carried in rivers as suspended load or as bed-load. Sedimentation and remobilisation of material transported mainly in alluvial watercourses take place on the banks and beds of rivers, and in the floodplains usually during floods. In general, there is erosion in the upstream parts of the catchment; transfer, deposition and remobilisation in the middle parts and in the lower sections of most rivers, the majority of the remaining sediment transported from inland to sea is deposited within the estuary and in the coastal zone. Torrents and reservoirs of hydropower plants act as human-made sediment traps. Damming affects the hydrology and morphology of the river upstream and especially downstream, mainly by interrupting the continuity of sediment transport. The relatively clear water leaving reservoirs and the limited sediment supply cause the incision of the river bed into the terrain.

Sediment acts as a potential sink for many hazardous chemicals. In river reaches with a long and undisturbed record of sedimentation, sediment cores may reflect the history of pollution in a given river basin. Where water quality is improving, the accumulated pollutants may still be present attached to sediment grains hidden at the bottom of rivers, behind dams, in lakes, estuaries and seas, as well as on floodplains. This annex provides a brief summary overview of the current knowledge on pressures and impacts related to sediment quantity and quality in the Danube River Basin (DRB).

2. Sediment quantity

2.1. Sediment balance

At present the sediment balance of most of the large rivers within the Danube Basin can be characterised as disturbed or severely altered. Morphological changes due to river engineering works, torrent control, hydropower development and dredging, as well as the reduction of adjacent floodplains by nearly 90%, are the most significant impacts during the last 150 years.

Bed-load material

The hydropower plants in the upper Danube catchment trap almost 80-90% of the sediment bed-load. For example, significant reduction of bed-load material was recorded on the Inn: from approx. 540,000 t/yr close to zero[1]. Additionally, torrent control reduces erosion and transfer of material so that a deficit of bed-load exists at the majority of the free-flowing river sections in the Danube catchment. On the other hand, there exists a surplus of material in the reservoirs of hydropower plants. This diverting development is still ongoing.

The middle Danube is characterised by the transition of the river from a gravel river into a sand river (due to a decreasing slope). Downstream of the Gabcikovo Dam, the fine gravel load (7-10 mm) currently amounts to approx. 250,000 m³/yr, while near Budapest the amount of transported bed-load declines considerably to approx. 50,000 m³/yr. In the lower Danube, the suspended load dominates the overall sediment transport.

Suspended sediments

For the suspended load, the retention in the upper catchment by river barrages or any kind of impoundment is not as efficient as for the bed-load. In particular, during floods huge amounts of fine sediment are transported from the upper to the lower catchment. During an extreme (200 years) flood event in August 2005 on the Inn River at Innsbruck, the 5-day assessment showed that about 1.74 million tonnes of particulate matter in suspension had been transported across the gauging section. This was about twice as much as the annual sediment load reported for the same site for the whole year of 2004 (0.82 million tonnes). The comparison of both values clearly reveals the necessity for a continuous and more accurate monitoring of the transport of suspended sediments. At present the torrent control works and impoundments on the upper catchments in the Danube River Basin retain about 1/3 of the suspended load.. In impounded sections during much shorter periods of time (mainly during floods), large quantities of sediments are remobilised and deposited e.g. in the inundated floodplains.

In the lower Danube, transport of the suspended load currently reaches only 30% of the original amount recorded before the construction of the Iron Gate Dams. Moreover, many tributaries of the lower Danube deliver only a very small amount of sediment in comparison with that measured before the construction of dams and reservoirs in their upper stretches. In the Danube Delta region, the annual natural sediment load decreased from 53 million to 18 million t/yr due to hydro-technical works in the entire DRB.

2.2. Erosion & deposition

Downstream of torrent control works and hydropower plants, river bed degradation is very intensive due to sediment deficit and is enhanced by river regulation (increase of slope, decrease of channel width, suppression of bank erosion).

In Bavaria, the Danube reach from Straubing to Vilshofen has an overall incision tendency of 1.5 cm/yr. Along the Austrian Danube, in the free-flowing stretch within the Wachau, a slight deepening of 0-1 cm/yr is observed, and the stretch downstream from Vienna has a degradation of 2-4 cm/yr. Along the Hungarian-Slovakian border, the channel incision downstream of the Gabcikovo power plant is 2-3 cm/yr; however it reduces downstream of Komárno to 1-2 cm/yr (including the impact of the Danube bend gorge, which is a regional erosion base). The overall riverbed incision in Hungary is estimated to be about 1-3 cm/yr. For the Serbian reach further downstream to the Iron Gate backwater (near the Tisza confluence) there is no clear evidence of channel incision. Downstream of the Iron Gate Dams, the rate of degradation along the Romanian-Bulgarian Danube reaches an average value of 2-3 cm/yr.

Upstream of dams in reservoirs or impounded sections, the reduction of the sediment transport capacity of water results in sediment deposition. This retained sediment has often to be dredged in order to maintain the river depth for navigation, standard reservoir operation, as well as to limit the height of the water level in case of floods. However, the excavated material should be reinserted into the river to maintain the overall sediment balance. Downstream of dams, the loss of the sediment sometimes requires an artificial supply of bed-load material or other engineering measures to stabilise the riverbed and prevent incision.

2.3. Dredging

The extraction of sediment is mostly necessitated by navigation (minimum water depth), flood protection purposes, reservoir management and torrent control. The major dredging user groups include:

- Waterway transport maintenance dredging;
- Commercial extraction, construction sector;
- Channel maintenance for flood protection;
- Impoundment clearing for hydropower plants;
- Fish farming.

Dredging is very common along the entire Danube River. In the upper Danube countries, commercial dredging is not allowed anymore and the situation in many new EU countries is changing towards more limitations and stronger requirements required by environmental impact studies. However, the total amount of maintenance dredging is still considerable and the amounts dredged in the past often cannot be compensated for by the river itself. If possible, sediments that are dredged at critical sections should be re-inserted into the river to decrease the sediment deficit.

3. Sediment quality

The characterisation of sediment quality in the Danube is primarily based on the results of the Danube Surveys (JDS1 and 2). During JDS1, significant concentrations of 4-iso-nonylphenol and di[2-ethyl-hexyl]phthalate were found in bottom sediments as well as in suspended solids (from a few µg/kg up to more than 100 mg/kg).

During JDS2, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) and dioxin-like polychlorinated biphenyls (PCBs) were more than one order of magnitude lower in all compartments when compared to the Elbe River and only one site (downstream of Pancevo) slightly exceeded the *safe sediment value* for PCDD/Fs. PCBs did not exceed the related German quality standards for sediment. Polybrominated diphenylethers (PBDEs) concentrations in the Danube suspended particulate matter (SPM) were an order of magnitude lower than in Dutch rivers.

Comparing the concentrations of polyaromatic hydrocarbons (PAH) analysed during JDS2 with the proposed EU environmental quality standards (EQS) for suspended solids, the results indicated that even the maximum concentrations recorded were far below the recommended limit values i.e. the maximum concentration of Benzo(a)pyrene was more than 20-times less than the EQS, and the concentration of Benzo(k)fluoranthene was about one-fifth of the proposed EQS for SPM. The most abundant PAH compounds in solid phase during JDS2 were fluoranthene and pyrene. The results of the Aquaterra survey in 2004 for PAHs however showed that fluoranthene frequently exceeded the proposed EU freshwater quality standard for sediment in the upper part of the surveyed reach (down to rkm 1262).

As regards pollution of the Danube sediment by the organochlorinated pesticides, JDS2 results from 2007 show an improvement when compared to JDS1 in 2001, not only in terms of the maximum concentrations recorded but mainly regarding the number of detected pesticides. Only for aldrin, chlorpyrifos, o,p'-DDD, p,p'DDE, o.p'-DDT, p,p-DDT, dieldrin, isodrin and the sum of trichlorbenzenes could concentrations above the limit of quantification

be found at several JDS2 sampling sites. While aldrin and isodrin were detected in the upper Danube reach, elevated concentrations of other organochlorinated pesticides were found at only a few sampling sites in the mid and lower Danube reach.

Besides the ongoing degradation of these compounds, their reduction can also be explained by "dilution" by less polluted or unpolluted fresh sediment and the re-suspension, mixing and transport processes during the flood event in the time span between the two surveys. Although the results of the two surveys provide insufficient data to derive a clear trend in sediment pollution of the Danube River, an improvement seems to be evident for the organochlorinated pesticides analysed in 2001 and 2007.

The results of analysis of heavy metals in the sediment samples collected during the JDS1 showed that the concentrations of arsenic, cadmium, copper, nickel, zinc and lead (in tributaries only) were above the applied quality targets at more than one-third of the sampling points (German quality targets were used for this evaluation). Analysis of heavy metals in sediments and SPM during JDS2 revealed an influence from the Tisza and Sava increasing the concentration of cadmium and lead along the lower Danube reach. Increased concentrations of mercury were found in the tributaries Vah and Velika Morava. The longitudinal profile of nickel clearly showed a significant increase downstream of the confluences of the Sava, Tisza and Velika Morava.

4. Reference:

1. WWF (2008): Assessment of the balance and management of sediments of the Danube Waterway (Final Draft)

Status assessment for groundwater: characterisation and methodology

icpdr iksd
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

Annex 9 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

1. Deep groundwater body – thermal water	
Member State code (MS_Code)	**DEGK11110, ATGK100158**
Description of important transboundary groundwater body (GWB)	The thermal groundwater of the Malmkarst (Upper Jurassic) in the Lower Bavarian and Upper Austrian Molasse Basin is of transboundary importance. It is used for spa purposes and to gain geothermal energy. All the used geothermal water is reinjected into the same aquifer. The transboundary GWB covers a total area of 5900 km²; the length is 155 km and the width is up to 55 km. The aquifer is Malm (karstic limestone); the top of the Malm reaches a depth of more than 1000 m below sea level in the Bavarian (Germany, DE) part and 2000 m below in the Upper Austrian (AT) part. The groundwater recharge is mainly composed of subterranean inflow from the adjacent Bohemian Massif and infiltration of precipitation in the northern part of the GWB area. The total groundwater recharge was determined to be 820 l/s. The GWB is included in the Danube Basin Analysis (DBA) because of its intensive use. An expert group is responsible for bilateral exchange of information and sustainable transboundary use.
Description of the status assessment methodology	Basic remarks: As already presented previously, the access to information regarding deep GWBs is extremely difficult. This is first and foremost due to the fact that the establishment of measuring sites is technically very complicated and very expensive. Consequently it has not been possible for the water management administrations of both countries to set up and maintain a separate comprehensive measuring and monitoring network for the deep GWB in the Lower Bavarian – Upper Austrian Molasse Basin. Instead, wells (from which thermal water is abstracted for geothermal and balneological utilization) are used as measuring and sampling sites. Measurements and sampling are carried out by the private plant operators according to requirements laid down by the authorising bodies from both countries. Attention should be paid to the fact that in spite of the above-mentioned GWB sampling and additional studies carried out to identify the thermal-hydraulic conditions, the level of knowledge about the deep GWB is insufficient to describe its quantitative and qualitative status in analogy to a near-surface GWB. Therefore it was necessary to develop a procedure adapted to the given conditions for the identification of the quantitative and the qualitative status of the deep GWB. In future this procedure will have to be examined and, if necessary, adapted according to the extent and quality of data available. The procedure will have to be discussed and adopted by the “Permanent Commission after the Regensburg Treaty”. **AT / DE: *Chemical status*** The *qualitative status* of the deep GWB will be described on the basis of measurement and analysis data according to a procedure agreed between the two states. The decisive parameters for the evaluation of the *qualitative status* of near-surface GWBs (such as nitrate and pesticides) are not relevant for deep GWBs. As expected, the parameters measured in the GWB extending over 5900 km² differ (in some cases considerably) from site to site. This is due to regionally different geo-hydraulic conditions. Therefore the description of the qualitative status cannot be made in the same way as that for near-surface GWBs (on the basis of aggregated data), but made on the basis of measurement and analysis data available at every individual measuring site. Contrary to near-surface GWBs, it should be considered that, due to the utilization of the waters (balneological and thermal uses), *good status* is not only not achieved if the concentration of certain contents rises above a certain level, but also if it falls below it. The available data is presently not sufficient to identify precisely enough the scope

1. Deep groundwater body – thermal water	
	of fluctuations relevant for individual parameters at the individual measuring sites. *Good qualitative status* is considered to be reached if the threshold value (TV) of the decisive parameters neither exceed nor fall below the scope of fluctuations determined for every measuring site. It is planned to examine the current selected scope of fluctuations on the basis of many years of monitoring, (at least over a period of 10 years) and to adapt them, where required. In any case, the GWB is considered to be in a *good qualitative status* if at least 75% of the measuring sites meet *good status*. The following parameters are used as a basis for the determination of the qualitative status of the deep GWB: temperature, electrical conductivity, total hardness, sulphate and chloride. The findings available at the individual measuring and sampling sites for the short period from 2005 to 2007 show comparable results. Thus the deep GWB in the Lower Bavarian - Upper Austrian Molasse Basin is of *good quantitative status*. **AT / DE: *Quantitative status*** There is no interaction between deep groundwater and surface waters and/or terrestrial ecosystems. The *quantitative status* of the deep GWB can be described by means of: - the identification of trends over a period of many years monitoring of the level of hydraulic pressure at groundwater measuring sites and wells; - a balancing calculation: a comparison between the thermal water supply and thermal water abstractions. Apart from Bad Füssing (records since 1948), no long-term monitoring of pressure potentials that would be significant for a trend analysis is available. As early as in 1998, detailed thermal water balancing was carried out for the deep GWB. In the course of this balancing an exploitation of the available thermal water resources by thermal water abstractions of about 25% was recorded, which corresponds to a *good quantitative status* (at least 30% of the quantity available). In the meantime, the extent of utilisation has been considerably reduced due to successfully implemented management measures (among other things the obligation to reinject the used thermal water exclusively). *Good quantitative status* could be even further improved on the basis of the level of hydraulic pressure in the thermal waters of Bad Füssing which has risen again since then. With a view to the regionally uneven distribution of the available quantity, water abstraction points and abstracted water quantities, a sub-division of the balance area into sub-areas can be made. For these areas the decisive balance parameters can be determined separately.
In the case of *poor chemical status*:	
Parameter(s) responsible for *poor status*	**AT:** **DE:**
Further information on TVs	**Procedure:** Brief summary of the way the procedure set out in Annex II Part A of the Directive 2006/118/EC has been followed in order to derive TVs. [< 5000 characters] **AT:** **DE:** **Relationship:** Brief summary of the relationship between TVs and background levels for naturally occurring substances. [< 2000 characters]

<table>
<tr><td colspan="5">1. Deep groundwater body – thermal water</td></tr>
<tr><td></td><td colspan="4">AT:
DE:</td></tr>
<tr><td rowspan="4">TVs per GWB</td><td>GWB</td><td>Pollutant / indicator</td><td>TV (or range) [1]
(mg/l or µg/l)</td><td>Level at which the TV is established
(national, RBD[2], GWB)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
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</table>

[1] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

[2] River Basin District

2: Upper Jurassic – Lower Cretaceous groundwater body	
Member State Code MS_Code	**BG_DGW02 / RO_DL06**
Description of important transboundary GWB	Criteria for delineation: the development of Upper Jurassic- Lower Cretaceous permeable deposits and water content in these deposits. Geological overview: stratigraphic age is Upper Jurassic- Lower Cretaceous. Lithological composition: limestones, dolomitic limestones and dolomites. Overlying strata consists of marls, clays, sands, limestones, pebbles and loess. The age of the above mentioned deposits is Hauterivian, Sarmatian, Pliocene and Quaternary. Excluding small cropped out areas, the GWB is very well protected. Main GWB use: drinking water supply, agriculture and industry supply. There is no significant impact on the GWB in either Bulgaria (BG) or Romania (RO). In Romania the GWB has an interaction with Lake Sintghiol situated near the Black Sea. The criterion for selection as 'important' is size, which exceeds 4000 km².
Description of status assessment methodology	**BG: *Chemical status* and *quantitative status*** 1. Comparison was made between total water abstraction according to permits and exploitation resources. 2. Standards for groundwater quality were established using Annex 1 of the Regulation N-1/2007 for Research, Water Use and the Protection of Groundwater. 3. TVs were defined according to the "Common methodology for groundwater threshold values" developed by the EU WFD CIS Working Group C (WGC). According to Article 4 of the GWD, a GWB is of *good status* when Groundwater Quality Standards (GW-QSs) or TVs are not exceeded at any monitoring point. Where a GW-QS or TV has been exceeded at one or more monitoring points, appropriate investigation (with appropriate aggregation of the monitoring results), is needed to estimate the extent to which the GWB (in terms of volume or spatial area) has an annual arithmetic mean concentration of a pollutant higher than a GW-QS or TV. This concerns the assessment of: - significant environmental risk from pollutants across a GWB; - no significant impairment of human uses; - saline and other intrusion. To satisfactorily carry out the appropriate investigation(s), additional data may be used to refine the conceptual model and/or confirm the extent of exceedance. 4. The ratio between the extent of exceedance of the GWB compared with the total area of the water body was calculated (< 20%: good; >20%: poor, according to guidance on groundwater *chemical status*, status and trends - WGC). The extent of exceedance of the GWB is the spatial area – part of the GWB, obtained by adding up the area of circles surrounding the monitoring points having an annual arithmetic mean concentration of a pollutant higher than a GW-QS. 6. Trends in pollutant concentrations were calculated. The present groundwater status assessment was made for every GWB on the basis of conceptual models of aquifers, *chemical status* data from the national monitoring system for the periods 2004-2006 and 2007-2008. Monitoring data from drinking water supply sources for the period 2004-2007 have also been

<table>
<tr><td colspan="5">2: Upper Jurassic – Lower Cretaceous groundwater body</td></tr>
<tr><td></td><td colspan="4">used.

Groundwater quantitative status was evaluated on the basis of a comparison between total water abstraction according to issued water use permits and exploitation resources established by “Orders of the Water Basin Directors”. All transboundary GWBs were determined to be not at risk.

For groundwater status assessment, TVs were determined:
- For GWBs at risk: TVs for nitrates, ammonia, total iron.

- Sea water intrusion: for chlorides and sulphate TVs, the background values were used in compliance with the EU WFD CIS Guidance on Groundwater Chemical status and Threshold Values.

Only one GWB was determined at risk (for nitrates content). There is no available methodology for assessment of groundwater pollution from diffuse sources at this moment. A procedure is underway to attempt to address these problems.

RO: Chemical status

The methodology for chemical status assessment generally followed recommendations of the WGC in the document “Towards a Guidance on Groundwater Chemical Status and Threshold Values”. The first step was to check for any exceedances of TVs. As no exceedance was present, the GWB was considered in good status.

RO: Quantitative status

Assessment was carried out after the chemical status assessment. As the chemical status was assessed as good and no sustained downward trend in water level was recorded across the water body (at any monitoring point), the water body was found to have good quantitative status.</td></tr>
<tr><td colspan="5">In the case of poor chemical status:</td></tr>
<tr><td>Parameter(s) respon-sible for poor status</td><td colspan="4">BG / RO:</td></tr>
<tr><td>Further information on TVs</td><td colspan="4">Procedure: Brief summary of the way the procedure set out in Annex II Part A of the GWD has been followed in order to derive the TVs. [<5000 characters]
BG / RO:

Relationship: Brief summary of the relationship between TVs and background levels for naturally occurring substances. [< 2000 characters]

BG / RO:</td></tr>
<tr><td rowspan="2">Threshold values per GWB</td><td>GWB</td><td>Pollutant / indicator</td><td>TV (or range) [3]
(mg/l or µg/l)</td><td>Level at which the TV is established
(national, RBD, GWB)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

[3] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

3: Middle Sarmatian – Pontian groundwater body	
Member State Code MS_Code	**RO_PR05/MD_PR01**
Description of important transboundary GWB	The criterion for delineation of the Romanian (RO) - Moldovan (MD) GWB was the development of the Sarmatian aquiferous deposits in the territories of Neamt, Bacau and Vaslui districts, situated in the Siret and Prut River Basins. Lithologically, the water-bearing deposits are constituted of thin layers of sands and sandstones. The overlying stratum is represented by clay of about 50 m in thickness. The GWB is locally used for drinking water supply. The criterion for selection as "important" is its size, which exceeds 4000 km^2.
Description of status assessment methodology	**RO: *Chemical status*** The methodology for the *chemical status* assessment followed the recommendations of WGC in the document "Towards a Guidance on Groundwater Chemical Status and Threshold Values". The first step was to check for any exceedances of TVs. As exceedance of the TV for NH_4 was recorded, the following relevant tests were carried out: - General assessment of the *chemical status*: Data aggregation was carried out and it was checked whether the total area of exceedance was greater than 20% of the total area of the GWB. The test showed a *good status* for the water body; - Saline or other intrusion: not relevant. - Significant diminution of associated surface water chemistry and ecology due to transfer of pollutants from the GWB: The exceedance of the TV was not found in areas where pollutants might be transferred to surface waters. The pollutant load transferred from the GWB to the surface water body compared to the total surface water body load does not exceed 50%. The test showed a *good status* for the water body. - Significant damage to groundwater dependent terrestrial ecosystems (GWDTE) due to transfer of pollutants from GWB: No GWDTE was found damaged. The test showed a *good status* for the water body. - Meets the requirements of Water Framework Directive (WFD) Article 7(3) – Drinking Water Protected Areas: There is no evidence of increased treatment due to changes in water quality. The test showed a *good status* for the water body **MD: *Chemical status*: no data** **RO: *Quantitative assessment*** This was carried out after the *chemical status* assessment. As the *chemical status* was assessed as *good* and no sustained downward trend in the water level was recorded across the water body (at any monitoring point), the water body was found to be in *good quantitative status*. **MD: *Quantitative status*: no data**
In the case of poor *chemical status*:	
Parameter(s) responsible for *poor status*	**RO:** **MD:**

3: Middle Sarmatian – Pontian groundwater body				
Further information on TVs	**Procedure:** Brief summary of the way the procedure set out in Annex II Part A of the GWD has been followed in order to derive the TVs. [<5000 characters] **RO:** **MD:** **Relationship:** Brief summary of the relationship between TVs and background levels for naturally occurring substances. [< 2000 characters] **RO:** **MD:**			
Threshold values per GWB	**GWB**	**Pollutant / indicator**	**TV (or range)** [4] (mg/l or μg/l)	**Level at which the TV is established** (national, RBD, GWB)

4: Sarmatian Groundwater Body	
Member State Code MS_Code	**RO_DL04 / BG_BSGW01**
Description of important transboundary GWB	Delineation criteria: development of Sarmatian permeable deposits and water resources in the deposits. The lithological composition of water-bearing deposits is as follows: Bulgaria: limestones, sands; Romania: oollitic limestones and organogenic limestones. The overlying strata consist of loess and clays. The GWB is well protected in clay-covered areas, but vulnerable to pollution in predom-inantly loess / sand-covered areas. This explains nitrate contamination in some areas. The main use of the GWB is for drinking water supply, and also in agricultural and industrial purposes. The main pressures are agriculture activities, waste landfills and small industrial plants. The GWB has an interaction with two small lakes in Bulgaria. The criterion for selection as "important" is size, which exceeds 4000 km^2.
Description of status assessment methodology	**BG: *Chemical status* and *quantitative status*** 1. A comparison was made between total water abstraction according to permits and exploitation resources. 2. Standards for groundwater quality were established using Annex 1 of the Regulation N-1/2007 for Research, Water Use and the Protection of Groundwater. 3. TVs were defined according to the "Common methodology for groundwater

[4] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

4: Sarmatian Groundwater Body	
	threshold values" developed by the EU WFD CIS Working Group C (WGC).. According to Article 4 of the GWD, a GWB is of *good status* when GW-QSs or TVs are not exceeded at any monitoring point. Where a GW-QS or TV has been exceeded at one or more monitoring points, appropriate investigation (with appropriate aggregation of monitoring results) is needed to estimate extent to which the GWB (in terms of volume or spatial area) has an annual arithmetic mean con-centration of a pollutant higher than a GW-QS or TV. This concerns assessment of: - significant environmental risk from pollutants across a GWB; - no significant impairment of human uses; - saline and other intrusion. To satisfactorily carry out the appropriate investigation(s) additional data may also be used to refine the conceptual model and/or confirm the extent of exceedance. 5. The ratio between the extent of exceedance of the GWB compared with the total area of the water body was calculated (< 20%: good; >20%: poor, according to guidance on groundwater *chemical status*, status and trends - WGC). The extent of exceedance of the GWB is the spatial area – part of the GWB, obtained by adding up the area of circles surrounding the monitoring points having an annual arithmetic mean concentration of a pollutant higher than a GW-QS. 6. Trends in pollutant concentrations were calculated. The present groundwater status assessment was made for every GWB on the basis of conceptual models of aquifers, *chemical status* data from the national monitoring system for the periods 2004-2006 and 2007-2008. Monitoring data from drinking water supply sources for the period 2004-2007 have also been used. Groundwater *quantitative status* was evaluated on the basis of a comparison between total water abstraction according to issued water use permits and exploitation resources established by "Orders of the Water Basin Directors". All transboundary GWBs were determined to be *not at risk*. For groundwater status assessment, TVs were determined**:** - For GWBs *at risk*: TVs for nitrates, ammonia, total iron. - Sea water intrusion: for chlorides and sulphate TVs, the background values were used in compliance with the document "Towards a Guidance on Groundwater Chemical status and Threshold Values". Only one GWB was determined to be *at risk* (nitrates content). There is no available methodology for assessment of groundwater pollution from diffuse sources at this moment. A procedure is underway to attempt to address these problems. **RO: *Chemical status*** The methodology for *chemical status* assessment generally followed the recommendations of WGC in the document "Towards a Guidance on Groundwater Chemical Status and Threshold Values". The first step was to check for any exceedances of TVs. As no exceedance was present, the GWB was considered in *good status*. **RO: *Quantitative status*** Assessment was carried out after the *chemical status* assessment. As the *chemical status* was assessed as *good* and no sustained downward trend in water level was recorded across the water body (at any monitoring point), the water body was found to have *good quantitative status*.

<table>
<tr><td colspan="5">4: Sarmatian Groundwater Body</td></tr>
<tr><td colspan="5">In the case of poor chemical status</td></tr>
<tr><td>Parameter(s) responsible for poor status</td><td colspan="4">BG:
RO:</td></tr>
<tr><td>Further information on TVs</td><td colspan="4">Procedure: Brief summary of the way the procedure set out in Annex II Part A of the GWD has been followed in order to derive the TVs. [<5000 characters]
BG / RO:
Relationship: Brief summary of the relationship between TVs and background levels for naturally occurring substances. [< 2000 characters]
BG / RO:</td></tr>
<tr><td rowspan="4">Threshold values per GWB</td><td>GWB</td><td>Pollutant / indicator</td><td>TV (or range)[5]
(mg/l or µ g/l)</td><td>Level at which the TV is established
(national, RBD, GWB)</td></tr>
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[5] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

5: Mures /Maros	
Member State Code MS_Code	**RO_MU20, RO_MU22 / HU_P.2.13.1, HU_P.2.13.2, HU_SP.2.13.1, HU_SP.2.13.2**
Description of important transboundary GWB	**Reasons for selection as an important transboundary GWB:** The alluvial deposit of the Maros/Mures River lies along both sides of the southern Hungarian – Romanian border, to the north of the actual river bed of the Maros/Mures. In particular, it is an important water resource for drinking water purposes for both countries and water abstraction in one country influences the water availability in the other. **General description:** The basin of the SE part of the Great Hungarian Plain is filled up with more than 2000 m thick deposits of different ages, which are progressively thinning in Romania. The alluvial fan of the Maros/Mures River forms the Pleistocene part of the strata. The aquifer is divided into several GWBs in both countries. Despite the differences in the delineation method of the two countries, it was possible to select the relevant water bodies from the transboundary point of view. Of the four water bodies containing cold water in Hungary (HU), two contain Quaternary strata from the surface to a depth of 30 m, namely the shallow GWBs (GWB HU_SP.2.13.1, GWB HU_SP.2.13.2). Underneath them are two porous GWBs (GWB HU_P.2.13.1, GWB HU_P.2.13.2), which, besides Quaternary strata, include some parts of the Upper-Pannonian deposits as well (to a depth of 400–500 m corresponding to the surface separating cold and thermal waters). Two Quaternary water bodies have been selected in Romania. On the Romanian side, two water bodies are included in the transboundary evaluation because in the Romanian method there is a separating horizon at the limit of the Upper (GWB RO_MU20) and Lower Pleistocene (GWB RO_MU22) age of the strata. Both water bodies can be lithologically characterised by pebbles, sands and clayey inter-layers, but the upper part is significantly coarser with better permeability. Virtually following the same separation line on the Hungarian side, the lower 100 m of the 250-300 m thick Pleistocene strata is silty-sand, sandy-silt, sand and clay, and the upper part is mainly sand with gravel, so that permeability improves towards the surface (the hydraulic conductivity of the aquifers ranges between 5–30 m/day). The covering layer is mainly sandy silt and clay of 3-13 m thickness. On the Romanian side, the upper water body is *unconfined* and the lower is *confined*. In Hungary both *confined* and *unconfined* conditions occur in the southern water bodies (GWB HU_SP.2.13.1, GWB HU_P.2.13.1) and mainly *confined* conditions are characteristic for the water bodies of the upward flow system (GWB HU_SP.2.13.2, GWB HU_P.2.13.2). The area covered by these water bodies is 4989 km^2. The groundwater table is 2-4 m below the surface in Hungary. Recharge in sandy areas has only local importance (15 Mm^3/year). At present, because of the considerable amount of water abstracted from the deep layers, there is a permanent recharge from shallow groundwater to the deep groundwater system (app. 15 Mm^3/year) and large areas with sandy-silty covered layers also contribute to the recharge of the abstracted amount in Hungary. Another important element of the global recharge of the Hungarian part is the lateral flow across the border, estimated at 15-20 Mm^3/d (uncertain value based on limited available knowledge). The direction of the groundwater flow is from the recharge area to the discharge areas (main river valleys and zones with groundwater level close to the surface) i.e. from SE to N and NW.

5: Mures /Maros	
Description of status assessment methodology	**RO: *Chemical status*** The methodology for the *chemical status* assessment followed the recommendations of WGC in the document "Towards a Guidance on Groundwater Chemical Status and Threshold Values". The first step was to check for any exceedances of TVs. As exceedance of the TVs for NO_3 and NH_4 was recorded, the following relevant tests were carried out: - General assessment of the *chemical status*: Data aggregation was carried out and it was checked whether the total area of exceedance was greater than 20% of the total area of the GWB. The test showed a *poor status* for the water body, so the GWB was considered to be in *poor status*. **HU: *Chemical status*** <u>1. Exceedance of TVs at monitoring points</u>: This test is performed for all GWBs and for all chemical elements (for which standard or TV(s) have been determined) in the following steps: - Selection of WFD monitoring points where the average concentration for the period 2004-2007 **exceeds the determined standard or the TV**. - Exclusion of monitoring sites where the higher concentration is due to **natural conditions** (although the TV is determined considering natural background level, it is possible to detect an exceedance of natural origin). - Immediate classification as *poor status* for all those GWBs where a **drinking water production well or captured spring** shows exceedance of the drinking water standard to such an extent that changes in treatment technology are needed. GWB should be classified as *poor* in cases of danger of pollution to drinking water production wells. (see next point for potential impact on active abstractions). - Evaluation of data on groundwater quality **inside the drinking water source protection area** (corresponding to 50 years travel time, according to Hungarian legislation). The evaluation is carried out in the framework of the general status assessment of exploited drinking water resources, including all observation wells and information on sources of pollution. If the result of evaluation shows that pollution is able to cause exceedance of the drinking water standard at the abstraction point, involving change in treatment technology, the GWB is classified as having *poor status*. - Selection of monitoring wells **inside aquifers designated for future drinking water abstraction.** If the number of wells exceeding the drinking water standard is higher than a given value (determined as a function of the chemical element and the type of aquifer), the GWB is classified as having *poor status* since it is likely that the exploitation would be difficult: not possible or would need treatment. - Analysis of the real impact of exceedances on ecosystems (according to points 3 & 4. Where the NBL > DWS, the TV is taken into consideration. NBL: Natural Background Level DWS: Drinking Water Standard <u>2. Delineation of polluted areas:</u> This test is carried out for **shallow and karstic GWBs regarding nitrate and ammonium**. The delineation of the polluted area (where the concentration exceeds the threshold of the given GWB) is based on all information (not only WFD monitoring!). The GWB is classified in *poor status* if **20–30% of the total surface of the GWB is**

5: Mures /Maros	
	polluted. For a given GWB, the criterion is selected according to its vulnerability: i.e. for karstic aquifers and GWBs with a recharge character 20%,: for other shallow GWBs: 30%. <u>3. Polluted surface water bodies:</u> The test is applied to those GWBs where for a **groundwater dependent surface water body, the physico-chemical or chemical test shows *poor status***, and its reason is not evidently sewage water discharges or diffuse pollution from surface runoff. Those cases shall also be analysed where a polluted monitoring well of a groundwater dependent surface water body of *poor chemical status*. can be found in the vicinity (closer than 5 km) The evaluation is special for each case, taking into account (i) all available data on groundwater and surface water quality, (ii) information on pollution sources - the point or diffuse character of the pollution, (iii) estimated load from pollution sources, (iv) attenuation and dilution effect. If it is proved that the *chemical status* of the GWB is the cause of the observed pollution in the surface water body, the GWB is classified as having *poor chemical status*. The real impact of **polluted springs** on the quality of the supplied water course is also evaluated, at least until the first water body (considering possible dilution). If the *physico-chemical or chemical status* of the surface water body is not *good* because of this pollution, the GWB is classified as having *poor status*. <u>4. Damaged groundwater dependent wetland and terrestrial ecosystems:</u> This test is applied for those GWBs where it is likely that the **documented damage of certain wetlands or GWDTEs** is due to polluted groundwater. The methodology for evaluation of the real impact on ecosystems is performed in a similar way to the case of aquatic ecosystems (see point 3.). Monitoring of the status of wetlands and GWDTEs is not part of the WFD, so only scattered information on status is available. **RO: *Quantitative status*** The quantitative status assessment was carried out after the *chemical status* assessment. As the *chemical status* was assessed as poor, the water balance test was performed (see below). The test showed a *good status* for the water body. **HU: *Quantitative status*** <u>1. Water balance test</u> The water balance test is carried out in two steps: - The GWB has *poor status* if **in 20% of its area, a continuous decreasing water level** can be observed due to groundwater abstraction. The test is based on data for the period 2001-2007. A declining trend of 5-15 cm/year (depending on aquifer type and depth) can be considered as significant. In mountainous regions, the rate of springs is also analysed; the significant trend depends on the average rate. Water abstractions causing the trend should be identified. (Trends caused by meteorological conditions or a short declining trend caused by new water abstractions are not considered.) If the designated area is in the vicinity of the country border, **transboundary conciliation is needed**. - The GWB is also considered to have *poor status* if **groundwater abstraction exceeds the available groundwater resource**. This test is applied for subsurface catchment areas, thus shallow and deeper GWBs (except porous thermal GWBs) and corresponding dominantly recharge and discharge GWBs are merged in GWB-groups. **The recharge** consists of three components: (i) recharge from precipitation, (ii) recharge from surface water, (iii) flow from adjacent GWB or GWB-group.

5: Mures /Maros	
	The recharge from precipitation is calculated by a spatially distributed (1x1 km grid) water balance model including precipitation (period 1991-2000), interception, surface runoff, evapotranspiration and storage in the unsaturated zone. Local recharge is ignored in dominantly discharge areas. **Recharge from surface water** (as a long-term average) is rare in Hungary, it is determined on a case by case basis. Although GWBs are grouped according to subsurface catchments, estimation of **flow from adjacent GWB-group** is still important (i) in the case of transboundary water bodies, (ii) between different types of GWBs, (iii) where the boundary in the deeper part does not represent the real no-flux boundary. The estimation is based on the results of regional groundwater flow models or simple calculations using maps of water levels and transmissibility. **The water demand of groundwater dependent ecosystems** also has three components: (i) baseflow and spring rates supplying aquatic ecosystems in water courses (ii) a surplus of evaporation in shallow lakes and wetlands (iii) a surplus of transpiration from groundwater (supplying GWDTE). **The water demand of aquatic ecosystem in rivers** is considered for small and medium water courses, where springs are frequent in the catchment or where the average groundwater level is above the bottom of the riverbed. Ecologically necessary low flow is estimated on the basis of required water depth, width and velocity. **The water demand of shallow lakes and wetlands** is estimated as the product of required water/wetland surface and a surplus of evaporation. The required water surface is estimated considering landscape-ecological aspects. **The water demand of vegetation in the discharge area** is estimated as the product of the area (where the groundwater should contribute significantly to the water supply of the vegetation) and the amount of capillary flow needed for surviving periods without precipitation. The potential area is delineated using GIS procedure (convenient combination of soil type and groundwater level). The required part is a percentage of the potential one (default is 30%). **The amount of abstracted water** is the sum of the amount abstracted by wells (average for the period 2004-2007) and the outflow related to other water uses (e.g. drainage canals, gravel pits, decreased surface water level). <u>2. Surface waters test</u> The test is applied to those GWBs where, for a groundwater dependent water body, the hydromorphological classification shows a critical flow situation and its reason is not evidently the use of surface waters. The GWB is classified as *poor status* if: - **the remaining spring rate** in low flow period (either due to abstraction by wells or due to the capture of spring) is smaller than the ecologically required flow; - **the decrease of baseflow** caused by groundwater abstraction (in whole catchment of the surface water body) exceeds half of the available surface water resource. <u>3. Groundwater dependent wetlands and terrestrial ecosystems test</u> The test (status evaluation) is applied to those GWBs where the available information shows significant damage in wetlands and GWDTE. - It is preferred that the real effect of groundwater status is determined by a case by case approach, including the analysis of the **role of groundwater levels and flow conditions in damaging biota** and the reason for it (e.g. groundwater abstraction or other water use, but climate change is not considered as a reason for bad status).

5: Mures /Maros	
	- In some cases, a detailed analysis is not possible because of limited available data. In these cases the GWB is classed as *poor status* if there are **direct and indirect groundwater abstractions whose recharge area overlaps with the recharge area of the ecosystem by more than 30%**.
In the case of *poor chemical status*	
Parameter(s) responsible for *poor status*	**RO:** **HU: nitrates (HU_SP.2.13.2)**
Further information on TVs	**RO:** The procedure for NBL and TV derivation was established in the framework of the MATRA PPA06/RM/7/5 Project. The first step of the procedure was NBL-derivation based on each Water Directorate water quality database. Data quality was controlled through four different criteria: - Ionic balance of the sample; - Sampling depth; - Sample typology; - NaCl content of the sample. Selection of unpolluted samples based on anthropic originated substances content (pesticides or other inorganic substances), using the Cl>200 mg/l content and NO_3>10 mg/l criteria. NBL was calculated as the 90 percentile of the remaining samples. When less than 20 samples remained after applying Cl and NO_3 content criteria, the NBL were calculated as the 50 percentile of all samples. Validation of the NBL was made through "expert judgment". TVs were derived by comparing NBL's with quality standard values. The quality standard values were established through Drinking Water Law no. 458/2002 completed with Law no. 311/2004 and through Surface Water Quality Standards approved through Environment and Sustainable Development Ministry Order No 161/2006. From these two standards, the most restrictive values were taken into account. If NBL was lower than the water quality standard, the TV was considered equal to the water quality standard. If NBL was greater than the water quality standard, the TV was considered to be the NBL value multiplied with a multiplying coefficient of 1.2. (according to the recommendations of WGC in the document "Towards a guidance on groundwater *chemical status* and threshold values" in order to avoid the problems of 90 percentile usage in the TV deriving methodology and also problems caused by the confidence level in the data quality (data sampled and analysed without using QA/QC (quality assurance and quality control) procedures and standards)). **HU:** TVs were established by following the guidelines given in Annex II Part A of the GWD. Substances considered for TVs are those listed in part B of GWD, as well as nitrates and pesticides. The TV of a given component was determined by taking into account: - the 90% percentile value (NBL) of the available chemical data of non-polluted objects of a given water body (NBL established for nitrate, ammonium, conductivity and sulphate (SO_4));

<table>
<tr><td colspan="5">5: Mures /Maros</td></tr>
<tr><td></td><td colspan="4">- the geology and hydrodynamics of the water body;
- Quality Standards (EQS surfacewater and DWS) of the given substance.
In the case of water bodies where both EQS surfacewater and DWS are applicable (e.g. for nitrates), TVs were established considering the more stringent criteria (i.e. EQSsurfacewater).
EQSsurfacewater is applicable only in case of karstic water bodies feeding surface waters for example by springs.
In the case of trichloroethylene and tetrachloroethylene, the DWS for pesticides took into account the GW-QS.
For those GWBs where the NBL was higher than the DWS due to natural hydro-geological reasons, the TVs for ammonium, SO_4 and EC were defined by taking into account these higher values, as described in EU WFD CIS Guidance Document No. 18.
To achieve EQ objectives in cold karstic GWBs with springs, TVs for nitrates were defined conforming to EQSsurfacewater (25 mg/l). For other GWBs, nitrate TV equals DWS. In the case of sulphate and EC, TVs can be higher than the quality standard, considering the geology or hydrogeological regime of the water bodies.</td></tr>
<tr><td rowspan="11">Threshold values per GWB</td><td>GWB</td><td>Pollutant / indicator</td><td>TV (or range)[6]
(mg/l or µg/l)</td><td>Level at which the TV is established
(national, RBD, GWB)</td></tr>
<tr><td>5-RO</td><td>Nitrate</td><td>50 mg/l</td><td>GWB</td></tr>
<tr><td>5-RO</td><td>NH_4</td><td>0.5-2.2 mg/l</td><td>GWB</td></tr>
<tr><td>5-RO</td><td>Cl</td><td>250 mg/l</td><td>GWB</td></tr>
<tr><td>5-RO</td><td>SO_4</td><td>250 mg/l</td><td>GWB</td></tr>
<tr><td>5-RO</td><td>As</td><td>0.04mg/l</td><td>GWB</td></tr>
<tr><td>5-RO</td><td>Cd</td><td>0.005 mg/l</td><td>GWB</td></tr>
<tr><td>5-RO</td><td>Pb</td><td>0.01 mg/l</td><td>GWB</td></tr>
<tr><td>5-RO</td><td>NO_2</td><td>0.5 mg/l</td><td>GWB</td></tr>
<tr><td>5-RO</td><td>PO_4</td><td>0.5-0.8 mg/l</td><td>GWB</td></tr>
<tr><td>HU_SP.2.13.2</td><td>Nitrate</td><td>50 mg/l</td><td>GWB</td></tr>
</table>

[6] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

6: Somes / Szamos	
Member State Code MS_Code	**RO_SO01, RO_SO13 / HU_P.2.1.2, HU_SP.2.1.2, HU_P.2.3.2, HU_SP.2.3.2**
Description of important transboundary GWB	**Reasons for selection as an important transboundary GWB:** The alluvial deposit of the Somes/Szamos River extends on both sides of the northern part of the Hungarian-Romanian border. It is also connected to the aquifer system lying in Ukraine close to the borders. The aquifer system supplies drinking water to a population of approx. 170,000 inhabitants in Romania and 50,000 inhabitants in Hungary. On the Hungarian side, due to the lowland character and upward flow system, the terrestrial ecosystems require surplus transpiration from groundwater; 7% of the area of the water body is under nature conservation. The recharge zone is in Romania and Ukraine, thus the available groundwater resource and the status of the terrestrial ecosystems on the Hungarian side depend on the lateral flow from the neighbouring countries. The Romanian and Hungarian parts of the water body complex are described below. **General description:** The Somes/Szamos River has formed a 30–250 m thick alluvial deposit. The aquifer is divided into several GWBs in both countries. Despite the differences in the delineation method of the two countries, it was possible to select the relevant water bodies from the transboundary point of view. Four water bodies containing cold water occur in Hungary. Two of them contain Quaternary strata from the surface to a depth of 30 m, namely the shallow GWBs (GWB HU_SP.2.1.2, GWB HU_SP.2.3.2). Underneath are the porous GWBs (GWB HU_P.2.13.1, GWB HU_P.2.13.2), which beside Quaternary strata include some parts of the Upper-Pannonian deposits as well, to a depth of 400–500 m corresponding to the surface separating cold and thermal waters. Two Quaternary water bodies in Romania have been selected. The Holocene-Pleistocene formation is divided vertically in Romania by the horizon separating the Upper and Lower Pleistocene strata. In Romania two water bodies are considered, overlapping each other and covering a surface area of 1380 km^2. The Hungarian part can be characterised only by an upward flow system, thus no further horizontal separation is applied. The area covered by the water body is 1035 km^2. In Romania, the shallow (Holocene-Upper-Pleistocene) aquifer is *unconfined*, consisting of sands, argillaceous sands, gravels and even boulders in the eastern part, and has a depth of 25-35 m. The silty-clayey covering layer is 5–15 m thick. The deeper (Lower-Pleistocene) aquifer is *confined* (it is separated from the Upper-Pleistocene part by a clay layer); its bottom is declining from 30 m to 130 m below the surface from East to West. The gravel and sandy strata (characteristic westwards of the town of Satu-Mare) represent the main aquifer for water supply in the region. In Hungary (as part of the cold water body), the Quaternary (Pleistocene) and Holocene strata are 50 m thick at the Ukrainian border and its continuously declining bottom is around 200 m below the surface at the western boundary. Mainly *confined* conditions characterise the Hungarian part, with a silty clayey covering layer of 1–6 m (increasing from the NE to the SW). The Quaternary aquifer is sand or gravelly sand, and the hydraulic conductivity ranges between 10-30 m/d. It should be noted that the Hungarian water body includes the cold water bearing part of the Upper-Pannonian formation as well, to a depth of 400–500 m (under this level, thermal water of a temperature greater than 30 °C can be found). Depth of the groundwater level (mainly pressure in *confined* area) below the

6: Somes / Szamos	
	surface ranges between 2 and 5 m in Hungary. The flow direction is from the ENE to the WSW in both countries, corresponding to the recharge and main discharge zones (rivers and area with groundwater level close to the surface). The recharge area is in the Romanian part of the water body (and in Ukraine). In Hungary the infiltrated amount from local recharge zones supplies neighbouring discharge zones and cannot be considered as part of the available groundwater resources.
Description of status assessment methodology	**RO: *Chemical status*** The methodology for the *chemical status* assessment followed the recommendations of WGC in the document "Towards a Guidance on Groundwater Chemical Status and Threshold Values". The first step was to check for any exceedances of TVs. As exceedance of the TVs for the following parameters: NH_4, NO_3, NO_2 and PO_4, Pb, and As, were recorded, the following tests were carried out: - **General assessment of the *chemical status***: Data aggregation was carried out and it was checked whether the total area of exceedance was greater than 20% of the total area of the GWB. The test showed a *good status* for the water body; - **Saline or other intrusion:** was not relevant; - **Significant diminution of associated surface water chemistry and ecology due to transfer of pollutants from the GWB:** The location of the exceedance of the relevant threshold values where not found in areas where pollutants might be transferred to the surface water. The load of the pollutant transferred from the GWB to the surface water body compared to the total load in the surface water body did not exceed 50%. The test showed a *good status* for the water body. - **Significant damage to GWDTEs due to transfer of pollutants from the GWB:** No GWDTE was found damaged. The test showed demonstrated a *good status*; - **Meeting the requirements of WFD Article 7(3)** – Drinking Water Protected Areas: there is no evidence of increased treatment due to changes in water quality. The test showed a *good status* for the water body. **HU: *Chemical status*** 1. Exceedance of TVs at monitoring points: This test is performed for all GWBs and for all chemical elements (for which standard or TV(s) have been determined) in the following steps: - Selection of WFD monitoring points where the average concentration for the period 2004-2007 **exceeds the determined standard or the TV**. - Exclusion of monitoring sites where the higher concentration is due to **natural conditions** (although the TV is determined considering natural background level, it is possible to detect an exceedance of natural origin). - Immediate classification as *poor status* for all those GWBs where a **drinking water production well or captured spring** shows exceedance of the drinking water standard to such an extent that changes in treatment technology are needed. GWB should be classified as *poor* in cases of danger of pollution to drinking water production wells. (see next point for potential impact on active abstractions). - Evaluation of data on groundwater quality **inside the drinking water source protection area** (corresponding to 50 years travel time, according to Hungarian legislation). The evaluation is carried out in the framework of the general status assessment of exploited drinking water resources, including all observation wells and information on sources of pollution. If the result of evaluation shows that pollution is able to cause exceedance of the drinking water standard at the

6: Somes / Szamos	
	abstraction point, involving change in treatment technology, the GWB is classified as having *poor status*. - Selection of monitoring wells **inside aquifers designated for future drinking water abstraction.** If the number of wells exceeding the drinking water standard is higher than a given value (determined as a function of the chemical element and the type of aquifer), the GWB is classified as having *poor status* since it is likely that the exploitation would be difficult: not possible or would need treatment. - Analysis of the real impact of exceedances on ecosystems (according to points 3 & 4. Where the NBL > DWS, the TV is taken into consideration. 2. Delineation of polluted areas: This test is carried out for **shallow and karstic GWBs regarding nitrates and ammonium**. The delineation of the polluted area (where the concentration exceeds the threshold of the given GWB) is based on all information (not only WFD monitoring!). The GWB is classified in *poor status* if **20–30% of the total surface of the GWB is polluted.** For a given GWB, the criterion is selected according to its vulnerability: i.e. for karstic aquifers and GWBs with a recharge character 20%,: for other shallow GWBs: 30%. 3. Polluted surface water bodies: The test is applied to those GWBs where for a **groundwater dependent surface water body, the physico-chemical or chemical test shows *poor status***, and its reason is not evidently sewage water discharges or diffuse pollution from surface runoff. Those cases shall also be analysed where a polluted monitoring well of a groundwater dependent surface water body of *poor chemical status*. can be found in the vicinity (closer than 5 km) The evaluation is special for each case, taking into account (i) all available data on groundwater and surface water quality, (ii) information on pollution sources - the point or diffuse character of the pollution, (iii) estimated load from pollution sources, (iv) attenuation and dilution effect. If it is proved that the *chemical status* of the GWB is the cause of the observed pollution in the surface water body, the GWB is classified as having *poor chemical status*. The real impact of **polluted springs** on the quality of the supplied water course is also evaluated, at least until the first water body (considering possible dilution). If the *physico-chemical or chemical status* of the surface water body is not *good* because of this pollution, the GWB is classified as having *poor status*. 4. Damaged groundwater dependent wetland and terrestrial ecosystems: This test is applied for those GWBs where it is likely that the **documented damage of certain wetlands or GWDTEs** is due to polluted groundwater. The methodology for evaluation of the real impact on ecosystems is performed in a similar way to the case of aquatic ecosystems (see point 3.). Monitoring of the status of wetlands and GWDTEs is not part of the WFD, so only scattered information on status is available. **RO: *Quantitative status*** The quantitative status assessment was carried out after the *chemical status* assessment. The water balance test was performed as well. The test showed a *good status* for the water body. **HU: *Quantitative status*** 1. Water balance test

6: Somes / Szamos	
	The water balance test is carried out in two steps: - The GWB has *poor status* if **in 20% of its area, a continuous decreasing water level** can be observed due to groundwater abstraction. The test is based on data for the period 2001-2007. A declining trend of 5-15 cm/year (depending on aquifer types and depth) can be considered as significant. In mountainous regions, the rate of springs are also analysed; the significant trend depends on the average rate. Water abstractions causing the trend should be identified. (Trends caused by meteorological conditions or a short declining trend caused by new water abstractions are not considered.) If the designated area is in the vicinity of the country border, **transboundary conciliation is needed**. - The GWB is also considered to have *poor status* if **groundwater abstraction exceeds the available groundwater resource**. This test is applied for subsurface catchment areas, thus shallow and deeper GWBs (except porous thermal GWBs) and corresponding dominantly recharge and discharge GWBs are merged in GWB-groups. **Recharge** consists of three components: (i) recharge from precipitation, (ii) recharge from surface water, (iii) flow from adjacent GWB or GWB-group. **Recharge from precipitation** is calculated by a spatially distributed (1x1 km grid) water balance model including precipitation (period 1991-2000), interception, surface runoff, evapotranspiration and storage in the unsaturated zone. Local recharge is ignored in dominantly discharge areas. **Recharge from surface water** (as a long-term average) is rare in Hungary, it is determined on a case-by-case basis. Although GWBs are grouped according to subsurface catchments, estimation of **flow from adjacent GWB-group** is still important (i) in the case of transboundary water bodies, (ii) between different types of GWBs, (iii) where the boundary in the deeper part does not represent the real no-flux boundary. The estimation is based on the results of regional groundwater flow models or simple calculations using maps of water levels and transmissibility. **The water demand of groundwater dependent ecosystems** also has three components: (i) baseflow and spring rates supplying aquatic ecosystems in water courses (ii) a surplus of evaporation in shallow lakes and wetlands (iii) a surplus of transpiration from groundwater (supplying GWDTE). **The water demand of aquatic ecosystem in rivers** is considered for small and medium water courses, where springs are frequent in the catchment or where the average groundwater level is above the bottom of the riverbed. Ecologically necessary low flow is estimated on the basis of required water depth, width and velocity. **The water demand of shallow lakes and wetlands** is estimated as the product of required water/wetland surface and a surplus of evaporation. The required water surface is estimated considering landscape-ecological aspects. **The water demand of vegetation in the discharge area** is estimated as the product of the area (where the groundwater should contribute significantly to the water supply of the vegetation) and the amount of capillary flow needed for surviving periods without precipitation. The potential area is delineated using GIS procedure (convenient combination of soil type and groundwater level). The required part is a percentage of the potential one (default is 30%). **The amount of abstracted water** is the sum of the amount abstracted by wells (average for the period 2004-2007) and the outflow related to other water uses (e.g. drainage canals, gravel pits, decreased surface water level). 2. Surface waters test

6: Somes / Szamos	
	The test is applied to those GWBs where, for a groundwater dependent water body, the hydromorphological classification shows a critical flow situation and its reason is not evidently the use of surface waters. The GWB is classified as *poor status* if: - **the remaining spring rate** in low flow period (either due to abstraction by wells or due to the capture of spring) is smaller than the ecologically required flow; - **the decrease of baseflow** caused by groundwater abstraction (in whole catchment of the surface water body) exceeds half of the available surface water resource. 3. Groundwater dependent wetlands and terrestrial ecosystems test The test (status evaluation) is applied to those GWBs where the available information shows significant damage in wetlands and GWDTE. - It is preferred that the real effect of groundwater status is determined by a case by case approach, including the analysis of the **role of groundwater levels and flow conditions in damaging biota** and the reason for it (e.g. groundwater abstraction or other water use, but climate change is not considered as a reason for bad status). - In some cases, a detailed analysis is not possible because of limited available data. In these cases the GWB is classed as *poor status* if there are **direct and indirect groundwater abstractions whose recharge area overlaps with the recharge area of the ecosystem by more than 30%**.
In the case of poor *chemical status*	
Parameter(s) responsible for *poor status*	**RO:** **HU:**
Further information on TVs	**Procedure:** Brief summary of the way the procedure set out in Annex II Part A of the GWD has been followed to derive TVs < 5000 characters **RO:** **HU:** TVs were established by following the guidelines given in Annex II Part A of the GWD. Substances considered for TVs were those listed in part B of the GWD, as well as nitrates and pesticides. The TV of a given component for a water body was determined by taking into account: - the 90% percentile value (NBL) of the available chemical data of non-polluted objects of a given water body (NBL was established for nitrates, ammonium, EC, sulphates); - the geology and the hydrodynamics of the water body; - Quality Standards (EQSsurfacewater and DWS) of the given substance. In the case of water bodies where both EQSsurfacewater and DWS are applicable (e.g. for nitrates), TVs were established considering the more stringent criteria (i.e. EQSsurfacewater). EQSsurfacewater is applicable only in the case of karstic water bodies feeding surface waters, for example by springs. In the case of trichloroethylene and tetrachloroethylene the DWS for pesticides took into account the GW-QS. For those GWBs where the NBL was higher than the DWS due to natural hydro-geological reasons, the TVs for ammonium, SO_4 and EC were defined by taking

<table>
<tr><td colspan="5">6: Somes / Szamos</td></tr>
<tr><td></td><td colspan="4">into account these higher values, as described in EU WFD CIS Guidance Document No. 18.

To achieve EQ objectives in cold karstic GWBs with springs, the TV for nitrates was defined to conform with EQSsurfacewater (25 mg/l). For other GWBs, the nitrate TV equals the DWS. In the case of sulphate and EC, TVs can be higher than the quality standard, considering the geology or hydrogeological regime of the water bodies.

Relationship: Brief summary of the relationship between TVs and background levels for naturally occurring substances< 2000 characters

RO:

HU: see the description above</td></tr>
<tr><td rowspan="4">Threshold values per GWB</td><td>GWB</td><td>Pollutant / indicator</td><td>TV (or range) [7]
(mg/l or µg/l)</td><td>Level at which the TV is established
(national, RBD, GWB)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
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</table>

[7] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

<table>
<tr><th colspan="2">7: Upper Pannonian - Lower Pleistocene GWB from Backa and Banat / Vojvodina / Duna-Tisza köze déli rész</th></tr>
<tr><td>Member State Code MS_Code</td><td>RO_BA18 / RS_TIS_GW_I_1, RS_TIS_GW_SI_1, RS_TIS_GW_I_2, RS_TIS_GW_SI_2, RS_TIS_GW_I_3, RS_TIS_GW_SI_3, RS_TIS_GW_I_4, RS_TIS_GW_SI_4, RS_TIS_GW_I_7, RS_TIS_GW_SI_7, RS_D_GW_I_1, RS_D_GW_SI_1 / HU_SP.1.15.1, HU_P.1.15.2, HU_SP.1.15.2, HU_P.1.15.2, HU_SP.2.11.1, HU_P.2.11.1, HU_SP.2.11.2, HU_P.2.11.2, HU_SP.2.16.1, HU_P.2.16.1.</td></tr>
<tr><td>Description of important transboundary GWB</td><td>RO: Delineation

The criterion for delineation of this regional body was the development of fluvial-lacustrine Pannonian-Pleistocene aquiferous deposits, in the Bega and Timis River Basins. Lithologically, the water-bearing deposits are comprised of thin layers with a fine to medium grain-size (sands, rarely gravels), sometimes with a lens aspect, and are situated at a depth of 30-350 m. The overlaying strata are predominantly represented by detritic Quaternary deposits. The GWB is mainly used for drinking water, agricultural and industrial supplies. The criterion for selection as “important” is size: exceeding 4000 km^2.

RS: Delineation

The criteria for the identification of water bodies were the following:

Horizontal delineation was carried out by:
1. Separating the discharge and recharge areas of the water bodies;
2. Using existing hydrodynamic boundary conditions;
3. Identifying direction of flow and association to the immediate DRB and Tisza RB.

Vertical delineation (shallow/deep) was carried out by:
1. Separating the shallow GWBs by geological boundary- aquitard;
2. Identifying transmissivity and effective porosity of the aquifers (if no aquitard exists);
3. Looking at groundwater chemical characteristics.

HU: Delineation

The following procedure was carried our to re-delineate GWBs in Hungary in 2007:
1. Separation of the main geological features based on recent information: porous aquifers in the basins, karstic (Triassic) aquifers, mixed formations of the mountainous regions, other than karstic aquifers.
2. Vertical separation of shallow groundwater (generally to the first aquitard below the surface, or approx. the first 30 m below the water table where there is no aquitard) in the case of porous aquifers in the basins and in mountainous regions other than Triassic karsts and fractured rocks.
3. Thermal water bodies are separated according to a temperature of 30 ºC. In the case of porous aquifers, it is done vertically, while in karstic aquifers, horizontally. There are no thermal aquifers in the mountainous regions other than karstic ones.
4. Further division is related to the subsurface catchment areas and vertical flow system (in the case of porous aquifers) and to structural and hydrological units (in the case of karstic aquifers and mountainous regions).

Reasons for selection as an important transboundary GWB

The porous aquifer system between the Danube and Tisza Rivers is the biggest geological unit of the Pannonian Basin. It lies mainly in Hungary and Serbia, with a smaller part in Croatia and Romania. Serbia and Hungary have selected it as an important transboundary GWB complex because: (i) size, (ii) importance in supplying drinking water for the population and (iii) the need to satisfy the water demand of agriculture and industry, (iv) protected areas cover a large part of the GWB complex (protection zones for vulnerable drinking water resources, nature</td></tr>
</table>

7: Upper Pannonian - Lower Pleistocene GWB from Backa and Banat / Vojvodina / Duna-Tisza köze déli rész	
	conservation areas and nitrate-sensitive areas). **General description** The whole aquifer system of the Danube-Tisza region stretches from the foothills of the northern mountainous region of Hungary to the Danube in Serbia, where the river flows to the south-east. The western boundary is the Danube itself downstream of Budapest in Hungary but after crossing the Hungarian border it enlarges towards Slavonia (western part of Backa in Croatia). The eastern boundary is somewhat east from the Tisza River in Hungary and in Serbia it includes the Banat as well, whose eastern part is in Romania. The Danube, Tisza and Timis Rivers are important discharge-lines but cannot be considered as pure hydrodynamic boundaries, since there is some flow under the river in the deeper aquifer that is not discharged into the river. The aquifer system is divided into several GWBs. Despite the differences in the delineation method of the three countries, it was possible to select the relevant water bodies from the transboundary point of view: In Serbia, the area of the whole Dunav aquifer system is 17,435 km^2 (the areas of Backa and Banat). However, the transboundary importance is related only to the GWBs adjacent to the state borders with Hungary (a total of 6 GWBs: 3 shallow (RS_TIS_GW_SI_1; RS_TIS_GW_SI_2; RS_TIS_GW_SI_3) and 3 deep (RS_TIS_GW_I_1; RS_TIS_GW_I_2; RS_TIS_GW_I_3)) and with Romania (a total of 6 GWBs: 3 shallow (RS_TIS_GW_SI_4; RS_TIS_GW_SI_7; RS_D_GW_SI_1) and 3 deep (RS_TIS_GW_I_4; RS_TIS_GW_I_7; RS_D_GW_I_1)). The area of water bodies situated towards Hungary is 5647 km^2 and towards Romania 4859 km^2, with a total aggregated area of 10,506 km^2 for the Vojvodina GWB. In Hungary, the aquifer system is divided into several water bodies according to major subsurface catchment areas and downward-upward flow systems. For the transboundary conciliation, only the southern part of the aquifer system is considered, which includes 10 cold water bodies. Five of them contain Quaternary strata from the surface to a depth of 23-30 m, i.e. shallow GWBs (GWB HU_SP.1.15.1, GWB HU_SP.1.15.2, GWB HU_SP.2.16.1, GWB HU_SP.2.11.1, GWB HU_SP.2.11.2). Beneath these are five porous GWBs (GWB HU_P.1.15.1, GWB HU_P.1.15.2, GWB HU_P.2.16.1, GWB HU_P.2.11.1, GWB HU_P.2.11.2). Besides Quaternary strata, these include part of the Upper-Pannonian deposits as well, to a depth of 400–500 m corresponding to the surface and separating cold and thermal water bodies. The Hungarian part can be characterised by both upward and downward flow systems that are the basis for the horizontal separation of the GWBs. The area covered by these water bodies is 7098 km^2. The aquifer can be considered *unconfined* in the shallow GWBs, despite a considerable area where the water level is in the semi-permeable covering layer, and *confined* in the deeper ones. The depth of the groundwater level below the surface ranges between 3 and 5 m in Hungary, with a maximum depth of 7-12 m in the main recharge zones (GWB HU_SP.1.15.1, GWB HU_SP.2.16.1 and GWB HU_SP.2.11.1). In Romania, the aquifer system covers around 11,408 km^2 and is adjacent to the state border with Serbia. The GWB is generally *confined*, its covering strata being of Quaternary age. The depth of the groundwater level below surface ranges from 3-20 m. The protection degree of the GWB is very good. The main aquifer is the Quaternary alluvial deposit of the Danube lying on the Pannonian strata. Its thickness is a few tens of meters at the northern, western and southern boundary and increases up to 700 m in the middle of the basin (in the lower Tisza-valley). At the eastern boundary, the thick Quaternary deposit is a mixture of the alluvial deposits of the Danube and the Carpathian rivers. In respect to lithology, the aquifer consists of medium and coarse sands and gravely sands

7: Upper Pannonian - Lower Pleistocene GWB from Backa and Banat / Vojvodina / Duna-Tisza köze déli rész	
	with inter-layers and lenses of silty sands and silty clays. Average hydraulic conductivity ranges between 5–30 m/d. The topographically elevated ridge between the Danube and the Tisza is formed of eolian sand with relatively good recharge conditions and phreatic groundwater. In the river valleys and east of the Tisza, mainly *confined* conditions appear. The depth of the fluvial-swamp silty clays and swamp clays overlying strata varies from 10-20 m in the western and southern part, and up to 100-125 m in the north-eastern part of Backa and in Banat. Here, prior to intensive groundwater abstraction, an artesian type of groundwater occurred. The main recharge area is in Hungary, in the eolian sand ridge, and in Romania. In Hungary, the estimated value of the recharge is approx. 220 Mm^3/year. In Serbia, only local recharge areas exist (areas of the Deliblat Sands and the Subotica/Horgos Sands), thus the lateral flow crossing the border from the neighbouring country - as a component of the overall recharge - is very important. The groundwater is mainly discharged by the rivers (and drainage canals) and by the surplus of evapotranspiration from vegetation in the areas characterised by groundwater levels close to the surface. Small lakes and marshes in locally deeper areas (i.e. in topographic depressions) must be considered as local discharge areas – they are important from the nature conservation point of view. Besides natural discharge, there is also significant groundwater tapping for various uses (drinking water, agriculture, industry, irrigation etc.). In Vojvodina, the entire public water supply relies exclusively on groundwater from aquifers formed at different depths, from 20 m to more than 200 m. The direction of the groundwater flow in the upper part of the aquifer-system follows the topography and recharge-discharge conditions. At the Hungarian-Serbian border, the flow direction is almost parallel to the border (flowing slightly from Hungary towards Serbia). In the deeper part, the general flow direction is NW to SE i.e. from the Danube to the Tisza in Hungary and in Backa, while in northern Banat, the piezometric surface subsides from the frontier zone towards the Tisza and the Timis, and in southern Banat, from the Deliblat Sands, it dips to the south and towards the Danube.
Description of status assessment methodology	**RO: *Chemical status*** The methodology for the *chemical status* assessment generally followed the recommendations of the WGC in the document "Towards a guidance on groundwater *chemical status* and threshold values". The first step was to check any exceedances of TVs. As exceedances of TVs were recorded for the following parameters: NH_4, NO_3, NO_2, PO_4, Pb, and As, the following relevant tests where carried out: - **General assessment of the *chemical status*:** Data aggregation was performed and it was checked whether the total area of exceedance was greater than 20% of the total area of the GWB. The test showed a *good status* for the water body. - **Saline or other intrusion:** not relevant. - **Significant diminution of associated surface water chemistry and ecology due to transfer of pollutants from the GWB:** The location of the exceedance of the relevant TVs was not found in areas where pollutants might be transferred to surface waters. A comparison of the pollutant load transferred from the GWB to the surface water body with the total load in the surface water body did not exceed 50%. The test showed a *good status* for the water body. - **Significant damage to GWDTEs due to transfer of pollutants from the GWB:** No GWDTE was found to be damaged. The test showed a *good status* for the water body; - **Meets the requirements of WFD Article 7(3) –** Drinking Water Protected Areas: there is no evidence of increased treatment due to changes in water quality. The test showed a *good status* for the water body

7: Upper Pannonian - Lower Pleistocene GWB from Backa and Banat / Vojvodina / Duna-Tisza köze déli rész	
	RS: *Chemical status*: *Description of methodology for assessing chemical status. [< 5000 characters]* **no data** **HU: *Chemical status*** 1. Exceedance of threshold values at monitoring points This test is performed for all GWBs and all chemical elements, for which standard or TV(s) have been determined, according to the following steps: - Selection of WFD monitoring points where the average concentration of the period 2004-2007 **exceeds the determined standard or the TV**. - Exclusion of monitoring sites where the higher concentration is due to **natural conditions** (although the TV is determined considering natural background levels, it is possible to detect an exceedance of natural origin). - Immediate classification of *poor status* for all those GWBs where a **drinking water production well or captured spring** shows exceedance of the drinking water standard to such an extent that changes in treatment technology are needed. The GWB should be classified as *poor* in the case of the danger of pollution to drinking water production wells. (See next point for potential impact on active abstractions.) - Evaluation of data on groundwater quality **inside the drinking water source protection area** (corresponding to a 50-year travel time according to Hungarian legislation). The evaluation is carried out in the framework of a general status assessment of the exploited drinking water resources, including all observation wells, and information on the sources of pollution. If the result of the evaluation shows pollution is able to cause exceedance of the drinking water standard at the abstraction point (involving a change in treatment technology), the GWB is classified as being of *poor status*. - Selection of monitoring wells **inside aquifers designated for future drinking water abstraction.** If the number of wells exceeding the drinking water standard is higher than a given value (determined as a function of the chemical element and the type of aquifer), the GWB is classified as being of *poor status* since it is likely that the exploitation would be difficult: not possible or would require treatment. The real impact of exceedances on ecosystems is analysed according to points 3.& 4. Where the NBL > DWS, the TV is taken into consideration. 2. Delineation of polluted areas This test is carried out for **shallow and karstic GWBs regarding nitrates and ammonium**. The delineation of the polluted area (where the concentration exceeds the threshold of the given GWB) is based on all information (not only WFD monitoring!). The GWB is classified as being of *poor status* if **20–30% of the total surface of the GWB is polluted.** For a given GWB, the criterion is selected according to its vulnerability i.e. for karstic aquifers and GWBs with a recharge character: 20 % and for other shallow GWBs: 30%. 3. Polluted surface water bodies This test is applied to those GWBs where **the physico-chemical or chemical test for a groundwater dependent surface water body shows *poor status*** and its cause is not evidently sewage water discharge or diffuse pollution from surface runoff. Cases where a polluted monitoring well can be found in the vicinity (closer than 5 km) of a groundwater dependent surface water body of *poor chemical status*

7: Upper Pannonian - Lower Pleistocene GWB from Backa and Banat / Vojvodina / Duna-Tisza köze déli rész

will also be analysed.

The evaluation is special to each case, taking into account (i) all available data on groundwater and surface water quality, (ii) information on pollution sources - the point or diffuse character of the pollution, (iii) estimated load from pollution sources, (iv) attenuation and dilution effects. If it is proved that the *chemical status* of the GWB is the cause of the observed pollution in the surface water body, the GWB is classified as being of *poor chemical status*.

The real impact of **polluted springs** on the quality of the supplied water course is also evaluated, at least up until the first water body (considering possible dilution). If the *physico-chemical or chemical status* of the surface water body is not good because of this pollution, the GWB is classified as being of *poor status*.

4. Damaged groundwater dependent wetland and terrestrial ecosystems

This test is applied for those GWBs where it is likely that the **documented damage of certain wetlands or GWDTEs** is due to polluted groundwater. The methodology for the evaluation of the real impact on the ecosystems is performed in a similar way as in the case of aquatic ecosystems (see point 3.). Monitoring of the status of wetlands and GWDTEs is not part of the WFD, so only scattered information on status is available.

RO: *Quantitative status*

The quantitative status assessment was carried out after the *chemical status* assessment. As the *chemical status* was assessed as *good* and no sustained downward trend in water levels was recorded across the water body (at any monitoring point), the water body was found to be in *good quantitative status*

RS: *Quantitative status*

Description of methodology for assessing quantitative status. [< 5000 characters]
no data

HU: *Quantitative status*

1. Water balance test

The water balance test was carried out in two steps:

- The GWB is in *poor status* if **continuous decreasing water levels can be observed in 20% of its area** due to groundwater abstraction. The test is based on data for the period 2001-2007. A declining trend of 5-15 cm/year (depending on aquifer type and depth) can be considered as significant. In mountainous regions, the rate of springs is also analysed: the significant trend depends on the average rate. Water abstractions causing the trend should be identified. (Trends caused by meteorological conditions or short declining trends caused by new water abstractions are not considered.) If the designated area is near the country border, **transboundary conciliation is needed**.

- The GWB is also in *poor status* if **groundwater abstraction exceeds the available groundwater resource**. This test is applied for subsurface catchment areas, thus shallow and deeper GWBs (except porous thermal GWBs) and corresponding dominantly recharge and discharge GWBs are merged into GWB-groups.

Recharge consists of three components: (i) recharge from precipitation, (ii) recharge from surface water, (iii) flow from adjacent GWB or GWB-group.

Recharge from precipitation is calculated by a spatially distributed (1x1 km grid) water balance model including precipitation (period 1991-2000), interception, surface runoff, evapotranspiration and storage in the unsaturated zone. Local recharge is ignored in dominantly discharge areas.

7: Upper Pannonian - Lower Pleistocene GWB from Backa and Banat / Vojvodina / Duna-Tisza köze déli rész	
	Recharge from surface water (as a long-term average) is rare in Hungary; it is determined on a case-by-case basis. Although GWBs are grouped according to subsurface catchments, estimation of the **flow from adjacent GWB-groups** is still important (i) in the case of transboundary water bodies, (ii) between different types of GWBs, (iii) where the boundary in the deeper section does not represent a real no-flux boundary. The estimation is based on the results of regional groundwater flow models or simple calculations using maps of water levels and transmissibility. **The water demand of groundwater dependent ecosystems** also has three components: (i) baseflow and spring rates supplying aquatic ecosystems in water courses, (ii) surplus of evaporation from shallow lakes and wetlands, (iii) surplus of transpiration from groundwater (supplying GWDTEs). **The water demand of aquatic ecosystem in rivers** is considered for small and medium water courses, where springs are frequent in the catchment or where the average groundwater level is above the bottom of the riverbed. Ecologically necessary low flow is estimated on the basis of required water depth, width and velocity. **The water demand of shallow lakes and wetlands** is estimated as the product of required water/wetland surface and surplus of evaporation. The required water surface is estimated considering landscape-ecology aspects. **The water demand of vegetation in the discharge area** is estimated as the product of the area (where the groundwater should contribute significantly to the water supply of the vegetation) and the amount of capillary flow needed for surviving periods without precipitation. The potential area is delineated using a GIS procedure (convenient combination of soil type and groundwater level). The required part is a percentage of the potential one (default is 30%). **The amount of abstracted water** is the sum of the amount abstracted by wells (average for the period 2004-2007) and the outflow related to other water uses (e.g. drainage canals, gravel pits, decreased surface water level). 2. Surface waters test This test is applied on those GWBs where, for a groundwater dependent water body, the hydromorphological classification shows a critical flow situation and its cause is not evidently the use of surface waters. The GWB is classified as *poor status* if: - **the remaining spring rate** in a low flow period (either due to abstraction by wells or the capture of springs) is smaller than the ecologically required flow; - **the decrease of the baseflow** caused by groundwater abstraction (in the whole surface water body catchment) exceeds half of the available surface water resource. 3. Groundwater dependent wetlands and terrestrial ecosystems test This test (status evaluation) is applied to those GWBs where the available information shows significant damage to wetlands and GWDTEs. - It is preferable if the real effect of groundwater status is determined on a case-by-case basis, including analysis of the **role of groundwater levels and flow conditions in damage to biota** and its causes (e.g. groundwater abstraction or other water use; climate change is not considered as a reason for *poor status*). - A detailed analysis may not be possible due to limited available data. In this case the GWB is of *poor status* if there are **direct and indirect groundwater abstractions whose recharge area overlaps by > 30% with the recharge area**

7: Upper Pannonian - Lower Pleistocene GWB from Backa and Banat / Vojvodina / Duna-Tisza köze déli rész	
	of the ecosystem.
In the case of poor *chemical status*	
Parameter(s) responsible for *poor status*	**RO / RS:** **HU: nitrates (HU_SP.2.16.1; HU_SP.1.15.1);**
Further information on TVs	**Procedure:** **HU:** TVs were established by following the guidelines given in Annex II Part A of the GWD. Substances considered for TVs are those listed in part B of GWD, as well as nitrates and pesticides. The TV of a given component for a water body was determined by taking into account: - the 90% percentile value (NBL) of available chemical data of non-polluted objects for a given water body (NBL was established for nitrates, ammonium, EC and sulphate); - the geology and hydrodynamics of the water body; - Quality Standards (EQSsurfacewater and DWS) of the given substance. In the case of water bodies where both EQSsurfacewater and DWS are applicable (e.g. for nitrates), TVs were established considering the more stringent criteria (i.e. EQSsurfacewater). EQSsurfacewater is applicable only in the case of karstic water bodies feeding surface waters, for example by springs. In the case of trichloroethylene and tetrachloroethylene, the DWS for pesticides took into account the GW-QS. For those GWBs where the NBL was higher than the DWS due to natural hydro-geological reasons, the TVs for ammonium, SO_4 and EC were defined by taking into account these higher values, as described in EU WFD CIS Guidance Document No. 18. To achieve EQ objectives in cold karstic GWBs with springs, TVs for nitrates were defined in conformity with EQSsurfacewater (25 mg/l). For other GWBs, nitrate TV equals DWS. In the case of sulphate and EC, TVs can be higher than the quality standard, considering the geology or hydrogeological regime of the water bodies. **Relationship:** (*Brief summary of the relationship between TVs and background levels for naturally occurring substances < 2000 characters)* **HU:** see the description above

Threshold values per GWB	GWB	Pollutant / indicator	TV (or range)[8]	Level at which the TV is established

[8] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

7: Upper Pannonian - Lower Pleistocene GWB from Backa and Banat / Vojvodina / Duna-Tisza köze déli rész				
			(mg/l or µg/l)	(national, RBD, GWB)
	HU_SP.1.15.1 **HU_SP.2.16.1**	**Nitrate**	**50 mg/l**	**GWB**

8: Podunajska Basin, Zitny Ostrov / Szigetköz, Hanság-Rábca	
Member State Code MS_Code	**SK1000300P, SK1000200P / HU_P.1.1.1, HU_P.1.1.2, HU_SP.1.1.1, HU_SP.1.1.2**
Description of important transboundary GWB	**SK: Delineation** Delineation of water bodies in Slovakia (SK) consists of the following steps: 1. Aquifers are vertically divided into three levels: Quaternary sediments, Pre-quaternary strata containing cold waters and thermal aquifers (with temperature >25°C or considered thermal by classification). 2. The pre-quaternary strata are further divided horizontally by the geological type of the aquifer: volcanic rocks, other fissured rocks, karstic rocks or porous sediments. 3. Further separation is the result of surface catchment area borders (river basin management units). **HU: Delineation** Re-delineation of GWBs in Hungary in 2007 was carried out as follows: 1. Separation of the main geological features (based on recent information): porous aquifers in the basins, karstic (Triassic) aquifers, mixed formations of the mountainous regions, aquifers other than karstic. 2. Vertical separation of shallow ground water (generally to the first aquitard below the surface or approx. the first 30 m below the water table where an aquitard is not present) in the case of porous aquifers in the basins and mountainous regions, other than Triassic karsts and fractured rocks. 3. Separation of thermal water bodies according to a 30 °C temperature. In the case of porous aquifers it is done vertically, while in karstic aquifers horizontally. There are no thermal aquifers in the mountainous regions other than karstic ones. 4. Further division is related to the subsurface catchment areas and vertical flow systems (in the case of porous aquifers) and to structural and hydrological units (in the case of karstic aquifers and mountainous regions). For transboundary water bodies, more detailed further characterisation was carried out. (N.B. Due to the numerous transboundary water bodies and the expected 20–30% at risk of failing *good status*, Hungary decided to apply this methodology of further characterisation to all water bodies). **Reasons for selection as an important transboundary GWB** The large alluvial deposit of the River Danube downstream of Bratislava lies in three countries: Slovakia (Podunajská lowland and the Žitný ostrov area), Hungary (Northern part of Kisalföld including Szigetköz) and Austria. The aquifer system was considered by Slovakia and Hungary as an important transboundary aquifer because of (i) its size, (ii) the unique amount of available groundwater resource and its important actual use for drinking water and other purposes, (iii) the GDTE of the floodplain, (iv) the majority of the area is protected (protection zones for drinking water abstraction sites, nitrate sensitive areas and nature conservation areas), (v) the existence of the Gabcikovo Hydropower System. The sections situated in Slovakia and Hungary will be described in the following. **General description** The Danube has played the decisive role in the formation of the aquifer system. The main aquifer is made up of 15-500 m thick Quaternary alluvia: a hydraulically connected mixture of sands and gravels, intercalated with numerous clay and silt lenses. The average hydraulic conductivity is in the range of 100–500 m/day providing extremely high transmissivity, especially in the centre of the basin. Here, the bottom of the underlying Pannonian deposits is at a depth of 3500 m. The aquifer is divided into several GWBs in both countries. Despite the differences in

8: Podunajska Basin, Zitny Ostrov / Szigetköz, Hanság-Rábca	
	the delineation method of the two countries, it was possible to select the relevant water bodies from the transboundary point of view. Of the four water bodies containing cold water in Hungary, two of them contain Quaternary strata from the surface to a depth of 30 m, i.e. shallow GWBs (GWB HU_SP.1.1.1, GWB HU_SP.1.1.2). Beneath these are two porous GWBs (GWB HU_P.1.1.1, GWB HU_P.1.1.2), which beside the Quaternary strata include a part of the Upper-Pannonian deposits as well, to a depth of 400–500 m corresponding to the surface separating cold and thermal waters (1152 km²). Two Quaternary water bodies in Slovakia (2193 km²) have been selected, making a total of 3345 km² in both countries (see the summary table above). The aquifer can be considered as *unconfined*, despite a considerable area where the water level is in a semi-permeable covering layer. Due to the high transmissivity of the aquifer, the groundwater regime and quality mainly depend on surface water. The flow system and type of covering layer provide surplus recharge conditions in the majority of the area, but the main source of groundwater recharge is the Danube. Before the construction of the hydropower system (1992), the riverbed was the infiltration surface, and the Danube had been the hydraulic boundary between the countries as well. (In the upper parts of the Danube stream between Devín and Hrušov, since around the1970's, the river bed started to drain groundwater.) In the actual situation, the artificial recharge system is the main source for the vicinity of the Danube, but a remaining part of the aquifers in Hungarian territory is recharged by the Čunovo reservoir. Where the reservoir is near the main channel (between Rajka and Dunakiliti), considerable transboundary groundwater flow appears under the Danube. The Danube's river bed downstream of the reservoir – due to the derived flow and the consequently decreased average water level - drains the neighbouring groundwater, causing a considerable drop of groundwater level in the immediate vicinity of the river bed. Both the quantity and the quality of the recharge from the reservoir is highly dependent on the continuously increasing deposits in the reservoir and the developing physico-chemical processes. Deposits in the reservoir are extracted. Signs of long-term changes in quantity and quality of recharge caused by continuously increasing deposits in the reservoir have not yet been observed in the Slovak part of the aquifer. The depth of the groundwater table varies from between 2 and 5 m. The wetting conditions of the covering layer have substantially changed along the Danube and in lower Szigetköz, where prior to the derivation of the Danube, the groundwater fluctuated in the covering layer and the existing artificial recharge system did not sufficiently compensate the former influence of the Danube. In the Slovak territory, annual artificial flooding of the river branch system in the high water periods seems to be able to efficiently supply groundwater as well as soil moisture resources.
Description of status assessment methodology	**SK: *Chemical status*** To assess *chemical status*, the proposed methodology stems from the feasibility of the input information, conceptual model and the hydrogeochemical and hydrogeological interpretation of conditions in the Slovak Republic. Article 3.2 of the Groundwater Directive offers the possibility to establish TVs at: the national level; the river basin district level; the level of the area of the international river basin district falling within the territory of a Member State; or at the level of a GWB or group of GWBs. In the Slovak Republic, the NBL and TVs were established at the level of the GWB. Determination of natural background levels: The input data consists of the database from the Geochemical Atlas of the Slovak Republic (spatial factor, 16 359 samples) and the results of national monitoring of groundwater quality (time factor, 16 475 samples) in Slovakia. The next step was to eliminate each sample with anthropogenic impacts (pre-selection method with half the DWS for each compound). Sample elimination was also done in cases where just one

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	compound failed to satisfy this principle. For determination of the NBL, a statistical method was used (NBL=median+2*median absolute deviation). For the treatment of *less than LOQ* (limit of quantification), measurements were applied according to the following system: simple substitution (LOQ*0.5, when <40% values are below LOQ), 40-60% - Kaplan-Meier´s analysis was used and over 60% NBL=LOQ). NBL were estimated for: NO_3, As, Cd, Pb, Hg, NH_4, Cl, SO_4, Na, K, Ca, Mg, Sr, PO_4, HCO_3, Fe, Mn, Cr, Cu, Se and Al. For synthetic organic compounds (not originating in a natural way) the NBL was “zero concentration” and this is practically the value of the LOQ of a single organic compound. <u>Threshold values:</u> The TV is a half the interval between the determined NBL and the reference (drinking water standard). As the TV can be below the geogenic concentration in groundwater, for example in the case of heavy metals, the TV will be assessed on the basis of the natural background level (TV = NBL). <u>*Chemical status*</u>: For *chemical status* assessment, general assessment of the *chemical status* of the GWB as a whole was applied. Input data results from the quality monitoring network from 2007 were used. Criteria for assessing the groundwater *chemical status* for this test were drinking water standards and TVs. The annual arithmetic mean concentration of the relevant pollutant at each monitoring point was the basis for aggregation on the level of a GWB. In the case of non exceedances, the GWB is recommended to be of good *chemical status* for the relevant parameters. The next step was to calculate the extent of exceedance of mean values by using the Kriging method - in the case of quaternary GWB (porous permeability and over five monitoring points). An acceptable extent of exceedance would not exceed 20% of the total GWB. In the case of pre-quaternary GWBs with fissure, karst, karst-fissure permeability, annual average concentrations with 20% confidence intervals were used. The final assessment of the *chemical status* of the GWB and its verification was performed using a GIS technique via comparison with maps of land use, hydrogeological and hydrogeochemical conditions in the GWB. **HU: *Chemical status*** <u>1. Exceedance of TVs at monitoring points</u> This test is performed for all GWBs and all chemical elements for which standards or TV(s) have been determined, in the following steps: - Selection of WFD monitoring points where the average concentration for the period 2004-2007 **exceeds the determined standard or the TV**. - Exclusion of monitoring sites where the higher concentration is due to **natural conditions** (although the TV is determined considering the natural background level, it is possible to detect an exceedance of natural origin). - Classification of *poor status* for all those GWBs where a **drinking water production well or captured spring** shows exceedance of the drinking water standard to such an extent that changes in treatment technology are needed. The GWB should be classified as *poor* in the case of danger of pollution to drinking water production wells. (See next point for potential impact on active abstractions.) - Evaluation of data on groundwater quality **inside the drinking water source protection area** (corresponding to a 50-year travel time according to Hungarian legislation). The evaluation is carried out in the framework of a general status assessment of exploited drinking water resources, including all observation wells and information on sources of pollution. If the result of evaluation shows that pollution is able to cause exceedance of the drinking water standard at the abstraction point involving a change in treatment technology, the GWB is classified as being in *poor status*.

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- Selection of monitoring wells **inside aquifers designated for future drinking water abstraction.** If the number of wells exceeding the drinking water standard is higher than a given value (determined as a function of the chemical element and type of aquifer), the GWB is classified as *poor status* since it is likely that the exploitation would be difficult: not possible or would need treatment.

- The real impact of exceedances on ecosystems is analysed according to points 3. & 4.

Where the NBL > DWS the TV is taken into consideration.

2. Delineation of polluted areas

This test is carried out for **shallow and karstic GWBs regarding nitrates and ammonium**. The delineation of the polluted area (where the concentration exceeds the threshold of the given GWB) is based on all information (not only WFD monitoring!).

The GWB is classified as having *poor status* if **20–30% of the total surface of the GWB is polluted.** For a given GWB, the criterion is selected according to its vulnerability i.e. for karstic aquifers and for GWBs of recharge character: 20 %; for other shallow GWBs: 30%.

3. Polluted surface water bodies

This test is applied in those GWBs where **the physico-chemical or the chemical test shows *poor status* for a groundwater dependent surface water body** and its reason is not evidently sewage water discharges or diffuse pollution from surface runoff. Cases where a polluted monitoring well can be found in the vicinity (closer than 5 km) of a groundwater dependent surface water body of *poor chemical status* will also be analysed

The evaluation is special to each case, taking into account (i) all available data on groundwater and surface water quality, (ii) information on pollution sources - the point or diffuse character of the pollution, (iii) estimated load from pollution sources, (iv) attenuation and dilution effects. If it is proved that the *chemical status* of the GWB is the cause of the observed pollution in the surface water body, the GWB is classified as having *poor chemical status*.

The real impact of **polluted springs** on the quality of the relevant water course is also evaluated, at least up until the first water body (considering possible dilution). If the *physico-chemical or chemical status* of the surface water body is *not good* because of this pollution, the GWB is classified as having *poor status*.

4. Damaged groundwater dependent wetland and terrestrial ecosystems

This test is applied to those GWBs where it is likely that the **documented damage to certain wetlands or GWDTE** is due to polluted groundwater. The methodology of the evaluation for the real impact on ecosystems is performed in a similar way to the case of aquatic ecosystems (see point 3.). Monitoring of the status of wetlands and GWDTEs is not part of the WFD, so only scattered information on status is available.

SK: *Quantitative status*

To determine the overall quantitative status for GWBs, four tests were applied:

1. Water balance test: Long-term annual abstraction from the GWB must not exceed 80% of available groundwater resources. Quantification of available groundwater resources was based on national quantification and categorization of exploitable groundwater amounts in individual GWBs: 8 categories with different accuracies for determined amounts varying from 100% (water balance evaluation) to 30% (less then 1 year of groundwater monitoring data); available groundwater resources for

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	GWB is the sum of groundwater amount in the individual category multiplied by the different significance from 1 to 0.3). 2. Groundwater level and discharge test: Identifying the presence of sustained long-term declines in groundwater levels or groundwater discharge caused by long-term groundwater abstraction using long-term groundwater monitoring data from the national groundwater monitoring network and the Mann-Kendall test (95% and 99% probability, z varying from absolute min to -3.0). 3. Surface water flow test: Evaluation of surface water discharge in surface water balance profiles (inside of surface water bodies failing their WFD environmental flow objectives). The sum of the long-term average groundwater abstraction in the balance area above the surface water balance profile must not exceed 50% from $Q_{180\ (2007)}$ or 100% from Q_{355} (whole monitoring period). 4. Groundwater dependent terrestrial ecosystems test: Expert judgment on GWDTEs and the influence of groundwater abstraction - groundwater pressures (and subsequently indication of flow or groundwater level changes due to groundwater abstraction) on GWDTEs. The assessments were made on the basis of selected ecological criteria established according to the common depended terrestrial ecosystems. **HU: *Quantitative status*** 1. Water balance test The water balance test is carried out in two steps: - The GWB is in *poor status* if **in 20% of its area, continuous decreasing water levels** can be observed due to groundwater abstraction. The test is based on data for the period 2001-2007. A declining trend of 5-15 cm/year (depending on aquifer type and depth) can be considered as significant. In mountainous regions, the rate of springs is also analysed; the significant trend depends on the average rate. Water abstractions causing the trend should be identified. (Trends caused by meteorological conditions or short declining trends caused by new water abstractions are not considered.). If the designated area is near the country border, **transboundary conciliation is needed**. - The GWB is also in *poor status* if the **groundwater abstraction exceeds the available groundwater resource**. This test is applied to subsurface catchment areas, thus shallow and deeper GWBs (except porous thermal GWBs) and corresponding dominantly recharge and discharge GWBs are merged in GWB-groups. **Recharge** consists of three components: (i) recharge from precipitation, (ii) recharge from surface water, (iii) flow from adjacent GWB or GWB-group. **Recharge from precipitation** is calculated by a spatially distributed (1x1 km grid) water balance model including precipitation (period 1991-2000), interception, surface runoff, evapotranspiration and storage in the unsaturated zone. Local recharge is ignored in dominantly discharge areas. **Recharge from surface water** (as a long-term average) is rare in Hungary, it is determined on a case-by-case basis. Although GWBs are grouped according to subsurface catchments, estimation of **flow from adjacent GWB-group** is still important (i) in the case of transboundary water bodies, (ii) between different types of GWBs, (iii) where the boundary in the deeper part does not represent a real no-flux boundary. The estimation is based on the results of regional groundwater flow models or simple calculations using maps of water levels and transmissibility. **The water demand of groundwater dependent ecosystems** also has three components: (i) baseflow and spring rates supplying aquatic ecosystems in water

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	courses, (ii) a surplus of evaporation in shallow lakes and wetlands, (iii) a surplus of transpiration from groundwater (supplying GWDTE). **The water demand of aquatic ecosystem in rivers** is considered for small and medium water courses, where springs are frequent in the catchment or where the average groundwater level is above the bottom of the riverbed. Ecologically necessary low flow is estimated on the basis of required water depth, width and velocity. **The water demand of shallow lakes and wetlands** is estimated as the product of required water/wetland surface and the surplus of evaporation. The required water surface is estimated considering landscape-ecology aspects. **The water demand of vegetation in the discharge area** is estimated as the product of the area (where the groundwater should contribute significantly to the water supply of the vegetation) and the amount of capillary flow needed for surviving periods without precipitation. The potential area is delineated using a GIS procedure (convenient combination of soil type and groundwater level). The required part is a percentage of the potential one (default is 30%). **The amount of abstracted water** is the sum of the amount abstracted by wells (average for the period 2004-2007) and the outflow related to other water uses (e.g. drainage canals, gravel pits, decreased surface water level). 2. Surface waters test This test is applied for those GWBs where the hydromorphological classification shows a critical flow situation for a groundwater dependent water body and its reason is not evidently the use of surface waters. The GWB is classified as *poor status* if: - **the remaining spring rate** in low flow period (either due to abstraction by wells or the capture of springs) is smaller than the ecologically required flow; - **the decrease in baseflow** caused by groundwater abstraction (in the whole catchment of the surface water body) exceeds half of the available surface water resource. 3. Groundwater dependent wetlands and terrestrial ecosystems test This test (status evaluation) is applied to those GWBs where the available information shows significant damage to wetlands and GWDTEs. - It is preferred, that the real effect on groundwater status is determined on a case-by-case approach, including the analysis of the **role of groundwater levels and flow conditions in damage to biota** and the reason for it (e.g. groundwater abstraction or other water use; climate change is not considered as a reason for *poor status*). - A detailed analysis may not be possible because of limited available data. In this case, the GWB is of *poor status* if there are **direct and indirect groundwater abstractions whose recharge area overlaps by more than 30% with the recharge area of the ecosystem**.
In the case of *poor chemical status*	
Parameter(s) responsible for *poor status*	**SK:** **HU: nitrates (HU_SP.1.1.2)**

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Further information on TVs	**SK: Procedure and relationship to background levels** To establish TVs as criteria, usage criteria were considered (drinking water standards). TVs were set by comparing natural background levels to the criteria value (CV). When NBLs and CVs are compared, two situations may arise: - NBL is below the CV. In this case the TV was established above the NBL. - NBL is higher than the CV. In this case, the TV should be equal to the NBL. The TV is half of the interval between the determined NBL and the reference (drinking water standards). As the TV can be below geogenic concentrations in groundwater, for example in the case of heavy metals, the TV will be assessed on the basis of the natural background level (TV = NBL). **HU: Procedure and relationship to background levels** TVs were established by following the guidelines given in Annex II Part A of the GWD. Substances considered for TVs were those listed in part B of the GWD, as well as nitrates and pesticides. The TV of a given component for a water body was determined by taking into account: - the 90% percentile value (NBL) of available chemical data on non-polluted objects for a given water body (NBL was established for nitrates, ammonium, EC and sulphate); - the geology and hydrodynamics of the water body; - Quality Standards (EQSsurfacewater and DWS) of the given substance. In the case of water bodies, where both EQSsurfacewater and DWS are applicable (e.g. for nitrates), TVs were established considering the more stringent criteria (i.e. EQSsurfacewater). EQSsurfacewater is applicable only in the case of karstic water bodies feeding surface waters, for example by springs. In the case of trichloroethylene and tetrachloroethylene, the DWS for pesticides took into account the GW-QS. For those GWBs where the NBL was higher than the DWS due to natural hydro-geological reasons, the TVs for ammonium, SO_4 and EC were defined by taking into account these higher values, as described in EU WFD CIS Guidance Document No. 18. To achieve EQ objectives in cold karstic GWBs with springs, TVs for nitrates were defined to conform with EQSsurfacewater (25 mg/l). For other GWBs, nitrate TV equals DWS. In the case of sulphate and EC, TVs can be higher than the quality standard, considering the geology or hydrogeological regime of the water bodies.			
TVs per GWB	**GWB**	**Pollutant / indicator**	**TV (or range)** [9] (mg/l or µg/l)	**Level at which the TV is established** (national, RBD, GWB)
	-	**NO_3**	**50**	**national**

[9] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

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	SK 1000300P	Na	104.45	GWB
	SK 1000300P	F	0.85	GWB
	SK 1000300P	Cl	62.30	GWB
	SK 1000300P	SO_4	157.60	GWB
	SK 1000300P	NH_4	0.26	GWB
	SK 1000300P	Cr	0.026	GWB
	SK 1000300P	Cu	0.502	GWB
	SK 1000300P	As	0.006	GWB
	SK 1000300P	Cd	0.002	GWB
	SK 1000300P	Se	0.006	GWB
	SK 1000300P	Pb	0.007	GWB
	SK 1000300P	Hg	0.00075	GWB
	-	atrazine	0.05 µg/l	national
	-	simazine	0.05 µg/l	national
	-	tetrachloroethylene	5 µg/l	national
	-	trichloroethylene	5 µg/l	national
	SK1000200P	Na	105.75	GWB
	SK1000200P	F	0.755	GWB
	SK1000200P	Cl	60.75	GWB
	SK1000200P	SO_4	148.90	GWB
	SK1000200P	NH_4	0.255	GWB
	SK1000200P	Cr	0.0255	GWB
	SK1000200P	Cu	0.501	GWB
	SK1000200P	As	0.006	GWB
	SK1000200P	Cd	0.002	GWB
	SK1000200P	Se	0.0055	GWB
	SK1000200P	Pb	0.0065	GWB
	SK1000200P	Hg	0.0007	GWB
	HU_SP.1.1.1	Nitrate	50 mg/l	GWB

9: Bodrog	
Member State Code MS_Code	**SK1001500P / HU_P.2.5.2, HU_SP.2.5.2**
Description of important transboundary GWB	**SK / HU: Delineation** See GWB no. 8. for details. **SK / HU: Reasons for selection as an important transboundary GWB** At the common eastern border of Slovakia and Hungary, the alluvial aquifer system corresponding to the Bodrog River catchment area in Slovakia and the Tisza-valley between Záhony and Tokaj (confluence with the Bodrog River) has been selected as important due to: (i) its significance in meeting the water demand of the region, (ii) the contamination threat of groundwater in the vicinity of state border between Slovakia and Hungary. A part of the water aquifer system is located in Ukraine. **SK / HU: General description** The aquifer is the alluvial deposit of the Bodrog River and its tributaries. The Tisza divides the lowland area in Hungary into Bodrogköz (northern part) and Rétköz (southern part). Holocene silty-clayey layers cover the surface, along with peaty areas. The Quaternary aquifer is around 60 m thick on the Slovakian side and its thickness gradually increases in Hungary towards the south (50-200 m). The fluvial sediments (from sandy gravels in the north to sands in the south with intercalated silt and clay lenses) can be characterised by 5–30 m/d hydraulic conductivity. In the Slovakian part, only the Quaternary aquifer system is part of the transboundary water body-complex, while in Hungary the upper part of the Pannonian formation is also attached (depth is approx. 500 m, corresponding to a water temperature of < 30^{o}C). The horizontal extension of the water body on the Slovak side is 1466 km^2, while in Hungary the two water bodies cover an area of 1300 km^2. The main recharge area is in Slovakian territory. The rain waters infiltrate at the marginal mountains and penetrate into permeable deep aquifers. In the upstream part of the catchment area, surface waters also contribute to the recharge. On the Slovakian side, the water bodies are mainly *unconfined* or in some places partly *confined*. In Hungary both water bodies are in a discharge position and the main aquifers can be considered as *confined*. Here the groundwater level lies close to the surface (between 2 and 4 m below). Where it is around 2 m below the surface, the groundwater can considerably contribute to the transpiration needs vegetation, which are adapted to these conditions, and consequently are very sensitive to the status of the groundwater. The surplus of evapotranspiration and the artificial drainage system (canals) collect the upward groundwater flow. From the south, the sandy hills of Nyírség contribute to the discharged groundwater as well, but the boundary of the waters of different origin is not known exactly (that is why both discharge areas in Hungary have been attached to the transboundary aquifer). The general direction of the groundwater flow is N-S (NE-SW) to the north of the Tisza River, SE-NW in the Rétköz and uncertain below the Tisza. The regional hydrogeochemical picture follows the flow system. Close to the river bed sections, recharging groundwater quality is almost the same as in surface streams. Generally low total dissolved solids, Ca-Mg-HCO_3 type waters occur in the recharge areas, Na-HCO_3 waters dominate in the middle and western part of Rétköz, and a mixture of these two types in the western part of the Bodrogköz region. At the centre of Bodrogköz, elevated Cl content indicates strong upward migration from the deeper zones. The major water quality problem of natural origin in the Bodrogköz Quaternary aquifer complex is the high iron and manganese content (reducing conditions). In the Rétköz elevated arsenic levels occur (10-30 µ/l).

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	The estimated amount of available groundwater resources is almost 50 Mm^3/year in the Slovakian part. From that 10–15 Mm^3/year should be maintained as lateral flow towards the Hungarian part. It should be mentioned that the southern part of the Hungarian discharge area receives water from the southern recharge areas as well, but no local recharge can be considered available for abstraction in Bodrogköz and Rétköz. **SK / HU: Major pressures and impacts** Groundwater is mainly used for drinking water supply, but partially for industrial and agricultural purposes (including irrigation) as well. The use ratio is quite low in Slovakia: only 10%. The development is limited by the occurrence of technologically inappropriate substances in the water (Mn and Fe) and sometimes also by groundwater pollution from surface waters, industry, agriculture and transport infrastructure (Strážske, Hencovce, Michalovce, Čierna nad Tisou). In Hungary, the available groundwater resources of the two water bodies are quite different. In the northern part, which is closely related to the Slovakian part, the water demand of groundwater dependent aquatic and terrestrial ecosystems can be estimated at 5–8 Mm^3/d, thus the available groundwater resource is in the range of 5–7 Mm^3/year. The abstracted amount of groundwater is 3 Mm^3/year, so the use ratio is around 50 %, but the majority is concentrated in the Ronyva/Roňava river valley. In the southern part the lateral flow from the recharge zone of the Nyírség (approx. 30 Mm^3/year) provides sufficient water for the minimum water demand of ecosystems (8–12 Mm^3/year) and for the 8 Mm^3/year required for abstraction. Groundwater quality in the Slovakian part (mainly alluvial sediments along the Laborec) is strongly influenced by potential risks from diffuse (mainly agricultural activities) and point sources (chemical industry Chemko Strážske etc.). In Hungary, 10 significant point sources of pollution have been registered. The shallow groundwater usually has high nitrate levels under the settlements, because of inappropriate handling of manure and the total or partial absence of sewerage systems. Agriculture contributes to the pollution as well, through the use of chemicals. The estimated amount of surplus nitrogen is 15 kgN/ha/year originated from the use of 88 kgN/ha/year fertilizer and 13 kgN/year manure. The groundwater quality in Slovakia is monitored at 21 sampling sites; groundwater samples are taken from the first aquifer once a year (in the autumn). In agricultural areas, nitrogen substances and micropollutants have been found exceeding limit values. Hungarian water quality monitoring concentrates on the surrounding waterworks. The quality of the Ronyva/Roňava aquifer close to the Sátoraljaújhely waterworks shows increasing tendency for nitrate pollution: the average concentration is around 30 mg/l, and in one production well the nitrate-concentration exceeded the limit value of 50 mg/l. Information on pollution in arable lands is practically missing in this region. The high vulnerability of groundwater and the expected future development in water demand requires a high level of protection in the Slovakian part of the region, mainly oriented on measures focused on industrial pollution sources. In Hungary the protection zones around waterworks (5%) need special attention.
Description of status assessment methodology	***SK: Chemical status*** To assess *chemical status*, the proposed methodology stems from the feasibility of the input information, conceptual model and the hydrogeochemical and hydrogeological interpretation of conditions in the Slovak Republic. Article 3.2 of the Groundwater Directive offers the possibility of establishing TVs at the national level, at the river basin district level, the level of the area of the international river basin district falling within the territory of a Member State; or at the level of a GWB or group of GWBs. In the Slovak Republic, the NBL and TVs were established at the level of the GWB.

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	Determination of natural background levels The input data consists of the database from the Geochemical Atlas of the Slovak Republic (spatial factor, 16 359 samples) and the results of national monitoring of groundwater quality (time factor, 16 475 samples) in Slovakia. The next step was the elimination of each sample with anthropogenic impacts (pre-selection method: half of the DWS for each compound). The sample elimination was also done in the case where only one compound didn't satisfy this principle. For determination of the NBL, statistical methods were used (NBL=median+2*median absolute deviation). For the treatment of *less than LOQ,* measurements were applied according to the following system: simple substitution (LOQ*0.5, when <40% values are below LOQ), 40-60% - Kaplan-Meier´s analysis was used and over 60% NBL=LOQ). NBL were estimated for: NO_3, As, Cd, Pb, Hg, NH_4, Cl, SO_4, Na, K, Ca, Mg, Sr, PO_4, HCO_3, Fe, Mn, Cr, Cu, Se and Al. For synthetic organic compounds (not originating in a natural way) the NBL is *zero concentration* and this is practically the value of the LOQ of a single organic compound. TVs The TV is half the interval between the determined NBL and the reference (drinking water standards). As the TV can be below the geogenic concentrations in groundwater, for example in the case of heavy metals, the TV will be assessed on the basis of the natural background level (TV = NBL). *Chemical status* For *chemical status* assessment, a general assessment of the *chemical status* of the GWB as a whole was applied. The input data results from the quality monitoring network from 2007 were used. The criteria for assessing groundwater *chemical status* for this test were drinking water standards and TVs. The annual arithmetic mean concentration of the relevant pollutant at each monitoring points was the basis for aggregation at the level of a GWB. In the case of non exceedances, the GWB is recommended to be of *good chemical status* for the relevant parameters. The next step was to calculate the extent of exceedance of mean values by using the kriging method in the case of quaternary GWB (porous permeability and over 5 monitoring points). An acceptable extent of exceedance would not exceed 20% of the total GWB. In the case of pre-quaternary GWBs with fissure, karst or karst-fissure permeability, annual average concentrations with 20% confidence intervals were used. The final assessment of the *chemical status* of the GWB and its verification was performed using a GIS technique via comparison with maps of land use, hydrogeological and hydrogeochemical conditions in the GWB. ***HU: Chemical status*** 1. Exceedance of TVs at monitoring points This test is performed for all GWBs and all chemical elements, for which standards or TV(s) have been determined, using the following steps. - Selection of WFD monitoring points, where the average concentration for the period 2004-2007 **exceeds the determined standard or the TV**. - Exclusion of monitoring sites where the higher concentration is due to **natural conditions** (although the TV is determined considering natural background level, it is possible to detect an exceedance of natural origin). - Classification of *poor status* for all those GWBs where a **drinking water production well or captured spring** shows exceedance of the drinking water standard to such an extent that changes in treatment technology are needed. The GWB should be classified as *poor* in the case of danger of pollution to drinking water production wells. (See next point for potential impact on active abstractions.) - Evaluation of data on groundwater quality **inside the drinking water source**

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	protection area (corresponding to a 50-year travel time, according to Hungarian legislation). The evaluation is carried out in the framework of the general status assessment for exploited drinking water resources, including all observation wells and information on sources of pollution. If the result of the evaluation shows that pollution is able to cause exceedance of the drinking water standards at the abstraction point, involving a change in treatment technology, the GWB is classified as having *poor status*. - Selection of monitoring wells **inside aquifers designated for future drinking water abstraction**. If the number of wells exceeding the drinking water standard is higher than a given value (determined as a function of the chemical element and type of aquifer), the GWB is classified as being of *poor status* since it is likely that the exploitation would be difficult: not possible or would need treatment. - The real impact of exceedances on ecosystems is analysed according to points 3. & 4. Where the NBL > DWS the TV is taken into consideration. <u>2. Delineation of polluted areas</u> This test is carried out for **shallow and karstic GWBs regarding nitrates and ammonium**. The delineation of the polluted area (where the concentration exceeds the threshold of the given GWB) is based on all information (not only WFD monitoring!). The GWB is classified as having *poor status* if **20–30% of the total surface of the GWB is polluted.** For a given GWB, the criterion is selected according to its vulnerability i.e. for karstic aquifers and GWB of recharge character: 20%: for other shallow GWBs: 30%. <u>3. Polluted surface water bodies</u> This test is applied in those GWBs where **the physico-chemical or the chemical test shows *poor status* for a groundwater dependent surface water body** and its reason is not evidently sewage water discharges or diffuse pollution from surface runoff. Cases where a polluted monitoring well can be found in the vicinity (closer than 5 km) of a groundwater dependent surface water body of *poor chemical status* will also be analysed The evaluation is special to each case, taking into account (i) all available data on groundwater and surface water quality, (ii) information on pollution sources - the point or diffuse character of the pollution, (iii) estimated load from pollution sources, (iv) attenuation and dilution effects. If it is proved that the *chemical status* of the GWB is the cause of the observed pollution in the surface water body, the GWB is classified as having *poor chemical status*. The real impact of **polluted springs** on the quality of the relevant water course is also evaluated, at least up until the first water body (considering possible dilution). If the *physico-chemical or chemical status* of the surface water body is *not good* because of this pollution, the GWB is classified as having *poor status*. <u>4. Damaged groundwater dependent wetland and terrestrial ecosystems</u> This test is applied for those GWBs where it is likely that the **documented damage of certain wetlands or GWDTEs** is due to polluted groundwater. The methodology of the evaluation of the real impact on ecosystems is performed in a similar way to the case of aquatic ecosystems (see point 3.). Monitoring of the status of wetlands and GWDTEs is not part of the WFD, so only scattered information on status is available. **SK: *Quantitative status***

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	To determine the overall quantitative status for the GWB, four tests were applied: 1. Water balance test – Long-term annual abstraction from the GWB must not exceed 80% of the available groundwater resources. Quantification of available groundwater resources was based on the national quantification and categorization of exploitable groundwater amounts in individual GWBs (8 categories with different levels of accuracy for determined amounts varying from 100% (water balance evaluation) to 30% (less then 1 year groundwater monitoring data); available groundwater resources for GWBs is the sum of groundwater amount in the individual category multiplied by different significances from 1 to 0.3). 2. Groundwater level and discharge test: Identifying the presence of sustained long-term declines in groundwater levels or groundwater discharge caused by long-term groundwater abstraction using long-term groundwater monitoring data from national groundwater monitoring network and the Mann-Kendall test (95% and 99% probability, z varying from absolute min to -3.0). 3. Surface water flow test: Evaluation of surface water discharge in surface water balance profiles (inside of surface water bodies failing their WFD environmental flow objectives). Sum of the long-term average groundwater abstraction in the balance area above the surface water balance profile must not exceed 50% from $Q_{180\ (2007)}$ or 100% fromQ_{355} (whole monitoring period). 4. Groundwater dependent terrestrial ecosystems test: Expert judgment of GWDTEs and the influence of groundwater abstraction - groundwater pressures (and subsequently indication of flow or groundwater level changes due to groundwater abstraction) on GWDTEs. The assessments were made on the basis of selected ecological criteria established according to the common depended terrestrial ecosystems **HU: *Quantitative status*** <u>1. Water balance test</u> The water balance test is carried out in two steps: - The GWB is in *poor status* if **in 20% of its area, continuous decreasing water levels** can be observed due to groundwater abstraction. The test is based on data for the period 2001-2007. A declining trend of 5-15 cm/year (depending on aquifer type and depth) can be considered as significant. In mountainous region, the rate of springs is also analysed, the significant trend depends on the average rate. Water abstractions causing the trend should be identified. (Trends caused by meteorological conditions or a short declining trend caused by new water abstractions are not considered.). If the designated area is near the country border, **transboundary conciliation is needed**. - The GWB is also in *poor status*, if **groundwater abstraction exceeds the available groundwater resource**. This test is applied for subsurface catchment areas, thus shallow and deeper GWBs (except porous thermal GWB) and corresponding dominantly recharge and discharge GWBs are merged in GWB-groups. **Recharge** consists of three components: (i) recharge from precipitation, (ii) recharge from surface water, (iii) flow from adjacent GWB or GWB-group. **Recharge from precipitation** is calculated by a spatially distributed (1x1 km grid) water balance model including precipitation (period 1991-2000), interception, surface runoff, evapotranspiration and storage in the unsaturated zone. Local recharge is ignored in dominantly discharging areas. **Recharge from surface water** (as a long-term average) is rare in Hungary, it is determined on a case-by-case basis. Although GWBs are grouped according to subsurface catchments, estimation of

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	flow from adjacent GWB-group is still important (i) in the case of transboundary water bodies, (ii) between different types of GWBs, (iii) where the boundary in the deeper part does not represent a real no-flux boundary. The estimation is based on the results of regional groundwater flow models or simple calculations using maps of water levels and transmissibility. **The water demand of the groundwater dependent ecosystems** also has three components: (i) baseflow and spring rates supplying aquatic ecosystems in water courses, (ii) surplus of evaporation in shallow lakes and wetlands, (iii) surplus of transpiration from groundwater (supplying GWDTEs). **The water demand of aquatic ecosystems in rivers** is considered for small and medium water courses, where springs are frequent in the catchment or where the average groundwater level is above the bottom of the riverbed. Ecologically necessary low flow is estimated on the basis of required water depth, width and velocity. **The water demand of shallow lakes and wetlands** is estimated as the product of required water/wetland surface and surplus of evaporation. The required water surface is estimated considering landscape-ecology aspects. **The water demand of vegetation in the discharge area** is estimated as the product of the area (where the groundwater should contribute significantly to the water supply of the vegetation) and the amount of capillary flow needed for surviving periods without precipitation. The potential area is delineated using a GIS procedure (convenient combination of soil type and groundwater level). The required part is a percentage of the potential one (default is 30%). **The amount of abstracted water** is the sum of the amount abstracted by wells (average for the period 2004-2007) and the outflow related to other water uses (e.g. drainage canals, gravel pits, decreased surface water level). 2 Surface waters test This test is applied to those GWBs where the hydromorphological classification shows a critical flow situation for a groundwater dependent water body and its reason is not evidently the use of surface waters. The GWB is classified as being of *poor status* if: - **the remaining spring rate** in low flow period (either due to abstraction by wells or the capture of springs) is smaller than the ecologically required flow; - **the decrease of the baseflow** caused by groundwater abstraction (in the whole catchment of the surface water body) exceeds half of the available surface water resource. 3. Groundwater dependent wetlands and terrestrial ecosystems test This test (status evaluation) is to be applied for those GWBs where the available information shows significant damage to wetlands and GWDTEs. - It is preferred, that the real effect on groundwater status is determined on a case-by-case basis, including analysis of the **role of groundwater levels and flow conditions in damage to biota** and the reason for it (e.g. groundwater abstraction or other water use; climate change is not considered as a reason for *poor status*). - Maybe a detailed analysis is not possible because of limited available data. In that case the GWB is in *poor status* if there are **direct and indirect groundwater abstractions whose recharge area overlaps in more than 30% with the recharge area of the ecosystem**.
In the case of poor *chemical status*	

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Parameter(s) responsible for poor status	SK: HU:			
Further information on TVs	**SK: Procedure and relationship to background levels** For establishing TVs as criteria, usage criteria were considered (drinking water standards). TVs were set by comparing the natural background level to the criteria value (CV). When NBLs and CVs are compared, two situations may arise: - NBL is below the CV. In this case, the TV were established above the NBL. - NBL is higher than the CV. In this case, the TV should equal the NBL. The TV is half of the interval between the determined NBL and the reference (drinking water standards). As the TV can be below the geogenic concentrations in groundwater, for example in the case of heavy metals, the TV will be assessed on the basis of the natural background level (TV = NBL). **HU: Procedure and relationship to background levels** TVs were established by following the guidelines given in Annex II Part A of the GWD. Substances considered for TVs are those listed in part B of GWD, as well as nitrates and pesticides. The TV of a given component for a water body was determined by taking into account: - the 90% percentile value (NBL) of the available chemical data of non-polluted objects of a given water body (NBL was established for nitrates, ammonium, EC and sulphate); - the geology and hydrodynamics of the water body; - Quality Standards (EQSsurfacewater and DWS) for the given substance. In the case of water bodies, where both EQSsurfacewater and DWS are applicable (e.g. for nitrates), TVs were established considering the more stringent criteria (i.e. EQSsurfacewater). EQSsurfacewater is applicable only in the case of karstic water bodies feeding surface waters, for example by springs. In the case of trichloroethylene and tetrachloroethylene, the DWS for pesticides took account of the GW-QS. For those GWBs where the NBL was higher than the DWS due to natural hydro-geological reasons, the TVs for ammonium, SO_4 and EC were defined by taking into account these higher values, as described in EU WFD CIS Guidance Document No. 18. To achieve EQ objectives in cold karstic GWBs with springs, TVs for nitrates were defined to conform with EQSsurfacewater (25 mg/l). For other GWBs, nitrate TVs equal DWS. In the case of sulphate and EC, TVs can be higher than the quality standard, considering the geology or hydrogeological regime of the water bodies.			
TVs per GWB	GWB	Pollutant / indicator	TV (or range)[10] (mg/l or µg/l)	Level at which the TV is established (national, RBD, GWB)

[10] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

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	SK1001500P-	NO_3	50	national
	SK1001500P	Na	111	GWB
	SK1001500P	F	0.85	GWB
	SK1001500P	Cl	72.35	GWB
	SK1001500P	SO_4	167.35	GWB
	SK1001500P	NH_4	0.295	GWB
	SK1001500P	Cr	0.027	GWB
	SK1001500P	Cu	0.504	GWB
	SK1001500P	As	0.006	GWB
	SK1001500P	Cd	0.002	GWB
	SK1001500P	Se	0.006	GWB
	SK1001500P	Pb	0.009	GWB
	SK1001500P	Hg	0.0007	GWB
	SK1001500P-	atrazine	0.05 µg/l	national
	SK1001500P-	simazine	0.05 µg/l	national
	SK1001500P-	tetrachloroethylene	5 µg/l	national
	SK1001500P	trichloroethylene	5 µg/l	national

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Member State Code MS_Code	**SK200480KF / HU_K.2.2**
Description of important transboundary GWB	**SK / HU: Delineation** See GWB no. 8. **SK / HU: Reasons for selection as an important transboundary GWB** The Aggtelek Mountain and Slovensky kras form a large common karstic aquifer system in the eastern part of each country. It has been selected as an important transboundary water body for this Danube Basin report because: (i) the National Park covers the majority of its surface, where the role of groundwater is presented by springs and stalactite caves, (ii) it forms a significant drinking water resource in Slovakia and regionally important in Hungary (iii) it is a vulnerable area requiring protection. **SK / HU: General description** The GWB is in a Mesozoic complex with morphologically visible karstic plateau and canyon-like valleys of water courses, separating different units. Hydrogeological units are very different according to permeability, groundwater circulation, groundwater regime, and also in the resulting yield of groundwater springs. From the hydrogeological point of view, the most important tectonic unit in the area is the Silicicum unit, mainly its Middle Triassic and Upper Triassic parts. The most important aquifer here is the Middle and Upper Triassic limestone and dolomites with karst-fissure type permeability. Similarly important hydrogeological units on the Hungarian side are Alsóhegy, Nagyoldal, Hasagistya and Galyaság, which contain the Aggtelek-Domica cave system. Tertiary basins act as a regional impermeable barrier for the groundwater accumulated in Triassic limestone. The transboundary karstic aquifer is divided into two water bodies by the state-border. The horizontal extensions are 598 km^2 and 471 km^2 in Slovakia and Hungary respectively, thus the total size is 1069 km^2. Groundwater circulation in these rocks is controlled by extreme heterogeneity of carbonate rocks, following tectonic development. These tectonically pre-destined drainage structures show the major influence on the direction of groundwater flows. The majority of groundwater is drained towards big karstic springs. Areas between such tectonic faults are less karstified and also less permeable. If not drained by cave systems or permeable tectonic faults, groundwater usually feeds the Quaternary coverage. A specific hydraulic feature of the karstified carbonate complex with preferred drainage structures is that no continuous groundwater table can be defined within the rock mass. Groundwater in many cases only fills up karstic openings – conduits, sometimes enlarged into cave systems, while segments between the preferred groundwater routes are unsaturated. On the other hand, groundwater level changes in these zones are sharp and show quick response to the meteorological situation. The typical amplitude of groundwater level change is from 5 to 15 m. In such levels above the erosion base, perennial springs occur after intensive rainfall events or sudden snowmelts. Hidden outflow to the deeper structures within and outside the area of territory (generally of westward direction under the Tertiary sediments of the Rimavská kotlina Basin) is considered to be quite important from the water management point of view. Groundwater abstraction for various purposes is concentrated at the natural outflows of springs – a relatively small portion is abstracted by pumping from boreholes and wells. **SK / HU: Major pressures and impacts** The estimated amount of available resources in Slovenský kras is 40.4 Mm^3/year;

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	actual use is estimated at 21% of available resources, mainly for drinking water purposes. On the Hungarian side, only the karstic water is utilized, which flows out naturally from karstic springs in Jósvafő, Szögliget, Komjáti, Égerszög and Aggtelek. There are enough data about karst spring discharge. Observed discharge data are available for a period of nearly 30 years. No important karstic water abstraction will be planned in the area because of the National Park. On the plateau, forestry is predominant, with some agriculture, settlements and related economic activities concentrated in the basins and river valleys. In both countries, only a few point sources of pollution occur and intensive agriculture is also insignificant. National Parks cover the majority of the area. In addition, in Hungary, the total area of the GWB is considered as Nitrate-sensitive. Groundwater quality on the Slovakian side has been monitored in 16 sampling sites: groundwater samples are taken from the first aquifer once a year (in the autumn). Quality monitoring shows no deterioration of the water quality compared to drinking water standards. 6 karst-springs are monitored four times per year for quality sampling in Hungary; they do not show signs of pollution.
Description of status assessment methodology	**SK: *Chemical status*** To assess *chemical status*, the proposed methodology stems from the feasibility of the input information, conceptual model and the hydrogeochemical and hydrogeological interpretation of conditions in the Slovak Republic. Article 3.2 of the Groundwater Directive offers the possibility of establishing TVs at the national level, at the river basin district level, the level of the area of the international river basin district falling within the territory of a Member State; or at the level of a GWB or group of GWBs. In the Slovak Republic, the NBL and TVs were established at the level of the GWB. Determination of natural background levels Input data consists of the database from the Geochemical Atlas of the Slovak Republic (spatial factor, 16 359 samples) and results from national monitoring of groundwater quality (time factor, 16 475 samples) in Slovakia. The next step was elimination of samples with anthropogenic impacts (pre-selection method: half of DWS for each compound). Sample elimination was also done in the case where only one compound didn't satisfy this principle. For determination of the NBL, the following statistical method was used: NBL=median+2*median absolute deviation. For the treatment of *less than LOQ* measurements, the following system was applied: simple substitution (LOQ*0.5, when <40% values are below LOQ), 40-60% - Kaplan-Meier´s analysis was used and over 60% NBL=LOQ). NBLs were estimated for: NO_3, As, Cd, Pb, Hg, NH_4, Cl, SO_4, Na, K, Ca, Mg, Sr, PO_4, HCO_3, Fe, Mn, Cr, Cu, Se and Al. For synthetic organic compounds (not originating in a natural way) the NBL is *zero concentration* and this is practically the value of the LOQ of a single organic compound. TVs The TV is half of the interval between the determined NBL and the reference (drinking water standards). As the TV can be below geogenic concentrations in groundwater, for example in the case of heavy metals, the TV will be assessed on the basis of the natural background level (TV = NBL). *Chemical status* For *chemical status* assessment a general assessment of the *chemical status* of the GWB as a whole was applied. Input data results for the quality monitoring network

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	from 2007 were used. Criteria for assessing groundwater *chemical status* for this test were drinking water standards and TVs. The annual arithmetic mean concentration of the relevant pollutant at each monitoring point is the basis for aggregation on the level of a GWB. In the case of non exceedances, the GWB is recommended to be of *good chemical status* for the relevant parameters. The next step was to calculate the extent of exceedance of mean values by using the kriging method, in the case of quaternary GWBs (porous permeability and over five monitoring points). An acceptable extent of exceedance would not exceed 20% of the total GWB. In the case of pre-quaternary GWBs with fissure, karst or karst-fissure permeability, annual average concentrations with 20% confidence interval were used. The final assessment of the *chemical status* of GWB and its verification was performed using a GIS technique via comparison with maps of land use, hydrogeological and hydrogeochemical conditions in the GWB. **HU: *Chemical status*** <u>1. Exceedance of threshold values at monitoring points</u> This test is performed for all GWBs and all chemical elements, for which standard or TV(s) have been determined, according to the following steps: - Selection of WFD monitoring points where the average concentration of the period 2004-2007 **exceeds the determined standard or the TV**. - Exclusion of monitoring sites where the higher concentration is due to **natural conditions** (although the TV is determined considering natural background levels, it is possible to detect an exceedance of natural origin). - Classification of *poor status* for all those GWBs where a **drinking water production well or captured spring** shows exceedance of the drinking water standard to such an extent that changes in treatment technology are needed. The GWB should be classified as *poor* in the case of the danger of pollution to drinking water production wells. (See next point for potential impact on active abstractions.) - Evaluation of data on groundwater quality **inside the drinking water source protection area** (corresponding to a 50-year travel time according to Hungarian legislation). The evaluation is carried out in the framework of a general status assessment of the exploited drinking water resources, including all observation wells, and information on the sources of pollution. If the result of the evaluation shows pollution is able to cause exceedance of the drinking water standard at the abstraction point (involving a change in treatment technology), the GWB is classified as being of *poor status*. - Selection of monitoring wells **inside aquifers designated for future drinking water abstraction.** If the number of wells exceeding the drinking water standard is higher than a given value (determined as a function of the chemical element and the type of aquifer), the GWB is classified as being of *poor status* since it is likely that the exploitation would be difficult: not possible or would require treatment. The real impact of exceedances on ecosystems is analysed according to points 3.& 4. Where the NBL > DWS, the TV is taken into consideration. <u>2. Delineation of polluted areas</u> This test is carried out for **shallow and karstic GWBs regarding nitrates and ammonium**. The delineation of the polluted area (where the concentration exceeds the threshold of the given GWB) is based on all information (not only WFD monitoring!). The GWB is classified as being of *poor status* if **20–30% of the total surface of the GWB is polluted.** For a given GWB, the criterion is selected according to its vulnerability i.e. for karstic aquifers and GWBs with a recharge character: 20 % and for other shallow GWBs: 30%.

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	3. Polluted surface water bodies This test is applied to those GWBs where **the physico-chemical or chemical test for a groundwater dependent surface water body shows *poor status*** and its cause is not evidently sewage water discharge or diffuse pollution from surface runoff. Cases where a polluted monitoring well can be found in the vicinity (closer than 5 km) of a groundwater dependent surface water body of *poor chemical status* will also be analysed. The evaluation is special to each case, taking into account (i) all available data on groundwater and surface water quality, (ii) information on pollution sources - the point or diffuse character of the pollution, (iii) estimated load from pollution sources, (iv) attenuation and dilution effects. If it is proved that the *chemical status* of the GWB is the cause of the observed pollution in the surface water body, the GWB is classified as being of *poor chemical status*. The real impact of **polluted springs** on the quality of the supplied water course is also evaluated, at least up until the first water body (considering possible dilution). If the *physico-chemical or chemical status* of the surface water body is not good because of this pollution, the GWB is classified as being of *poor status*. 4. Damaged groundwater dependent wetland and terrestrial ecosystems This test is applied for those GWBs where it is likely that the **documented damage of certain wetlands or GWDTEs** is due to polluted groundwater. The methodology for the evaluation of the real impact on the ecosystems is performed in a similar way as in the case of aquatic ecosystems (see point 3.). Monitoring of the status of wetlands and GWDTEs is not part of the WFD, so only scattered information on status is available. **SK: *Quantitative status*** To determine the overall quantitative status for GWBs, four tests were applied: 1. Water balance test: Long-term annual abstraction from the GWB must not exceed 80% of available groundwater resources. Quantification of available groundwater resources was based on national quantification and categorization of exploitable groundwater amounts in individual GWBs: 8 categories with different accuracies for determined amounts varying from 100% (water balance evaluation) to 30% (less then 1 year of groundwater monitoring data); available groundwater resources for GWB is the sum of groundwater amount in the individual category multiplied by the different significance from 1 to 0.3). 2. Groundwater level and discharge test: Identifying the presence of sustained long-term declines in groundwater levels or groundwater discharge caused by long-term groundwater abstraction using long-term groundwater monitoring data from the national groundwater monitoring network and the Mann-Kendall test (95% and 99% probability, z varying from absolute min to -3.0). 3. Surface water flow test: Evaluation of surface water discharge in surface water balance profiles (inside of surface water bodies failing their WFD environmental flow objectives). The sum of the long-term average groundwater abstraction in the balance area above the surface water balance profile must not exceed 50% from $Q_{180\ (2007)}$ or 100% from Q_{355} (whole monitoring period). 4. Groundwater dependent terrestrial ecosystems test: Expert judgment on GWDTEs and the influence of groundwater abstraction - groundwater pressures (and subsequently indication of flow or groundwater level changes due to groundwater abstraction) on GWDTEs. The assessments were made on the basis of selected ecological criteria established according to the common depended terrestrial ecosystems. **HU: *Quantitative status***

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	1. Water balance test The water balance test is carried out in two steps: - The GWB is in *poor status* if **in 20% of its area, continuous decreasing water levels** can be observed due to groundwater abstraction. The test is based on data for the period 2001-2007. A declining trend of 5-15 cm/year (depending on aquifer type and depth) can be considered as significant. In mountainous regions, the rate of springs is also analysed; the significant trend depends on the average rate. Water abstractions causing the trend should be identified. (Trends caused by meteorological conditions or short declining trends caused by new water abstractions are not considered.). If the designated area is near the country border, **transboundary conciliation is needed**. - The GWB is also in *poor status* if the **groundwater abstraction exceeds the available groundwater resource**. This test is applied to subsurface catchment areas, thus shallow and deeper GWBs (except porous thermal GWBs) and corresponding dominantly recharge and discharge GWBs are merged in GWB-groups. **Recharge** consists of three components: (i) recharge from precipitation, (ii) recharge from surface water, (iii) flow from adjacent GWB or GWB-group. **Recharge from precipitation** is calculated by a spatially distributed (1x1 km grid) water balance model including precipitation (period 1991-2000), interception, surface runoff, evapotranspiration and storage in the unsaturated zone. Local recharge is ignored in dominantly discharge areas. **Recharge from surface water** (as a long-term average) is rare in Hungary, it is determined on a case-by-case basis. Although GWBs are grouped according to subsurface catchments, estimation of **flow from adjacent GWB-group** is still important (i) in the case of transboundary water bodies, (ii) between different types of GWBs, (iii) where the boundary in the deeper part does not represent a real no-flux boundary. The estimation is based on the results of regional groundwater flow models or simple calculations using maps of water levels and transmissibility. **The water demand of groundwater dependent ecosystems** also has three components: (i) baseflow and spring rates supplying aquatic ecosystems in water courses, (ii) a surplus of evaporation in shallow lakes and wetlands, (iii) a surplus of transpiration from groundwater (supplying GWDTE). **The water demand of aquatic ecosystem in rivers** is considered for small and medium water courses, where springs are frequent in the catchment or where the average groundwater level is above the bottom of the riverbed. Ecologically necessary low flow is estimated on the basis of required water depth, width and velocity. **The water demand of shallow lakes and wetlands** is estimated as the product of required water/wetland surface and the surplus of evaporation. The required water surface is estimated considering landscape-ecology aspects. **The water demand of vegetation in the discharge area** is estimated as the product of the area (where the groundwater should contribute significantly to the water supply of the vegetation) and the amount of capillary flow needed for surviving periods without precipitation. The potential area is delineated using a GIS procedure (convenient combination of soil type and groundwater level). The required part is a percentage of the potential one (default is 30%). **The amount of abstracted water** is the sum of the amount abstracted by wells (average for the period 2004-2007) and the outflow related to other water uses (e.g. drainage canals, gravel pits, decreased surface water level).

10: Slovensky kras / Aggtelek	
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In the case of poor *chemical status*	
Parameter(s) responsible for *poor status*	**SK:** **HU:**
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In the case of trichloroethylene and tetrachloroethylene, the DWS for pesticides took account of the GW-QS.

For those GWBs where the NBL was higher than the DWS due to natural hydro-geological reasons, the TVs for ammonium, SO_4 and EC were defined by taking into account these higher values, as described in EU WFD CIS Guidance Document No. 18.

To achieve EQ objectives in cold karstic GWBs with springs, TVs for nitrates were defined to conform to EQSsurfacewater (25 mg/l). For other GWBs, nitrate TV equals DWS. In the case of sulphate and EC, TVs can be higher than the quality standard, considering the geology or hydrogeological regime of the water bodies.</td></tr>
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(mg/l or µg/l)</td><td>Level at which the TV is established
(national, RBD, GWB)</td></tr>
<tr><td>SK200480KF-</td><td>NO_3</td><td>50</td><td>national</td></tr>
<tr><td>SK200480KF</td><td>Na</td><td>52.30</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>F</td><td>0.8</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>Cl</td><td>56.75</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>SO_4</td><td>167.55</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>NH_4</td><td>0.265</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>Cr</td><td>0.0252</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>Cu</td><td>0.5</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>As</td><td>0.0055</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>Cd</td><td>0.0017</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>Se</td><td>0.0055</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>Pb</td><td>0.0055</td><td>GWB</td></tr>
<tr><td>SK200480KF</td><td>Hg</td><td>0.00055</td><td>GWB</td></tr>
<tr><td>SK200480KF-</td><td>atrazine</td><td>0.05 µg/l</td><td>national</td></tr>
<tr><td>SK200480KF-</td><td>simazine</td><td>0.05 µg/l</td><td>national</td></tr>
<tr><td>SK200480KF-</td><td>tetrachloroethylene</td><td>5 µg/l</td><td>national</td></tr>
<tr><td>SK200480KF-</td><td>trichloroethylene</td><td>5 µg/l</td><td>national</td></tr>
</table>

[11] Insert the range of TVs if different TVs are applied within the national aggregated ICPDR GWB

11: Komarnanska Vysoka Kryha / Dunántúli – középhegység északi rész	
Member State Code MS_Code	**SK300010FK, SK300020FK / HU_K.1.2, HU_K.1.4, HU_KT.1.2**
Description of important transboundary GWB	**SK / HU: Delineation** See GWB no. 8 **SK / HU: Reasons for selection as an important transboundary GWB** The Middle and Upper-Triassic karstic dolomite and limestone formation of the northern part of the Transdanubian Mountain (Hungary) and the Komarnanská Výsoká Kryha (Slovakia) belong to one of the largest karstic aquifer systems in Central Europe. It provides good quality drinking water for the population of the region in Hungary; it contributes to the characteristic landscape by supplying springs; and the deeper part of the aquifer system comprises a very important thermal water resource in both countries. **SK / HU: General description** The karstic formation of the northern part of the Transdanubian Mountains is composed mainly of Upper-Triassic dolomite and limestone. The considerable matrix porosity of the dolomite is due to its dense fissure-system, while in the limestone large fractures are characteristic along the faults. The elevated open karstic zones are separated by sunken basins, where the thickness of the covering layer is several hundred metres. Above the thermal part it exceeds 500 m in thickness (in some places it reaches up to 2500 m) consisting of different types of sediments: sand, clay, marl, sandstone and Eocene karstic formation with brown coal. The Slovakian part (the Komarno block) extends between Komarno and Sturovo. It is fringed by the Danube River in the south and by the east-west Hurbanovo fault in the north. The southern limit along the Danube is tectonic as well and therefore the Komarno block is a sunken tract of the northern slope of the Gerecse and Pilis Mountains. The Komarno block consists largely of Triassic dolomites and limestones up to 1000 m in thickness. The surface of the pre-Tertiary substratum plunges towards the north from a depth of approximately 100 m near the River Danube to as much as 3000 m near the Hurbanovo fault. The karstic aquifer is divided into six water bodies. In Hungary, where the recharge area appears, two water bodies bearing cold waters (HU_K.1.2 and HU_K1.4) have been delineated according to the flow system. The thermal water bodies are in close hydraulic connection with the cold ones. (in Hungary waters with a temperature > 30°C are considered as thermal, while in Slovakia the limit is 25°C HU_Kt.1.2, SK_300010FK and SK_300020FK.) To be noted is the fact that the missing continuation of the cold water bodies in the Slovakian part is mainly due to the differing considerations of the temperature limit. Taking into account, hydrogeothermal aspects, the deep Slovakian karstic aquifer is divided into the Komarno high block (SK300010FK) and the Komarno marginal block (SK300020FK). The total area of the transboundary water body-complex is 3811 km^2 (563 km^2 in Slovakia and 3248 km^2 in Hungary). The Danube River is the regional erosion base of the water bodies. The water level fluctuation is in strong relation to the water level changes in the river. The water bodies are hydraulically connected. The recharge area is on the Hungarian side and the total recharge is estimated at 60 Mm^3/y. Without abstraction this amount of water is discharged by springs and the upward flow towards the covering layer, and some part infiltrates to the deeper, thermal part.

11: Komarnanska Vysoka Kryha / Dunántúli – középhegység északi rész	
	The temperature of the water abstracted (captured) from the Hungarian thermal water body does not exceed 50 °C. Heat-flow densities suggest that the Komarno high block can be characterised by a fairly low thermal spring at Sturovo and Patince (39°C and 26°C) and the marginal block by medium geothermal activity (40–68 °C). Heat flow given in mW/m² is 50-60 in the Komárno high block and 60–70 mW/m² in the Komárno marginal block, both considered as low values. The coefficient of transmissivity in the high block varies from 13 to 100 m²/d, while in the marginal block between 4 to 20 m²/d. Prognostic recoverable amounts for thermal water in the high block is estimated at 12,000 m³/d water at 20 to 40 °C. In the marginal block the abstracted thermal water should be reinjected after use. **SK / HU: Major pressures and impacts** In Hungary, the actual abstractions are approx. 30 Mm³/y from the cold part and 2 Mm³/y from the thermal part. In Slovakia, the thermal water abstraction is 0.6 Mm³/y mainly in the Komárno-Patince-Štúrovo area. The cold karstic water is used for drinking water, while the thermal water for balneology (in Hungary and also in Slovakia) and for energetical purposes (in Slovakia). Disposal of used geothermal water is resolved in Slovakia by discharge into surface water (River Danube and Váh) after dilution with groundwater on acceptable qualitative parameters. Due to mining activities in the 20th century, the actual water levels - especially in the cold water bodies on the Hungarian side - are significantly lower than the long-term natural averages and as a consequence all cold and lukewarm karstic springs have dried out. On the Slovak side, the regime of geothermal water (decreasing discharges of wells) was also affected by extensive pumping of karstic water from coal mines in Tatabánya and Dorog (Hungary). After the mining was stopped (in 1993), water levels have been showing an increasing trend and the gradual reappearance of the springs is forecasted in the coming 5-15 years. The abandoned cuts and fields of mines submerged by the rising karstic waters represent a potential pollution source. Water quality monitoring has been installed, but data are not sufficient for estimating future impacts. In extremely vulnerable open karstic areas, a few settlements should be considered as potential sources of pollution. A relatively high number of significant pollutants exist in the area (40). The majority lie above the *not vulnerable* covered part. The average amount of nitrogen fertilizer is 86 kgN/ha/year, the use of manure is insignificant (3 kgN/ha/year). The surplus nitrogen from agriculture is 17 kgN/ha/year, but in the majority of the area the thick covering layers provide natural protection. (Localities in real danger should be assessed at a smaller scale, focusing on open karstic zones).
Description of status assessment methodology	**SK: *Chemical status*** To assess *chemical status*, the proposed methodology stems from the feasibility of the input information, conceptual model and the hydrogeochemical and hydrogeological interpretation of conditions in the Slovak Republic. Article 3.2 of the Groundwater Directive offers the possibility of establishing TVs at the national level, at the river basin district level, the level of the area of the international river basin district falling within the territory of a Member State; or at the level of a GWB or group of GWBs. In the Slovak Republic, the NBL and TVs were established at the level of the GWB. Determination of natural background levels Input data consists of the database from the Geochemical Atlas of the Slovak Republic (spatial factor, 16 359 samples) and results from national monitoring of groundwater quality (time factor, 16 475 samples) in Slovakia. The next step was elimination of samples with anthropogenic impacts (pre-selection method: half of DWS for each compound). Sample elimination was also done in the case where only

11: Komarnanska Vysoka Kryha / Dunántúli – középhegység északi rész	
	one compound didn't satisfy this principle. For determination of the NBL, the following statistical method was used: NBL=median+2*median absolute deviation. For the treatment of *less than LOQ* measurements, the following system was applied: simple substitution (LOQ*0.5, when <40% values are below LOQ), 40-60% - Kaplan-Meier´s analysis was used and over 60% NBL=LOQ). NBLs were estimated for: NO_3, As, Cd, Pb, Hg, NH_4, Cl, SO_4, Na, K, Ca, Mg, Sr, PO_4, HCO_3, Fe, Mn, Cr, Cu, Se and Al. For synthetic organic compounds (not originating in a natural way) the NBL is *zero concentration* and this is practically the value of the LOQ of a single organic compound. <u>TVs</u> The TV is half of the interval between the determined NBL and the reference (drinking water standards). As the TV can be below geogenic concentrations in groundwater, for example in the case of heavy metals, the TV will be assessed on the basis of the natural background level (TV = NBL). <u>*Chemical status*</u> For *chemical status* assessment a general assessment of the *chemical status* of the GWB as a whole was applied. Input data results for the quality monitoring network from 2007 were used. Criteria for assessing groundwater *chemical status* for this test were drinking water standards and TVs. The annual arithmetic mean concentration of the relevant pollutant at each monitoring point is the basis for aggregation on the level of a GWB. In the case of non exceedances, the GWB is recommended to be of *good chemical status* for the relevant parameters. The next step was to calculate the extent of exceedance of mean values by using the kriging method, in the case of quaternary GWBs (porous permeability and over five monitoring points). An acceptable extent of exceedance would not exceed 20% of the total GWB. In the case of pre-quaternary GWBs with fissure, karst or karst-fissure permeability, annual average concentrations with 20% confidence interval were used. The final assessment of the *chemical status* of GWB and its verification was performed using a GIS technique via comparison with maps of land use, hydrogeological and hydrogeochemical conditions in the GWB. **HU: *Chemical status*** <u>1. Exceedance of threshold values at monitoring points</u> This test is performed for all GWBs and all chemical elements, for which standard or TV(s) have been determined, according to the following steps: - Selection of WFD monitoring points where the average concentration of the period 2004-2007 **exceeds the determined standard or the TV**. - Exclusion of monitoring sites where the higher concentration is due to **natural conditions** (although the TV is determined considering natural background levels, it is possible to detect an exceedance of natural origin). - Classification of *poor status* for all those GWBs where a **drinking water production well or captured spring** shows exceedance of the drinking water standard to such an extent that changes in treatment technology are needed. The GWB should be classified as *poor* in the case of the danger of pollution to drinking water production wells. (See next point for potential impact on active abstractions.) - Evaluation of data on groundwater quality **inside the drinking water source protection area** (corresponding to a 50-year travel time according to Hungarian legislation). The evaluation is carried out in the framework of a general status assessment of the exploited drinking water resources, including all observation wells, and information on the sources of pollution. If the result of the evaluation shows pollution is able to cause exceedance of the drinking water standard at the abstraction point (involving a change in treatment technology), the GWB is classified as being of *poor status*.

11: Komarnanska Vysoka Kryha / Dunántúli – középhegység északi rész	
	- Selection of monitoring wells **inside aquifers designated for future drinking water abstraction.** If the number of wells exceeding the drinking water standard is higher than a given value (determined as a function of the chemical element and the type of aquifer), the GWB is classified as being of *poor status* since it is likely that the exploitation would be difficult: not possible or would require treatment. The real impact of exceedances on ecosystems is analysed according to points 3.& 4. Where the NBL > DWS, the TV is taken into consideration. 2. Delineation of polluted areas This test is carried out for **shallow and karstic GWBs regarding nitrates and ammonium**. The delineation of the polluted area (where the concentration exceeds the threshold of the given GWB) is based on all information (not only WFD monitoring!). The GWB is classified as being of *poor status* if **20–30% of the total surface of the GWB is polluted.** For a given GWB, the criterion is selected according to its vulnerability i.e. for karstic aquifers and GWBs with a recharge character: 20 % and for other shallow GWBs: 30%. 3. Polluted surface water bodies This test is applied to those GWBs where **the physico-chemical or chemical test for a groundwater dependent surface water body shows *poor status*** and its cause is not evidently sewage water discharge or diffuse pollution from surface runoff. Cases where a polluted monitoring well can be found in the vicinity (closer than 5 km) of a groundwater dependent surface water body of *poor chemical status* will also be analysed. The evaluation is special to each case, taking into account (i) all available data on groundwater and surface water quality, (ii) information on pollution sources - the point or diffuse character of the pollution, (iii) estimated load from pollution sources, (iv) attenuation and dilution effects. If it is proved that the *chemical status* of the GWB is the cause of the observed pollution in the surface water body, the GWB is classified as being of *poor chemical status*. The real impact of **polluted springs** on the quality of the supplied water course is also evaluated, at least up until the first water body (considering possible dilution). If the *physico-chemical or chemical status* of the surface water body is not good because of this pollution, the GWB is classified as being of *poor status*. 4. Damaged groundwater dependent wetland and terrestrial ecosystems This test is applied for those GWBs where it is likely that the **documented damage of certain wetlands or GWDTEs** is due to polluted groundwater. The methodology for the evaluation of the real impact on the ecosystems is performed in a similar way as in the case of aquatic ecosystems (see point 3.). Monitoring of the status of wetlands and GWDTEs is not part of the WFD, so only scattered information on status is available. **SK: *Quantitative status*** No data **HU: *Quantitative status*** 1. Water balance test The water balance test is carried out in two steps: - The GWB is in *poor status* if **in 20% of its area, continuous decreasing water levels** can be observed due to groundwater abstraction. The test is based on data for the period 2001-2007. A declining trend of 5-15 cm/year (depending on aquifer

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List of the the protected areas in the DRBD

icpdr iksd
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

Annex 10 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Explanations

Types:
H = Habitat (FFH) Directive
B = Bird Protection Directive
O = Others (Non EU MS)

Water relevant according to EU WFD:
Y = Yes
Z = Unknown

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
DE	DE5937-471	Schneeberggebiet und Goldkronacher / Sophientaler Forst	B	26.19	Y
DE	DE6139-371	Waldnaabtal zwischen Tirschenreuth und Windisch-Eschenbach	H	26.18	Y
DE	DE6139-471	Waldnaabaue westlich Tirschenreuth	B	22.59	Y
DE	DE6237-371	Heidenaab, Creussenaue und Weihergebiet nordwestlich Eschenbach	H	18.65	Y
DE	DE6336-301	US-Truppenübungsplatz Grafenwöhr	B,H	192.79	Y
DE	DE6336-471	Vilsecker Mulde	B	9.2	Y
DE	DE6337-371	Vilsecker Mulde mit den Tälern der Schmalnohe und Wiesenohe	H	9.39	Y
DE	DE6338-301	Lohen im Manteler Forst mit Schießlweiher und Straßweiherkette	H	7.73	Y
DE	DE6338-401	Manteler Forst	B	26.92	Y
DE	DE6528-371	Anstieg der Frankenhöhe östlich der A 7	H	11.79	Y
DE	DE6537-371	Vils von Vilseck bis zur Mündung in die Naab	H	6.22	Y
DE	DE6541-371	Bayerische Schwarzach und Biberbach	H	5.3	Y
DE	DE6636-371	Lauterachtal	H	8.23	Y
DE	DE6639-371	Talsystem von Schwarzach, Auerbach und Ascha	H	7.84	Y
DE	DE6639-372	Charlottenhofer Weihergebiet, Hirtlohweiher und Langwiedteiche	B,H	9.31	Y
DE	DE6728-471	Altmühltal mit Brunst-Schwaigau und Altmühlsee	B	49.71	Y
DE	DE6736-302	Truppenübungsplatz Hohenfels	B,H	149.06	Y
DE	DE6741-371	Chamb, Regentalaue und Regen zwischen Roding und Donaumündung	H	31.94	Y
DE	DE6741-471	Regentalaue und Chambtal mit Rötelseeweihergebiet	B	27.78	Y
DE	DE6830-371	Obere Altmühl mit Brunst-Schwaigau und Wiesmet	H	45.08	Y
DE	DE6833-371	Trauf der südlichen Frankenalb	H	41.47	Y
DE	DE6834-301	Trauf der mittleren Frankenalb im Sulztal	H	12.24	Y

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DE	DE6836-371	Schwarze Laaber	H	11.6	Y
DE	DE6844-371	Oberlauf des Weißen Regens bis Kötzting mit Kaitersbachaue	H	6.37	Y
DE	DE6844-373	Großer und Kleiner Arber mit Arberseen	H	22.96	Y
DE	DE6935-371	Weiße, Wissinger, Breitenbrunner Laaber u. Kreuzberg bei Dietfurt	H	23.23	Y
DE	DE6937-371	Naab unterhalb Schwarzenfeld und Donau von Poikam bis Regensburg	H	11.15	Y
DE	DE6939-302	Bachtäler im Falkensteiner Vorwald	H	13.87	Y
DE	DE6939-371	Trockenhänge am Donaurandbruch	H	5.21	Y
DE	DE6946-301	Nationalpark Bayerischer Wald	B,H	242.18	Y
DE	DE7029-371	Wörnitztal	H	38.93	Y
DE	DE7036-371	Trockenhänge im unteren Altmühltal mit Laaberleiten und Galgental	H	27.19	Y
DE	DE7037-471	Felsen und Hangwälder im Altmühl-, Naab-, Laber- und Donautal	B	48.44	Y
DE	DE7038-371	Standortübungsplatz Oberhinkofen	H	5.27	Y
DE	DE7040-302	Wälder im Donautal	B,H	12.89	Y
DE	DE7040-371	Donau und Altwässer zwischen Regensburg und Straubing	H	21.94	Y
DE	DE7040-471	Donau zwischen Regensburg und Straubing	B	32.6	Y
DE	DE7043-371	Deggendorfer Vorwald	H	14.98	Y
DE	DE7045-371	Oberlauf des Regens und Nebenbäche	H	19.22	Y
DE	DE7128-371	Trockenverbund am Rand des Nördlinger Rieses	H	9.5	Y
DE	DE7130-471	Nördlinger Ries und Wörnitztal	B	70.36	Y
DE	DE7132-371	Mittleres Altmühltal mit Wellheimer Trockental und Schambachtal	H	42.01	Y
DE	DE7132-471	Felsen und Hangwälder im Altmühltal und Wellheimer Trockental	B	36.12	Y
DE	DE7136-301	'Weltenburger Enge' und 'Hirschberg und Altmühlleiten'	H	9.34	Y

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DE	DE7136-304	Donauauen zwischen Ingolstadt und Weltenburg	H	27.67	Y
DE	DE7138-372	Tal der Großen Laaber zwischen Sandsbach und Unterdeggenbach	H	6.82	Y
DE	DE7142-301	Donauauen zwischen Straubing und Vilshofen	H	47.86	Y
DE	DE7142-471	Donau zwischen Straubing und Vilshofen	B	67.76	Y
DE	DE7229-471	Riesalb mit Kesseltal	B	120.37	Y
DE	DE7230-371	Donauwörther Forst mit Standortübungsplatz und Harburger Karab	H	24.01	Y
DE	DE7231-471	Donauauen zwischen Lechmündung und Ingolstadt	B	69.61	Y
DE	DE7232-301	Donau mit Jura-Hängen zwischen Leitheim und Neuburg	H	32.81	Y
DE	DE7233-372	Donauauen mit Gerolfinger Eichenwald	H	29.27	Y
DE	DE7233-373	Donaumoosbäche, Zucheringer Wörth und Brucker Forst	H	9.47	Y
DE	DE7243-301	Untere Isar zwischen Landau und Plattling	H	12.17	Y
DE	DE7243-302	Isarmündung	H	19.07	Y
DE	DE7243-401	Untere Isar oberhalb Mündung	B	9.74	Y
DE	DE7243-402	Isarmündung	B	21.13	Y
DE	DE7246-371	Ilz-Talsystem	H	28.45	Y
DE	DE7329-301	Donauauen Blindheim-Donaumünster	H	12.11	Y
DE	DE7329-372	Jurawälder nördlich Höchstädt	H	38.2	Y
DE	DE7330-301	Mertinger Hölle und umgebende Feuchtgebiete	H	8.58	Y
DE	DE7330-471	Wiesenbrüterlebensraum Schwäbisches Donauried	B	39.66	Y
DE	DE7335-371	Feilenmoos mit Nöttinger Viehweide	H	8.7	Y
DE	DE7341-471	Wiesenbrütergebiete im Unteren Isartal	B	13.84	Y
DE	DE7347-371	Erlau	H	5.75	Y

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DE	DE7427-471	Schwäbisches Donaumoos	B	25.78	Y
DE	DE7428-301	Donau-Auen zwischen Thalfingen und Höchstädt	H	57.97	Y
DE	DE7428-471	Donauauen	B	80.53	Y
DE	DE7433-371	Paar	H	29.7	Y
DE	DE7439-371	Isarleiten bei der Gretlmühle	H	6.43	Y
DE	DE7440-371	Vilstal zwischen Vilsbiburg und Marklkofen	H	8.35	Y
DE	DE7446-301	Donauleiten von Passau bis Jochenstein	H	5.17	Y
DE	DE7446-371	Östlicher Neuburger Wald und Innleiten bis Vornbach	H	10.89	Y
DE	DE7447-371	Donau von Kachlet bis Jochenstein mit Inn- und Ilzmündung	H	5.08	Y
DE	DE7537-301	Isarauen von Unterföhring bis Landshut	H	52.77	Y
DE	DE7537-401	Naturschutzgebiet "Vogelfreistätte Mittlere Isarstauseen"	B	5.87	Y
DE	DE7630-371	Schmuttertal	H	9	Y
DE	DE7631-371	Lechauen zwischen Königsbrunn und Augsburg	H	23.04	Y
DE	DE7631-372	Lech zwischen Landsberg und Königsbrunn mit Auen und Leite	H	25.02	Y
DE	DE7635-301	Ampertal	H	21.72	Y
DE	DE7636-471	Freisinger Moos	B	11.3	Y
DE	DE7726-371	Untere Illerauen	H	16.42	Y
DE	DE7736-471	Ismaninger Speichersee und Fischteiche	B	10.29	Y
DE	DE7739-371	Isental mit Nebenbächen	H	7.66	Y
DE	DE7742-371	Inn und Untere Alz	H	15.65	Y
DE	DE7744-371	Salzach und Unterer Inn	H	56.89	Y
DE	DE7744-471	Salzach und Inn	B	48.28	Y

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DE	DE7820-441	Südwestalb und Oberes Donautal	B	428.56	Y
DE	DE7823-341	Donau zwischen Munderkingen und Riedlingen	H	14.29	Y
DE	DE7828-471	Mindeltal	B	26.55	Y
DE	DE7829-301	Angelberger Forst	H	6.41	Y
DE	DE7832-371	Ampermoos	H	5.29	Y
DE	DE7833-371	Moore und Buchenwälder zwischen Etterschlag und Fürstenfeldbruck	H	7.76	Y
DE	DE7837-371	Ebersberger und Großhaager Forst	H	38.41	Y
DE	DE7919-341	Donautal und Hochflächen von Tuttlingen bis Beuron	H	54.26	Y
DE	DE7920-342	Oberes Donautal zwischen Beuron und Sigmaringen	H	27.04	Y
DE	DE7922-342	Donau zwischen Riedlingen und Sigmaringen	H	11.66	Y
DE	DE7932-372	Ammerseeufer und Leitenwälder	H	9.53	Y
DE	DE7932-471	Ammerseegebiet	B	77.1	Y
DE	DE7934-371	Moore und Wälder der Endmoräne bei Starnberg	H	5.87	Y
DE	DE7939-301	Innauen und Leitenwälder	H	35.53	Y
DE	DE7939-401	NSG 'Vogelfreistätte Innstausee bei Attel und Freiham'	B	5.67	Y
DE	DE8016-341	Baar	H	22.24	Y
DE	DE8017-341	Nördliche Baaralb und Donau bei Immendingen	H	24.98	Y
DE	DE8017-441	Baar	B	377.58	Y
DE	DE8031-471	Mittleres Lechtal	B	32.08	Y
DE	DE8032-371	Ammersee-Südufer und Raistinger Wiesen	H	8.82	Y
DE	DE8032-372	Moore und Wälder westlich Dießen	H	25.91	Y
DE	DE8033-371	Moränenlandschaft zwischen Ammersee und Starnberger See	H	20.73	Y

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DE	DE8034-371	Oberes Isartal	H	46.71	Y
DE	DE8038-371	Rotter Forst und Rott	H	8.47	Y
DE	DE8039-302	Moore und Seen nordöstlich Rosenheim	H	5.6	Y
DE	DE8039-371	Murn, Murner Filz und Eiselfinger See	H	5.14	Y
DE	DE8040-371	Moorgebiet von Eggstädt-Hemhof bis Seeon	H	21.16	Y
DE	DE8040-471	Moorgebiet von Eggstätt-Hemhof bis Seeon	B	20.06	Y
DE	DE8127-301	Illerdurchbruch zwischen Reicholzried und Lautrach	H	9.68	Y
DE	DE8131-301	Moorkette von Peiting bis Wessobrunn	H	9.43	Y
DE	DE8131-371	Lech zwischen Hirschau und Landsberg mit Auen und Leiten	H	28.9	Y
DE	DE8133-301	Naturschutzgebiet 'Osterseen'	H	10.87	Y
DE	DE8133-302	Eberfinger Drumlinfeld mit Magnetsrieder Hardt u. Bernrieder Filz	H	11.16	Y
DE	DE8133-371	Starnberger See	H	56.89	Y
DE	DE8133-401	Starnberger See	B	56.93	Y
DE	DE8134-371	Moore südlich Königsdorf, Rothenrainer Moore und Königsdorfer Alm	H	10.98	Y
DE	DE8135-371	Moore zwischen Dietramszell und Deining	H	9.61	Y
DE	DE8136-302	Taubenberg	B,H	18.5	Y
DE	DE8136-371	Mangfalltal	H	13.47	Y
DE	DE8138-372	Moore um Raubling	H	10.28	Y
DE	DE8139-371	Simsseegebiet	H	10.42	Y
DE	DE8140-371	Moore südlich des Chiemsees	H	35.67	Y
DE	DE8140-372	Chiemsee	H	81.51	Y
DE	DE8140-471	Chiemseegebiet mit Alz	B	103.55	Y

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DE	DE8141-471	Moore südlich des Chiemsees	B	27.21	Y
DE	DE8142-371	Moore im Salzach-Hügelland	H	13.08	Y
DE	DE8142-372	Oberes Surtal und Urstromtal Höglwörth	H	8.78	Y
DE	DE8227-373	Kürnacher Wald	H	27.6	Y
DE	DE8228-301	Kempter Wald mit Oberem Rottachtal	H	40.96	Y
DE	DE8232-371	Grasleitner Moorlandschaft	H	21.38	Y
DE	DE8233-301	Moor- und Drumlinlandschaft zwischen Hohenkasten und Antdorf	H	14.12	Y
DE	DE8234-371	Moore um Penzberg	H	11.62	Y
DE	DE8235-301	Ellbach- und Kirchseemoor	H	11.72	Y
DE	DE8235-371	Attenloher Filzen und Mariensteiner Moore	H	6.51	Y
DE	DE8236-371	Flyschberge bei Bad Wiessee	H	9.55	Y
DE	DE8237-371	Leitzachtal	H	22.39	Y
DE	DE8239-371	Hochriesgebiet und Hangwälder im Aschauer Tal	H	18.26	Y
DE	DE8239-372	Geigelstein und Achentaldurchbruch	H	32.07	Y
DE	DE8239-401	Geigelstein	B	32.08	Y
DE	DE8241-372	Östliche Chiemgauer Alpen	H	129.23	Y
DE	DE8327-304	Rottachberg und Rottachschlucht	H	5.27	Y
DE	DE8329-301	Wertachdurchbruch	B,H	8.76	Y
DE	DE8329-303	Sulzschneider Moore	H	17.95	Y
DE	DE8330-371	Urspringer Filz,Premer Filz und Viehweiden	H	5.48	Y
DE	DE8330-471	Ammergebirge mit Kienberg und Schwarzenberg sowie Falkenstein	B	301.05	Y
DE	DE8331-302	Ammer vom Alpenrand b. zum NSG 'Vogelfreistätte Ammersee-Südufer'	H	23.91	Y

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DE	DE8331-303	Trauchberger Ach, Moore und Wälder am Nordrand des Ammergebirges	H	11.29	Y
DE	DE8332-301	Murnauer Moos	H	42.9	Y
DE	DE8332-371	Moore im oberen Ammertal	H	6.29	Y
DE	DE8332-372	Moränenlandschaft zwischen Staffelsee und Baiersoien	H	25.92	Y
DE	DE8332-471	Murnaür Moos und Pfrühlmoos	B	72.82	Y
DE	DE8334-371	Loisach-Kochelsee-Moore	H	19	Y
DE	DE8334-373	Kesselberggebiet	H	6.48	Y
DE	DE8334-471	Loisach-Kochelsee-Moore	B	41.84	Y
DE	DE8336-371	Mangfallgebirge	H	148.72	Y
DE	DE8342-301	Nationalpark Berchtesgaden	B,H	213.64	Y
DE	DE8342-302	NSG 'Aschau', NSG 'Schwarzbach' und Schwimmendes Moos	H	8.04	Y
DE	DE8343-303	Untersberg	H	35.14	Y
DE	DE8426-302	Nagelfluhkette Hochgrat-Steineberg	H	19.93	Y
DE	DE8429-303	Kienberg mit Magerrasen im Tal der Steinacher Ach	H	6.24	Y
DE	DE8430-301	Naturschutzgebiet 'Bannwaldsee'	H	5.58	Y
DE	DE8430-303	Falkenstein, Alatsee, Faulenbacher- und Lechtal	H	9.87	Y
DE	DE8431-371	Ammergebirge	H	275.82	Y
DE	DE8432-301	Loisachtal zwischen Farchant und Eschenlohe	H	6.92	Y
DE	DE8433-301	Karwendel mit Isar	B,H	195.9	Y
DE	DE8433-371	Estergebirge	H	60.77	Y
DE	DE8434-372	Jachenau und Extensivwiesen bei Fleck	H	14.52	Y
DE	DE8527-301	Hörnergruppe	H	11.83	Y

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DE	DE8528-301	Allgäuer Hochalpen	H	212.27	Y
DE	DE8532-371	Wettersteingebirge	H	42.57	Y
DE	DE8532-471	Naturschutzgebiet "Schachen und Reintal"	B	39.64	Y
DE	DE8533-301	Mittenwalder Buckelwiesen	H	19.29	Y
DE	DE8626-301	Hoher Ifen	H	24.51	Y
AT	AT1110137	Neusiedlersee-Seewinkel	B,H	505.93	Y
AT	AT1122916	Lafnitzauen	H	5.36	Y
AT	AT1202000	March-Thaya-Auen	H	89.44	Y
AT	AT1202V00	March-Thaya-Auen (SPA)	B	130.16	Y
AT	AT1204000	Donau-Auen östlich von Wien	H	95.7	Y
AT	AT1204V00	Donau-Auen östlich von Wien (SPA)	B	117.47	Y
AT	AT1208A00	Thayatal bei Hardegg	H	44.16	Y
AT	AT1301000	Nationalpark Donau-Auen (Wiener Teil)	B,H	22.57	Y
AT	AT2101000	Nationalpark Hohe Tauern (Kernzone I und Sonderschutzgebiete)	H	294.77	Y
AT	AT2102000	Nationalpark Nockberge (Kernzone)	H	77.38	Y
AT	AT2108000	Inneres Pöllatal	H	31.96	Y
AT	AT2109000	Wolayersee und Umgebung	H	19.46	Y
AT	AT2114000	Obere Drau	H	9.24	Y
AT	AT2116000	Görtschacher Moos-Obermoos im Gailtal	B,H	11.99	Y
AT	AT2120000	Schütt-Graschelitzen	B,H	23.05	Y
AT	AT2129000	NP Hohe Tauern (Kernzone II und Sonderschutzgebiete), Kärnten	B	299.03	Y
AT	AT2205000	Pürgschachen-Moos und ennsnahe Bereiche zwischen Selzthal und dem Gesäuseeingang	B,H	16.17	Y
AT	AT2208000	Lafnitztal - Neudauer Teiche	B,H	8.76	Y
AT	AT2210000	Ennstaler Alpen / Gesäuse	B,H	145.12	Y
AT	AT2213000	Steirische Grenzmur mit Gamlitzbach und Gnasbach	B,H	22.38	Y
AT	AT2215000	Teile der Eisenerzer Alpen	H	43.87	Y
AT	AT2220000	Zirbitzkogel	B	22.97	Y
AT	AT2225000	Demmerkogel-Südhänge; Wöllinggraben mit Sulm, Saggau und Laßnitzabschnitten und Pößn.	B,H	20.31	Y
AT	AT2226000	Furtner Teich - Dürnberger-Moor	B	10.84	Y
AT	AT2229000	Teile des Steirischen Jogl- und Wechsellandes	B	455.44	Y
AT	AT2230000	Teile des südoststeirischen Hügellandes inklusive Höll und Grabenlandbäche	B,H	156.52	Y
AT	AT2233000	Raabklamm	B,H	5.58	Y

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AT	AT2236000	Ober- und Mittellauf der Mur mit Puxer Auwald, Puxer Wand und Gulsen	H	12.84	Y
AT	AT2243000	Totes Gebirge mit Altausseer See	B,H	241.67	Y
AT	AT3101000	Dachstein	B,H	146.17	Y
AT	AT3105000	Unterer Inn	B,H	8.63	Y
AT	AT3110000	Ettenau	B,H	5.74	Y
AT	AT3111000	Nationalpark Kalkalpen, 1. Verordnungsabschnitt	B,H	214.36	Y
AT	AT3112000	Oberes Donautal	B,H	9.24	Y
AT	AT3113000	Untere Traun	B	24.53	Y
AT	AT3114000	Traun-Donau-Auen	B,H	6.64	Y
AT	AT3117000	Mond- und Attersee	H	61.31	Y
AT	AT3119000	Auwälder am Unteren Inn	H	5.48	Y
AT	AT3120000	Waldaist und Naarn	H	41.55	Y
AT	AT3121000	Böhmerwald und Mühltäler	H	98.46	Y
AT	AT3122000	Oberes Donau- und Aschachtal	H	61.63	Y
AT	AT3123000	Wiesengebiete und Seen im Alpenvorland	H	13.72	Y
AT	AT3124000	Wiesengebiete im Freiwald	B	24.05	Y
AT	AT3209022	Salzachauen, Salzburg (SPA)	B	6	Y
AT	AT3210001	Hohe Tauern, Salzburg	B,H	804.31	Y
AT	AT3211012	Kalkhochalpen, Salzburg	H	234.23	Y
AT	AT3302000	Vilsalpsee	B,H	18.26	Y
AT	AT3309000	Lechtal	B,H	41.33	Y
CZ	CZ0314024	Šumava	H	102.86	Y
CZ	CZ0320180	Čerchovský les	H	21.79	Y
CZ	CZ0323151	Kateřinský a Nivní potok	H	9.8	Y
CZ	CZ0530146	Králický Sněžník	H	16.82	Y
CZ	CZ0621025	Bzenecká Doubrava - Strážnické Pomoraví	B	119.1	Y
CZ	CZ0621027	Soutok - Tvrdonicko	B	96.61	Y
CZ	CZ0621028	Lednické rybníky	B	7.06	Y
CZ	CZ0621029	Pálava	B	85.31	Y
CZ	CZ0621030	Střední nádrž Vodního Díla Nové Mlýny	B	10.47	Y
CZ	CZ0624064	Krumlovský les	H	19.46	Y
CZ	CZ0624068	Strážnická Morava	H	6.59	Y
CZ	CZ0624070	Hodonínská doubrava	H	30.29	Y
CZ	CZ0624072	Čertoryje	H	46.95	Y
CZ	CZ0624095	Údolí Dyje	H	18.19	Y
CZ	CZ0624096	Podyjí	H	62.38	Y
CZ	CZ0624099	Niva Dyje	H	32.49	Y
CZ	CZ0624103	Mušovský luh	H	5.57	Y
CZ	CZ0624119	Soutok - Podluží	H	95.28	Y
CZ	CZ0624130	Moravský kras	H	64.85	Y
CZ	CZ0710161	Království	H	5.88	Y
CZ	CZ0711018	Litovelské Pomoraví	B	93.19	Y
CZ	CZ0714073	Litovelské Pomoraví	H	97.26	Y

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CZ	CZ0714075	Keprník	H	16.7	Y
CZ	CZ0714077	Praděd	H	26.93	Y
CZ	CZ0714085	Morava - Chropyňský luh	H	32.05	Y
CZ	CZ0714133	Libavá	H	67.07	Y
CZ	CZ0720033	Semetín	H	13.27	Y
CZ	CZ0720192	Velká Vela	H	7.71	Y
CZ	CZ0723435	Vlára - polesí	H	11.28	Y
CZ	CZ0724089	Beskydy	H	626.55	Y
CZ	CZ0724090	Bílé Karpaty	H	148.23	Y
CZ	CZ0724091	Chřiby	H	192.26	Y
CZ	CZ0724107	Nedakonický les	H	15.25	Y
CZ	CZ0724120	Kněžpolský les	H	5.21	Y
CZ	CZ0724121	Nad Jasenkou	H	7.39	Y
CZ	CZ0724428	Tesák	H	11.03	Y
SK	SKCHVU002	Bukovské vrchy	B	409.14	Z
SK	SKCHVU003	Cerová vrchovina a Rimavská kotlina	B	303.01	Z
SK	SKCHVU005	Dolné Považie	B	323.6	Z
SK	SKCHVU007	Dunajské luhy	B	188.84	Z
SK	SKCHVU008	Horná Orava	B	590.94	Z
SK	SKCHVU009	Košická kotlina	B	179.65	Z
SK	SKCHVU010	Kráľová	B	12.14	Z
SK	SKCHVU011	Laborecká vrchovina	B	1073.4	Z
SK	SKCHVU012	Lehnice	B	23.87	Z
SK	SKCHVU013	Malá Fatra	B	680.57	Z
SK	SKCHVU014	Malé Karpaty	B	524.59	Z
SK	SKCHVU015	Medzibodrožie	B	344.71	Z
SK	SKCHVU016	Záhorské Pomoravie	B	323.83	Z
SK	SKCHVU017	Muránska planina - Stolica	B	257.87	Z
SK	SKCHVU018	Nízke Tatry	B	987.12	Z

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
SK	SKCHVU019	Ostrovné lúky	B	83.35	Z
SK	SKCHVU021	Poiplie	B	80.63	Z
SK	SKCHVU022	Poľana	B	323.16	Z
SK	SKCHVU023	Úľanská mokraď	B	212.04	Z
SK	SKCHVU024	Senianske rybníky	B	27.17	Z
SK	SKCHVU025	Slanské vrchy	B	611.71	Z
SK	SKCHVU027	Slovenský kras	B	448.62	Z
SK	SKCHVU028	Strážovské vrchy	B	597.18	Z
SK	SKCHVU029	Sysľovské polia	B	17.76	Z
SK	SKCHVU030	Tatry	B	407.17	Z
SK	SKCHVU031	Tribeč	B	242.28	Z
SK	SKCHVU033	Veľká Fatra	B	567.65	Z
SK	SKCHVU035	Vihorlatské vrchy	B	483.89	Z
SK	SKCHVU036	Volovské vrchy	B	1245.2	Z
SK	SKCHVU037	Ondavská rovina	B	210.02	Z
SK	SKUEV0006	Rieka Latorica	H	73.36	Z
SK	SKUEV0036	Rieka Litava	H	26.3	Z
SK	SKUEV0043	Kamenná	H	8.52	Z
SK	SKUEV0048	Dukla	H	66.4	Z
SK	SKUEV0057	Rašeliniská Oravskej kotliny	H	8.04	Z
SK	SKUEV0064	Bratislavské luhy	H	6.77	Z
SK	SKUEV0089	Martinský les	H	6.59	Z

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SK	SKUEV0090	Dunajské luhy	H	45.46	Z
SK	SKUEV0103	Čachtické Karpaty	H	7.08	Z
SK	SKUEV0104	Homolské Karpaty	H	51.86	Z
SK	SKUEV0110	Dubiny pri Levoči	H	6.02	Z
SK	SKUEV0112	Slovenský raj	H	168.41	Z
SK	SKUEV0125	Gajarské alúvium Moravy	H	12.13	Z
SK	SKUEV0128	Rokoš	H	56.85	Z
SK	SKUEV0130	Zoborské vrchy	H	19.05	Z
SK	SKUEV0163	Rudava	H	21.44	Z
SK	SKUEV0168	Horný les	H	6.42	Z
SK	SKUEV0172	Bežnisko	H	8.61	Z
SK	SKUEV0184	Burda	H	14.82	Z
SK	SKUEV0188	Pilsko	H	6.73	Z
SK	SKUEV0192	Prosečné	H	23	Z
SK	SKUEV0194	Hybická tiesňava	H	5.67	Z
SK	SKUEV0197	Salatín	H	33.47	Z
SK	SKUEV0198	Zvolen	H	25.93	Z
SK	SKUEV0203	Stolica	H	27.94	Z
SK	SKUEV0205	Hubková	H	28.51	Z
SK	SKUEV0209	Morské oko	H	158.14	Z
SK	SKUEV0210	Stinská	H	14.28	Z
SK	SKUEV0211	Danova	H	8.39	Z

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
SK	SKUEV0216	Sitno	H	9.29	Z
SK	SKUEV0225	Muránska planina	H	202.22	Z
SK	SKUEV0229	Beskýd	H	288.29	Z
SK	SKUEV0230	Iľovnica	H	7.94	Z
SK	SKUEV0238	Veľká Fatra	H	463.64	Z
SK	SKUEV0250	Krivoštianka	H	7.09	Z
SK	SKUEV0251	Zázrivské lazy	H	29.44	Z
SK	SKUEV0252	Malá Fatra	H	222.52	Z
SK	SKUEV0256	Strážovské vrchy	H	298.89	Z
SK	SKUEV0258	Tlstý vrch	H	12.17	Z
SK	SKUEV0259	Stará hora	H	26.33	Z
SK	SKUEV0262	Čejkovské bralie	H	16.22	Z
SK	SKUEV0263	Hodrušská hornatina	H	102.67	Z
SK	SKUEV0264	Klokoč	H	22.98	Z
SK	SKUEV0265	Suť	H	99.77	Z
SK	SKUEV0266	Skalka	H	102.99	Z
SK	SKUEV0267	Biele hory	H	101.41	Z
SK	SKUEV0269	Ostrovné lúčky	H	7.05	Z
SK	SKUEV0273	Vtáčnik	H	100.64	Z
SK	SKUEV0274	Baske	H	40.33	Z
SK	SKUEV0275	Kňaží stôl	H	42.27	Z
SK	SKUEV0276	Kuchynská hornatina	H	32.01	Z

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SK	SKUEV0278	Brezovské Karpaty	H	26.35	Z
SK	SKUEV0280	Devínska Kobyla	H	6.43	Z
SK	SKUEV0282	Tisovský kras	H	14.69	Z
SK	SKUEV0287	Galmus	H	31.14	Z
SK	SKUEV0288	Kysucké Beskydy	H	68.46	Z
SK	SKUEV0295	Biskupické luhy	H	9.16	Z
SK	SKUEV0299	Baranovo	H	8.61	Z
SK	SKUEV0302	Ďumbierske Nízke Tatry	H	440.83	Z
SK	SKUEV0305	Choč	H	16.27	Z
SK	SKUEV0306	Pod Suchým hrádkom	H	7.59	Z
SK	SKUEV0307	Tatry	H	335.73	Z
SK	SKUEV0310	Kráľovohoľské Nízke Tatry	H	305.1	Z
SK	SKUEV0313	Devínske jazero	H	13.02	Z
SK	SKUEV0318	Pod Čelom	H	6.26	Z
SK	SKUEV0319	Poľana	H	30.72	Z
SK	SKUEV0322	Fintické svahy	H	7.48	Z
SK	SKUEV0326	Strahuľka	H	11.92	Z
SK	SKUEV0327	Milič	H	49.21	Z
SK	SKUEV0328	Stredné Pohornádie	H	71.5	Z
SK	SKUEV0331	Čergovský Minčol	H	38.02	Z
SK	SKUEV0332	Čergov	H	60.03	Z
SK	SKUEV0341	Dolný vrch	H	15.28	Z

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SK	SKUEV0348	Dolina Čiernej Moldavy	H	19.11	Z
SK	SKUEV0353	Plešivská planina	H	28.53	Z
SK	SKUEV0355	Fabiánka	H	6.62	Z
SK	SKUEV0356	Horný vrch	H	60.44	Z
SK	SKUEV0357	Cerová vrchovina - lesné biotopy	H	25.69	Z
SK	SKUEV0366	Drienčanský kras	H	15.9	Z
SK	SKUEV0367	Holubyho kopanice	H	38.9	Z
SK	SKUEV0380	Tematínske vrchy	H	25.23	Z
SK	SKUEV0387	Beskyd	H	52.38	Z
SK	SKUEV0393	Dunaj	H	11.95	Z
HU	HUAN10001	Aggteleki-karszt Madárvédelmi	B	236.15	Z
HU	HUAN10002	Putnoki-dombság Madárvédelmi T	B	70.75	Z
HU	HUAN20001	Aggteleki-karszt és peremterületei	H	229.3	Y
HU	HUAN20002	Rakaca-völgy és oldalvölgyei	H	20.26	Y
HU	HUAN20003	Bódva-völgy és a Sas-patak völgye	H	21.52	Y
HU	HUAN20004	Hernád-völgy és Sajóládi-erdõ	H	46.39	Y
HU	HUAN20005	Szuha-völgy	H	9.29	Y
HU	HUAN20006	Sajó-völgy	H	19.02	Y
HU	HUBF20006	Tihanyi-félsziget	H	7.51	Y
HU	HUBF20007	Monostorapáti Fekete-hegy	H	18.11	Y
HU	HUBF20009	Devecseri Széki-erdõ	H	15.93	Y
HU	HUBF20011	Felsõ-Nyirádi-erdõ és Meggyes-erdõ	H	42.13	Y

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HU	HUBF20015	Marcal-medence	H	48.97	Y
HU	HUBF20028	Tapolcai-medence	H	23.38	Y
HU	HUBF20037	Alsó-Zala-völgy	H	65.36	Y
HU	HUBF20043	Mura mente	H	21.31	Y
HU	HUBF20044	Kerka mente	H	72.62	Y
HU	HUBF20045	Szévíz–Principális-csatorna	H	83.81	Y
HU	HUBF20047	Felsõ-Zala-völgy	H	11.67	Y
HU	HUBF20048	Kebele	H	19.09	Y
HU	HUBF20049	Dél-zalai homokvidék	H	29.28	Y
HU	HUBF20050	Csörnyeberek	H	21.44	Y
HU	HUBF20052	Sárvíz-patak mente	H	11.64	Y
HU	HUBF30001	Északi Bakony,Északi-Bakony	B,H	258.03	Y,Z
HU	HUBF30002	Balaton	B,H	588.9	Y
HU	HUBF30003	Kis-Balaton	B,H	128.03	Y
HU	HUBN10001	Bodrogzug - Kopasz-hegy - Taktak	B	222.54	Y
HU	HUBN10002	Borsodi-sík	B	371.5	Y
HU	HUBN10003	Bükk hegység és peremterületei	B	664	Z
HU	HUBN10004	Hevesi-sík	B	773.39	Z
HU	HUBN10005	Kesznyéteni Sajó-öböl	B	64.11	Y
HU	HUBN10006	Mátra hegység és peremterületei	B	374.9	Z
HU	HUBN10007	Zemplén hegység, a Szerencsi-dom	B	1152	Z
HU	HUBN20001	Bükk-fennsík és a Lök-völgy	H	140.79	Y

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HU	HUBN20015	Izra-völgy és az Arlói-tó	H	12.48	Y
HU	HUBN20018	Upponyi-szoros	H	11.99	Y
HU	HUBN20034	Borsodi-Mezõség	H	147.58	Y
HU	HUBN20035	Poroszlói szikesek	H	9.3	Y
HU	HUBN20040	Nagy-fertõ – Gulya-gyep – Hamvajárás szikes pusztái	H	18.29	Y
HU	HUBN20041	Pélyi szikesek	H	27.79	Y
HU	HUBN20047	Mátra északi letörése	H	7.72	Y
HU	HUBN20057	Bézma	H	8.05	Y
HU	HUBN20062	Közép-Ipoly-völgy	H	16	Y
HU	HUBN20069	Kesznyéteni Sajó-öböl	H	46.92	Y
HU	HUBN20071	Bodrogzug és Bodrog hullámtere	H	72.27	Y
HU	HUBN20081	Long-erdõ	H	30.99	Y
HU	HUBN20084	Központi-Zempléni-hegység	H	86.59	Y
HU	HUDD10002	Nyugat-Dráva	B	152.08	Y
HU	HUDD10003	Gemenc	B	195.13	Y
HU	HUDD10004	Béda-Karapancsa	B	87.25	Y
HU	HUDD10005	Kisszékelyi-dombság	B	26.34	Z
HU	HUDD10007	Mecsek	B	208.05	Z
HU	HUDD10008	Belsõ-Somogy	B	333.94	Z
HU	HUDD10012	Balatoni berkek	B	90.13	Y
HU	HUDD20007	Kelet-Dráva	H	64.04	Y
HU	HUDD20008	Ormánsági erdõk	H	102.5	Y

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HU	HUDD20014	Jánosházi-erdõ és Égett-berek	H	5.91	Y
HU	HUDD20015	Kisbajomi erdõk	H	12.81	Y
HU	HUDD20023	Tolnai Duna	H	57.02	Y
HU	HUDD20030	Mecsek	H	261.71	Y
HU	HUDD20031	Fehérvíz	H	15.3	Y
HU	HUDD20032	Gemenc	H	198.78	Y
HU	HUDD20035	Pogány-völgyi rétek	H	18.22	Y
HU	HUDD20036	Ordacsehi berek	H	7.81	Y
HU	HUDD20044	Boronka-melléke	H	106.44	Y
HU	HUDD20045	Béda-Karapancsa	H	112.03	Y
HU	HUDD20051	Darányi borókás	H	34.59	Y
HU	HUDD20052	Ormánsági vizes élõhelyek és gyepek	H	13.76	Y
HU	HUDD20056	Közép-Dráva	H	61.94	Y
HU	HUDD20058	Látrányi-puszta	H	8.6	Y
HU	HUDD20059	Balatonkeresztúri rétek	H	5.57	Y
HU	HUDD20060	Rinyaszentkirályi-erdõ	H	5.23	Y
HU	HUDD20062	Nyugat-Dráva-sík	H	52.32	Y
HU	HUDD20063	Szentai-erdõ	H	189	Y
HU	HUDD20073	Szedresi Õs-Sárvíz	H	7.06	Y
HU	HUDI10002	Börzsöny és Visegrádi-hegység	B	497.73	Z
HU	HUDI10003	Gerecse	B	309.95	Z
HU	HUDI10004	Jászkarajenõi puszták	B	96.54	Z
HU	HUDI10005	Sárvíz völgye	B	78.11	Y
HU	HUDI10006	Tatai Öreg-tó	B	20.11	Y
HU	HUDI10007	Velencei-tó és Dinnyési-fertõ	B	21.18	Y

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HU	HUDI10008	Ipoly völgye	B	63.42	Y
HU	HUDI20008	Börzsöny	H	304.24	Y
HU	HUDI20019	Felsõ-Tápió	H	20.31	Y
HU	HUDI20021	Gerje mente	H	34.32	Y
HU	HUDI20022	Gógány- és Kõrös-ér mente	H	8.24	Y
HU	HUDI20024	Tápiógyörgye-újszilvási szikesek	H	17.54	Y
HU	HUDI20025	Hajta mente	H	57.84	Y
HU	HUDI20026	Alsó-Ipoly-völgy	H	29.54	Y
HU	HUDI20034	Duna és ártere	H	166.42	Y
HU	HUDI20039	Pilis és Visegrádi-hegység	H	311.88	Y
HU	HUDI20042	Ráckevei Duna-ág	H	35.43	Y
HU	HUDI20044	Sárrét	H	39.91	Y
HU	HUDI20050	Alsó-Tápió és patakvölgyek	H	18.1	Y
HU	HUDI20051	Turjánvidék	H	106.31	Y
HU	HUDI20054	Velencei-tó	H	9.97	Y
HU	HUDI30001	Vértes	B	255.39	Z
HU	HUDI30002	Zámolyi-medence	B,H	25.96	Y
HU	HUFH10001	Fertõ-tó	B	84.71	Y
HU	HUFH10004	Mosoni-sík	B	131.53	Z
HU	HUFH20001	Rábaköz	H	59.69	Y
HU	HUFH20002	Fertõ tó	H	113.2	Y
HU	HUFH20003	Fertõmelléki dombsor	H	25.46	Y
HU	HUFH20010	Répce mente	H	15.13	Y
HU	HUFH20011	Rába	H	42.28	Y
HU	HUFH20012	Soproni-hegység	H	53.53	Y
HU	HUFH30004	Szigetköz	B,H	173.32	Y
HU	HUFH30005	Hanság	B,H	134.8	Y
HU	HUHN10001	Szatmár-Bereg	B	527.55	Y
HU	HUHN10002	Hortobágy	B	1207.9	Y
HU	HUHN10003	Bihar	B	734.68	Z

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HU	HUHN10004	Közép-Tisza	B	131.56	Y
HU	HUHN10005	Jászság	B	163.87	Z
HU	HUHN10008	Felsõ-Tisza	B	146.16	Y
HU	HUHN20001	Felsõ-Tisza	H	277.35	Y
HU	HUHN20002	Hortobágy	H	1040.6	Y
HU	HUHN20003	Tisza-tó	H	178.19	Y
HU	HUHN20004	Felsõ-Sebes-Körös	H	8.73	Y
HU	HUHN20007	Szentpéterszeg-hencidai gyepek	H	9.41	Y
HU	HUHN20008	Kismarja–Pocsaj–esztári gyepek	H	25.76	Y
HU	HUHN20009	Derecske–konyári gyepek	H	36.18	Y
HU	HUHN20013	Közép-Bihar	H	122.87	Y
HU	HUHN20014	Kismarjai Nagy-szik	H	6.92	Y
HU	HUHN20015	Közép-Tisza	H	138.87	Y
HU	HUHN20016	Kék-Kálló-völgye	H	14.77	Y
HU	HUHN20035	Ömbölyi-erdõ és Fényi-erdõ	H	14.36	Y
HU	HUHN20045	Kaszonyi-hegy – Dédai-erdõ	H	14.53	Y
HU	HUHN20046	Gelénes–Beregdaróc	H	11.77	Y
HU	HUHN20047	Vámosatya-Csaroda	H	18.67	Y
HU	HUHN20048	Tarpa-Tákos	H	63.05	Y
HU	HUHN20049	Lónya–Tiszaszalka	H	37.7	Y
HU	HUHN20050	Kömörõ–Fülesd	H	19.64	Y
HU	HUHN20053	Magosligeti-erdõ és gyepek	H	5.67	Y

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HU	HUHN20054	Csaholc–Garbolc	H	40.53	Y
HU	HUHN20058	Teremi-erdõ	H	7.58	Y
HU	HUHN20063	Baktai-edõ	H	10.17	Y
HU	HUHN20069	Hajdúszoboszlói szikes gyepek	H	5.51	Y
HU	HUHN20076	Borsóhalmi-legelõ	H	14.59	Y
HU	HUHN20093	Kaba-földesi gyepek	H	45.97	Y
HU	HUHN20098	Dél-ásványi gyepek	H	15.49	Y
HU	HUHN20100	Gatály	H	7.69	Y
HU	HUHN20101	Bihari-legelõ	H	25.24	Y
HU	HUHN20103	Berekböszörmény–körmösdpusztai legelõk	H	13.46	Y
HU	HUHN20105	Csökmõi gyepek	H	6.09	Y
HU	HUHN20113	Kisvárdai gyepek	H	5.78	Y
HU	HUHN20114	Tiszalöki szikesek	H	15.58	Y
HU	HUHN20141	Tiszaigar–Tiszaörsi Körtvélyes	H	6.13	Y
HU	HUHN20145	Kecskeri-puszta és környéke	H	14.37	Y
HU	HUHN20146	Hegyesbor	H	13.15	Y
HU	HUKM10001	Kígyósi-puszta	B	88.34	Y
HU	HUKM10002	Kis-Sárrét	B	83.4	Y
HU	HUKM10003	Dévaványai-sík	B	251.17	Z
HU	HUKM10004	Vásárhelyi- és Csanádi-puszták	B	215.47	Y
HU	HUKM10005	Cserebökényi-puszta	B	279.6	Z
HU	HUKM20001	Hódmezõvásárhely környéki és csanádi-háti gyepek	H	160.98	Y

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HU	HUKM20004	Száraz-ér	H	15.58	Y
HU	HUKM20008	Maros	H	58.25	Y
HU	HUKM20010	Gyula–szabadkígyósi gyepek	H	114.73	Y
HU	HUKM20011	Körösközi erdõk	H	57.83	Y
HU	HUKM20012	Fekete-	H	16.42	Y
HU	HUKM20013	Bélmegyeri Fás-puszta	H	6.45	Y
HU	HUKM20014	Dévaványa környéki gyepek	H	134.18	Y
HU	HUKM20015	Hortobágy–Berettyó	H	30.18	Y
HU	HUKM20016	Sebes-Körös	H	11.21	Y
HU	HUKM20017	Hármas-Körös	H	76.55	Y
HU	HUKM20018	Holt-Sebes-Körös	H	5.3	Y
HU	HUKM20019	Dél-Bihari szikesek	H	70.12	Y
HU	HUKM20027	Cserebökény	H	98.57	Y
HU	HUKM20028	Tõkei gyepek	H	29.83	Y
HU	HUKM20029	Szentesi gyepek	H	6.14	Y
HU	HUKM20030	Lapistó–Fertõ	H	18.86	Y
HU	HUKN10001	Felsõ Kiskunsági puszták és turj	B	462.16	Z
HU	HUKN10002	Kiskunsági szikes tavak és az Õr	B	357.48	Y
HU	HUKN10004	Tisza Alpár-Bokrosi ártéri öblöz	B	49.98	Y
HU	HUKN10007	Alsó-Tiszavölgy	B	363.43	Y
HU	HUKN10008	Balástya-Szatymaz környéki homok	B	61.78	Z
HU	HUKN20001	Felsõ-kiskunsági szikes puszta	H	157.8	Y

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HU	HUKN20002	Peszéri-erdõ	H	16.27	Y
HU	HUKN20003	Felsõ-kiskunsági turjánvidék	H	144.43	Y
HU	HUKN20004	Dél-Bácska	H	7.79	Y
HU	HUKN20005	Tass–szalkszentmártoni szikes puszta	H	16.52	Y
HU	HUKN20008	Déli-Homokhátság	H	22.93	Y
HU	HUKN20009	Felsõ-kiskunsági szikes tavak és Miklapuszta	H	195.78	Y
HU	HUKN20011	Fülöpházi homokbuckák	H	21.11	Y
HU	HUKN20013	Fülöpszállás–Soltszentimre–csengõdi lápok	H	31.16	Y
HU	HUKN20015	Ágasegyháza–orgoványi rétek	H	43.09	Y
HU	HUKN20017	Közép-csongrádi szikesek	H	11.42	Y
HU	HUKN20018	Jánoshalma-kunfehértói erdõk	H	9.41	Y
HU	HUKN20019	Baksi-puszta	H	48.66	Y
HU	HUKN20020	Harkai-tó	H	6.38	Y
HU	HUKN20021	Ökördi–erdõtelek–keceli lápok	H	25.28	Y
HU	HUKN20022	Kiskõrösi turjános	H	28.84	Y
HU	HUKN20023	Tázlár–kiskunhalasi homokbuckák	H	19.17	Y
HU	HUKN20024	Bócsa-bugaci homokpuszta	H	116.33	Y
HU	HUKN20026	Móricgáti lápok	H	7.6	Y
HU	HUKN20027	Péteri-tó	H	7.81	Y
HU	HUKN20028	Tiszaalpár-bokrosi ártéri öblözet	H	32.88	Y
HU	HUKN20031	Alsó-Tisza hullámtér	H	76.9	Y
HU	HUKN20032	Dél-Õrjeg	H	45.65	Y

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HU	HUKN20036	Imre-hegy	H	15.72	Y
HU	HUKN30001	Csongrád-Bokrosi sóstó	B,H	7.3	Y
HU	HUKN30002	Gátéri Fehér-tó,Gátéri-Fehértó	B,H	8.15	Y
HU	HUKN30003	Izsáki Kolon-tó	B,H	35.78	Y
HU	HUON10001	Õrség	B	474.67	Z
HU	HUON20002	Kõszegi-hegység	H	41.19	Y
HU	HUON20003	Ablánc patak völgye	H	13.66	Y
HU	HUON20008	Rába és Csörnöc-völgy	H	117.82	Y
HU	HUON20018	Õrség	H	459.91	Y
SI	SISI3000046	Bela Krajina	H	5.38	Y
SI	SISI3000051	Krakovski gozd	H	34.12	Y
SI	SISI3000057	Vrhtrebnje - Sv. Ana	H	6.91	Y
SI	SISI3000059	Mirna	H	5.17	Y
SI	SISI3000062	Gradac	H	14.91	Y
SI	SISI3000075	Lahinja	H	8.24	Y
SI	SISI3000100	Gozd Kranj - Škofja Loka	H	19.51	Y
SI	SISI3000101	Gozd Olševek - Adergas	H	8.33	Y
SI	SISI3000126	Nanoščica	H	6.69	Y
SI	SISI3000149	Obrež	H	7.57	Y
SI	SISI3000166	Razbor	H	14.67	Y
SI	SISI3000171	Radensko polje - Viršnica	H	5	Y
SI	SISI3000172	Zgornja Drava s pritoki	H	59.49	Y

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SI	SISI3000173	Bloščica	H	7.85	Y
SI	SISI3000175	Kolpa	H	8.5	Y
SI	SISI3000188	Ajdovska planota	H	24.11	Y
SI	SISI3000191	Ajdovska jama	H	17.06	Y
SI	SISI3000192	Radulja	H	12.29	Y
SI	SISI3000194	Radgonsko - Kapelske Gorice	H	10.9	Y
SI	SISI3000197	Slavinski Ravnik	H	11.91	Y
SI	SISI3000205	Kandrše	H	13.29	Y
SI	SISI3000206	Marijino brezno	H	12.48	Y
SI	SISI3000214	Ličenca pri Poljčanah	H	27.21	Y
SI	SISI3000215	Mura	H	82.44	Y
SI	SISI3000219	Grad Brdo - Preddvor	H	5.8	Y
SI	SISI3000220	Drava	H	36.23	Y
SI	SISI3000221	Goričko	H	448.23	Y
SI	SISI3000224	Huda luknja	H	30.15	Y
SI	SISI3000227	Krka	H	13.39	Y
SI	SISI3000231	Javorniki - Snežnik	H	438.21	Y
SI	SISI3000232	Notranjski trikotnik	H	152.02	Y
SI	SISI3000253	Julijske Alpe	H	741.59	Y
SI	SISI3000255	Trnovski gozd - Nanos	H	526.36	Y
SI	SISI3000256	Krimsko hribovje - Menišija	H	201.07	Y
SI	SISI3000257	Rački ribniki - Požeg	H	5.06	Y

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SI	SISI3000263	Kočevsko	H	1063.4	Y
SI	SISI3000264	Kamniško - Savinjske Alpe	H	145.19	Y
SI	SISI3000267	Gorjanci - Radoha	H	116.07	Y
SI	SISI3000268	Dobrava - Jovsi	H	29.02	Y
SI	SISI3000270	Pohorje	H	268.26	Y
SI	SISI3000271	Ljubljansko barje	H	126.66	Y
SI	SISI3000273	Orlica	H	37.73	Y
SI	SISI3000274	Bohor	H	67.93	Y
SI	SISI3000275	Rašica	H	22.12	Y
SI	SISI3000278	Pokljuška barja	H	8.72	Y
SI	SISI3000285	Karavanke	H	230.66	Y
SI	SISI5000001	Jelovica	B	98	Y
SI	SISI5000002	Snežnik - Pivka	B	549.06	Y
SI	SISI5000004	Slovenske gorice	B	49.43	Y
SI	SISI5000005	Dravinjska dolina	B	19.61	Y
SI	SISI5000006	Pohorje	B	197.31	Y
SI	SISI5000009	Goričko	B	365.99	Y
SI	SISI5000010	Mura	B	145.32	Y
SI	SISI5000011	Drava	B	108.06	Y
SI	SISI5000012	Krakovski gozd - Šentjernejsko polje	B	95.33	Y
SI	SISI5000013	Kočevsko - Kolpa	B	978.55	Y
SI	SISI5000014	Ljubljansko barje	B	126.38	Y

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SI	SISI5000015	Cerkniško jezero	B	33.57	Y
SI	SISI5000016	Planinsko polje	B	10.42	Y
SI	SISI5000017	Nanoščica - porečje	B	19.41	Y
SI	SISI5000019	Julijske Alpe - Triglav	B	845.5	Y
SI	SISI5000021	Trnovski gozd - južni rob in Nanos,Trnovski gozd in Nanos - južni rob	B	122.42	Y
SI	SISI5000022	Kozjansko - Dobrava - Jovsi	B	115.95	Y
SI	SISI5000024	Kamniško - Savinjske Alpe in vzhodne Karavanke	B	232.83	Y
SI	SISI5000026	Posavsko hribovje	B	26.73	Y
HR	HR1000001	Pokupski bazen	B	449.51	Y
HR	HR1000002	Sava kod Hruščice (s okolnim šljunčarama)	B	17.58	Y
HR	HR1000003	Turopolje	B	227.35	Y
HR	HR1000004	Donja Posavina	B	1256.2	Y
HR	HR1000005	Jelas polje s ribnjacima i poplavnim pašnjacima uz Savu	B	417.55	Y
HR	HR1000006	Spačvanski bazen	B	429.02	Y
HR	HR1000011	Ribnjaci Grudnjak i Našički ribnjak s kompleksom lužnjakovih šuma	B	205.48	Y
HR	HR1000013	Dravske akumulacije	B	195.62	Y
HR	HR1000014	Gornji tok Drave (od Donje Dubrave do Terezinog polja)	B	340.85	Y
HR	HR1000015	Srednji tok Drave (od Terezinog polja do Donjeg Miholjca)	B	171.58	Y
HR	HR1000016	Podunavlje i donje Podravlje	B	816.79	Y
HR	HR1000021	Lička krška polja	B	706.16	Y
HR	HR1000040	Papuk	B	362.58	Y
HR	HR2000364	Mura	H	145.5	Y
HR	HR2000365	Plitvica	H	21.49	Y
HR	HR2000366	Bednja	H	42.23	Y
HR	HR2000372	Dunav - Vukovar	H	60.33	Y
HR	HR2000382	Potok Zbel	H	7.45	Y
HR	HR2000388	Slanje	H	6.76	Y
HR	HR2000394	Kopački rit	H	229.63	Y
HR	HR2000398	Ribnjaci Podunavlje	H	8.27	Y
HR	HR2000401	Ušæe Plitvice i Bednje	H	13.49	Y
HR	HR2000409	Križnica	H	7.06	Y
HR	HR2000414	Izvorišno područje Odre	H	9.05	Y

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HR	HR2000415	Odransko polje	H	84.93	Y
HR	HR2000416	Lonjsko polje	H	501.57	Y
HR	HR2000420	Sunjsko polje	H	203.52	Y
HR	HR2000424	Vlakanac - Radinje	H	31.94	Y
HR	HR2000426	Dvorina	H	20.55	Y
HR	HR2000427	Gajna	H	5.65	Y
HR	HR2000431	Sava - Štitar	H	17.18	Y
HR	HR2000439	Dolina Bijele	H	5.16	Y
HR	HR2000452	Zrinska gora	H	356.45	Y
HR	HR2000463	dolina Une	H	36.98	Y
HR	HR2000465	Žutica	H	46.95	Y
HR	HR2000569	Vuka	H	5.23	Y
HR	HR2000580	Papuk	H	350.2	Y
HR	HR2000583	Medvednica	H	226.01	Y
HR	HR2000592	Ogulinsko-plaščansko područje	H	434.61	Y
HR	HR2000593	Mrežnica - Tounjčica	H	15.2	Y
HR	HR2000595	Korana	H	25.15	Y
HR	HR2000609	Dolina Dretulje	H	5.81	Y
HR	HR2000613	Stari tok Drave I	H	26.07	Y
HR	HR2000614	Stari tok Drave II	H	24.5	Y
HR	HR2000620	Mala i Velika Utinja	H	21.49	Y
HR	HR2000631	Odra	H	5.02	Y
HR	HR2000632	Krbavsko polje	H	114.3	Y
HR	HR2000642	Kupa	H	62.82	Y
HR	HR2000879	Lapačko polje	H	22.22	Y
HR	HR2001116	Sava	H	119.35	Y
HR	HR2001118	Park šuma Jankovac	H	6.38	Y
HR	HR5000006	Spačvanski bazen	H	429.02	Y
HR	HR5000013	Šire područje Drave	H	1525.3	Y
HR	HR5000020	Nacionalni park Plitvička jezera (s Vrhovinskim poljem)	H	266.39	Y
BA	BABardaca	Zasticeno podrucje BARDACA	B	35	
RS	RS121	Fruska gora	O	253.93	Y
RS	RS314	Djerdap	O	636.08	Y
RS	RS485	Gornje Podunavlje	O	196.48	Y
RS	RS50	Obedska bara	O	98.2	Y
RS	RS599	Zasavica	O	6.71	Y
RS	RS602	Karadjordjevo	O	29.55	Y
RS	RS605	Tikvara	O	5.08	Y
RS	RS608	Koviljsko-Petrovaradinski rit	O	48.41	Y
RS	RS619	Slano Kopovo	O	9.76	Y
RS	RS64	Ludasko jezero	O	8.59	Y
RS	RS663	Jegricka	O	11.45	Y
RS	RS666	Vlasina	O	128.15	Y

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RS	RS69	Stari Begej-Carska bara	O	16.76	Y
RS	RS99997	Labudovo okno	O	37.33	Y
RS	RS99999	Pester	O	34.53	Y
RO	ROSCI0002	Apuseni	H	761.5	Y
RO	ROSCI0004	Bagau	H	32.57	Y
RO	ROSCI0005	Balta Alba - Amara - Jirlau - Lacul Sarat	H	64.04	Y
RO	ROSCI0006	Balta Mica a Brailei	H	204.6	Y
RO	ROSCI0007	Bazinul Ciucului de Jos	H	26.86	Y
RO	ROSCI0008	Betfia	H	17.48	Y
RO	ROSCI0012	Bratul Macin	H	103.03	Y
RO	ROSCI0013	Bucegi	H	387.45	Y
RO	ROSCI0015	Buila - Vanturarita	H	44.9	Y
RO	ROSCI0019	Calimani - Gurghiu	H	1366.6	Y
RO	ROSCI0020	Campia Careiului	H	242.24	Y
RO	ROSCI0021	Campia Ierului	H	217.85	Y
RO	ROSCI0022	Canaralele Dunarii	H	260.64	Y
RO	ROSCI0024	Ceahlau	H	77.39	Y
RO	ROSCI0025	Cefa	H	54.13	Y
RO	ROSCI0027	Cheile Bicazului - Hasmas	H	76.45	Y
RO	ROSCI0028	Cheile Cernei	H	5.35	Y
RO	ROSCI0029	Cheile Glodului, Cibului si Mazii	H	7.12	Y
RO	ROSCI0030	Cheile Lapusului	H	14.87	Y
RO	ROSCI0031	Cheile Nerei - Beusnita	H	372.89	Y
RO	ROSCI0036	Cheile Varghisului	H	8.3	Y
RO	ROSCI0037	Ciomad - Balvanyos	H	60.29	Y
RO	ROSCI0038	Ciucas	H	219.5	Y
RO	ROSCI0039	Ciuperceni - Desa	H	408.53	Y
RO	ROSCI0040	Coasta Lunii	H	8.3	Y
RO	ROSCI0042	Codru - Moma	H	242.45	Y
RO	ROSCI0043	Comana	H	253.26	Y
RO	ROSCI0044	Corabia - Turnu Magurele	H	70.24	Y
RO	ROSCI0045	Coridorul Jiului	H	713.94	Y
RO	ROSCI0046	Cozia	H	167.2	Y
RO	ROSCI0047	Creasta Nemirei	H	35.5	Y
RO	ROSCI0048	Crisul Alb	H	8.26	Y
RO	ROSCI0049	Crisul Negru	H	18.95	Y
RO	ROSCI0050	Crisul Repede amonte de Oradea	H	20.06	Y
RO	ROSCI0051	Cusma	H	446.36	Y
RO	ROSCI0056	Dealul Ciocas - Dealul Vitelului	H	9.1	Y
RO	ROSCI0058	Dealul lui Dumnezeu	H	5.7	Y
RO	ROSCI0061	Defileul Crisului Negru	H	23.27	Y
RO	ROSCI0062	Defileul Crisului Repede - Padurea Craiului	H	388.13	Y
RO	ROSCI0063	Defileul Jiului	H	111.56	Y
RO	ROSCI0064	Defileul Muresului	H	320.03	Y

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RO	ROSCI0065	Delta Dunarii	H	4505.4	Y
RO	ROSCI0066	Delta Dunarii - zona marina	H	1217	Y
RO	ROSCI0069	Domogled - Valea Cernei	H	620.14	Y
RO	ROSCI0070	Drocea	H	256.41	Y
RO	ROSCI0071	Dumbraveni - Valea Urluia - Lacul Vederoa	H	187.14	Y
RO	ROSCI0074	Fagetul Clujului - Valea Morii	H	16.39	Y
RO	ROSCI0079	Fanatele de pe Dealul Corhan - Sabed	H	5.15	Y
RO	ROSCI0084	Ferice - Plai	H	19.77	Y
RO	ROSCI0085	Frumoasa	H	1371.2	Y
RO	ROSCI0086	Gaina - Lucina	H	8.36	Y
RO	ROSCI0087	Gradistea Muncelului - Ciclovina	H	400.09	Y
RO	ROSCI0088	Gura Vedei - Saica - Slobozia	H	58.13	Y
RO	ROSCI0089	Gutai - Creasta Cocosului	H	6.93	Y
RO	ROSCI0090	Harghita Madaras	H	133.49	Y
RO	ROSCI0091	Herculian	H	128.46	Y
RO	ROSCI0092	Ignis	H	196.02	Y
RO	ROSCI0099	Lacul Stiucilor - Sic - Puini - Valea Leg	H	17.84	Y
RO	ROSCI0101	Larion	H	30.16	Y
RO	ROSCI0102	Leaota	H	14	Y
RO	ROSCI0103	Lunca Buzaului	H	39.91	Y
RO	ROSCI0104	Lunca Inferioara a Crisului Repede	H	8.44	Y
RO	ROSCI0105	Lunca Joasa a Prutului	H	56.21	Y
RO	ROSCI0106	Lunca Mijlocie a Argesului	H	36.35	Y
RO	ROSCI0108	Lunca Muresului Inferior	H	174.28	Y
RO	ROSCI0109	Lunca Timisului	H	97.68	Y
RO	ROSCI0111	Mestecanisul de la Reci	H	21.12	Y
RO	ROSCI0115	Mlastina Satchinez	H	23.15	Y
RO	ROSCI0116	Molhasurile Capatanei	H	8.16	Y
RO	ROSCI0119	Muntele Mare	H	16.59	Y
RO	ROSCI0122	Muntii Fagaras	H	1985	Y
RO	ROSCI0123	Muntii Macinului	H	185.46	Y
RO	ROSCI0124	Muntii Maramuresului	H	1033.9	Y
RO	ROSCI0125	Muntii Rodnei	H	479.75	Y
RO	ROSCI0126	Muntii Tarcu	H	588.4	Y
RO	ROSCI0128	Nordul Gorjului de Est	H	491.14	Y
RO	ROSCI0129	Nordul Gorjului de Vest	H	873.22	Y
RO	ROSCI0130	Oituz - Ojdula	H	152.72	Y
RO	ROSCI0131	Oltenita - Mostistea - Chiciu	H	119.3	Y
RO	ROSCI0132	Oltul Mijlociu - Cibin - Hartibaciu	H	20.54	Y
RO	ROSCI0135	Padurea Barnova - Repedea	H	124.26	Y
RO	ROSCI0137	Padurea Bogatii	H	63.29	Y
RO	ROSCI0149	Padurea Esechioi - Lacul Bugeac	H	32.58	Y
RO	ROSCI0154	Padurea Glodeni	H	10.91	Y
RO	ROSCI0155	Padurea Goroniste	H	8.07	Y

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RO	ROSCI0157	Padurea Hagieni - Cotul Vaii	H	36.52	Y
RO	ROSCI0162	Padurea Merisor - Cotul Zatuanului	H	5.79	Y
RO	ROSCI0166	Padurea Resca Hotarani	H	16.52	Y
RO	ROSCI0168	Padurea Sarului	H	70.06	Y
RO	ROSCI0172	Padurea si Valea Canaraua Fetii - Iortmac	H	144.73	Y
RO	ROSCI0188	Parang	H	299.07	Y
RO	ROSCI0194	Piatra Craiului	H	160.72	Y
RO	ROSCI0195	Piatra Mare	H	42.83	Y
RO	ROSCI0198	Platoul Mehedinti	H	538.92	Y
RO	ROSCI0200	Platoul Vascau	H	48.15	Y
RO	ROSCI0201	Podisul Nord Dobrogean	H	872.29	Y
RO	ROSCI0206	Portile de Fier	H	1242.6	Y
RO	ROSCI0207	Postavarul	H	12.8	Y
RO	ROSCI0208	Putna - Vrancea	H	381.9	Y
RO	ROSCI0212	Rarau - Giumalau	H	24.98	Y
RO	ROSCI0213	Raul Prut	H	125.06	Y
RO	ROSCI0214	Raul Tur	H	209.53	Y
RO	ROSCI0217	Retezat	H	431.98	Y
RO	ROSCI0218	Rovina Ineu	H	8.74	Y
RO	ROSCI0219	Rusca Montana	H	127.2	Y
RO	ROSCI0220	Sacueni	H	6.98	Y
RO	ROSCI0222	Saraturile Jijia Inferioara - Prut	H	109.76	Y
RO	ROSCI0224	Scrovistea	H	33.74	Y
RO	ROSCI0225	Seaca - Optasani	H	21.46	Y
RO	ROSCI0226	Semenic - Cheile Carasului	H	377.29	Y
RO	ROSCI0227	Sighisoara - Tarnava Mare	H	853.74	Y
RO	ROSCI0228	Sindrilita	H	8.84	Y
RO	ROSCI0229	Siriu	H	57.47	Y
RO	ROSCI0230	Slanic	H	13.92	Y
RO	ROSCI0233	Somesul Rece	H	84.62	Y
RO	ROSCI0236	Strei - Hateg	H	239.41	Y
RO	ROSCI0239	Tarnovu Mare - Latorita	H	13.04	Y
RO	ROSCI0240	Tasad	H	15.57	Y
RO	ROSCI0247	Tinovul Mare Poiana Stampei	H	6.44	Y
RO	ROSCI0250	Tinutul Padurenilor	H	43.18	Y
RO	ROSCI0251	Tisa Superioara	H	63.92	Y
RO	ROSCI0252	Toplita - Scaunul Rotund Borsec	H	54.36	Y
RO	ROSCI0253	Trascau	H	501.02	Y
RO	ROSCI0260	Valea Cepelor	H	7.61	Y
RO	ROSCI0262	Valea Iadei	H	28.41	Y
RO	ROSCI0263	Valea Ierii	H	61.94	Y
RO	ROSCI0264	Valea Izei si Dealul Solovan	H	476.75	Y
RO	ROSCI0266	Valea Oltetului	H	15.9	Y
RO	ROSCI0267	Valea Rosie	H	8.2	Y

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RO	ROSCI0268	Valea Valsanului	H	96.02	Y
RO	ROSCI0269	Vama Veche - 2 Mai	H	52.72	Y
RO	ROSCI0270	Vanatori - Neamt	H	308.41	Y
RO	ROSPA0001	Aliman - Adamclisi	B	194.67	Y
RO	ROSPA0002	Allah Bair - Capidava	B	116.45	Y
RO	ROSPA0003	Avrig - Scorei - Fagaras	B	27.88	Y
RO	ROSPA0004	Balta Alba - Amara - Jirlau	B	45.09	Y
RO	ROSPA0005	Balta Mica a Brailei	B	204.6	Y
RO	ROSPA0006	Balta Tataru	B	5.21	Y
RO	ROSPA0007	Balta Vederoasa	B	21.04	Y
RO	ROSPA0008	Baneasa - Canaraua Fetei	B	31.06	Y
RO	ROSPA0009	Bestepe - Mahmudia	B	36.62	Y
RO	ROSPA0010	Bistret	B	19.15	Y
RO	ROSPA0011	Blahnita	B	452.86	Y
RO	ROSPA0012	Bratul Borcea	B	130.96	Y
RO	ROSPA0013	Calafat - Ciuperceni - Dunare	B	290.24	Y
RO	ROSPA0014	Campia Cermeiului	B	199.76	Y
RO	ROSPA0015	Campia Crisului Alb si Crisului Negru	B	321.96	Y
RO	ROSPA0016	Campia Nirului - Valea Ierului	B	386.82	Y
RO	ROSPA0017	Canaralele de la Harsova	B	74.06	Y
RO	ROSPA0018	Cheile Bicazului - Hasmas	B	79.6	Y
RO	ROSPA0019	Cheile Dobrogei	B	109.29	Y
RO	ROSPA0020	Cheile Nerei - Beusnita	B	371.89	Y

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RO	ROSPA0021	Ciocanesti - Dunare	B	9.04	Y
RO	ROSPA0022	Comana	B	249.56	Y
RO	ROSPA0023	Confluenta Jiu - Dunare	B	219.99	Y
RO	ROSPA0024	Confluenta Olt - Dunare	B	212.85	Y
RO	ROSPA0025	Cozia - Buila - Vanturarita	B	217.69	Y
RO	ROSPA0026	Cursul Dunarii - Bazias - Portile de Fier	B	86.28	Y
RO	ROSPA0027	Dealurile Homoroadelor	B	368.81	Y
RO	ROSPA0028	Dealurile Tarnavelor si Valea Nirajului	B	852.17	Y
RO	ROSPA0029	Defileul Muresului Inferior - Dealurile Lipovei	B	556.6	Y
RO	ROSPA0030	Defileul Muresului Superior	B	95.1	Y
RO	ROSPA0031	Delta Dunarii si Complexul Razim - Sinoie	B	5123.8	Y
RO	ROSPA0032	Deniz Tepe	B	18.91	Y
RO	ROSPA0033	Depresiunea si Muntii Giurgeului	B	581.76	Y
RO	ROSPA0034	Depresiunea si Muntii Ciucului	B	171.83	Y
RO	ROSPA0035	Domogled - Valea Cernei	B	611.91	Y
RO	ROSPA0036	Dumbraveni	B	20.55	Y
RO	ROSPA0037	Dumbravita - Rotbav - Magura Codlei	B	45.36	Y
RO	ROSPA0038	Dunare - Oltenita	B	59.51	Y
RO	ROSPA0039	Dunare - Ostroave	B	162.23	Y
RO	ROSPA0040	Dunarea Veche - Bratul Macin	B	187.59	Y
RO	ROSPA0042	Elesteele Jijiei si Miletinului	B	194.25	Y
RO	ROSPA0043	Frumoasa	B	1311.8	Y

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
RO	ROSPA0044	Gradistea - Caldarusani - Dridu	B	66.42	Y
RO	ROSPA0045	Gradistea Muncelului - Cioclovina	B	381.16	Y
RO	ROSPA0046	Gruia - Garla Mare	B	27.56	Y
RO	ROSPA0047	Hunedoara Timisana	B	15.36	Y
RO	ROSPA0048	Ianca - Plopu - Sarat	B	19.82	Y
RO	ROSPA0049	Iazurile de pe valea Ibanesei - Baseului - Podrigai	B	25.12	Y
RO	ROSPA0050	Iazurile Mihesu de Campie - Taureni	B	12.08	Y
RO	ROSPA0051	Iezerul Calarasi	B	40.23	Y
RO	ROSPA0053	Lacul Bugeac	B	13.91	Y
RO	ROSPA0054	Lacul Dunareni	B	10.03	Y
RO	ROSPA0055	Lacul Galatui	B	9.07	Y
RO	ROSPA0056	Lacul Oltina	B	35.42	Y
RO	ROSPA0057	Lacul Siutghiol	B	20.23	Y
RO	ROSPA0058	Lacul Stanca Costesti	B	20.51	Y
RO	ROSPA0059	Lacul Strachina	B	10.64	Y
RO	ROSPA0060	Lacurile Tasaul - Corbu	B	27.01	Y
RO	ROSPA0061	Lacul Techirghiol	B	30.35	Y
RO	ROSPA0062	Lacurile de acumulare de pe Arges	B	21.8	Y
RO	ROSPA0063	Lacurile de acumulare Buhusi - Bacau - Beresti	B	55.75	Y
RO	ROSPA0064	Lacurile Falticeni	B	6.59	Y
RO	ROSPA0065	Lacurile Fundata - Amara	B	7.09	Y
RO	ROSPA0067	Lunca Barcaului	B	26.66	Y

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
RO	ROSPA0068	Lunca Inferiora a Turului	B	201.26	Y
RO	ROSPA0069	Lunca Muresului inferior	B	174.28	Y
RO	ROSPA0070	Lunca Prutului - Vladesti - Frumusita	B	76.57	Y
RO	ROSPA0071	Lunca Siretului Inferior	B	384.96	Y
RO	ROSPA0072	Lunca Siretului Mijlociu	B	104.55	Y
RO	ROSPA0073	Macin - Niculitel	B	673.61	Y
RO	ROSPA0074	Maglavit	B	35.62	Y
RO	ROSPA0075	Magura Odobesti	B	127.53	Y
RO	ROSPA0076	Marea Neagra	B	1472.4	Y
RO	ROSPA0077	Maxineni	B	15.04	Y
RO	ROSPA0080	Muntii Almajului - Locvei	B	1178.9	Y
RO	ROSPA0081	Muntii Apuseni - Vladeasa	B	962.23	Y
RO	ROSPA0082	Muntii Bodoc Baraolt	B	580.21	Y
RO	ROSPA0083	Muntii Rarau - Giumalau	B	21.57	Y
RO	ROSPA0084	Muntii Retezat	B	380.09	Y
RO	ROSPA0085	Muntii Rodnei	B	472.07	Y
RO	ROSPA0086	Muntii Semenic - Cheile Carasului	B	361.96	Y
RO	ROSPA0087	Muntii Trascaului	B	587.53	Y
RO	ROSPA0088	Muntii Vrancei	B	381.9	Y
RO	ROSPA0089	Obcina Feredeului	B	639.83	Y
RO	ROSPA0090	Ostrovu Lung - Gostinu	B	24.88	Y
RO	ROSPA0091	Padurea Babadag	B	584.73	Y

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
RO	ROSPA0092	Padurea Barnova	B	128.86	Y
RO	ROSPA0093	Padurea Bogata	B	63.29	Y
RO	ROSPA0095	Padurea Macedonia	B	46.25	Y
RO	ROSPA0096	Padurea Miclesti	B	84.73	Y
RO	ROSPA0097	Pescaria Cefa - Padurea Radvani	B	122.53	Y
RO	ROSPA0098	Piemontul Fagaras	B	712.56	Y
RO	ROSPA0099	Podisul Hartibaciului	B	2463.6	Y
RO	ROSPA0100	Stepa Casimcea	B	222.26	Y
RO	ROSPA0101	Stepa Saraiu - Horea	B	41.85	Y
RO	ROSPA0102	Suhaia	B	12.5	Y
RO	ROSPA0103	Valea Alceului	B	10.72	Y
RO	ROSPA0104	Valea Fizesului - Sic - Lacul Stiucilor	B	16.27	Y
RO	ROSPA0105	Valea Mostistea	B	43.79	Y
RO	ROSPA0106	Valea Oltului Inferior	B	540.74	Y
RO	ROSPA0107	Vanatori - Neamt	B	308.4	Y
RO	ROSPA0108	Vedea - Dunare	B	228.74	Y
BG	BG0000106	Harsovska reka	H	367.56	Y
BG	BG0000107	Suha reka	H	624.81	Y
BG	BG0000113	Vitosha	B,H	158.7	Y
BG	BG0000117	Kotlenska planina	H	149.18	Y
BG	BG0000165	Lozenska planina	H	12.96	Y
BG	BG0000166	Vrachanski Balkan	H	360.25	Y
BG	BG0000168	Ludogorie	H	594.47	Y
BG	BG0000169	Ludogorie - Srebarna	H	52.24	Y
BG	BG0000171	Ludogorie - Boblata	H	48.33	Z
BG	BG0000173	Ostrovche	H	58.94	Y
BG	BG0000180	Boblata	H	32.17	Y
BG	BG0000181	Reka Vit	H	57.18	Y

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
BG	BG0000182	Orsoya	H	24.61	Y
BG	BG0000190	Vitata stena	H	26.3	Y
BG	BG0000199	Tzibar	H	23.04	Y
BG	BG0000204	Vardim	H	11.05	Y
BG	BG0000211	Tvardishka planina	H	256.04	Y
BG	BG0000213	Tarnovski visochini	H	44.32	Y
BG	BG0000214	Dryanovski manastir	H	29.86	Y
BG	BG0000231	Belenska gora	H	50.39	Z
BG	BG0000232	Batin	H	26.83	Y
BG	BG0000233	Studena reka	H	52.99	Y
BG	BG0000237	Ostrov Pozharevo	B	9.75	Y
BG	BG0000239	Obnova - Karaman dol	H	107.49	Y
BG	BG0000240	Studenetz	B,H	280.57	Y
BG	BG0000241	Srebarna	B,H	14.47	Y
BG	BG0000247	Nikopolsko plato	H	185.01	Y
BG	BG0000263	Skalsko	H	21.89	Y
BG	BG0000275	Yazovir Stamboliyski	H	93.53	Y
BG	BG0000308	Verila	H	37.48	Y
BG	BG0000313	Rui	H	16.36	Y
BG	BG0000322	Dragoman	H	213.57	Y
BG	BG0000332	Karlukovski karst	B	142.17	Y
BG	BG0000334	Ostrov	H	34.4	Y
BG	BG0000335	Karaboaz	H	122	Y
BG	BG0000336	Zlatiya	H	31.95	Y
BG	BG0000339	Rabrovo	H	9.11	Y
BG	BG0000340	Tzar Petrovo	H	17.48	Y
BG	BG0000374	Bebresh	H	68.22	Y
BG	BG0000377	Kalimok - Brashlen	H	73.32	Y
BG	BG0000396	Persina	H	223.77	Y
BG	BG0000399	Bulgarka	H	210.91	Y
BG	BG0000432	Golyama reka	H	74.52	Y
BG	BG0000494	Tzentralen Balkan	B,H	312.21	Y
BG	BG0000495	Rila	B,H	206.5	Y
BG	BG0000497	Archar	H	5.97	Y
BG	BG0000498	Vidbol	H	13.05	Y
BG	BG0000500	Voynitza	H	23.13	Y
BG	BG0000503	Reka Lom	H	14.41	Y
BG	BG0000507	Deleina	H	22.58	Y
BG	BG0000509	Tzibritza	H	9.63	Y
BG	BG0000517	Portitovtsi-Vladimirovo	H	6.64	Y
BG	BG0000518	Vartopski dol	H	9.87	Y
BG	BG0000521	Makresh	H	20.61	Y
BG	BG0000522	Vidinski park	H	15.79	Y
BG	BG0000523	Shishentzi	H	5.73	Y

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
BG	BG0000529	Marten-Ryahovo	H	11.73	Y
BG	BG0000530	Pozharevo - Garvan	H	58.66	Y
BG	BG0000533	Ostrovi Kozlodui	H	6.06	Y
BG	BG0000569	Kardam	H	9.18	Y
BG	BG0000570	Izvorovo - Kraishte	H	10.81	Y
BG	BG0000572	Rositza - Loznitza	H	18.12	Z
BG	BG0000576	Svishtovska gora	H	19.17	Y
BG	BG0000608	Lomovete	H	324.89	Y
BG	BG0000609	Reka Rositza	H	14.41	Y
BG	BG0000610	Reka Yantra	H	139	Y
BG	BG0000611	Yazovir Gorni Dubnik	H	25.39	Y
BG	BG0000613	Reka Iskar	H	94.58	Y
BG	BG0000614	Reka Ogosta	H	12.53	Y
BG	BG0000615	Devetashko plato	H	149.97	Y
BG	BG0000616	Mikre	H	154.47	Y
BG	BG0000617	Reka Palakariya	H	31.56	Y
BG	BG0000618	Vidima	H	18.23	Y
BG	BG0000624	Lyubash	H	12.67	Y
BG	BG0001014	Karlukovo	H	288.42	Y
BG	BG0001017	Karvav kamak	H	36.5	Y
BG	BG0001036	Balgarski izvor	H	26.19	Y
BG	BG0001037	Pastrina	H	35.52	Y
BG	BG0001040	Zapadna stara planina i Predba	H	2193	Y
BG	BG0001042	Iskarski prolom - Rzhana	H	226.93	Y
BG	BG0001043	Etropole - Baylovo	H	191.26	Y
BG	BG0001307	Plana	H	27.89	Y
BG	BG0001389	Sredna Gora	H	21.42	Y
BG	BG0001493	Tzentralen Balkan - buffer	H	867.22	Y
BG	BG0002001	Rayanovtsi	B	132.02	Y
BG	BG0002002	Zapaden Balkan	B	1467.7	Y
BG	BG0002004	Dolni Bogrov-Kazichene	B	22.54	Y
BG	BG0002005	Ponor	B	314.06	Y
BG	BG0002009	Zlatiata	B	435.38	Y
BG	BG0002017	Complex Belenski Ostrovi	B	66.83	Y
BG	BG0002018	Ostrov Vardim	B	11.66	Y
BG	BG0002024	Ribarnitsi Mechka	B	27.11	Y
BG	BG0002025	Lomovete	B	43.08	Y
BG	BG0002029	Kotlenska planina	B	196.89	Y
BG	BG0002030	Complex Kalimok	B	92.2	Y
BG	BG0002039	Harsovska reka	B	354	Y
BG	BG0002048	Suha reka	B	257.5	Y
BG	BG0002053	Vrachanski Balkan	B	309.17	Y
BG	BG0002062	Ludogorie	B	913.15	Y
BG	BG0002074	Nikopolsko plato	B	222.31	Y

Country	Area code	Name of Protected area	Type(s)	Area in km²	Water relevant according to EU WFD
BG	BG0002083	Svishtovsko-Belenska nizina	B	54.39	Y
BG	BG0002084	Palakaria	B	158.25	Y
BG	BG0002085	Chairya	B	14.5	Y
BG	BG0002088	Mikre	B	123.87	Y
BG	BG0002090	Berkovitsa	B	28.04	Z
BG	BG0002091	Ostrov Lakat	B	11.56	Y
BG	BG0002095	Gorni Dabnik-Telish	B	34	Y
BG	BG0002096	Obnova	B	54.21	Y
BG	BG0002101	Meshtitsa	B	16.27	Z
BG	BG0002102	Devetashko plato	B	78.92	Y
BG	BG0002104	Tsibarsko blato	B	9.11	Y
BG	BG0002109	Vasilyovska planina	B	454.84	Y
BG	BG0002110	Apriltsi	B	19.42	Z
BG	BG0002111	Velchevo	B	23.1	Z
BG	BG0002112	Ruy	B	173.94	Y
MD	MD1	Lord's Forest	O	158.32	Y
MD	MD2	Lower Prut Lakes	O	184.92	Y
UA	UA01	Danube Biosphere reserve	O	464	Y
UA	UA02	Izmail Islands	O	13.66	Y
UA	UA10	Carpathian biosphere reserve	O	578.8	Y
UA	UA11	Kartal lake	O	15	Y
UA	UA12	Kugurlui Lake	O	95	Y
UA	UA20	Uzhansikj national natural park	O	392	Y
UA	UA30	Pritisanskij regional landscape park	O	220	Y
UA	UA37	Lung	O	7.99	Y

GW pressures and measures

Annex 11 of the DRBM Plan

DRBM Plan Data Collection - Groundwater

The basis for the Data Collection is the 11 nominated transboundary groundwater bodies and groups of groundwater bodies. The focus of the data collection is on the whole national part of the Transboundary Groundwater Body.

Please use one document for the whole national part of the transboundary groundwater (GW) body and fill in the required information asked for in the templates on GW_Status, GW_Measures and GW_Pressures

In case there are changes or amendments concerning the delineation of the 11 nominated transboundary groundwater bodies and groups of groundwater bodies, please update: Roof Report - Annex 12 List of nominated transboundary groundwater bodies and groups of groundwater bodies.
In case there are changes in the Monitoring Network, please update: Summary Report to EU on monitoring programmes in the DRBD designed under Article 8 - Part II - Table 1 and Table 2

AT / DE (Austria / Germany)

Name of the Groundwater Body (GWB)	Locally used name of the GWB e.g. Maros	**Deep Groundwater Body - Thermal Water**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**DEGK1110 ATGK100158**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transboundary GWB) e.g. HU5	
Status		
Chemical Status	Good	If Poor, list the Pollutants/Indicators:
Quantitative Status	Good	If Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality	No	
Quantity	No	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	No	
Impact (deterioration) on quality of waters for human consumption due to …	No	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Deep Groundwater Body - Thermal Water**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**DEGK1110 ATGK100158**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transboundary GWB) e.g. HU5	

Measures (Basic and Other basic measures)

Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Wastewater Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			

Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) including those to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			

Controls, including a requirement for prior authorisation of artificial recharge or augmentation of GWBs Requirement for prior regulation of point source discharges liable to cause pollution Prohibition of direct discharge of pollutants into groundwater Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	No		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Deep Groundwater Body - Thermal Water**
ATGK100158	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**DEGK1110** **ATGK100158**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: No**	**Posing Risk/Poor status for Quantity: No**	**Where relevant, give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources Leakages from contaminated sites Leakages from waste disposal sites (landfill and agricultural waste disposal) Leakages associated with oil industry infrastructure Mine water discharges Discharges to ground such as disposal of contaminated water to soakways other relevant point sources (specify) **Diffuse Sources** Due to agricultural activities Due to Non-sewered population Urban land use **Water abstractions** Abstractions for agriculture Abstractions for public water supply Abstractions by industry IPPC activities Non-IPPC activities Abstractions by quarries/open cast coal sites Other major abstractions (specify) **Artificial recharge** Discharges to groundwater for artificial recharge purposes Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing) Mine water rebound Other major recharges (specify) **Other significant pressures** Saltwater intrusion Other intrusion (specify)			If Yes, specify the abstractions If Yes, specify the recharges If Yes, specify the intrusion

BG (Bulgaria)		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Karst groundwater in Malm-Valanginian basin**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**2**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**BG1G0000J3K0511**
Status		
Chemical Status	Good	if Poor, list the Pollutants/Indicators:
Quantitative Status	Good	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality	Yes,No	
Quantity	Yes,No	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	No	
Impact (deterioration) on quality of waters for human consumption due to …		
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Karst groundwater in Malm-Valanginian basin**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		2
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**BG1G0000J3K051**
Measures (Basic and Other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			

Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes		

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Karst groundwater in Malm-Valanginian basin**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**2**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**BG1G0000J3K051**

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: No**	**Posing Risk/Poor status for Quantity: No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities			
due to Non-sewered population			
Urban land use			
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			If Yes, specify the abstractions
Artificial recharge			
Discharges to groundwater for artificial recharge purposes			
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)			
Mine water rebound			
Other major recharges (specify)			If Yes, specify the recharges
Other significant pressures			
Saltwater intrusion			
Other intrusion (specify)			If Yes, specify the intrusion

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Porous groundwater in Neogene (Sarmatian)**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**4**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**BG1G00000N1049**
Status		
Chemical Status	Good	
Quantitative Status	Good	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality		
Quantity		
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	No	
Impact (deterioration) on quality of waters for human consumption due to …	No	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Porous groundwater in Neogene (Sarmatian)**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures /		4
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**BG1G00000N1049**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			

Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures			
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Porous groundwater in Neogene (Sarmatian)**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures /		**4**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**BG1G00000N1049**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: No**	**Posing Risk/Poor status for Quantity: No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities			
due to Non-sewered population			
Urban land use			
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			If Yes, specify the abstractions
Artificial recharge			
Discharges to groundwater for artificial recharge purposes			
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)			
Mine water rebound			
Other major recharges (specify)			If Yes, specify the recharges
Other significant pressures			
Saltwater intrusion			
Other intrusion (specify)			If Yes, specify the intrusion

HU (Hungary)

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Maros**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**5**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU5**
Status		
Chemical Status	**Poor**	**Nitrate**
Quantitative Status	**Good**	if Poor, please select (multi-selection possible):
(Risk: only in case there is No status assessment available)		
Quality	Yes, No	
Quantity	Yes, No	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	Quantity, Quality, both, No, unkNown	
Impact to terrestrial ecosystems due to …	Quantity, Quality, both, No, unkNown	
Impact to actual or potential legitimate uses due to …	Quantity, Quality, both, No, unkNown	**No**
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	Quantity, Quality, both, No	**Quality**
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Szamos**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**6**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU6**
Status		
Chemical Status	**Good**	
Quantitative Status	**Good**	if Poor, please select (multi-selection possible):
(Risk: only in case there is No status assessment available)		
Quality	Yes, No	
Quantity	Yes, No	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	Quantity, Quality, both, No, unkNown	No
Impact to terrestrial ecosystems due to …	Quantity, Quality, both, No, unkNown	**No**
Impact to actual or potential legitimate uses due to …	Quantity, Quality, both, No, unkNown	**No**
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	No
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	Quantity, Quality, both, No	**No**
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Duna-Tisza közi hátság déli rész**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**7**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU7**
Status		
Chemical Status	**Poor**	**Nitrate, Ammonium**
Quantitative Status	**Poor**	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to terrestrial ecosystem
(Risk: only in case there is No status assessment available)		
Quality	Yes, No	
Quantity	Yes, No	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	Quantity, Quality, both, No, unkNown	

Impact to terrestrial ecosystems due to …	Quantity, Quality, both, No, unkNown	**Quantity**
Impact to actual or potential legitimate uses due to …	Quantity, Quality, both, No, unkNown	**Quantity**
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	Quantity, Quality, both, No	**Both**
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Szigetköz, Hanság-Rábca**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**8**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU8**
Status		
Chemical Status	**Poor**	**Nitrate**
Quantitative Status	**Good**	if Poor, please select (multi-selection possible):
(Risk: only in case there is No status assessment available)		
Quality	Yes, No	
Quantity	Yes, No	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	Quantity, Quality, both, No, unkNown	
Impact to terrestrial ecosystems due to …	Quantity, Quality, both, No, unkNown	
Impact to actual or potential legitimate uses due to …	Quantity, Quality, both, No, unkNown	
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	Quantity, Quality, both, No	**Quality**
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Bodrog**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**9**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU9**
Status		
Chemical Status	**Good**	
Quantitative Status	**Good**	if Poor, please select (multi-selection possible):
(Risk: only in case there is No status assessment available)		
Quality	Yes, No	
Quantity	Yes, No	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	Quantity, Quality, both, No, unkNown	**No**
Impact to terrestrial ecosystems due to …	Quantity, Quality, both, No, unkNown	**No**
Impact to actual or potential legitimate uses due to …	Quantity, Quality, both, No, unkNown	**No**
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	**No**
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	Quantity, Quality, both, No	**No**
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Aggtelek**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**10**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU10**
Status		
Chemical Status	**Good**	
Quantitative Status	**Good**	if Poor, please select (multi-selection possible):
(Risk: only in case there is No status assessment available)		

Quality	Yes, No		
Quantity	Yes, No		
Review of the impact of human activity on groundwaters			
Impact to aquatic ecosystems due to …	Quantity, Quality, both, No, unkNown	**No**	
Impact to terrestrial ecosystems due to …	Quantity, Quality, both, No, unkNown	**No**	
Impact to actual or potential legitimate uses due to …	Quantity, Quality, both, No, unkNown	**No**	
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	**No**	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))			
Exemptions will be needed for …	Quantity, Quality, both, No	**No**	
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Dunántúli-középhegység északi rész**	
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**11**	
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU11**	
Status			
Chemical Status	**Good**	if Poor, please select (multi-selection possible): damage to surface waters (springs)	
Quantitative Status	**Poor**		
(Risk: only in case there is No status assessment available)			
Quality	Yes, No		
Quantity	Yes, No		
Review of the impact of human activity on groundwaters			
Impact to aquatic ecosystems due to …	Quantity, Quality, both, No, unkNown	**Quantity**	
Impact to terrestrial ecosystems due to …	Quantity, Quality, both, No, unkNown		
Impact to actual or potential legitimate uses due to …	Quantity, Quality, both, No, unkNown		
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown		
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))			
Exemptions will be needed for …	Quantity, Quality, both, No	**Quantity**	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Maros**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**5**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU5**

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities	**Yes**		
due to Non-sewered population	**Yes**		
Urban land use	**Yes**		
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			

Abstractions by quarries/open cast coal sites Other major abstractions (specify) **Artificial recharge** Discharges to groundwater for artificial recharge purposes Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing) Mine water rebound Other major recharges (specify) **Other significant pressures** Saltwater intrusion Other intrusion (specify)			If Yes, specify the abstractions If Yes, specify the recharges If Yes, specify the intrusion
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Szamos**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		6
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**HU6**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources Leakages from contaminated sites Leakages from waste disposal sites (landfill and agricultural waste disposal) Leakages associated with oil industry infrastructure Mine water discharges Discharges to ground such as disposal of contaminated water to soakways other relevant point sources (specify) **Diffuse Sources** due to agricultural activities due to Non-sewered population Urban land use **Water abstractions** Abstractions for agriculture Abstractions for public water supply Abstractions by industry IPPC activities Non-IPPC activities Abstractions by quarries/open cast coal sites Other major abstractions (specify) **Artificial recharge** Discharges to groundwater for artificial recharge purposes Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing) Mine water rebound Other major recharges (specify) **Other significant pressures** Saltwater intrusion Other intrusion (specify)			If Yes, specify the abstractions If Yes, specify the recharges If Yes, specify the intrusion
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Duna-Tisza közi hátság déli rész**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		7
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**HU7**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			

Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities	Yes		
due to Non-sewered population	Yes		
Urban land use	Yes		
Water abstractions		Yes	construction project; abstraction controls; rehabilitation projects; demand management measures, inter alia, promotion of adapted agricultural production such as low water requiring crops in areas affected by drought
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			If Yes, specify the abstractions
Artificial recharge			
Discharges to groundwater for artificial recharge purposes			
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)			
Mine water rebound			
Other major recharges (specify)			If Yes, specify the recharges
Other significant pressures			
Saltwater intrusion			
Other intrusion (specify)			If Yes, specify the intrusion

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Szigetköz, Hanság-Rábca**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**8**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU8**

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities	Yes		
due to Non-sewered population	Yes		
Urban land use	Yes		
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			If Yes, specify the abstractions
Artificial recharge			

Discharges to groundwater for artificial recharge purposes Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing) Mine water rebound Other major recharges (specify) **Other significant pressures** Saltwater intrusion Other intrusion (specify)			If Yes, specify the recharges If Yes, specify the intrusion

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Bodrog**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	9
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU9**

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources Leakages from contaminated sites Leakages from waste disposal sites (landfill and agricultural waste disposal) Leakages associated with oil industry infrastructure Mine water discharges Discharges to ground such as disposal of contaminated water to soakways other relevant point sources (specify) **Diffuse Sources** due to agricultural activities due to Non-sewered population Urban land use **Water abstractions** Abstractions for agriculture Abstractions for public water supply Abstractions by industry IPPC activities Non-IPPC activities Abstractions by quarries/open cast coal sites Other major abstractions (specify) **Artificial recharge** Discharges to groundwater for artificial recharge purposes Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing) Mine water rebound Other major recharges (specify) **Other significant pressures** Saltwater intrusion Other intrusion (specify)			If Yes, specify the abstractions If Yes, specify the recharges If Yes, specify the intrusion

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Aggtelek**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	10
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU10**

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources Leakages from contaminated sites Leakages from waste disposal sites (landfill and agricultural waste disposal)			

Leakages associated with oil industry infrastructure Mine water discharges Discharges to ground such as disposal of contaminated water to soakways other relevant point sources (specify) **Diffuse Sources** due to agricultural activities due to Non-sewered population Urban land use **Water abstractions** Abstractions for agriculture Abstractions for public water supply Abstractions by industry IPPC activities Non-IPPC activities Abstractions by quarries/open cast coal sites Other major abstractions (specify) **Artificial recharge** Discharges to groundwater for artificial recharge purposes Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing) Mine water rebound Other major recharges (specify) **Other significant pressures** Saltwater intrusion Other intrusion (specify)		If Yes, specify the abstractions If Yes, specify the recharges If Yes, specify the intrusion
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Dunántúli-középhegység északi r.**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**11**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU11**

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources Leakages from contaminated sites Leakages from waste disposal sites (landfill and agricultural waste disposal) Leakages associated with oil industry infrastructure Mine water discharges Discharges to ground such as disposal of contaminated water to soakways other relevant point sources (specify) **Diffuse Sources** due to agricultural activities due to Non-sewered population Urban land use **Water abstractions** Abstractions for agriculture Abstractions for public water supply Abstractions by industry IPPC activities Non-IPPC activities Abstractions by quarries/open cast coal sites Other major abstractions (specify) **Artificial recharge** Discharges to groundwater for artificial recharge purposes Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing) Mine water rebound Other major recharges (specify) **Other significant pressures** Saltwater intrusion			Pressures have stopped (mining activities closed) If Yes, specify the abstractions If Yes, specify the recharges

Other intrusion (specify)			If Yes, specify the intrusion
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Maros**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**5**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**HU5**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)	x		
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)	x		
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes, No		**Yes**
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Szamos**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**6**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**HU6**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**

Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)		
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment		
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies		
Requirement for prior regulation of point source discharges liable to cause pollution		
Prohibition of direct discharge of pollutants into groundwater		
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents		

Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)		
Will the basic measures identified above be sufficient to address the significant Pressures	Yes, No	Yes

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Duna-Tisza közi hátság déli rész**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**7**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU7**

Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)	x		
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)	x		
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment		Yes	
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			

Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	no		Quantity
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Szigetköz, Hanság-Rábca**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		8
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**HU8**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)	x		
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)	x		
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes, No		Yes
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Bodrog**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		9
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**HU9**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			

Nitrates Directive (91/676/EC) Habitats Directive (92/43/EEC) Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies Requirement for prior regulation of point source discharges liable to cause pollution Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes, No		**Yes**

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Aggtelek**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**10**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**HU10**

Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC) Urban Waste-water Treatment Directive (91/271/EEC) Plant Protection Products Directive (91/414/EEC) Nitrates Directive (91/676/EC) Habitats Directive (92/43/EEC) Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies Requirement for prior regulation of point source discharges liable to cause pollution			

Prohibition of direct discharge of pollutants into groundwater		
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents		
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)		
Will the basic measures identified above be sufficient to address the significant Pressures	Yes, No	**Yes**

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Dunántúli-középhegység északi r.**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**11**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**HU11**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			No measures needed as the pressures have stopped.
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes, No		**Yes**

RO (Romania)		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Platforma Valaha**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**2**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO2**
Status		
Chemical Status	Good	if Poor, list the Pollutants/Indicators:
Quantitative Status	Good	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality		
Quantity		
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	No	
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Platforma Valaha**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		2
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RO2**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			

Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Platforma Valaha**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**2**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RO2**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities			
due to Non-sewered population			
Urban land use			
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			If Yes, specify the abstractions
Artificial recharge			
Discharges to groundwater for artificial recharge purposes			
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)			
Mine water rebound			
Other major recharges (specify)			If Yes, specify the recharges
Other significant pressures			
Saltwater intrusion			
Other intrusion (specify)			If Yes, specify the intrusion

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Podisul Central Moldovenesc**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**3**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO3**
Status		
Chemical Status	Good	if Poor, list the Pollutants/Indicators:
Quantitative Status	Good	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality		

Quantity

Review of the impact of human activity on groundwaters	
Impact to aquatic ecosystems due to …	No
Impact to terrestrial ecosystems due to …	No
Impact to actual or potential legitimate uses due to …	No
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown

Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))	
Exemptions will be needed for …	No

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Podisul Central Moldovenesc**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**3**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO3**

Measures (Basic and other basic measures)

Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			

Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			

Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)

Will the basic measures identified above be sufficient to address the significant Pressures	Yes

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Podisul Central Moldovenesc**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**3**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO3**

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	Posing Risk/Poor status for Quality: Yes, No	Posing Risk/Poor status for Quantity: Yes, No	Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities			
due to Non-sewered population			
Urban land use			
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			If Yes, specify the abstractions
Artificial recharge			
Discharges to groundwater for artificial recharge purposes			
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)			
Mine water rebound			
Other major recharges (specify)			If Yes, specify the recharges
Other significant pressures			
Saltwater intrusion			
Other intrusion (specify)			If Yes, specify the intrusion

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Cobadin - Mangalia**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**4**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO4**
Status		
Chemical Status	Good	if Poor, list the Pollutants/Indicators:
Quantitative Status	Good	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality		
Quantity		
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	No	
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Cobadin - Mangalia**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**4**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO4**
Measures (Basic and other basic measures)		

Basic measures (Directive listed in Annex VI Part A)	Measures implemented to adress … (tick if Yes) Poor status/risk for Quality	Poor status/risk for Quantity	Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC) Urban Waste-water Treatment Directive (91/271/EEC) Plant Protection Products Directive (91/414/EEC) Nitrates Directive (91/676/EC) Habitats Directive (92/43/EEC) Integrated Pollution Prevention Control Directive (96/61/EC)			

Other basic measures as required by Article 11(3)(b-l)	Measures implemented to adress … (tick if Yes) Poor status/risk for Quality	Poor status/risk for Quantity	Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes		

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Cobadin - Mangalia**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**4**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO4**

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	Posing Risk/Poor status for Quality: Yes, No	Posing Risk/Poor status for Quantity: Yes, No	Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities			
due to Non-sewered population			
Urban land use			
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			

Abstractions by industry		
IPPC activities		
Non-IPPC activities		
Abstractions by quarries/open cast coal sites		
Other major abstractions (specify)		If Yes, specify the abstractions
Artificial recharge		
Discharges to groundwater for artificial recharge purposes		
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)		
Mine water rebound		
Other major recharges (specify)		If Yes, specify the recharges
Other significant pressures		
Saltwater intrusion		
Other intrusion (specify)		If Yes, specify the intrusion

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Mures**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**5**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO5**
Status		
Chemical Status	Poor	Nitrates
Quantitative Status	Good	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality		
Quantity		
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	No	
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	Yes	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Mures**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**5**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RO5**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)	x		
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)	x		
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			

Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	No		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Conul aluvial al Muresului**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		5
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RO5**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities	Yes		research, development and demonstrations projects regarding mathematical modeling of nitrate fate
due to Non-sewered population	Yes		
Urban land use			
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			If Yes, specify the abstractions
Artificial recharge			
Discharges to groundwater for artificial recharge purposes			
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)			
Mine water rebound			
Other major recharges (specify)			If Yes, specify the recharges
Other significant pressures			
Saltwater intrusion			
Other intrusion (specify)			If Yes, specify the intrusion
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Somes**	

EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**6**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO6**
Status		
Chemical Status	Good	if Poor, list the Pollutants/Indicators:
Quantitative Status	Good	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality		
Quantity		
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	No	
Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Somes**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**6**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RO6**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			

Will the basic measures identified above be sufficient to address the significant Pressures	Yes		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Somes**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**6**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RO6**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities			
due to Non-sewered population			
Urban land use			
Water abstractions			
Abstractions for agriculture			
Abstractions for public water supply			
Abstractions by industry			
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			If Yes, specify the abstractions
Artificial recharge			
Discharges to groundwater for artificial recharge purposes			
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)			
Mine water rebound			
Other major recharges (specify)			If Yes, specify the recharges
Other significant pressures			
Saltwater intrusion			
Other intrusion (specify)			If Yes, specify the intrusion

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Banat**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**7**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RO7**
Status		
Chemical Status	Good	if Poor, list the Pollutants/Indicators:
Quantitative Status	Good	if Poor, please select (multi-selection possible): exceeding available groundwater resource, damage to surface waters, damage to terrestrial ecosystem, saline or other intrusion
(Risk: only in case there is No status assessment available)		
Quality		
Quantity		
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	No	

Impact (deterioration) on quality of waters for human consumption due to …	Quantity, Quality, both, No, unkNown	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Banat**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		7
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RO7**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)			
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes		

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Banat**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		7
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RO7**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			

Discharges to ground such as disposal of contaminated water to soakways		
other relevant point sources (specify)		
Diffuse Sources		
due to agricultural activities		
due to Non-sewered population		
Urban land use		
Water abstractions		
Abstractions for agriculture		
Abstractions for public water supply		
Abstractions by industry		
IPPC activities		
Non-IPPC activities		
Abstractions by quarries/open cast coal sites		
Other major abstractions (specify)		If Yes, specify the abstractions
Artificial recharge		
Discharges to groundwater for artificial recharge purposes		
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)		
Mine water rebound		
Other major recharges (specify)		If Yes, specify the recharges
Other significant pressures		
Saltwater intrusion		
Other intrusion (specify)		If Yes, specify the intrusion

RS (Republic of Serbia)		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**Vojvodina**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**7**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**RS7**
Status		
Chemical Status		
Quantitative Status		
(Risk: only in case there is No status assessment available)		
Quality	No	
Quantity	Yes	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	No	
Impact to terrestrial ecosystems due to …	No	
Impact to actual or potential legitimate uses due to …	Yes	overabstraction (lowering of GW levels increases pumping costs and poses threat to intrusion of deep mineralized water)
Impact (deterioration) on quality of waters for human consumption due to …	No	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	Yes/No	can Not be defined at this stage due to lack of information on status assessment

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Vojvodina**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**7**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RS7**
Measures (Basic and other basic measures)			
Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)		x	No corresponding national legislation covers measures that should be implemented to address quantity risk.
Urban Waste-water Treatment Directive (91/271/EEC)			
Plant Protection Products Directive (91/414/EEC)			
Nitrates Directive (91/676/EC)			
Habitats Directive (92/43/EEC)			
Integrated Pollution Prevention Control Directive (96/61/EC)			
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)			
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment			
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies			
Requirement for prior regulation of point source discharges liable to cause pollution			
Prohibition of direct discharge of pollutants into groundwater			

Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents			
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	No		Additional measures needed, (WFD Annex VI, part B), including investigation, development and construction projects. Measures include further activities on construction of regional water supply systems, based on water sources in Danube aluvium.
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**Vojvodina**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		7
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**RS7**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites			
Leakages from waste disposal sites (landfill and agricultural waste disposal)			
Leakages associated with oil industry infrastructure			
Mine water discharges			
Discharges to ground such as disposal of contaminated water to soakways			
other relevant point sources (specify)			
Diffuse Sources			
due to agricultural activities			
due to Non-sewered population			
Urban land use			
Water abstractions			
Abstractions for agriculture		Yes	Measures include further activities on construction of regional water supply systems or Bačka and Banat, based on groundwater sources in the Danube alluvion. These sources will Not only solve the problem of providing an adequate supply of quality drinking water, but will also improve the quantitative status of the RS7 group of GWBs, since they will reduce the current rate of abstraction from deep aquifers by more than 3 m3/s. According to the WFD, these measures can be classified as »supplementary« measures (Annex VI, Part B), which include: research, development and demonstration projects and construction designs for new gw sources. Based on Serbia's investment potential, it is expected that project documentation can be completed by 2015, but the timeframe for the construction of these systems is still uncertain.
Abstractions for public water supply		Yes	
Abstractions by industry		Yes	
IPPC activities			
Non-IPPC activities			
Abstractions by quarries/open cast coal sites			
Other major abstractions (specify)			
Artificial recharge			
Discharges to groundwater for artificial recharge purposes			

Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing) Mine water rebound Other major recharges (specify) **Other significant pressures** Saltwater intrusion Other intrusion (specify)		

SK (Slovakia)		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**8**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**Podunajska Basin/Zitny ostrov/Szigetkoz, Hanság-Rabca**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**SK1000300P SK1000200P**
Status		
Chemical Status	**Good**	
Quantitative Status	**Good**	
(Risk: only in case there is No status assessment available)		
Quality	**No**	
Quantity	**No**	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	**No**	
Impact to terrestrial ecosystems due to …	**No**	
Impact to actual or potential legitimate uses due to …	**quality**	
Impact (deterioration) on quality of waters for human consumption due to …	**quality**	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	**no**	
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**9**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**Bodrog**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**SK1001500P**
Status		
Chemical Status	**Good**	
Quantitative Status	**Good**	
(Risk: only in case there is No status assessment available)		
Quality	**No**	
Quantity	**No**	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	**No**	
Impact to terrestrial ecosystems due to …	**No**	
Impact to actual or potential legitimate uses due to …	**quality**	
Impact (deterioration) on quality of waters for human consumption due to …	**quality**	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	**no**	
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**10**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**Slovensky kras/Aggtelek hgs.**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**SK200480KF**
Status		
Chemical Status	**Good**	
Quantitative Status	**Good**	
(Risk: only in case there is No status assessment available)		
Quality	**No**	
Quantity	**No**	
Review of the impact of human activity on groundwaters		
Impact to aquatic ecosystems due to …	**No**	
Impact to terrestrial ecosystems due to …	**No**	
Impact to actual or potential legitimate uses due to …	**No**	
Impact (deterioration) on quality of waters for human consumption due to …	**No**	
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))		
Exemptions will be needed for …	**No**	
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**11**

EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**Komarnanska Vysoka Kryha/Dunántúli-khgs. északi r.**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**SK300010FK** **SK300020FK**

Status	
Chemical Status	**Good**
Quantitative Status	**Good**
(Risk: only in case there is No status assessment available)	
Quality	**No**
Quantity	**No**
Review of the impact of human activity on groundwaters	
Impact to aquatic ecosystems due to …	**No**
Impact to terrestrial ecosystems due to …	**No**
Impact to actual or potential legitimate uses due to …	**quantity**
Impact (deterioration) on quality of waters for human consumption due to …	**No**
Less stringent environmental objectives & exemptions (WFD Art. 4 (4) and 4 (5))	
Exemptions will be needed for …	**No**

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**8**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**Podunajska Basin/Zitny ostrov/Szigetkoz, Hanság-Rabca**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**SK1000300P** **SK1000200P**

Measures (Basic and other basic measures)

Basic measures (Directive listed in Annex VI Part A)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on**
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)	**Yes**	**No**	
Urban Waste-water Treatment Directive (91/271/EEC)	**Yes**	**No**	
Plant Protection Products Directive (91/414/EEC)	**Yes**	**No**	
Nitrates Directive (91/676/EC)	**Yes**	**No**	
Habitats Directive (92/43/EEC)	**Yes**	**No**	
Integrated Pollution Prevention Control Directive (96/61/EC)	**Yes**	**No**	

Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes)** **Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)	**Yes**	**No**	
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment	**No**	**No**	
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies	**No**	**No**	
Requirement for prior regulation of point source discharges liable to cause pollution	**Yes**	**No**	
Prohibition of direct discharge of pollutants into groundwater	**Yes**	**No**	
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents	**Yes**	**No**	

Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)

Will the basic measures identified above be sufficient to address the significant Pressures	**Yes**

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**9**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**Bodrog**

EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**SK1001500P**

Measures (Basic and other basic measures)

Basic measures (Directive listed in Annex VI Part A)	Measures implemented to adress … (tick if Yes) Poor status/risk for Quality	Poor status/risk for Quantity	Explanatory Keywords: for Non EU-Member States - add information on
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)	Yes	No	
Urban Waste-water Treatment Directive (91/271/EEC)	Yes	No	
Plant Protection Products Directive (91/414/EEC)	Yes	No	
Nitrates Directive (91/676/EC)	Yes	No	
Habitats Directive (92/43/EEC)	Yes	No	
Integrated Pollution Prevention Control Directive (96/61/EC)	Yes	No	
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes) Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on**
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)	Yes	No	
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment	No	No	
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies	No	No	
Requirement for prior regulation of point source discharges liable to cause pollution	Yes	No	
Prohibition of direct discharge of pollutants into groundwater	Yes	No	
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents	Yes	No	

Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)

Will the basic measures identified above be sufficient to address the significant Pressures	Yes

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	**10**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	**Slovensky kras/Aggtelek hgs.**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	**SK200480KF**

Measures (Basic and other basic measures)

Basic measures (Directive listed in Annex VI Part A)	Measures implemented to adress … (tick if Yes) Poor status/risk for Quality	Poor status/risk for Quantity	Explanatory Keywords: for Non EU-Member States - add information on corresponding national legislation
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)	Yes	No	
Urban Waste-water Treatment Directive (91/271/EEC)	Yes	No	
Plant Protection Products Directive (91/414/EEC)	Yes	No	
Nitrates Directive (91/676/EC)	Yes	No	
Habitats Directive (92/43/EEC)	Yes	No	
Integrated Pollution Prevention Control Directive (96/61/EC)	Yes	No	
Other basic measures as required by Article 11(3)(b-l)	**Measures implemented to adress … (tick if Yes) Poor status/risk for Quality**	**Poor status/risk for Quantity**	**Explanatory Keywords: for Non EU-Member States - add information on**

Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)	Yes	No	
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment	No	No	
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies	No	No	
Requirement for prior regulation of point source discharges liable to cause pollution	Yes	No	
Prohibition of direct discharge of pollutants into groundwater	Yes	No	
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents	Yes	No	
Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)			
Will the basic measures identified above be sufficient to address the significant Pressures	Yes		

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	11
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	Komarnanska Vysoka Kryha/Dunántúli-khgs. északi r.
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	SK300010FK SK300020FK

Measures (Basic and other basic measures)

Basic measures (Directive listed in Annex VI Part A)	Measures implemented to adress … (tick if Yes) Poor status/risk for Quality	Poor status/risk for Quantity	Explanatory Keywords: for Non EU-Member States - add information on
Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)	No	Yes	
Urban Waste-water Treatment Directive (91/271/EEC)	No	No	
Plant Protection Products Directive (91/414/EEC)	No	No	
Nitrates Directive (91/676/EC)	No	No	
Habitats Directive (92/43/EEC)	No	No	
Integrated Pollution Prevention Control Directive (96/61/EC)	No	No	

Other basic measures as required by Article 11(3)(b-l)	Measures implemented to adress … (tick if Yes) Poor status/risk for Quality	Poor status/risk for Quantity	Explanatory Keywords: for Non EU-Member States - add information on
Measures for the protection of water abstracted for drinking water (Article 7) includingthose to reduce the level of purification required for the production of drinking water (Note: these basic measures may Not apply to the whole territory)	No	No	
Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment	No	Yes	
Controls, including a requirement for prior authorisation of artificial recharge or augmentation of gwbodies	No	Yes	
Requirement for prior regulation of point source discharges liable to cause pollution	No	No	
Prohibition of direct discharge of pollutants into groundwater	No	No	
Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents	No	No	

Need for Supplementary/Additional Measures WFD Article 11(4) and 11(5)

Will the basic measures identified above be sufficient to address the significant Pressures	Yes		
Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**8**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**Podunajska Basin/Zitny ostrov/Szigetkoz, Hanság-Rabca**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**SK1000300P SK1000200P**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites	**Yes**	**No**	
Leakages from waste disposal sites (landfill and agricultural waste disposal)	**Yes**	**No**	
Leakages associated with oil industry infrastructure	**Yes**	**No**	
Mine water discharges	**No**	**No**	
Discharges to ground such as disposal of contaminated water to soakways	**No**	**No**	
other relevant point sources (specify)	**Yes**	**No**	**septic tanks, discharge of used thermal water**
Diffuse Sources			
due to agricultural activities	**Yes**	**No**	
due to Non-sewered population	**Yes**	**No**	
Urban land use	**Yes**	**No**	
Water abstractions			
Abstractions for agriculture	**No**	**No**	
Abstractions for public water supply	**No**	**No**	
Abstractions by industry	**No**	**No**	
IPPC activities	**No**	**No**	
Non-IPPC activities	**No**	**No**	
Abstractions by quarries/open cast coal sites	**No**	**No**	
Other major abstractions (specify)	**No**	**No**	
Artificial recharge			
Discharges to groundwater for artificial recharge purposes	**No**	**No**	
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)	**No**	**No**	
Mine water rebound	**No**	**No**	
Other major recharges (specify)	**No**	**No**	
Other significant pressures			
Saltwater intrusion	**No**	**No**	
Other intrusion (specify)	**No**	**No**	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros		**9**
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)		**Bodrog**
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5		**SK1001500P**
Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4))**
Point sources			
Leakages from contaminated sites	**No**	**No**	
Leakages from waste disposal sites (landfill and agricultural waste disposal)	**Yes**	**No**	
Leakages associated with oil industry infrastructure	**No**	**No**	
Mine water discharges	**No**	**No**	
Discharges to ground such as disposal of contaminated water to soakways	**No**	**No**	
other relevant point sources (specify)	**Yes**	**No**	**septic tanks**
Diffuse Sources			

due to agricultural activities	Yes	No	
due to Non-sewered population	Yes	No	
Urban land use	No	No	
Water abstractions			
Abstractions for agriculture	No	No	
Abstractions for public water supply	No	No	
Abstractions by industry	No	No	
IPPC activities	No	No	
Non-IPPC activities	No	No	
Abstractions by quarries/open cast coal sites	No	No	
Other major abstractions (specify)	No	No	
Artificial recharge			
Discharges to groundwater for artificial recharge purposes	No	No	
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)	No	No	
Mine water rebound	No	No	
Other major recharges (specify)	No	No	
Other significant pressures			
Saltwater intrusion	No	No	
Other intrusion (specify)	No	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	10
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	Slovensky kras/Aggtelek hgs.
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	SK200480KF

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures

Please select all relevant pressures and provide information on Supplementary and Additional Measures

Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites	No	No	
Leakages from waste disposal sites (landfill and agricultural waste disposal)	No	No	
Leakages associated with oil industry infrastructure	No	No	
Mine water discharges	No	No	
Discharges to ground such as disposal of contaminated water to soakways	No	No	
other relevant point sources (specify)	No	No	
Diffuse Sources			
due to agricultural activities	No	No	
due to Non-sewered population	No	No	
Urban land use	No	No	
Water abstractions			
Abstractions for agriculture	No	No	
Abstractions for public water supply	No	No	
Abstractions by industry	No	No	
IPPC activities	No	No	
Non-IPPC activities	No	No	
Abstractions by quarries/open cast coal sites	No	No	
Other major abstractions (specify)	No	No	
Artificial recharge			
Discharges to groundwater for artificial recharge purposes	No	No	
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)	No	No	
Mine water rebound	No	No	
Other major recharges (specify)	No	No	
Other significant pressures			
Saltwater intrusion	No	No	
Other intrusion (specify)	No	No	

Name of the Groundwater Body	Locally used name of the GWB e.g. Maros	11
EuropeantransboundaryGWBCode	Internationally agreed code for a transboundary GWB e.g. 5 (Mures / Maros)	Komarnanska Vysoka Kryha/Dunántúli-khgs. északi r.
EuropeanAGWBCode	International code for an aggregated GWB (for the whole national part of the transb. GWB) e.g. HU5	SK300010FK SK300020FK

Significant Pressures and Measures Checklist for Groundwater Quality and Quantity- incl. Supplementary Measures and Additional Measures			
Please select all relevant pressures and provide information on Supplementary and Additional Measures			
Significant Pressures for Groundwater	**Posing Risk/Poor status for Quality: Yes, No**	**Posing Risk/Poor status for Quantity: Yes, No**	**Where relevant give details of supplementary measures (Art 11(4)) put in place (Type of measure from pick list of Annex VI part B and details) and additional measures (Art 11(5)) (Type of measure from pick list and details**
Point sources			
Leakages from contaminated sites	No	No	
Leakages from waste disposal sites (landfill and agricultural waste disposal)	No	No	
Leakages associated with oil industry infrastructure	No	No	
Mine water discharges	No	No	
Discharges to ground such as disposal of contaminated water to soakways	No	No	
other relevant point sources (specify)	No	No	
Diffuse Sources			
due to agricultural activities	No	No	
due to Non-sewered population	No	No	
Urban land use	No	No	
Water abstractions			
Abstractions for agriculture	No	No	
Abstractions for public water supply	No	No	
Abstractions by industry	No	No	
IPPC activities	No	No	
Non-IPPC activities	No	No	
Abstractions by quarries/open cast coal sites	No	No	
Other major abstractions (specify)	No	Yes	abstraction for spa, swimming pools
Artificial recharge			
Discharges to groundwater for artificial recharge purposes	No	No	
Returns of groundwater to GWB from which it was abstracted (e.g. for sand and gravel washing)	No	No	
Mine water rebound	No	No	
Other major recharges (specify)	No	No	
Other significant pressures			
Saltwater intrusion	No	No	
Other intrusion (specify)	No	No	

Lists of Measures to be included within the Programmes of Measures
The basis for the data collection are the 11 nominated transboundary groundwater bodies and groups of groundwater bodies. The focus of the data collection is on the whole national part of the Transboundary Groundwater Body.
administrative instruments
economic or fiscal instruments
negotiated environmental agreements
emission controls
codes of good practice
recreation and restoration of wetland areas
abstraction controls
demand management measures, inter alia, promotion of adapted agricultural production such as low water requiring crops in areas affected by drought
efficiency and reuse measures, inter alia, promotion of water-efficient technologies in industry and water-saving irrigation techniques
construction projects
desalination plants
rehabilitation projects
educational projects
research, development and demonstrations projects
other relevant measures

Groundwater Monitoring

International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Annex 12 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Table 1: List of nominated transboundary groundwater bodies (GWBs) and groups of GWBs

Name	MS_CD	Size (km²)	National size (km²)	Aquifer characteri-sation		Main use	Overlying strata (m)	Criteria for importance	Bilaterally agreed with
				Aquifer Type	Confined:				
1: Deep Groundwater Body – Thermal Water	DEGK1110	5900	4250	K	Yes	SPA, CAL	100 – 1000	Intensive use	AT, DE
	ATGK100158		1650						
2: Upper Jurassic – Lower Cretaceous GWB	BG1G0000J3K051	24 465	13 034	F, K	Yes	DRW, AGR, IND	0 - 600	>4000 km²	RO, BG
	RO_DL06		11,427						
3: Middle Sarmatian - Pontian GWB	ROPR05	21,626	11,964	P	Yes	DRW, AGR/DRW, AGR, IND	0 - 150	>4000 km²	MD, RO
	MDPR01		9662						
4: Sarmatian GWB	RODL04	5486	2178	K, F-P	No	DRW, AGR, IND	0 - 60	>4000 km²	BG, RO
	BG1G00000N1049		3308						
5: Mures / Maros	RO_MU20 RO_MU22	7699	2710	P	No/ Yes	DRW, IRR, IND	2 - 30	Important GW resource, protection of DRW res.	RO, HU
	HU_sp.2.13.1 HU_p.2.13.1 HU_sp.2.13.2 HU_p.2.13.2		4989						
6: Somes / Szamos	RO_SO01 RO_SO13	275	1440	P	No/ Yes	DRW, IRR	2 - 30	Important GW resource, protection of DRW res.	RO, HU
	HU_sp.2.1.2 HU_p.2.1.2 HU_sp.2.3.2 HU_p.2.3.2		1035						
7: Upper Pannonian – Lower Pleistocene /Vojvodina/ Duna-Tisza köze deli r.	ROBA18	29,012	11,408	P	Yes/ Yes/ No	DRW, AGR, IND, IRR	0 - 30, 4 -190, 2 -125	> 4000 km², GW use, Important GW resource, protection of DRW res.	RO, RS, HU
	RS_TIS_GW_I_1, RS_TIS_GW_SI_1, RS_TIS_GW_I_2, RS_TIS_GW_SI_2, RS_TIS_GW_I_3, RS_TIS_GW_SI_3, RS_TIS_GW_I_4, RS_TIS_GW_SI_4, RS_TIS_GW_I_7, RS_TIS_GW_SI_7, RS_D_GW_I_1, RS_D_GW_SI_1		10,506						
	HU_sp.1.15.1 HU_p.1.15.1 HU_sp.1.15.2 HU_p.1.15.2 HU_sp.2.11.1 HU_p.2.11.1 HU_sp.2.11.2 HU_p.2.11.2 HU_sp.2.16.1 HU_p.2.16.1		7098						
8: Podunajska Basin, Zitny Ostrov / Szigetköz,	SK1000300P SK1000200P	3363	2211	P	No	DRW, IRR, AGR, IND	2 - 5	Important GW resources, protection	SK, HU

	HU_sp.1.1.1 HU_p.1.1.1 HU_sp.1.1.2 HU_p.1.1.2		1152						
9: Bodrog	SK1001500P	2216	1466	P	Yes	DRW,IRR	2 - 10	Important GW resource	SK, HU
	HU_sp.2.5.2 HU_p.2.5.2		750						
10: Slovensky kras / Aggtelek-hgs.	SK200480KF	1090	598	K,F	Yes/	DRW, OTH	0 - 500	Protection of drinking water resources, GW depend. ecosystems (springs, caves)	SK, HU
	HU_k.2.2		492	K	No				
11: Komarnanska Vysoka Kryha / Dunántúli-khgs. északi r.	SK300010FK SK300020FK	3811	250 313	F,K	Yes/	DRW, SPA, CAL	0 - 2500	Thermal water resource	SK, HU
	HU_k.1.2 HU_kt.1.2 HU_k.1.4		3248	K	No				

Name	Name of the important transboundary groundwater body. Max. 100 digits, no restrictions concerning language, central European encoding (CEE), different national names divided by slash.
MS_CD	Member State Code which is a unique identifier. ISO-Code 2-digits & max. 22 digits. National codes from all countries sharing the GWB have to be named to identify the bodies in the respective part B (National Reports).
Size: km²	Whole area of the transboundary groundwater body covering all countries concerned (in km²).
National size: km²	Each country indicates size of national territory (in km²).
Aquifer characterisation	[Aquifer Type: Predominantly **P** = porous; **K** = karst; **F** = fissured]. Multiple selections possible: Predominantly porous, karst, fissured and combinations are possible. Main type should be listed first. [Confined: **Yes** / **No**]
Main use	[**DRW** = drinking water; **AGR** = agriculture; **IRR** = irrigation; **IND** = Industry; **SPA** = balneology; **CAL** = caloric energy; **OTH** = other] Multiple selections possible.
Overlying strata: m	Range in metres. Indicates a range of thickness, minimum and maximum (in m).
Criteria for importance	If size <4000 km² criteria for importance of the GWB should be listed; they have to be bilaterally agreed upon.
Bilaterally agreed with	Country which has been bilaterally agreed with should be indicated: two digit country code (after ISO 3166).

Table 2: Number of monitoring stations and density per GWB

Trans-boundary GWB	Country	Area (km²)	Chemical			Quantity			Associated with	
			Sites	Area / site (km²)	No. of sites bilaterally agreed upon for data exchange	Sites	Area / site (km²)	No. of sites bilaterally agreed upon for data exchange	Drinking water protected areas	Eco-systems
1. Deep Thermal	DE	4250	4	1063		5	850			
	AT	1650	4	413		1	1650			
	TOTAL	**5900**	**8**	**738**		**6**	**983**			
2. Upper Jurassic – Lower Cretaceous	BG	13,034	6	2173		13	1103			
	RO	11,427	13	879		13	879			
	TOTAL	**24,461**	**19**	**1287**		**26**	**941**			
3. Sarmatian – Pontian	RO	11,964	35	342		35	342			
	MD	9662								
	TOTAL	**21,626**								
4. Sarmatian	RO	2178	7	311		7	311			
	BG	3308	4	827		6	551			
	TOTAL	**5486**	**11**	**499**		**13**	**422**			
5. Mures/Maros	RO	2710	56	48	5	56	48	5		
	HU	4989	138	36		109	46		56	3
	TOTAL	**7699**	**194**	**40**		**165**	**47**	**5**	**56**	**3**
6. Somes/Szamos	RO	1440	44	33	3	44	33	3		
	HU	1035	27	38		19	54		7	2
	TOTAL	**2475**	**71**	**35**		**63**	**39**	**3**	**7**	**2**
7. Upper Pannonian – Lower Pleistocene /Vojvodina/ Duna-Tisza köze deli r.	RO	11,408	40	285		40	285			
	RS	10,506	16	656		39	269			
	HU	7098	150	47		147	48		44	10
	TOTAL	**29,012**	**206**	**141**		**226**	**128**		**44**	**10**
8. Podunajska Basin, Zitny Ostrov / Szigetköz, Hanság-Rábca	SK	2211	63	35		283	8			
	HU	1152	54	21		101	11		38	15
	TOTAL	**3363**	**117**	**29**		**384**	**9**		**38**	**15**
9. Bodrog	SK	1466	30	49		102	14			
	HU	750	10	75		17	44		5	3
	TOTAL	**2216**	**40**	**55**		**119**	**19**		**5**	**3**
10. Slovensky kras /Aggtelek-hsg.	SK	598	4	150		35	17		11	
	HU	492	14	35		17	29		8	9
		1090	**18**	**61**		**52**	**21**		**19**	**9**
11. Komarnans	SK	563	0			0				
	HU	3248	24	135		37	88		17	9

			Chemical			Quantity			Associated with	
ka Vysoka Kryha / Dunántúli-khgs. Északi r.	**TOTAL**	**3811**								

Table 3: Parameters and frequency for the surveillance monitoring programme

	AT / DE	BG	RS	HU	MD	RO	SK
Transboundary GWB	1	2, 4	7	5, 6, 7, 8, 9, 10, 11	3	2, 3, 4, 5, 6, 7	8, 9, 10
CHEMICAL (with estimation of frequency)							
Oxygen	1/a	>1/a	1/a	1/6a		1/a	1/a
pH-value	1/a	>1/a	1/a	1/a		1/a	1/a
Electrical conductivity	1/a	>1/a	1/a	1/a		1/a	1/a
Nitrate	1/5a[1]	>1/a	1/a	1/a		1/a	1/a
Ammonium	1/a	>1/a	1/a	1/a		1/a	1/a
Temperature	continuous	>1/a	1/a			1/a	>1/a (selected stations)
Further parameters e.g. major ions	x	x	x	x		x	x
Operational		x		x		x	x
QUANTITY							
GW levels/well-head pressure	x	x	x	x		x	x
Spring flows		x				x	
Flow characteristics							
Extraction (not obligatory)	x						
Reinjection (not obligatory)	x						

Notes:

Transboundary GWB: Number code of transboundary GWB according to chapter 5 of the WFD Roof Report 2004.
>1/a: More than 1 per year.
x: Parameter is measured.

[1] Both a yearly programme and a five-year monitoring programme were established.

Basic criteria: Final HMWB designation for the Danube River

icpdr iksd
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

A joint and harmonised approach

Document number: ICWD/346

Annex 13 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Imprint

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1. Introduction

The final designation of Heavily Modified Water Bodies (HMWB) is required by the EU Water Framework Directive's (WFD) Article 4 and has to be part of national as well as international River Basin Management Plans 2009.

As an outcome of the meetings of the Task Group for Hydromorphology (HYMO TG) and the River Basin Management Expert Group (RBM EG), the preparation of a joint and harmonized approach to undertaking the final designation of HMWBs for the Danube River was agreed. The harmonized approach presented in this document is based on both Joint Danube Survey 2 (JDS2) data and available WFD-compliant status assessment results. The Standing Working Group was informed about this agreement in June 2008 by the RBM EG and supported the exercise. The procedure on the final HMWB designation was also discussed with the Monitoring and Assessment Expert Group (MA EG): they agreed on the approach and supported all necessary information.

The RBM EG and HYMO TG mandated the ICPDR Secretariat to elaborate this document together with the HYMO TG chairperson, specifically elaborating the criteria and a proposal for the final HMWB designation for the Danube River to be discussed with the Danube countries in the framework of the HYMO TG and RBM EG. The proposal should follow the requirements of the WFD and the respective European Commission (EC) CIS[2] guidance on HMWB designation. The results of the joint approach will be compared with the national final HMWB designation for harmonization.

The final HMWB designation was performed by the Danube countries and reported to the EC. The exercise should support the countries in the process toward the final HMWB designation and ensure the harmonized designation of the Danube River for the international DRBM Plan.

As a first step, this document proposes draft criteria for the joint approach toward a harmonised HMWB designation according to WFD Article 4(3).

As soon as the criteria have been agreed upon, the ICPDR Secretariat and the HYMO TG will prepare a proposal for the final HMWB designation for the Danube River based on the agreed criteria and the (WFD-compliant) data available. Results of this joint exercise will be discussed in the framework of the HYMO TG, at the RBM EG meetings and in the framework of the MA EG.

[2] EC Common Implementation Strategy

2. Step-by-step approach

The joint approach for a final HMWB designation for the Danube River is based on some basic principles and a step-by-step approach, which is briefly described below.

2.1. Basic principles for the joint final HMWB designation for the Danube River

The joint and harmonised HMWB designation for the Danube River will be based on JDS2 data (hydromorphological assessment results, biological monitoring results, status indications) and available WFD-compliant status assessment results (TNMN data, national monitoring assessment results if provided by the countries).

The principle of three confidence classes (high, medium and low confidence) for ecological monitoring assessment results – as agreed by the MA EG – will be applied.

Only those water bodies, which, with high confidence, fail *good ecological status* due to hydromorphological alterations resulting in a change of character, can be considered for a final HMWB designation.

2.2. Step-by-step approach for the joint final HMWB designation for the Danube River

The step-by-step approach should ensure a joint understanding of the respective Danube countries throughout the entire exercise of the joint/harmonised approach. It consists of two components:

1. Development of criteria for the final HMWB designation for the Danube River;
2. Performance of the joint final HMWB designation based on the agreed criteria.

2.2.1. Development of criteria for the final HMWB designation for the Danube River

Step 1: Development of criteria for the joint final HMWB designation of the Danube River water bodies

When criteria for the final HMWB designation for the Danube River (according to Art. 4(3) of the WFD) are developed, it is necessary to firstly clarify which water bodies **should undergo the Art. 4(3) test.** Therefore the following question has to be answered: "*When is a surface water body not only significantly impacted but "changed in character" due to hydromorphological alterations?*. This refers directly to the required WFD Article 4(3) test, which is adapted to the conditions of the Danube River in this proposal.

Step 1a: Criteria: for which water bodies can the WFD Article 4 (3) test be applied?[3]

Proposal: The water body is:

- Significantly physically altered (not only in hydrology but also in morphology). This has lead to a change in character: the alteration is profound, widespread and permanent (according to the HMWB guidance) **and**
- Fails *good ecological status*. This has to be proven with high confidence (= the biological monitoring result is based on a WFD-compliant assessment method and is less than *good*).

[3] Precondition according to the WFD (as mentioned in 2.1): high confidence in failing *good status* due to hydromorphological changes which lead to a *change in character*.

Step 1b: Criteria: which main measures would be needed to restore *good ecological status*?

Measures are proposed for "types" of pressures and impacts that are of relevance for the Danube River. Listed below are pressure/impact types that are assumed to alter hydromorphological character specifically for the Danube River:

i. **Impoundments** (Driver: hydropower generation use).
ii. **Water abstraction** (Driver: hydropower generation use. Regarding the Danube River relevant only for the Gabcikovo Hydropower Plant).
iii. **Water level fluctuation** >1m or <1m/day but significant for failing *good ecological status* (Driver: hydropower generation use).
iv. **Continuity interruption** (Driver: hydropower generation use).
v. **Disconnection of groundwater** (Driver: Hydropower generation use).
vi. **Channel patterns, riparian zone (banks), flow pattern** - riverine anthropogenic uses with respect to bank and channel structure, lateral disconnection (wetlands/floodplains; groundwater bodies), river bed deepening (through hydropower and dredging) (Drivers: flood protection, navigation etc.)

Step 1c: Criteria: which of these main measures would have a significant impact on specific uses/ the wider environment?

Step 1d: Criteria: when is a better environmental option not applicable due to technical feasibility and disproportionate cost?

Flow diagrams illustrate the steps of the WFD Article 4(3) test in the form of decision trees for each pressure/impact type relevant for the Danube River (see Chapter 3). The diagrams should serve the clear reconstruction of the WFD Article 4(3) steps and thereby facilitate review through the Danube countries.

Step 2: Comments and revision of the above criteria for the WFD Article 4(3) test

The above proposal and its criteria were open for comments by the Danube countries and have been revised accordingly.

Step 3: Integration of received comments and finalisation of above criteria as agreed by the countries

Discussion and further development of the proposal at the 4th HYMO TG meeting and the 27th RBM EG meeting.

2.2.2. Performance of the joint final HMWB designation based on the agreed criteria

Step 5: Elaboration of the proposal for general water body delineation for the Danube River based on JDS2 hydromorphological findings. Discussion of delineation with the Danube countries – agreement on water bodies.

The HYMO TG will discuss at its 4th meeting if a revision of the water body delineation of the Danube River according to the HYMO results of JDS2 and other available status assessment results is needed to perform the joint final HMWB designation of the Danube

River. If so, the HYMO TG will elaborate criteria on when and how to transparently revise the water body delineation for the Danube River as the basis for the HMWB designation.[4]

The final delineation of water bodies will be performed by the Danube countries and reported to the EC.

Step 6: Elaboration of a proposal for the joint and final designation of HMWB for the Danube River water bodies by applying the agreed criteria

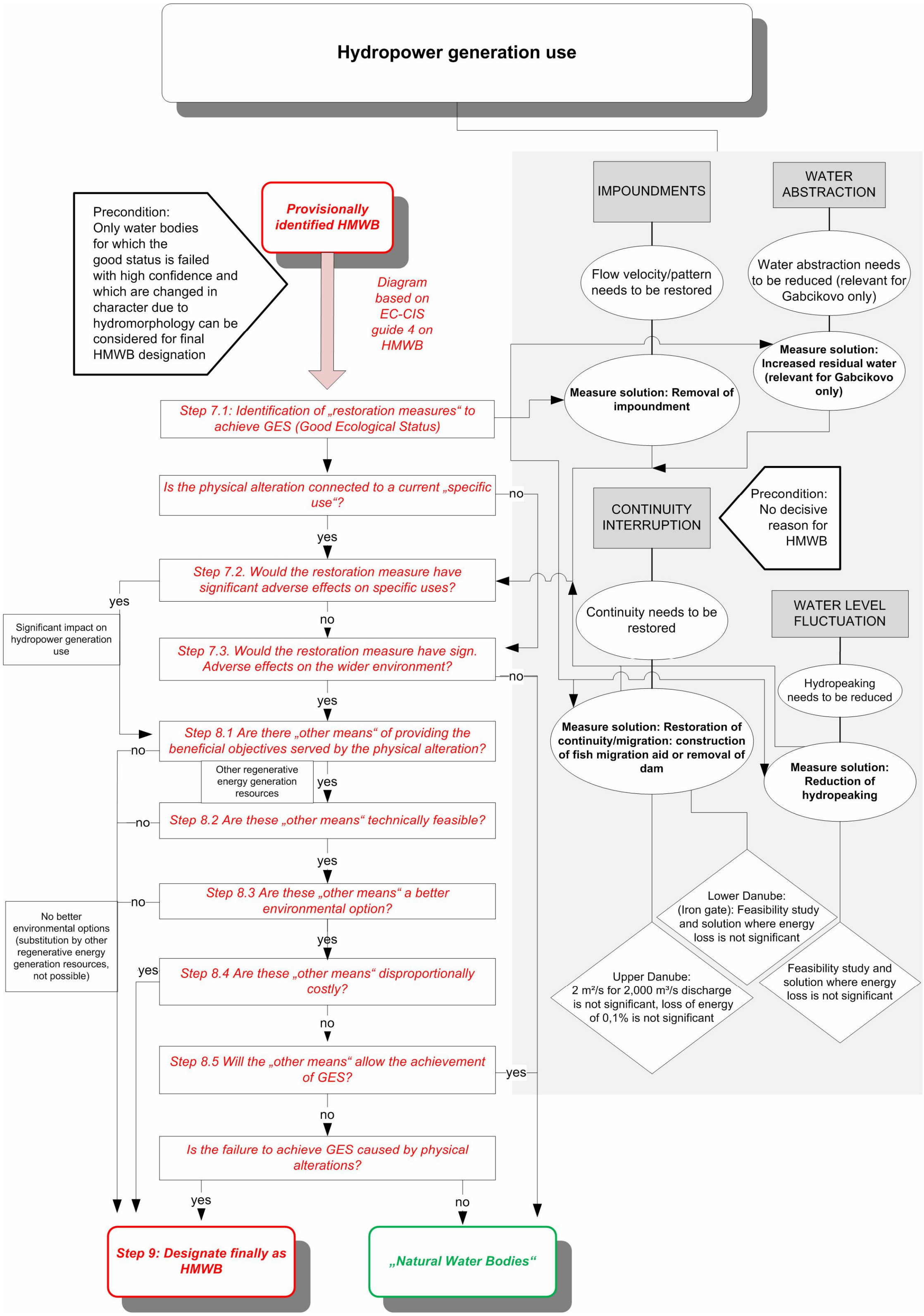
Based on the previous steps, the joint and harmonised designation of HMWB in the Danube River will be performed. All results and comparison with the national HMWB designations of the Danube River will be discussed with and between the Danube countries in the framework of the HYMO TG, RBM EG and MA EG in order to complete the harmonised approach.

3. Flow Diagrams - WFD Article 4(3) HMWB test for the Danube River

The flow diagrams of this chapter illustrate the steps of the WFD Article 4(3) test using decision trees for each pressure/impact type relevant to the Danube River. The diagrams should provide a clear reconstruction of the WFD Article 4(3) steps and thereby facilitate review through the Danube countries.

[4] E.g. The water body delineation can be based on JDS2 HYMO evaluation stretches (stretches qualified as being "*not good*" according to JDS 2 (continuous longitudinal hydromorphological assessment) and is estimated to fail *good ecological status*; definition minimum length of water body for the Danube River.

Annex 1: Flow diagram for the WFD Article 4(3) test: hydropower generation (Danube River)



Annex 2: Flow diagram for the WFD Article 4(3) test: Riverine anthropogenic uses with respect to bank and channel structures (Danube River)

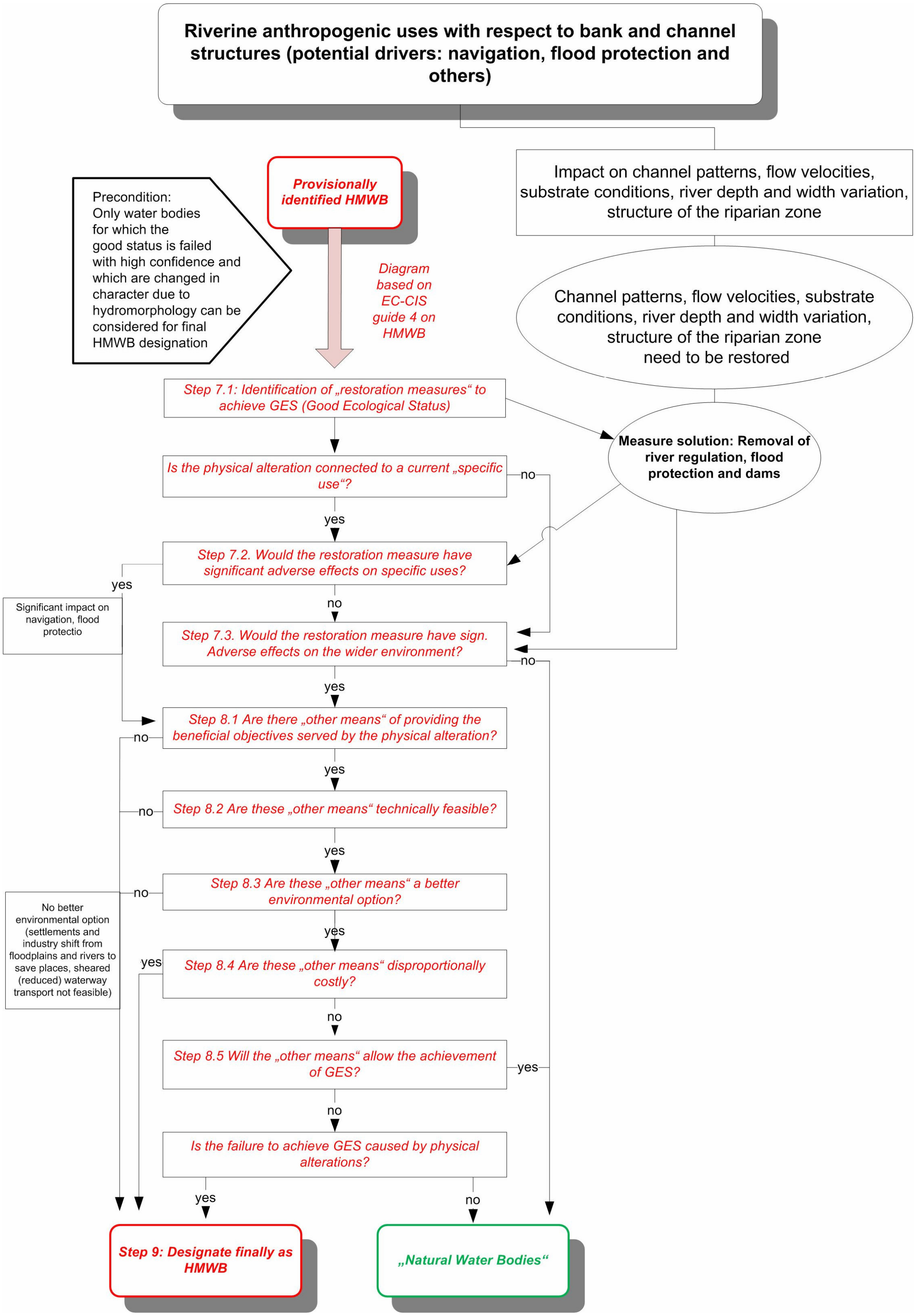


Table on the detailed results of classification of all assessed surface water bodies according to particular biological, hydromorphological and chemical quality elements

icpdr iksd

International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Annex 14 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Explanations

	Labels in the table	Descripton	Possible values
	Water body code with country code	as in Article 5 Roof Report	
	Name of river	as in Article 5 Roof Report	
Biological Quality Elements	**Fish**	Status Class for the Water Body	1 = high, 2 = good, 3 = moderate, 4 = poor, 5 = bad
	Benthic invertebrates	Status Class for the Water Body	
	Phytobenthos and Macrophytes	Status Class for the Water Body	
	Phytoplankton	Status Class for the Water Body	
	Overall Biological Status	Status Class for the Water Body = worst case of the status classes of all biological quality elements (acc. to one-out-all-out principle)	
Hydromorphology	**Hydromorphology - High Status**	Only if biological quality elements are in high status hydromorphology must also be in high status	Y = Yes, N = No
General Physical and Chemical conditions	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	Status Class for the Water Body	1 = high, 2 = good, 3 = moderate, 4 = poor, 5 = bad
Specific pollutants	**Specific pollutants** (good or failing for Ecological Status)	Status Class for the Water Body for specific pollutants based on national quality standards; relevant for the assessment of Ecological Status. Specific pollutants are those pollutants that are regulated at the national level (and not included in the List	G = good, F = failing
OVERALL ECOLOGICAL STATUS	**Overall Ecological Status**	Worst case of the Biological Quality Class and Specific pollutants Status Class. For High Ecological Status additionally the General Physical and Chemical Parameters and the Hydromorphology have to be in high status.	1 = high, 2 = good, 3 = moderate, 4 = poor, 5 = bad
	Confidence class (high, medium, low for Overall Ecol.Status)	Confidence level of assessment (as discussed in the MA EG)	H = high, M = medium, L = low

Artificial and HMWB	**Artificial Water Body (Y/N)**	Is the water body artificial?	Y = Yes, N = No
	HMWB (Y/N)	Is the water body heavily modified?	Y = Yes, N = No, PN = provisionally no, PY = provisionally yes
	Ecological Potential Class	If the water body is artificial or heavily modified - please give the information of the Ecological Potential Class	2 = good and above, 3 = moderate, 4 = poor, 5 = bad
	Confidence class (Ecological Potential)	Confidence level of assessment (as discussed in the MA EG)	H = high, M = medium, L = low

	Labels in the table	Descripton	Possible values
CHEMICAL STATUS CLASS	**CHEMICAL STATUS CLASS**	Chemical Status Class for all pollutants that are regulated by the EU	G = good, F = failing
	Confidence (Chemical Status)	Confidence level of assessment (as discussed in the MA EG)	H = high, M = medium, L = low

Risk assessment for Non EU MS and also for EU MS in case of low confidence	Ecological Status	Risk Class for the Water Body	Y = at risk, P = possibly at risk, N = not at risk
	Chemical Status	Risk Class for the Water Body	
	Organic pollution	Risk Class for the Water Body	
	Nutrient pollution	Risk Class for the Water Body	
	Hazardous substances	Risk Class for the Water Body	
	Hydromorphological alterations	Risk Class for the Water Body	

Exemptions	Exemption Art. 4(4)		Y = Yes, N = No
	Exemption Art. 4(5)		Y = Yes, N = No

Water Body code with country code	**Name of river**	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						**Exemption Art. 4(4)**	**Exemption Art. 4(5)**
		Fish	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
DEBW_6-01	Donau	3	3			3	N		G	3		N	N			G	H							Y	N
DEBW_6-02	Donau	4	3			4	N		G	4		N	N			G	H							Y	N
DEBW_6-03	Donau	3	3			3	N		G	3		N	N			G	H							Y	N
DEBW_6-04	Donau	4	3			4	N		G	4		N	N			G	H							N	N
DEBW_6-05	Donau	5	3			5	N		G	5		N	N			G	H							Y	N
DEBY_AP002	Donau	2	3	3		3	N	3	G	3	H	N	N			G	H							Y	N
DEBY_AP004	Donau	2	2	3		3	N	3	G	3	H	N	N			G	H							N	N
DEBY_AP_02	Donau	3	2	3	3	3	N	3	G			N	Y	3	H	G	H							N	N
DEBY_IL001	Donau	3	2	2	2	3	N	3	G			N	Y	3	H	G	H							Y	N
DEBY_IL002	Donau	2	2	2	3	3	N	3	G	3	H	N	N			G	H							Y	N
DEBY_IN002	Donau	3	2	3	3	3	N	3	G			N	Y	3	M	G	H							Y	N
DEBY_IN004	Donau	3	2	3	2	3	N	3	G			N	Y	3	H	G	H							Y	N
DEBY_IN_01	Donau	2	2	3	3	3	N	3	G	3	H	N	N			G	H							Y	N
DEBY_NR002	Donau	3	3	3	3	3	N	3	G			N	Y	3	H	G	H							Y	N
AT303070000	Donau	4	2	2		4	N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT409040008	Donau	2	2	2		2	N		G	2	H	N	N			G	H	N	Y	N	N	Y	N	N	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
AT409040009	Donau	5	2	2		5	N		G			N	Y	5	H	G	H	Y	N	N	N		Y	Y	N
AT409040011	Donau	5	2	2		5	N		G			N	Y	5	H	G	H	Y	N	N	N		Y	Y	N
AT409040012	Donau	5	2	2		5	N		G			N	Y	5	H	G	H	Y	N	N	N		Y	Y	N
AT410350000	Donau	4	2	2		4	N		G	4	H	N	N			G	H	N	N	N	N		N	Y	N
AT410360002	Donau	5				5	N		G			N	Y	3	H	G	H	Y	N	N	N		Y	Y	N
AT410360003	Donau	4	2	2		4	N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT410360005	Donau	4	2	2		4	N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT410360007	Donau	4	2	2		4	N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT410360009	Donau	4	2	2		4	N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT410360012	Donau	5				5	N		G			N	Y	5	H	G	H	Y	N	N	N	N	Y	Y	N
AT411340000	Donau	2	2	2		2	N		G	2	H	N	N			G	H	N	Y	N	N	Y	N	N	N
SKD0016	Dunaj		2	3	1	3	N	2	G	2	L	N	N			G	L	N	N						
SKD0017	Dunaj		3	2	1	3	N	2	G			N	Y	3	M	G	M							Y	N
SKD0018	Dunaj		3	3	1	3	N	2	G	3	M	N	N			G	M							Y	N
SKD0019	Dunaj						N	2	G			N	Y	2	M	F	M							Y	N
HUAEP443	Duna	3	2	2	1	3	N	2	G			N	Y	3	M	F	M							Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
HUAEP444	Duna	3	3	2	2	3	N	2	G	3	M	N	N			G	M							Y	N
HUAEP445	Duna	3	3	2	2	3	N	2	G	3	M	N	N											Y	N
HUAEP446	Duna	3	3	2		3	N	2	G	3	M	N	N			G	M							Y	N
HRDRA_T0001	Dunav						N				L	N	PN				L			N	N		P		
HRDRA_T0002	Dunav						N				L	N	PN				L			N	N		Y		
RSD1	Dunav						N				L	N					L		P	P	Y	P			
RSD10	Dunav						N				L	N					L		Y	Y	Y	Y			
RSD2	Dunav						N					N	PY				L		P	Y	N	P	Y		
RSD3	Dunav						N					N	PY				L		P	P	Y	P	Y		
RSD4	Dunav						N					N	PY				L		Y	P	Y	Y	Y		
RSD5	Dunav						N					N	PY				L		P	P	Y	P	Y		
RSD6	Dunav						N					N	PY				L		Y	Y	Y	Y	Y		
RSD7	Dunav						N					N	PY				L		Y	Y	Y	Y	Y		
RSD8	Dunav						N				L	N					L		Y	P	Y	Y			
RSD9	Dunav						N				L	N					L		Y	Y	Y	Y			
RORW14.1_B1	Dunarea		3			3	N	2	G			N	Y	3	L	F	M	Y	Y	N	N	Y	Y	Y	N

		Biological Quality Elements					HyMo	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**		**Specific pollutants** (good or failing for Ecological Status)			**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW14.1_B2	Dunarea		3			3	N	3	G			N	Y	3	L	F	M	Y	Y	Y	N	Y	Y	Y	N
RORW14.1_B3	Dunarea		3			3	N	2	G			N	Y	3	L	F	M	Y	Y	N	N	Y	Y	Y	N
RORW14.1_B4	Dunarea		3			3	N	2	G			N	Y	3	L	F	M	Y	Y	N	N	Y	Y	Y	N
RORW14.1_B5	Dunarea		3			3	N	2	G			N	Y	3	L	F	M	Y	Y	N	N	Y	Y	Y	N
RORW14.1_B6	Dunarea	3	3		2	3	N	2	G	3	M	N	N			F	M	N	Y	N	N	Y	N	N	N
RORW14.1_B7	Dunarea	3	3		2	3	N	2	G	3	M	N	N			F	M	N	Y	N	N	Y	N	N	N
BGTDU000R001	Dunav						N		F			N	Y	3	M	F	M							N	Y
UADb	Danube						N					N						P	P						

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
DEBY_AP144	Main-Donau-Kanal		2	3		3	N	3	G			Y	N	3	H	G	H							Y	N
DEBY_AP221	Main-Donau-Kanal		2	3	3	3	N	3	G			Y	N	3	H	G	H							Y	N
DEBY_ILS03	Lech				2	2	N	2	G			N	Y	2	M	G	H							N	N
DEBY_ILS10	Lech				2	2	N	2	G			N	Y	2	M	G	H							N	N
DEBY_IL328	Lech		2	2		2	N	2	G	2	H	N	N			G	H							N	N
DEBY_IL329	Lech	3				3	N	3	F			N	Y	3	H	G	H							Y	N
DEBY_IL330	Lech	3	2	2		3	N	3	F			N	Y	3	M	G	H							Y	N
DEBY_IL331	Lech	3	2	1		3	N	3	G	3	H	N	N			G	H							N	N
DEBY_IL332	Lech	3	3	2		3	N	3	G			N	Y	3	H	G	H							N	N
DEBY_IL333	Lech	3	3	2		3	N	3	G			N	Y	3	H	G	H							Y	N
DEBY_IL335	Lech	3	3	2		3	N	3	G			N	Y	3	M	G	H							N	N
DEBY_IL336	Lech		3	2		3	N	3	G			N	Y	3	H	G	H							Y	N
DEBY_IL337	Lech	2	3	2		3	N	3	G			N	Y	3	H	G	H							N	N
DEBY_IN153	Inn	3	2	2		3	N	3	G			N	Y	3	H	G	H							Y	N
DEBY_IN156	Inn	3	2	2		3	N	3	G			N	Y	3	H	G	H							Y	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
DEBY_IN157	Inn	3	2	2		3	N	3	G	3	M	N	N			G	H							N	N
DEBY_IN158	Inn	3	2	2		3	N	3	G	3	H	N	N			G	H							Y	N
DEBY_IN159	Inn	2	2	2		2	N	2	G			N	Y	2	H	G	H							N	N
DEBY_IN162	Inn	3	3	2		3	N	3	G			N	Y	3	H	G	H							Y	N
DEBY_IN408	Salzach	3	1	2		3	N	3	G	3	H	N	N			G	H							Y	N
DEBY_ISS11	Isar				2	2	N	2	G			N	Y	2	H	G	H							N	N
DEBY_IS082	Isar	3	4	3		4	N	3	G			N	Y	4	M	G	H							Y	N
DEBY_IS083	Isar	3	2	2		3	N	3	G	3	M	N	N			G	H							N	N
DEBY_IS084	Isar	3	2	2		3	N	3	G			N	Y	3	M	G	H							N	N
DEBY_IS085	Isar	3	3	3		3	N	3	G	3	H	N	N			G	H							Y	N
DEBY_IS086	Isar	2	1	1		2	N	2	G	2	H	N	N			G	H							N	N
DEBY_IS087	Isar	2	2	1		2	N	2	G	2	H	N	N			G	H							N	N
DEBY_IS090	Isar	4	2	1		4	N	3	G	4	H	N	N			G	H							Y	N
DEBY_IS091	Isar	3	2	2		3	N	3	G			N	Y	3	H	G	H							N	N
DEBY_IS092	Isar	2	2	1		2	N	2	G	2	H	N	N			G	H							N	N
DEBY_IS093	Isar	3	2	2		3	N	3	G	3	H	N	N			G	H							Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
DEBY_IS094	Isar	3	2	2		3	N	3	G	3	M	N	N			G	H							N	N
DEBY_IS095	Isar		3	2		3	N	3	G	3	H	N	N			G	H							Y	N
DEBY_NRS08	Naab			4	4	4	N	3	G			N	Y	4	H	G	H							Y	N
DEBY_NR020	Naab	3	2	2		3	N	3	G	3	M	N	N			G	H							N	N
DEBY_NR021	Naab	2	2	3	3	3	N	3	G	3	H	N	N			G	H							Y	N
DEBY_NR023	Naab	4	2	3		4	N	3	G	4	H	N	N			G	H							Y	N
DEBY_NR024	Naab	5	3	3		5	N	3	G	5	H	N	N			G	H							N	N
AT4500500	Traun						N		G	2	H	N	N			G	H	N	N	N	N		N	N	
AT4500900	Traun						N		G	1	H	N	N			G	H	N	N	N	N		N	N	
AT4501000	Traun						N		G	1	H	N	N			G	H	N	N	N	N		N	N	
AT4501200	Traun						N		G	1	H	N	N			G	H	N	N	N	N		N	N	
AT301500000	Lech						N		G	3	L	N	N			G	H	N	N	N	N		N	Y	N
AT301860000	Isar						Y		G	1	H	N	N			G	H	N	N	N	N		N	N	N
AT302340000	Isar		1	1		1	N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT302370006	Lech						N		G	3	H	N	N			G	H	Y	N	N	N		Y	Y	N
AT302370007	Lech						N		G	2	H	N	N			G	H	Y	N	N	N		Y	N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
AT302370009	Lech						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT302370010	Lech						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT302370011	Lech						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT302370013	Lech						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT302370014	Lech						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT304690001	Salzach	5				5	N		G	5	L	N	N			G	H	Y	N	N	N	N	Y	N	N
AT304690002	Salzach	5	2	2		5	N		G			N	Y	5	H	G	H	Y	N	N	N	N	Y	N	N
AT304690003	Salzach						N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT304690004	Salzach						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT304690005	Salzach	2				2	N		G	2	L	N	N			G	H	Y	N	N	N	N	Y	N	N
AT304690006	Salzach						N		G			N	Y	3	H	G	H	N	N	N	N	N	N	Y	N
AT304690007	Salzach						Y		G	1	H	N	N			G	H	N	N	N	N	N	N	N	N
AT304690078	Salzach						N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT304980001	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N
AT304980003	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT304980005	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
AT304980006	Inn		3	2		3	N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N
AT304980007	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT304980008	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT305000000	Salzach						Y		G	1	H	N	N			G	H	N	N	N	N	N	N	N	N
AT305340003	Inn	5	3	2		5	N		G			N	Y	5	H	G	H	Y	N	N	N		Y	Y	N
AT305340005	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT305340007	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT305340009	Inn	5	4	2		5	N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT305340010	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT305350001	Salzach	5				5	N		G			N	Y	5	H	G	H	Y	N	N	N	N	Y	N	N
AT305350002	Salzach	5	2	2		5	N		G	5	L	N	N			G	H	N	N	N	N	N	N	N	N
AT305350003	Salzach						N		G			N	Y	5	H	G	H	Y	N	N	N	N	Y	N	N
AT305350004	Salzach	5	2	2		5	N		G			N	Y	5	H	G	H	Y	N	N	N	N	Y	N	N
AT305350006	Salzach						N		G			N	Y	5	H	G	H	Y	N	N	N	N	Y	N	N
AT305360001	Salzach						N		G	4	L	N	N			G	H	Y	N	N	N	N	Y	N	N
AT305360002	Salzach						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
AT305850003	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT305850004	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N
AT305850005	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N
AT307030000	Inn		4	3		4	N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N
AT307080000	Lech		1	2		2	N		G			N	Y	3	H	G	H	Y	N	N	N		Y	Y	N
AT307200001	Salzach		2	2		2	N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT307200002	Salzach	5	2	2		5	N		G	5	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT307210000	Inn						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N
AT400240027	Enns						N		G	3	H	N	N			G	H	Y			N	N	Y	Y	N
AT400240089	Enns						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT400240090	Enns						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT400240092	Enns						N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT400240103	Enns						N		G	2	H	N	N			G	H	N	N	N	N	N	N	N	N
AT400240104	Enns						Y		G	1	H	N	N			G	H	N	N	N	N	N	N	N	N
AT400240105	Enns						N		G			N	Y	3	H	G	H	Y	N	N	N	N	Y	Y	N
AT400240106	Enns						N		G	4	H	N	N			G	H	Y	N	N	N	N	Y	Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
AT400780000	Traun						Y		G	1	H	N	N			G	H	N	N	N	N		N	N	N
AT400780002	Traun						Y		G	1	H	N	N			G	H	N	N	N	N		N	N	N
AT401220004	Traun						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT401220006	Traun						N		G	2	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT401220012	Traun						N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT409920001	Traun						N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT409970000	Enns						N		G			N	Y	3	H	G	H	Y	N	N	N		Y	Y	N
AT411130001	Traun						N		G	4	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT411130003	Traun						N		G	2	H	N	N			G	H	N	N	N	N	N	N	N	N
AT411130005	Traun						Y		G	2	H	N	N			G	H	N	N	N	N	N	N	N	N
AT411130013	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411130014	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411130016	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411130018	Traun						N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT411130020	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411130024	Traun						N		G	4	H	N	N			G	H	Y	N	N	N	N	Y	Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
AT411130027	Traun		2	2		2	N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT411130028	Traun		2	2		2	N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT411130030	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	N	N
AT411130031	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	N	N
AT411130032	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	N	N
AT411130034	Traun						N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	N	N
AT411130035	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250006	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT411250008	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT411250009	Enns						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT411250010	Enns						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT411250012	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT411250014	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250016	Enns						N		G			N	Y	3	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250018	Enns		2	2		2	N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	N	N
AT411250020	Enns						N		G	3	L	N	N			G	H	Y	N	N	N	N	Y	Y	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollutants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
AT411250021	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250023	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250025	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250027	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250029	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250031	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250035	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT411250036	Enns						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT411250037	Enns						N		G	3	L	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT411970000	Traun						N		G	4	H	N	N			G	H	Y	N	N	N		Y	Y	N
AT411980001	Traun						N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT411980002	Traun						N		G	4	H	N	N			G	H	Y	N	N	N		Y	Y	N
AT412090000	Traun						N		G	2	H	N	N			G	H	N	N	N	N	N	N	N	N
AT412100001	Traun						N		G	3	L	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT412100002	Traun						N		G			N	Y	4	H	G	H	Y	N	N	N	N	Y	Y	N
AT500010030	Thaya						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
AT500010031	Thaya						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT500010036	Thaya		2	2		2	N		G			N	Y	3	H	G	H	Y	N	Y	Y		Y	Y	N
AT500010038	Thaya						N		G	3	H	N	N			G	H	Y	N	N	N		Y	Y	N
AT500010043	Thaya		3	3		3	N		G			N	Y	3	H	G	H	Y	N	N	N		Y	Y	N
AT500020001	March	2		4		4	N		G	3	H	N	N			G	H	Y	Y	Y	Y	Y	N	Y	N
AT500040002	Thaya		3	2		3	N		G	5	H	N	N			G	H	Y	N	Y	Y		Y	Y	N
AT500040003	Thaya		3	2		3	N		G	3	H	N	N			G	H	Y	N	Y	Y		Y	Y	N
AT501710003	Thaya	3		2		3	N		G	3	H	N	N			G	H	Y	Y	Y	Y	Y	N	Y	N
AT501790000	Thaya						N		G	2	H	N	N			G	H	Y	Y	Y	Y	Y	N	N	N
AT501870001	Thaya						N		G			N	Y	4	H	G	H	Y	N	Y	Y		Y	Y	N
AT501930000	Thaya	3		2		3	N		G	3	H	N	N			G	H	Y	Y	Y	Y		N	Y	N
AT501940000	Thaya	2		3		3	N		G	2	H	N	N			G	H	Y	Y	Y	Y		N	N	N
AT801180001	Mur		2	2		2	N		G	2	L	N	N			G	H	N	N	N	N		N	N	N
AT801180002	Mur	3				3	N		G	3	L	N	N			G	H	Y			N	N	Y	Y	N
AT801180003	Mur	3				3	N		G	3	L	N	N			G	H	Y			N	N	Y	Y	N
AT801180004	Mur						N		G	3	H	N	N			G	H	Y			N	N	Y	Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
AT801180005	Mur	2				2	N		G	2	L	N	N			G	H	N	N	N	N		N	N	N
AT801180006	Mur	2				2	N		G	2	L	N	N			G	H	Y	N	N	N		Y	N	N
AT801180007	Mur		3			3	N		G			N	Y	3	H	G	H	Y	N	N	N		Y	N	N
AT801180008	Mur		3			3	N		G			N	Y	3	H	G	H	Y	N	N	N		Y	Y	N
AT801180009	Mur		2			2	N		G	2	L	N	N			G	H	N	N	N	N		N	N	N
AT801180028	Mur						N		G	2	H	N	N			G	H	Y	N	N	N		Y	N	N
AT801180029	Mur						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT801180055	Mur						N		G	2	H	N	N			G	H	Y	N	N	N		Y	N	N
AT802710002	Mur	2	2	2		2	N		G			N	Y	3	H	G	H	Y	Y	N	N	N	Y	Y	N
AT802710008	Mur						N		G			N	Y	4	H	G	H	Y	Y	N	N	Y	Y	Y	N
AT802710009	Mur						N		G			N	Y	4	H	G	H	Y	Y	N	N	Y	Y	Y	N
AT802710010	Mur						N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT802710012	Mur		2	2		2	N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT802710014	Mur	4	3	2		4	N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT802710015	Mur	4	3	2		4	N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT802720001	Mur						N		G			N	Y	3	H	G	H	Y	N	N	N		Y	Y	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
AT802720002	Mur						N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT802720003	Mur						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT802720004	Mur						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT802720005	Mur						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT802720006	Mur						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT803280000	Mur		2			2	N		G	2	L	N	N			G	H	N	N	N	N	N	N	N	N
AT803280001	Mur		1			1	Y		G	1	L	N	N			G	H	N	N	N	N	N	N	N	N
AT804000000	Mur	2	3	2		3	N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT900470001	Drau		2	2		2	N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT900470003	Drau						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N
AT900470021	Drau						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT900470022	Drau	4				4	N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT900470051	Drau	4	3	2		4	N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT900470055	Drau						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT900470056	Drau	2	2	2		2	N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT900470057	Drau						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
AT903540001	Drau						N		G			N	Y	4	H	G	H	Y	N	N	N		Y	Y	N
AT903540002	Drau						N		G			N	Y	3	H	G	H	Y	N	N	N		Y	Y	N
AT903540003	Drau						N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT903770000	Drau	4	3	2		4	N		G			N	Y	3	H	G	H	Y	N	N	N		Y	N	N
AT1000960015	Raab						N		G	3	H	N	N			G	H	Y	N	N	N		Y	Y	N
AT1000960017	Raab						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT1000960019	Raab						N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT1000960020	Raab						N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT1001040041	Raab	2	2	2		2	N		G	3	H	N	N			G	H	N	N	N	N	N	N	N	N
AT1001040042	Raab		3	3		3	N		G	3	H	N	N			G	H	Y	Y	N	N	Y	Y	N	N
AT1001040098	Raab						N		G			N	Y	4	H	G	H	Y	N	Y	Y		Y	Y	N
AT1001040102	Raab	2	3	3		3	N		G	3	H	N	N			G	H	Y	N	N	N		Y	Y	N
AT1001040105	Raab			3		3	N		G			N	Y	4	H	G	H	Y	N	Y	Y		Y	Y	N
AT1001040108	Raab						N		G	3	H	N	N			G	H	Y	N	Y	Y		Y	Y	N
AT1001040109	Raab						N		G	3	H	N	N			G	H	Y	N	Y	Y		Y	Y	N
AT1001760000	Rabnitz						N		G	3	L	N	N			G	H	Y	N	N	N		Y	N	N

Water Body code with country code	Name of river	Biological Quality Elements: Fish	Biological Quality Elements: Benthic invertebrates	Biological Quality Elements: Phytobenthos and Macrophytes	Biological Quality Elements: Phytoplankton	Biological Quality Elements: Overall Biological Status	HyMo: Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants: Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB: Artificial Water Body (Y/N)	Artificial and HMWB: HMWB (Y/N)	Artificial and HMWB: Ecological Potential Class	Artificial and HMWB: Confidence class (Ecological Potential)	Chemical Status Class: CHEMICAL STATUS CLASS	Chemical Status Class: Confidence class (Chemical Status)	Risk assessment for Non EU MS and also for EU MS in case of low confidence: Ecological Status	Risk assessment: Chemical Status	Risk assessment: Organic Pollution	Risk assessment: Nutrient Pollution	Risk assessment: Hazardous Substances	Risk assessment: Hydromorphological Alterations	Exemption Art. 4(4) (Y/N)	Exemption Art. 4(5) (Y/N)
AT1001790012	Rabnitz						N		G	4	H	N	N			G	H	Y	N	N	N		Y	N	N
AT1001790013	Rabnitz						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
AT1001790035	Rabnitz						N		G	4	H	N	N			G	H	Y	N	N	N		Y	N	N
AT1001790039	Rabnitz						N		G	3	L	N	N			G	H	Y	N	N	N		Y	N	N
AT1002140000	Raab						N		G	3	H	N	N			G	H	Y	N	N	N	N	Y	Y	N
AT1002160000	Raab						N		G	3	L	N	N			G	H	Y	N	N	N		Y	Y	N
AT1002370000	Rabnitz						Y		G	1	H	N	N			G	H	N	N	N	N		N	N	N
AT1002370003	Rabnitz						N		G	2	H	N	N			G	H	N	N	N	N		N	N	N
CZ40121000	Morava	3	2			3	N	2		3	M	N	N			G	H							Y	N
CZ40163020	Morava	2	2			2	N	2		2	M	N	N			F	H							Y	N
CZ40202000	Morava	3	2		2	3	N	2		3	M	N	N			G	H							Y	N
CZ40263000	Morava	3	2		2	3	N	2		3	M	N	N			F	H							Y	N
CZ40440000	Morava	2	2		2	2	N	2		2	M	N	N			F	H							Y	N
CZ40660000	Morava	4	2		2	4	N	2				N	Y	4	M	G	H							Y	N
CZ40794000	Morava	4	4			4	N	2				N	Y	4	M	F	H							Y	N
CZ40875000	Morava	4	4			4	N	4				N	Y	4	M	F	H							Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
CZ40939110	Morava	3	2		2	3	N	2		3	M	N	N			F	H							Y	N
CZ41049000	Morava	4	2		4	4	N	4				N	Y	4	M	F	H							Y	N
CZ41126000	Dyje	2	2		4	4	N	2		4	M	N	N			F	H							Y	N
CZ41172000	Dyje						N					N	Y	3	M	G	H			N	Y	N	Y	Y	N
CZ41174000	Dyje	3	2		2	3	N	2				N	Y	3	M	F	H							Y	N
CZ41180000	Dyje	3	2		2	3	N	2				N	Y	3	M	G	H							Y	N
CZ41192000	Dyje	4	3		3	4	N	3				N	Y	4	M	F	H			N	Y	Y	Y	Y	N
CZ41214030	Dyje	4	4		4	4	N	4				N	Y	4	M	F	H							Y	N
CZ41272040	Dyje	4	4		4	4	N	4				N	Y	4	M	F	H							Y	N
CZ41277001	Dyje						N					N	Y	3	M	G	H			N	Y	N	Y	Y	N
CZ41287000	Svratka	3	4			4	N	4		4	M	N	N			G	H							Y	N
CZ41311000	Svratka	3	2			3	N	2		3	M	N	N			F	H							Y	N
CZ41315000	Svratka						N					N	Y	3	M	G	H			N	Y	N	Y	Y	N
CZ41344000	Svratka	3	3			3	N	3				N	Y	3	M	F	H			N	Y	Y	Y	Y	N
CZ41410000	Svratka	3	2		2	3	N	2		3	M	N	N			F	H							Y	N
CZ41416000	Svratka						N					N	Y	3	M	G	H			N	Y	N	Y	Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
CZ41428000	Svratka	4	2		4	4	N	2				N	Y	4	M	F	H							Y	N
CZ41559030	Svratka	4	4		2	4	N	4				N	Y	4	M	F	H							Y	N
CZ41651080	Svratka	4	2		2	4	N	4				N	Y	4	M	F	H							Y	N
CZ41948000	Dyje						N					N	Y	3	M	G	H			N	Y	N	Y	Y	N
CZ41958000	Dyje						N					N	Y	3	M	G	H			Y	Y	N	Y	Y	N
CZ41990040	Dyje	4	3		3	4	N	3				N	Y	4	M	F	H			Y	Y	Y	Y	Y	N
CZ41993000	Dyje	3	2		2	3	N	4		4	M	N	N			F	H							Y	N
CZ42020000	Dyje	3	3		3	3	N	3		3	M	N	N			G	H			N	Y	N	Y	Y	N
SKB0001	Bodrog		4	3	1	4	N	3	G	4	M	N	N			F	M							Y	N
SKB0140	Latorica		3	1	1	3	N	2	G	3	M	N	N			F	M							Y	N
SKB0141	Laborec						N			2	L	N	N			G	L	N	N	N	N	N	N		
SKB0142	Laborec		3	3		3	N	3	G	3	M	N	N			F	M							N	N
SKB0144	Laborec		1	2	1	2	N	2	G	2	M	N	N			F	M							N	N
SKD0015	Prívodný kanál (VN Gabčíkovo) - Odpadový kanál				2	2	N	2	G			Y	N	2	L	F	L	N	Y	N	N	N	N	Y	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)		Specific pollutants (good or failing for Ecological Status)			Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
SKH0001	Hornád		2	2		2	N	3	G	2	M	N	N			F	M							N	N
SKH0002	Hornád						N			2	L	N	N			G	L	N	N	N	N	N	N		
SKH0003	Hornád		2	3		3	N	2	G	3	M	N	N			G	M							Y	N
SKH0004	Hornád		3	3	1	3	N	3	G	3	M	N	N			G	M							Y	N
SKH1001	Hornád						N					N	Y	4	L	G	L	Y	N	N	Y	Y	Y	Y	N
SKI0001	Ipeľ		2	2		2	N		F	3	M	N	N			G	M							N	N
SKI0003	Ipeľ		3	2		3	N			2	L	N	N			G	L	N	N	N	N	N	N		
SKI0004	Ipeľ		3	3	2	3	N	2	G	3	M	N	N			G	M							Y	N
SKI1001	Ipeľ						N					N	Y	2	L	G	L	N	N	N	N	N	N		
SKM0001	Morava		2	3	2	3	N	2	G			N	Y	3	M	F	M							Y	N
SKM0002	Morava		3	3	2	3	N	3	F	3	M	N	N			F	M							Y	N
SKN0001	Nitra				1	1	N		G	1	M	N	N			G	L	N	N	N	N	N	N		
SKN0002	Nitra		2	2		2	N		G	2	M	N	N			G	L	N	N	N	N	N	N		
SKN0003	Nitra		3	3		3	N	3	F	3	M	N	N			F	M							Y	N
SKN0004	Nitra		2	2	3	3	N	3	G	3	M	N	N			F	M							Y	N
SKR0001	Hron			2		2	N		G	2	L	N	N			G	M	N	N	N	N	N	N		

Water Body code with country code	Name of river	Biological Quality Elements					HyMo	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)		Specific pollutants (good or failing for Ecological Status)			Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
SKR0002	Hron		3	2		3	N	2		3	M	N	N			G	L	N	N	N	N	N	N	Y	N
SKR0003	Hron		3	3		3	N	3	G	3	M	N	N			F	M							Y	N
SKR0004	Hron		3	3		3	N	3	G	3	M	N	N			F	M							Y	N
SKR0005	Hron		2	3	2	3	N	2	G	3	M	N	N			G	M							Y	N
SKS0001	Slaná						N			1	L	N	N			G	L	N	N	N	N	N	N		
SKS0002	Slaná		3	2		3	N	2	G	3	M	N	N			G	M							Y	N
SKS0003	Slaná		4	3		4	N	3	F	4	M	N	N			G	M							Y	N
SKT0001	Tisa		4	3	2	4	N	3	G	4	M	N	N			F	M							Y	N
SKV0003	Čierny Váh				1	1	Y	2	G	2	M	N	N			F	M							N	N
SKV0004	Čierny Váh						N			2	L	N	N			G	L	N	N	N	N	N	N		
SKV0005	Váh		2	2		2	N	2		2	M	N	N			G	L	N	N						
SKV0006	Váh		3	2		3	Y	2	G	3	M	N	N			F	M							Y	N
SKV0007	Váh		2	2		2	N	2	G			N	Y	2	M	F	M							N	N
SKV0008	Váh		3	3		3	N	3				N	Y	3	M	G	L		N					Y	N
SKV0019	Váh		3	3		3	N	2	G			N	Y	3	M	G	M							Y	N
SKV0027	Váh		3	3	2	3	N	2	G			N	Y	3	M	F	M							Y	N

Water Body code with country code	Name of river	Biological Quality Elements: Fish	Biological Quality Elements: Benthic invertebrates	Biological Quality Elements: Phytobenthos and Macrophytes	Biological Quality Elements: Phytoplankton	Biological Quality Elements: Overall Biological Status	HyMo: Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants: Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB: Artificial Water Body (Y/N)	Artificial and HMWB: HMWB (Y/N)	Artificial and HMWB: Ecological Potential Class	Artificial and HMWB: Confidence class (Ecological Potential)	Chemical Status Class: CHEMICAL STATUS CLASS	Chemical Status Class: Confidence class (Chemical Status)	Risk assessment for Non EU MS and also for EU MS in case of low confidence: Ecological Status	Risk assessment: Chemical Status	Risk assessment: Organic Pollution	Risk assessment: Nutrient Pollution	Risk assessment: Hazardous Substances	Risk assessment: Hydromorphological Alterations	Exemption Art. 4(4) (Y/N)	Exemption Art. 4(5) (Y/N)
SKV1001	Váh						N		G			N	Y	3	L	F	M	Y	Y	Y	Y	Y	Y	Y	N
SKV1002	Váh			2		2	N		G			N	Y	3	L	G	L	Y	N	Y	Y	Y	Y	Y	N
SKV1003	Váh						N		G			N	Y	3	L	F	M	Y	Y	Y	Y	Y	Y	Y	N
HUAEP322	Berettyó	2	3	3	2	3	N	2	F			N	Y	3	M	F	M							Y	N
HUAEP334	Bodrog	2	1	3	2	3	N	1	G			N	Y	3	M									Y	N
HUAEP438	Dráva	1	2	2	2	2	N	1	G			N	Y	2	M	G	M							N	N
HUAEP439	Dráva	3			2	3	N	1	G	3	M	N	N											Y	N
HUAEP471	Fehér-Körös	2	2	2	2	2	N	1	G			N	Y	3	M	F	M							Y	N
HUAEP475	Fekete-Körös	2	2	2	2	2	N	1	G			N	Y	2	M	G	M							N	N
HUAEP567	Hármas-Körös	2	2	2	2	2	N	2	G			N	Y	2	M	G	M							N	N
HUAEP579	Hernád	3	3	3		3	N	3	G	3	M	N	N			G	M							Y	N
HUAEP580	Hernád	2		3		3	N	2	G	3	M	N	N											Y	N
HUAEP594	Hortobágy-Berettyó	2	2	2	3	3	N	3	G			N	Y	3	M	F	M							Y	N
HUAEP595	Hortobágy-főcsatorna	2	2	1	3	3	N	3	F			N	Y	3	M									Y	N
HUAEP596	Hortobágy-főcsatorna	3	3	1	2	3	N	3				N	Y	3	M									Y	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
HUAEP597	Hortobágy-fõcsatorna	3		1	2	3	N	3	F			N	Y	3	M									Y	N
HUAEP614	Ipoly	3	3	3		3	N	2	G	3	M	N	N			F	M							Y	N
HUAEP668	Kettős-Körös	2	3	2	2	3	N	1	G			N	Y	3	M									Y	N
HUAEP783	Maros	1	2	2	3	3	N	2				N	Y	3	M									Y	N
HUAEP784	Maros	1	2	2	3	3	N	2	F			N	Y	3	M	F	M							Y	N
HUAEP810	Mosoni-Duna	3	3	3	1	3	N	2	F			N	Y	3	M	F	M							Y	N
HUAEP811	Mosoni-Duna	3	1	2		3	N	1				N	Y	3	M									N	N
HUAEP812	Mosoni-Duna	3	1	2	1	3	N	2	G			N	Y	3	M	G	M							Y	N
HUAEP816	Mura	2	3	2	1	3	N	2	G	3	M	N	N			G	M							Y	N
HUAEP898	Rába	1		2	2	2	N	2	G			N	Y	2	M	F	M							Y	N
HUAEP899	Rába	1	2	2		2	N	2				N	Y	2	M									N	N
HUAEP900	Rába	3	2	2		3	N	2	G	3	M	N	N											Y	N
HUAEP901	Rába	1	1	4		4	N	2				N	Y	2	M									Y	N
HUAEP902	Rába	2	3	3	1	3	N	2	G			N	Y	3	M	F	M							Y	N
HUAEP903	Rába	2	2	3		3	N	2	G	3	M	N	N			F	M							Y	N
HUAEP904	Rábca	3	3	2		3	N	3	G			N	Y	3	M									Y	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
HUAEP919	Répce	2	3	4		4	N	2	G	4	M	N	N			G	M							Y	N
HUAEP920	Répce						N					N	Y											Y	N
HUAEP921	Répce		3			3	N	2		3	L	N	N											Y	N
HUAEP931	Sajó	2	3	3		3	N	2	G	3	M	N	N											Y	N
HUAEP932	Sajó	2	4	3		4	N	3	G	3	M	N	N			F	M							Y	N
HUAEP953	Sebes-Körös	1	3	3	2	3	N	2	G			N	Y	3	M	F	M							Y	N
HUAEP954	Sebes-Körös		1	2	2	2	N	2				N	Y	2	M									N	N
HUAEP958	Sió		2	3		3	N	3				Y	N	3	L									Y	N
HUAEP959	Sió	3	3	3		3	N	3	G			Y	N	3	M	G	M							Y	N
HUAEP971	Szamos	2	4	2	3	4	N	2	F	3	M	N	N			F	M							Y	N
HUAEQ054	Tisza	2	3	2	2	3	N	2	F	3	M	N	N											Y	N
HUAEQ055	Tisza	2	2	2	1	2	N	1	F	3	M	N	N			F	M							Y	N
HUAEQ056	Tisza	2	2	3	2	3	N	1	F			N	Y	3	M	F	M							Y	N
HUAEQ057	Tisza	2	3	2	2	3	N	2	F	3	M	N	N											Y	N
HUAEQ058	Tisza	2	1	3	3	3	N	1	F			N	Y	3	M									Y	N
HUAEQ059	Tisza	2	2	3		3	N	1	G			N	Y	3	M	F	M							Y	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)		Specific pollutants (good or failing for Ecological Status)			Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
HUAEQ060	Tisza	2	3	3		3	N	1	G	3	M	N	N			F	M							Y	N
HUAEQ137	Zagyva-patak	3	2	2		3	N	3	G	3	M	N	N											Y	N
HUAEQ138	Zagyva-patak		4	2		4	N	2		4	L	N	N											Y	N
HUAEQ139	Zagyva	2	2			2	N	3				N	Y	3	M									Y	N
HUAEQ140	Zagyva	2	3	2	3	3	N	3	G			N	Y	3	M	G	M							Y	N
HUAEQ144	Zala	2				2	N	2		2	L	N	N											N	N
HUAEQ146	Zala	3	2	3		3	N	3	G	4	M	N	N			G	M							Y	N
HUAEQ147	Zala	4	3	2		4	N	3		4	M	N	N											Y	N
HUAIW389	Tisza	2				2	N	1				N	Y	2	M									N	N
SISI1VT137	Sava		3	1		3	N	2	G	3	M	N	N			G	M	N	N	N	N	N	N	N	N
SISI1VT150	Sava		1	2		2	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
SISI1VT170	Sava						N					N	Y			G	H	Y	N	N	N	N	Y	Y	N
SISI1VT310	Sava		3	2		3	N	2	G	3	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI1VT519	Sava		2	3		3	N	2	G	3	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI1VT557	Sava		1	3		3	N	2	G	3	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI1VT713	Sava						N					N	Y			F	H	Y	Y	N	N	N	Y	Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
SISI1VT739	Sava		1	2		2	N	2	G	2	M	N	N			G	M	Y	N	N	N	N	Y	N	N
SISI1VT913	Sava		2	2		2	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
SISI1VT930	Sava		2	2		2	N	2	G	2	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI3VT197	Drava						N					N	Y			G	H	N	N	N	N	N	N	N	N
SISI3VT359	Drava						N					N	Y			G	H	Y	N	N	N	N	Y	Y	N
SISI3VT930	Drava						N					N	Y			G	H	N	N	N	N	N	N	N	N
SISI3VT950	Drava						N					N	Y			G	M	Y	N	N	N	N	Y	Y	N
SISI3VT970	Drava						N					N	Y			G	M	N	N	N	N	N	N	N	N
SISI3VT5171	Drava						N					N	Y			G	H	Y	N	N	N	N	Y	Y	N
SISI3VT5172	Drava						N					N	Y			G	M	Y	N	N	N	N	Y	Y	N
SISI21VT13	Kolpa		1	1		1	N	1	G	1	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI21VT50	Kolpa		1	3		3	N	2	G	3	M	N	N			G	H	Y	N	N	Y	N	N	N	N
SISI21VT70	Kolpa		2	2		2	N	2	G	2	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI43VT10	Mura		1	1		1	N	2	G	2	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI43VT30	Mura		1	1		1	N	2	G	2	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI43VT50	Mura		2	2		2	N	2	F	3	M	N	N			G	M	Y	N	N	N	Y	N	Y	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
SISI111VT5	Sava		2	2		2	N	1	G	2	M	N	N			G	H	N	N	N	N	N	N	N	N
SISI111VT7	Sava						N					N	Y			G	H	Y	N	N	Y	N	Y	Y	N
HRBID_T0001	Sava						N				L	N					L			N	N		Y		
HRBID_T0002	Sava						N				L	N					L			N	N		Y		
HRCES_T0001	Sava						N				L	N					L			N	N		P		
HRDRA_S0002	Drava						N				L	N					L			N	N		Y		
HRDRA_S0011	Drava						N				L	N					L			P	N		Y		
HRDRA_S0012	Drava						N				L	N					L			N	N		Y		
HRDRA_T0003	Drava						N				L	N					L			N	N		Y		
HRDRA_T0004	Drava						N				L	N					L			N	N		P		
HRDRA_T0005	Drava						N				L	N					L			N	N		P		
HRDRA_T0006	Drava						N				L	N					L			N	N		Y		
HRDRA_T0007	Drava						N				L	N					L			N	N		Y		
HRDRA_T0008	Drava						N				L	N					L			N	N		N		
HRDRA_T0009	Drava						N				L	N					L			N	N		Y		
HRDRA_T0010	Drava						N				L	N					L			N	N		Y		

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemptio n Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
HRDRA_T0011	Drava						N				L	N					L			N	N		Y		
HRDRA_T0013	Drava						N				L	N					L			N	N		N		
HRDRA_T0016	Mura						N				L	N					L			N	N		P		
HRILO_T0001	Sava						N				L	N					L			N	N		Y		
HRKRA_T0001	Sava						N				L	N					L			N	N		Y		
HRKRA_T0002	Sava						N				L	N					L			N	N		N		
HRKUP_T0001	Sava						N				L	N					L			P	P		Y		
HRKUP_T0002A	Kupa						N				L	N					L			N	N		N		
HRKUP_T0003A	Kupa						N				L	N					L			N	N		N		
HRKUP_T0004	Kupa						N				L	N					L			N	N		N		
HRKUP_T0005	Kupa						N				L	N					L			N	N		N		
HRKUP_T0006	Kupa						N				L	N					L			N	N		N		
HRKUP_T0007	Kupa						N				L	N					L			N	P		N		
HRSTR_T0001	Sava						N				L	N					L			N	N		Y		
HRUNA_T0001	Una						N				L	N					L			N	N		N		
HRUNA_T0002	Una						N				L	N					L			N	N		N		

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
HRUNA_T0004	Una						N				L	N					L			N	N		N		
BABOS_1	Bosna						N					N	PY				L								
BABOS_2	Bosna						N				L	N	PN				L								
BABOS_3	Bosna						N				L	N	PN				L								
BABOS_4	Bosna						N				L	N	PN				L								
BABOS_5	Bosna						N				L	N	PN				L								
BABOS_6	Bosna						N				L	N	PN				L								
BABOS_7	Bosna						N				L	N	PN				L								
BADR_1	Drina						N					N	PY				L								
BADR_2	Drina						N					N	PY				L								
BADR_3	Drina						N					N	PY				L								
BADR_4	Drina						N					N	PY				L								
BADR_5	Drina						N					N	PY				L								
BADR_6	Drina						N					N	PY				L								
BADR_7	Drina						N					N	PY				L								
BALIM_1	Lim						N					N	PY				L								

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
BASA_1	Sava						N					N	PY				L								
BASA_2	Sava						N					N	PY				L								
BASA_3	Sava						N					N	PY				L								
BAUNA_SAN_1	Sana						N				L	N	PN				L								
BAUNA_SAN_2	Sana						N				L	N	PN				L								
BAUNA_SAN_3	Sana						N					N	PY				L								
BAUNA_SAN_4	Sana						N				L	N	PN				L								
BAUNA_SAN_5	Sana						N				L	N	PN				L								
BAUNA_1	Una						N					N	PY				L								
BAUNA_2	Una						N				L	N	PN				L								
BAUNA_3	Una						N				L	N	PN				L								
BAUNA_4	Una						N				L	N	PN				L								
BAVRB_1	Vrbas						N					N	PY				L								
BAVRB_2	Vrbas						N				L	N	PN				L								
BAVRB_3	Vrbas						N					N	PY				L								
BAVRB_4	Vrbas						N					N	PY				L								

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemptio n Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
BAVRB_5	Vrbas						N					N	PY				L								
BAVRB_6	Vrbas						N				L	N	PN				L								
BAVRB_7	Vrbas						N				L	N	PN				L								
BAVRB_8	Vrbas						N				L	N	PN				L								
RSBEG	Begej						N					N	PY				L		Y	Y	Y	Y	Y		
RSCAN_BAJ	Bajski kanal						N					Y	N		L		L		P	P	Y	P			
RSCAN_BEC-BOG	DTD Becej-Bogojevo						N					Y	N		L		L		Y	Y	Y	Y			
RSCAN_BP-KAR	DTD B.Petrovac-Karavukovo						N					Y	N		L		L		P	P	P	P			
RSCAN_BP-NB_1	DTD Ban. Palanka-Novi Becej						N					Y	N		L		L		P	Y	Y	P			
RSCAN_BP-NB_2	DTD Ban. Palanka-Novi Becej						N					Y	N		L		L		P	Y	Y	P			
RSCAN_KIK	Kikindski kanal						N					Y	N		L		L		P	Y	Y	P			

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RSCAN_KOS-MS	DTD Kosancic-Mali Stapar						N					Y	N		L		L								
RSCAN_NS-SS	DTD Novi Sad-Savino selo						N					Y	N		L		L		P	P	Y	P			
RSCAN_OD-SO	DTD Odzaci-Sombor						N					Y	N		L		L								
RSCAN_PR-BEZ	DTD Prigrevica-Bezdan						N					Y	N		L		L								
RSCAN_VR-BEZ	DTD Vrbas-Bezdan						N					Y	N		L		L		P	Y	Y	P			
RSDR_1	Drina						N				L	N					L		P	N	P	P			
RSDR_2	Drina						N					N	PY				L		P	P	P	P	Y		
RSDR_3	Drina						N				L	N					L		P	P	N	P			
RSDR_4	Drina						N					N	PY				L		P	P	P	P	Y		
RSIB_1	Ibar						N				L	N	PN				L		P	P	Y	P			
RSIB_2	Ibar						N				L	N	PN				L		P	P	Y	P			
RSIB_3	Ibar						N				L	N	PN				L		P	P	Y	P			

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RSIB_4	Ibar						N				L	N	PN				L								
RSIB_5	Ibar						N					N	PY				L						Y		
RSIB_6	Ibar						N				L	N	PN				L								
RSJMOR_1	Juzna Morava						N				L	N	PN				L		P	P	P	P			
RSJMOR_2	Juzna Morava						N				L	N					L		P	P	P	P			
RSJMOR_3	Juzna Morava						N				L	N					L								
RSJMOR_4	Juzna Morava						N				L	N					L		P	P	P	P			
RSJMOR_5	Juzna Morava						N				L	N	PN				L		P	P	P	P			
RSJMOR_6	Juzna Morava						N				L	N					L		P	P	P	P			
RSLIM_1	Lim						N				L	N	PN				L								
RSLIM_2	Lim						N				L	N	PN				L		P	P	N	P			
RSLIM_3	Lim						N					N	PY				L		P	P	P	P	Y		
RSLIM_4	Lim						N				L	N	PN				L		P	P	N	P			
RSNIS_1	Nisava						N				L	N					L		P	P	P	P			
RSNIS_2	Nisava						N				L	N					L								
RSNIS_3	Nisava						N				L	N	PN				L		P	P	P	P			

Water Body code with country code	Name of river	Biological Quality Elements: Fish	Biological Quality Elements: Benthic invertebrates	Biological Quality Elements: Phytobenthos and Macrophytes	Biological Quality Elements: Phytoplankton	Biological Quality Elements: Overall Biological Status	HyMo: Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants: Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB: Artificial Water Body (Y/N)	Artificial and HMWB: HMWB (Y/N)	Artificial and HMWB: Ecological Potential Class	Artificial and HMWB: Confidence class (Ecological Potential)	Chemical Status Class: CHEMICAL STATUS CLASS	Chemical Status Class: Confidence class (Chemical Status)	Risk assessment for Non EU MS and also for EU MS in case of low confidence: Ecological Status	Risk assessment: Chemical Status	Risk assessment: Organic Pollution	Risk assessment: Nutrient Pollution	Risk assessment: Hazardous Substances	Risk assessment: Hydromorphological Alterations	Exemption Art. 4(4) (Y/N)	Exemption Art. 4(5) (Y/N)
RSPLBEG	Plovni Begej						N					Y	N		L		L		Y	Y	Y	Y			
RSSA_1	Sava						N					N	PY				L		P	N	N	P	Y		
RSSA_2	Sava						N				L	N					L		P	N	Y	P			
RSSA_3	Sava						N				L	N					L		P	P	N	P			
RSTAM_1	Tamis						N					N	PY				L		Y	P	Y	Y	Y		
RSTAM_2	Tamis						N				L	N					L		Y	P	Y	Y			
RSTIM_1	Timok						N				L	N	PN				L								
RSTIM_2	Timok						N				L	N	PN				L		P	P	P	P			
RSTIM_3	Timok						N				L	N	PN				L		P	P	Y	P			
RSTIM_4	Timok						N				L	N	PN				L								
RSTIS_1	Tisa						N					N	PY				L		Y	P	Y	Y	Y		
RSTIS_2	Tisa						N					N	PY				L		Y	P	Y	Y	Y		
RSVMOR_1	Velika Morava						N					N	PY				L		P	P	P	P	Y		
RSVMOR_2	Velika Morava						N				L	N					L		P	P	Y	P			
RSVMOR_3	Velika Morava						N				L	N					L		P	P	Y	P			
RSZMOR_1	Zapadna Morava						N				L	N	PN				L		P	P	Y	P			

Water Body code with country code	Name of river	Biological Quality Elements: Fish	Biological Quality Elements: Benthic invertebrates	Biological Quality Elements: Phytobenthos and Macrophytes	Biological Quality Elements: Phytoplankton	Biological Quality Elements: Overall Biological Status	HyMo: Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants: Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB: Artificial Water Body (Y/N)	Artificial and HMWB: HMWB (Y/N)	Artificial and HMWB: Ecological Potential Class	Artificial and HMWB: Confidence class (Ecological Potential)	Chemical Status Class: CHEMICAL STATUS CLASS	Chemical Status Class: Confidence class (Chemical Status)	Risk assessment for Non EU MS and also for EU MS in case of low confidence: Ecological Status	Risk assessment: Chemical Status	Risk assessment: Organic Pollution	Risk assessment: Nutrient Pollution	Risk assessment: Hazardous Substances	Risk assessment: Hydromorphological Alterations	Exemption Art. 4(4) (Y/N)	Exemption Art. 4(5) (Y/N)
RSZMOR_2	Zapadna Morava						N				L	N	PN				L		P			P			
RSZMOR_3	Zapadna Morava						N					N	PY				L		P	P	Y	P	Y		
ROLW2.1.31_B1	Somesul Mic				1	1	N	2	G			N	Y	2	L	G	M	N		N	N	N		N	N
ROLW2.1.31_B2	Somesul Mic						N	1	G			N	Y	2	L	G	L	N	N	N	N	N		N	N
ROLW2.1.31_B3	Somesul Mic				1	1	N	1	G			N	Y	2	L	G	L	N	N	N	N	N		N	N
ROLW2.1.31_B4	Somesul Mic				1	1	N	2	G			N	Y	2	L	G	L	N	N	N	N	N		N	N
ROLW3.1.44_B5	Crisul Repede				3	3	N	1	G			N	Y	3	L	G	L	Y	N	N	N	N	Y	Y	N
ROLW4.1.96_B2	Tarnava (Tarnava Mare)				1	1	N	2	G			N	Y	2	L	G	L		N	N	N	N		N	N
ROLW5.2_B1	Timis				2	2	N	2	G			N	Y	2	L	G	M		N	N	N	N		N	N
ROLW7.1_B26	Jiu (Jiul de Vest, Jiul Romanesc)				2	2	N	2	G			N	Y	2		G	L	N	N	N	N	N		N	N
ROLW7.1_B56	Jiu (Jiul de Vest, Jiul Romanesc)				3	3	N	2	G			N	Y	3	L	G	L	Y	N	N	N	N	Y	Y	N
ROLW7.1_B120	Jiu (Jiul de Vest, Jiul Romanesc)				2	2	N	3	G			N	Y	2	L	G	L	N	N	N	N	N		N	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
ROLW8.1_B7	Olt				2	2	N	3	F			N	Y	3	L	G	L	Y	N	Y	Y	N	Y	N	Y
ROLW8.1_B9	Olt				3	3	N	3	F			N	Y	3	L	G	L	Y	N	Y	Y	N	Y	N	Y
ROLW8.1_B10	Olt				3	3	N	2	F			N	Y	3	L	G	L	Y	N	Y	Y	N	Y	N	Y
ROLW8.1_B11	Olt				1	1	N	3	G			N	Y	3	L	G	L	Y	N	Y	Y	N	Y	N	Y
ROLW10.1_B1	Arges				1	1	N	2	G			N	Y	2	L	G	M	N	N	N	N	N	Y	N	N
ROLW10.1_B2	Arges				1	1	N	1	G			N	Y	2	L	F	M	N	Y	N	N	Y		N	N
ROLW10.1_B3	Arges				1	1	N	2	G			N	Y	2	L	F	M	N	Y	N	N	Y		N	N
ROLW10.1_B4	Arges				1	1	N	3	G			N	Y	3	L	G	M	Y	N	N	N	N	Y	Y	N
ROLW10.1_B5	Arges				1	1	N	2	G			N	Y	2	L	G	M	N	N	N	N	N	Y	N	N
ROLW10.1_B6	Arges				3	3	N	3	G			N	Y	3	L	G	M	Y	N	N	N	N	Y	Y	N
ROLW10.1_B7	Arges				1	1	N	3	G			N	Y	3	L	G	M	Y	N	N	N	N	Y	Y	N
ROLW11.1_B1	Ialomita				2	2	N		G			N	Y	2	L	G	L	N	N	N	N	N		N	N
ROLW11.1_B2	Ialomita				1	1	N		G			N	Y	2	L	G	L	N	N	N	N	N	Y	N	N
ROLW11.1_B3	Ialomita				1	1	N		G			N	Y	2	L	G	L	N	N	N	N	N		N	N
ROLW12.1_B1	Siret				1	1	N	2	G			N	Y	2	L	G	M							N	N
ROLW12.1.82_B1	Buzau				1	1	N		G			N	Y	2	L	G	L	N	N	N	N	N	Y	N	N

Water Body code with country code	**Name of river**	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						**Exemption Art. 4(4)**	**Exemptio n Art. 4(5)**
		Fish	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
ROLW12.1.82_B2	Buzau				1	1	N	2	G			N	Y	2	L	G	L	N	N	N	N	N	Y	N	N
ROLW12.1_B3	Siret				1	1	N	2	G			N	Y	2	L	G	M							N	N
ROLW12.1.53_B3	Bistrita						N	1	G			N	Y	2	L	G	M							N	N
ROLW12.1.53_B5	Bistrita						N	1	G			N	Y	2	L	G	M							N	N
ROLW12.1_B6	Siret						N		F			N	Y	3	L	G	M							N	N
ROLW12.1.53_B7	Bistrita						N	3	G			N	Y	3	L	G	M							N	N
ROLW12.1_B8	Siret				1	1	N	2	G			N	Y	2	L	G	M							N	N
ROLW13.1.15_B2	Jijia				1	1	N	2	G			N	Y	2	L	G	L	N	N	N	N	N		N	N
ROLW13.1_B2	Prut				1	1	N	2	F			N	Y	2	L	G	M	N	N	N	N	N		N	N
RORW1.1_B1	Tisa	2	1		3	3	N	2	G	2	L	N	N			G	L							N	N
RORW2.1_B1	Somes (Somesul Mare)	2	1		2	2	N	2	F	3	L	N	N			F	M	Y		N	Y	N	N	N	N
RORW2.1.31_B1	Somesul Mic		1			1	Y	1	G	1	M	N	N			G	M							N	N
RORW2.1_B2	Somes (Somesul Mare)	3	2		3	3	N	2	G	3	M	N	N			G	M							N	N

Water Body code with country code	Name of river	Biological Quality Elements: Fish	Biological Quality Elements: Benthic invertebrates	Biological Quality Elements: Phytobenthos and Macrophytes	Biological Quality Elements: Phytoplankton	Biological Quality Elements: Overall Biological Status	HyMo: Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants: Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB: Artificial Water Body (Y/N)	Artificial and HMWB: HMWB (Y/N)	Artificial and HMWB: Ecological Potential Class	Artificial and HMWB: Confidence class (Ecological Potential)	Chemical Status Class: CHEMICAL STATUS CLASS	Chemical Status Class: Confidence class (Chemical Status)	Risk assessment for Non EU MS and also for EU MS in case of low confidence: Ecological Status	Risk assessment: Chemical Status	Risk assessment: Organic Pollution	Risk assessment: Nutrient Pollution	Risk assessment: Hazardous Substances	Risk assessment: Hydromorphological Alterations	Exemption Art. 4(4) (Y/N)	Exemption Art. 4(5) (Y/N)
RORW2.1.31_B2	Somesul Mic						N	2	G	2	L	N	N			G	L	N	N	N	N	N	N	N	N
RORW2.1_B3	Somes (Somesul Mare)		1			1	N	3	F			N	Y	3	L	F	M	Y		N	Y	N	Y	Y	N
RORW2.1.31_B3	Somesul Mic	2	2		2	2	N	2	G	2	M	N	N			G	M							N	N
RORW2.1_B4	Somes (Somesul Mare)		3		3	3	N	3	F	3	M	N	N			F	M							N	N
RORW2.1.31_B4	Somesul Mic		1			1	N	3	F			N	Y	3	L	F	M	Y		N	Y	N	Y	Y	N
RORW2.1_B5	Somes (Somesul Mare)	2	1		2	2	N	2	F	3	M	N	N			F	M							N	N
RORW2.1_B6	Somes (Somesul Mare)	2	1		2	2	N	2	F	3	M	N	N			F	M							N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemptio n Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW2.1_B7	Somes (Somesul Mare)	2	1		3	3	N	3	F	3	M	N	N			F	M							N	N
RORW3.1_B1	Crisul Alb	2	2			2	Y	1	G	2	M	N	N			G	M			N	N	N		N	N
RORW3.1.44.33_B1	Barcau	1	2			2	N	2	G	2	M	N	N			G	L		N					N	N
RORW3.1.42_B1	Crisul Negru	4	2			4	N	2	G	4	M	N	N			G	L		N					N	N
RORW3.1.44_B1	Crisul Repede	4	3			4	N	3	G	4	M	N	N			G	M							N	N
RORW3.1_B2	Crisul Alb	2	2			2	Y	1	G	2	M	N	N			G	L		N					N	N
RORW3.1.44.33_B2	Barcau		1			1	N	1	G			N	Y	2	L	G	L	N	N	N	N	N	Y	N	N
RORW3.1.42_B2	Crisul Negru	4	2			4	N	3	G	4	M	N	N			G	L		N					N	N
RORW3.1.44_B2	Crisul Repede	2	2			2	N	2	G	2	M	N	N			G	L		N					N	N
RORW3.1_B3	Crisul Alb	2	1			2	N	1	F	3	M	N	N			G	L		N					N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW3.1.44.33_B3	Barcau	2	1		2	2	N	2	G	2	M	N	N			G	L		N					N	N
RORW3.1.42_B3	Crisul Negru	1	1		2	2	N	2	G	2	M	N	N			G	M							N	N
RORW3.1.44_B3	Crisul Repede	2	2			2	N	2	G	2	M	N	N			G	L		N					N	N
RORW3.1.42_B4	Crisul Negru	1	1		1	1	N	2	G	2	M	N	N			G	L		N					N	N
RORW3.1.44_B4	Crisul Repede	2	1		1	2	N	1	G	2	M	N	N			G	M							N	N
RORW3.1.44.33_B4	Barcau	2	1		2	2	N	2	G	2	M	N	N			G	L		N					N	N
RORW3.1_B4	Crisul Alb	3	1			3	N	3	G	3	M	N	N			G	M							N	N
RORW3.1.42_B5	Crisul Negru	1	1		1	1	N	2	G	2	M	N	N			G	M							N	N
RORW3.1_B5	Crisul Alb	1	1		2	2	N	2	G	2	L	N	N			G	L	N	N	N	N	N		N	N
RORW3.1.44.33_B5	Barcau	2	1		2	2	N	3	G	3	M	N	N			G	M							N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW3.1.44_B6	Crisul Repede	1	1		2	2	N	2	G	2	L	N	N			G	L	N	N	N	N	N		N	N
RORW3.1_B6	Crisul Alb	1	1		2	2	N	2	G	2	M	N	N			G	M							N	N
RORW3.1.44.33_B6	Barcau	2	1		2	2	N	2	G	2	M	N	N			G	M							N	N
RORW3.1.44_B7	Crisul Repede		1			1	N	2	G			N	Y	2	L	G	M	N		N	N	N	Y	N	N
RORW3.1_B7	Crisul Alb	1	2		1	2	N	2	G	2	M	N	N			G	M							N	N
RORW4.1_B1	Mures	2	1		1	2	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
RORW4.1.96_B1	Tarnava (Tarnava Mare)	1	1		1	1	Y	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
RORW4.1_B2	Mures		1			1	N	2	G			N	Y	2	L	G	L		N	N	N	N		N	N
RORW4.1_B3	Mures	2	1		1	2	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
RORW4.1.96_B3	Tarnava (Tarnava Mare)		1		1	1	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
RORW4.1_B4	Mures		1		1	1	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N

Water Body code with country code	**Name of river**	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						**Exemption Art. 4(4)**	**Exemption Art. 4(5)**
		Fish	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW4.1.96_B4	Tarnava (Tarnava Mare)		1			1	N	2	G			N	Y	2	L	G	L		N	N	N	N	Y	N	N
RORW4.1_B5	Mures	1	1		1	1	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
RORW4.1.96_B5	Tarnava (Tarnava Mare)	2	1		2	2	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
RORW4.1_B6	Mures		2			2	N	3	G			N	Y	3	L	G	L	Y	N	N	Y	N	Y	Y	N
RORW4.1.96_B6	Tarnava (Tarnava Mare)		2			2	N	2	G			N	Y	2	L	G	L		N	N	N	N		N	N
RORW4.1_B7	Mures		2			2	N	2	G			N	Y	2	L	G	L		N	N	N	N		N	N
RORW4.1.96_B7	Tarnava (Tarnava Mare)	1	1		2	2	N	2	G	2	M	N	N			F	M	N	Y	N	N	Y	N	N	N
RORW4.1_B8	Mures		2			2	N	2	G			N	Y	2	L	G	L		N	N	N	N		N	N
RORW4.1_B9	Mures	2	2		3	3	N	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
RORW4.1_B10	Mures		2			2	N	2	G			N	Y	2	L	G	L	N	N	N	N	N		N	N
RORW4.1_B11	Mures		2			2	N	2	G			N	Y	2	L	G	L	N	N	N	N	N		N	N
RORW5.1_B1	Bega	2	1			2	Y	2	G	2	M	N	N			G	M							N	N

Water Body code with country code	Name of river	Biological Quality Elements: Fish	Biological Quality Elements: Benthic invertebrates	Biological Quality Elements: Phytobenthos and Macrophytes	Biological Quality Elements: Phytoplankton	Biological Quality Elements: Overall Biological Status	HyMo: Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants: Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB: Artificial Water Body (Y/N)	Artificial and HMWB: HMWB (Y/N)	Artificial and HMWB: Ecological Potential Class	Artificial and HMWB: Confidence class (Ecological Potential)	Chemical Status Class: CHEMICAL STATUS CLASS	Chemical Status Class: Confidence class (Chemical Status)	Risk assessment for Non EU MS and also for EU MS in case of low confidence: Ecological Status	Risk assessment: Chemical Status	Risk assessment: Organic Pollution	Risk assessment: Nutrient Pollution	Risk assessment: Hazardous Substances	Risk assessment: Hydromorphological Alterations	Exemption Art. 4(4) (Y/N)	Exemption Art. 4(5) (Y/N)
RORW5.1_B2	Bega	2	1		2	2	N	2	G	2	M	N	N			G	M							N	N
RORW5.1_B3	Bega		2			2	N	2	G			N	Y	2	L	G	M		N	N	N	N		N	N
RORW5.1_B4	Bega		2			2	N	3	G			Y	N	3	L	G	M	N	N	N	N	N	N	N	N
RORW5.2_B1	Timis	2	1			2	Y	2	G	2	M	N	N			G	M							N	N
RORW5.2_B2	Timis		3			3	N	2	G			N	Y	3	L	G	M	Y	N	N	N	N	Y	N	N
RORW5.2_B3	Timis	2	2			2	N	2	G	2	L	N	N			G	M	N	N	N	N	N		N	N
RORW5.2_B4	Timis		1		1	1	N	1	G	2	M	N	N			G	M							N	N
RORW5.2_B5	Timis		2			2	N	1	G			N	Y	2	L	G	M		N	N	N	N		N	N
RORW5.2_B6	Timis		2			2	N	1	G			N	Y	2	L	G	M		N	N	N	N		N	N
RORW5.2_B7	Timis	2	1		2	2	N	2	G	2	M	N	N			G	M							N	N
RORW7.1_B1	Jiu (Jiul de Vest, Jiul Romanesc)	2	2		1	2	N	2	G	2	M	N	N			G	M							N	N
RORW7.1_B4	Jiu (Jiul de Vest, Jiul Romanesc)	2	2			2	N	2	G	2	M	N	N			G	L	N	N	N	N	N		N	N
RORW7.1_B14	Jiu (Jiul de Vest, Jiul Romanesc)	2	1		1	2	N	2	G	2	M	N	N			G	M							N	N

Water Body code with country code	**Name of river**	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						**Exemption Art. 4(4)**	**Exemptio n Art. 4(5)**
		Fish	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW7.1_B28	Jiu (Jiul de Vest, Jiul Romanesc)	2	1			2	N	2	G	2	M	N	N			G	M							N	N
RORW7.1_B51	Jiu (Jiul de Vest, Jiul Romanesc)	2	1			2	N	2	G	2	M	N	N			G	M							N	N
RORW7.1_B57	Jiu (Jiul de Vest, Jiul Romanesc)		2			2	N	2	G	2	M	N	N			G	M							N	N
RORW7.1_B121	Jiu (Jiul de Vest, Jiul Romanesc)	2	2			2	N	2	G	2	M	N	N			G	M							N	N
RORW7.1_B148	Jiu (Jiul de Vest, Jiul Romanesc)		1			1	N	3	F	3	M	N	N			F	M							N	N
RORW8.1_B1	Olt	2	1		2	2	Y	1	G	2	M	N	N			G	L	N	N	N	N	N	N	N	N
RORW8.1_B2	Olt		2		1	2	N	3	G			N	Y	2	L	G	L		N	N	N	N		N	N
RORW8.1_B3	Olt		4			4	N	3	F			N	Y	4	L	F	L	Y	Y	Y	Y	Y	Y	Y	N
RORW8.1_B4	Olt		1		2	2	N	2	G	2	M	N	N			F	L	N	N	N	N	N	N	N	N
RORW8.1_B5	Olt		2		1	2	N	3	G	3	M	N	N			F	L	N	N	N	N	N	N	N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW8.1_B6	Olt		2		1	2	N	3	F			N	Y	2	L	F	L		Y	N	N	Y		N	N
RORW8.1_B8	Olt		3		4	4	N	3	G	3	M	N	N			G	L	N	N	N	N	N	N	N	N
RORW8.1_B12	Olt	3	1		3	3	N	2	G	3	M	N	N			F	L	N	N	N	N	N	N	N	N
RORW9.1_B1	Vedea		1		2	2	Y	2	G	2	M	N	N			G	M	N	N	N	N	N	N	N	N
RORW9.1_B2	Vedea	1	1		3	3	Y	3	G	3	M	N	N			G	M							N	N
RORW9.1_B3	Vedea	2	1		3	3	Y	3	G	3	M	N	N			G	M							N	N
RORW9.1_B4	Vedea	2	1		3	3	Y	3	G	3	M	N	N			F	M							N	N
RORW9.1_B5	Vedea	3	1		3	3	Y	3	G	3	M	N	N			G	M							N	N
RORW9.1_B6	Vedea	5	1		2	5	N	3	G	5	M	N	N			G	M							N	N
RORW9.1_B7	Vedea		1			1	N	3	G			N	Y	3	L	G	M	Y	N	N	Y	N	Y	Y	N
RORW9.1_B8	Vedea		1			1	N	3	G			Y	N	3	L	G	M	Y	N	N	Y	N	Y	Y	N
RORW10.1_B1	Arges		1		3	3	N	1	G	2	M	N	N			G	M							N	N
RORW10.1_B2	Arges		3			3	N	2	G			N	Y	3	L	G	M	Y	N	N	N	Y	Y	N	Y
RORW10.1_B3	Arges	3	1		3	3	N	2	G	3	M	N	N			G	M	N		N	N		N	N	N
RORW10.1_B4	Arges		1		3	3	N	2	G	3	M	N	N			G	M							N	N
RORW10.1_B5	Arges		1		3	3	N	2	G	3	M	N	N			G	M							N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW10.1_B6	Arges		1			1	N	3	G			N	Y	3	L	G	M	Y	N	N	N	N	Y	Y	N
RORW10.1_B7	Arges		1			1	N	3	G			N	Y	3	L	F	M	Y	Y	Y	N	Y	Y	Y	N
RORW11.1_B1	Ialomita		1			1	Y	2	G	2	M	N	N			G	L		N			N		N	N
RORW11.1_B2	Ialomita		1			1	N	2	G	2	M	N	N			G	L		N			N		N	N
RORW11.1_B3	Ialomita		1			1	Y	2	G	2	M	N	N			G	L		N			N		N	N
RORW11.1_B4	Ialomita	2	1			2	N	2	G	2	M	N	N			G	L		N			N		N	N
RORW11.1_B5	Ialomita	2	2		2	2	N	3	G	3	M	N	N			G	L		N			N		N	N
RORW11.1_B6	Ialomita	2	1		3	3	N	3	G	3	M	N	N			G	L		N			N		N	N
RORW11.1_B7	Ialomita	2	2		2	2	N	3	G	3	M	N	N			G	L		N			N		N	N
RORW11.1_B8	Ialomita	2	2		3	3	N	3	G	3	M	N	N			G	L		N			N		N	N
RORW11.1_B9	Ialomita	2	2		2	2	N	2	G	2	M	N	N			G	L		N			N		N	N
RORW12.1.69_B1	Trotus	1	1			1	N	2	F	3	M	N	N			F	M							N	N
RORW12.1.53_B1	Bistrita	3	1			3	N	1	F	3	M	N	N			F	M							N	N
RORW12.1.40_B1	Moldova	2	1			2	N	1	G	2	M	N	N			F	M							N	N
RORW12.1.82_B1	Buzau		1			1	Y	2	G	2	M	N	N			G	L		N			N		N	N
RORW12.1.78_B1	Barlad		2		1	2	Y	2	F	2	M	N	N			F	M	N	N	N	N	N	N	N	N

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
RORW12.1.69_B2	Trotus	2	1			2	N	1	G	2	M	N	N			F	M							N	N
RORW12.1.53_B2	Bistrita	4	1			4	N	1	F	3	M	N	N			F	M							N	N
RORW12.1.40_B2	Moldova	2	2			2	N	1	G	2	M	N	N			G	M							N	N
RORW12.1_B2	Siret	1	1			1	N	1	F	3	M	N	N			F	M							N	N
RORW12.1.82_B2	Buzau	2	1			2	N	2	G	2	M	N	N			G	L		N			N		N	N
RORW12.1.78_B2	Barlad		3		1	3	N	3	F			N	Y	3	L	F	M	Y	N	N	Y	N	Y	N	N
RORW12.1.69_B3	Trotus	4	2			4	N	1	G	4	M	N	N			F	M							N	N
RORW12.1.40_B3	Moldova	3	1			3	N	1	F	3	M	N	N			F	M							N	N
RORW12.1.82_B3	Buzau	2	1			2	Y	2	G	2	M	N	N			G	L		N			N		N	N
RORW12.1.78_B3	Barlad		2		2	2	N	3	F			N	Y	3	L	F	M	Y	N	N	Y	N	Y	N	N
RORW12.1.53_B4	Bistrita	2	1			2	N	1	G	2	M	N	N			F	M							N	N
RORW12.1.40_B4	Moldova	1	2			2	N	1	F	3	M	N	N			F	M							N	N
RORW12.1_B4	Siret	2	2			2	N	2	F	3	M	N	N			F	M							N	N
RORW12.1.82_B4	Buzau	2	1		1	2	N	2	G	2	M	N	N			G	L		N			N		N	N
RORW12.1.69_B4	Trotus	3	1			3	N	1	F	3	M	N	N			F	M							N	N
RORW12.1_B5	Siret	1	2		3	3	N	1	G	3	M	N	N			F	M							N	N

Water Body code with country code	Name of river	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollutants (good or failing for Ecological Status)	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
RORW12.1.82_B5	Buzau		2		1	2	N	3	G	3	M	N	N			G	L		N			N	N	N	N
RORW12.1.53_B6	Bistrita	3	1			3	N	3	F	3	M	N	N			F	M							N	N
RORW12.1.82_B6	Buzau		2		2	2	N	2	G	2	M	N	N			G	L		N			N		N	N
RORW12.1_B7	Siret	2	1		3	3	N	2	G	3	M	N	N			G	M							N	N
RORW12.1_B9	Siret	1	1		1	1	N	2	G	2	M	N	N			F	M							N	N
RORW13.1_B1	Prut		1		1	1	Y	1	F	1	M	N	N			F	M	N	Y	N	N	Y	N	N	N
RORW13.1.15_B1	Jijia		2		1	2	Y	3	F	3	M	N	N			F	M	N	N	N	N	N	N	N	N
RORW13.1_B3	Prut		1		1	1	N	1	F	2	M	N	N			F	M	N	N	N	N	N	N	N	N
RORW13.1.15_B3	Jijia		2		1	2	N	3	F	3	M	N	N			F	M	Y	N	N	Y	N	N	N	N
RORW13.1_B4	Prut		1		1	1	N	1	G			N	Y	2	L	G	M	N	N	N	N	N		N	N
RORW13.1.15_B4	Jijia		1		1	1	N	3	G			Y	N	2	L	F	M	Y	N	N	Y	N	Y	N	N
RORW13.1.15_B5	Jijia		3		1	3	N	3	G			N	Y	2	L	F	L	Y	N	N	Y	N		N	N
RORW13.1_B5	Prut		1		1	1	N	1	F			N	Y	2	L	F	M	N	N	N	N	N		N	N
RORW15.1.10B_B1	Canal Dunare Marea		3			3	N	2	G			Y	N	3	L	F	M	Y	Y	N	N	Y	Y	N	Y
RORW15.1.10B_B2	Canal Dunare Marea		3			3	N	2	G			Y	N	3	L	F	M	Y	Y	N	N	Y	Y	N	Y

Water Body code with country code	**Name of river**	Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						**Exemption Art. 4(4)**	**Exemption Art. 4(5)**
		Fish	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
BG1IS100R027	Iskar		3			3	N	2	G			N	Y	3	M	G	M							N	N
BG1IS135R026	Iskar		4			4	N	4	G	4	M	N	N			G	M							N	Y
BG1IS700R006	Iskar		2			2	N	2	G	2	M	N	N			G	M							N	N
BG1IS789R004	Iskar		3			3	N	2	G	3	M	N	N			G	M							N	N
BG1IS900R003	Iskar		2			2	N	2	G	2	M	N	N			G	M							N	N
BG1NV200R001	Nishava		2			2	N	2	G	2	M	N	N			G	M							N	N
BG1OG100R014	Ogosta		2			2	N	3	F			N	Y	3	M	G	M							N	N
BG1OG307R013	Ogosta		4			4	N	4	F	4	M	N	N			F	M							Y	N
BG1OG789R001	Ogosta		3			3	N	2	F	3	M	N	N			G	M							Y	N
BG1WO100R001	Timok		5			5	N	3	F	5	M	N	N			F	M							N	Y
BG1YN130R029	Yantra		3			3	N	2	G			N	Y	3	M	G	M							N	N
BG1YN307R027	Yantra		3			3	N	2	G			N	Y	3	M	G	M							N	N
BG1YN700R017	Yantra		3			3	N	4	G	3	M	N	N			G	M							N	N
BG1YN900R015	Yantra		5			5	N	4	G	4	M	N	N			G	M							N	Y
UALAR01	Latorica						N					N	N					P	P	N	N	N	N		
UALAR02	Latorica						N					N	N					P	P	P	P	P	N		

		Biological Quality Elements					HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
Water Body code with country code	**Name of river**	**Fish**	**Benthic invertebrates**	**Phytobenthos and Macrophytes**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
UALAR03	Latorica						N					N	N					P	P	P	Y	Y	Y		
UAPru01	Prut						N					N						P	P						
UAPru03	Prut						N					N						P	P						
UASr	Siret						N					N						P	P						
UATISR01	Tisza						N					N	N					P	P	N	N	P	P		
UATISR02	Tisza						N					N	N					P	P	P	N	Y	Y		
UATISR03	Tisza						N					N	N					P	P	P	N	P	P		
UATISR04	Tisza						N					N	N					P	P	P	N	P	P		
UATISR05	Tisza						N					N	N					P	P	P	N	P	P		
UAYlpgr	Yalpug						N					N						P	P						

Water Body code with country code	Name of river	Biological Quality Elements					HyMo	General Physical and Chemical conditions SUPPORTIVE to the Ecological Status	Specific pollu-tants	OVERALL ECOLOGICAL STATUS	Confidence class (high, medium, low for Overall Ecol.Status)	Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						Exemption Art. 4(4)	Exemption Art. 4(5)
		Fish	Benthic invertebrates	Phytobenthos and Macrophytes	Phytoplankton	Overall Biological Status	Hydromorphology - High Status (Y/N)		Specific pollutants (good or failing for Ecological Status)			Artificial Water Body (Y/N)	HMWB (Y/N)	Ecological Potential Class	Confidence class (Ecological Potential)	CHEMICAL STATUS CLASS	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	(Y/N)	(Y/N)
AT10500200	Neusiedler See				2	2	N		G	2	H	N	N			G	H	N	N	N	N	N	N	N	N
HUAIH049	Balaton			2	2	2	N	2	G	2	M	N	N			G	M							N	N
HUAIH070	Fertõ			2	2	2	N	2	G	2	M	N	N			G	M							N	N
ROLW01.14.1.0.0.0.0.0	Razim				2	2	N	2	G	2	L	N	N			F	M	N	Y	N	N	Y	N	N	N
UAKU	Kugurlui						N					N													
UAYL	Yalpug						N					N													

Explanations

	Labels in the table	Descripton	Possible values
	Water body code with country code	as in Article 5 Roof Report	
	Name of river	as in Article 5 Roof Report	
Biological Quality Elements	**Fish**	Status Class for the Water Body	1 = high, 2 = good, 3 = moderate, 4 = poor, 5 = bad
	Benthic invertebrates	Status Class for the Water Body	
	Angiosperms	Status Class for the Water Body	
	Macroalgae	Status Class for the Water Body	
	Phytoplankton	Status Class for the Water Body	
	Overall Biological Status	Status Class for the Water Body = worst case of the status classes of all biological quality elements (acc. to one-out-all-out principle)	
Hydromorphology	**Hydromorphology - High Status**	Only if biological quality elements are in high status hydromorphology must also be in high status	Y = Yes, N = No
General Physical and Chemical conditions	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	Status Class for the Water Body	1 = high, 2 = good, 3 = moderate, 4 = poor, 5 = bad
Specific pollutants	**Specific pollutants** (good or failing for Ecological Status)	Status Class for the Water Body for specific pollutants based on national quality standards; relevant for the assessment of Ecological Status. Specific pollutants are those pollutants that are regulated at the national level (and not included in the List	G = good, F = failing
OVERALL ECOLOGICAL STATUS	**Overall Ecological Status**	Worst case of the Biological Quality Class and Specific pollutants Status Class. For High Ecological Status additionally the General Physical and Chemical Parameters and the Hydromorphology have to be in high status.	1 = high, 2 = good, 3 = moderate, 4 = poor, 5 = bad
	Confidence class (high, medium, low for Overall Ecol.Status)	Confidence level of assessment (as discussed in the MA EG)	H = high, M = medium, L = low

Artificial and HMWB	**Artificial Water Body (Y/N)**	Is the water body artificial?	Y = Yes, N = No
	HMWB (Y/N)	Is the water body heavily modified?	Y = Yes, N = No, PN = provisionally no, PY = provisionally yes
	Ecological Potential Class	If the water body is artificial or heavily modified - please give the information of the Ecological Potential Class	2 = good and above, 3 = moderate, 4 = poor, 5 = bad

	Labels in the table	Descripton	Possible values
	Confidence class (Ecological Potential)	Confidence level of assessment (as discussed in the MA EG)	H = high, M = medium, L = low
CHEMICAL STATUS CLASS	**CHEMICAL STATUS CLASS**	Chemical Status Class for all pollutants that are regulated by the EU	G = good, F = failing
	Confidence (Chemical Status)	Confidence level of assessment (as discussed in the MA EG)	H = high, M = medium, L = low
Risk assessment for Non EU MS and also for EU MS in case of low confidence	Ecological Status	Risk Class for the Water Body	Y = at risk, P = possibly at risk, N = not at risk
	Chemical Status	Risk Class for the Water Body	
	Organic pollution	Risk Class for the Water Body	
	Nutrient pollution	Risk Class for the Water Body	
	Hazardous substances	Risk Class for the Water Body	
	Hydromorphological alterations	Risk Class for the Water Body	
Exemptions	Exemption Art. 4(4)		Y = Yes, N = No
	Exemption Art. 4(5)		Y = Yes, N = No

Water Body code with country code	**Name of river**	Biological Quality Elements						HyMo		Specific pollu-tants			Artificial and HMWB				Chemical Status Class		Risk assessment for Non EU MS and also for EU MS in case of low confidence						**Exemption Art. 4(4)**	**Exemption Art. 4(5)**
		Fish	**Benthic invertebrates**	**Angiosperms**	**Macroalgae**	**Phytoplankton**	**Overall Biological Status**	**Hydromorphology - High Status (Y/N)**	**General Physical and Chemical conditions SUPPORTIVE to the Ecological Status**	**Specific pollutants** (good or failing for Ecological Status)	**OVERALL ECOLOGICAL STATUS**	Confidence class (high, medium, low for Overall Ecol.Status)	**Artificial Water Body (Y/N)**	**HMWB (Y/N)**	**Ecological Potential Class**	Confidence class (Ecological Potential)	**CHEMICAL STATUS CLASS**	Confidence class (Chemical Status)	Ecological Status	Chemical Status	Organic Pollution	Nutrient Pollution	Hazardous Substances	Hydromorphological Alterations	**(Y/N)**	**(Y/N)**
ROCT01_B1	Periboina-Cap Singol		2		3		3	Y	3	F	3	M	N	N			F	M	Y	Y	N	Y	Y	N	N	N
ROCT01_B2	Mangalia		4		5		5	N	3	F			N	Y	5	M	F	M	Y	Y	N	Y	Y	Y	N	Y
ROCT02_B1	Cap Singol-Eforie Nord		2		3		3	N	3	F			N	Y	3	M	F	M	Y	Y	N	Y	Y	Y	N	Y
ROCT02_B2	Eforie Nord-Vama Veche		2		2		2	Y	3	F	3	M	N	N			F	M	Y	Y	N	Y	Y	N	N	N
ROTT02_B1	Lacul Sinoe		5		5		5	N	3	F	5	M	N	N			F	M	Y	Y	Y	Y	Y	N	N	N
ROTT03_B1	Chilia-Periboina	4	2		3		4	N	3	F	4	M	N	N			F	M	Y	Y	N	Y	Y	N	N	N
UABScstl	Black Sea coastal							N					N													
UADDBS	Black sea							N					N													
UADDBys	Bystroe							N					N													
UADDOch	Ochakovskoe							N					N													

UADDPr	Prorva							N					N													
UADDUtya	Starostambulskoe							N																		

Economic analysis – basin wide overview

International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

Annex 15 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

COMMENTS

1. There are differences between the countries in the methodologies used for calculating respective socio-economic indicators - different reference parameters have been used such as population or area within the Danube River Basin (DRB).

DE, SI, HR, BG, RO, CZ, AT, MD, BA: For calculation of the respective data the reference parameter is "area".

SK, RO, AT: National data used as around 98% of the country is in the DRB. RS: 92.8% is in the DRB.

RS: Data does not include data for Kosovo and Metohija, except for *Total area within the DRB* (Table 1, Column B) where Kosovo and Metohija are included.

2. The reference year for data collected is 2005. In cases where there is a different reference year, this is indicated. For DE: the reference year for all data is 2004 unless otherwise indicated.

3. Data resulting from calculations - in some cases the figures are rounded to facilitate presentation.

4. The reader of the report should have in mind exchange rate fluctuations.

Table 1: General socio-economic indicators

	Total area within DRB	Population	Employees total	GDP	GDP per capita
	(km ²)	(inhabitants)	(number)	(million EUR)	(EUR per capita)
Austria	80565	7,911,000	3830500	244453	29700
Bosnia and Herzegovina*	38719	1,487,785	241047	3323	2230
Bulgaria	42,837	3,443,822	1,419,906	8876	2577
Croatia	35090	3,045,707	1049020	21757	7144
Czech Republic	21692	2,755,000	1244000	29306	10696
Germany	56300	9,700,000	4900000	310000	31700
Hungary	93000	10,176,581	3930100	90003	8937
Moldova	12330	1,096,000	314000	24	754
Romania	231219	21,623,000	9851000	80049	3702
Serbia	81974	7,481,698	2025627	23610	3186
Slovak Republic	47185	5,184,184	2132650	37035	6875
Slovenia	16380	1,761,191	688945	24922	14150
Ukraine	31165	2,640,455	1399465	2881	1090
Total for the Danube River Basin (DRB)	**788456**	**78306423**	**31000633**	**876239**	**11190**

Comments:

Austria: Figures estimated for DRB share of AT, data in column E and F is with reference year 2005

* Bosnia and Herzegovina: Figures only for Republic Srpska; data also for Federation of BiH will be provided in n

Bulgaria
Croatia: Reference year for population 2001
Czech Republic
Germany
Hungary: Exchange rate: 264.27 average yearly exchange rate of Hungarian National Bank for 2006

Moldova: Estimated data for the Danube Basin; reference year 2006; at date of calculation average exchange rate was 1 EUR = 16.3 MDL; GDP per capita is an average per country
Romania

Serbia: Reference year 2005.For all tables, average exchange rate for 2005 was 1EUR=83 din. Data does not include data for Kosovo and Metohija, except for *Total area within the DRB* (Table 1, Column B) which does include Kosova and Metohija.
Slovak Republic
Slovenia
Ukraine

Table 2: Production in main economic sectors

	Agriculture (A+B)		Industry (C+D+E41)		Electricity generation (Total) (% hydropower, if available)	
	Gross value added (million EUR)	Share of GVA (%)	Gross value added (million EUR)	Share of GVA (%)	Gross value added (million EUR)	Share of GVA (%)
Austria	3661	1.65	45933	20.74	1752	0.75
Bosnia and Herzegovina*	450.00	14.15	486.48	14.64	195	5.87
Bulgaria	795	12	2,221	59	n.a	n.a
Croatia	1637	9.1	4243	23.5	499	2.8
Czech Republic	1156	4.40	10083	38.36	645	2.45
Germany	3500	1.3	79600	28.9	3700	1.3
Hungary	3190	4.1	17824	22.9	1294	1.7
Moldova	102	18	85	15	3	0
Romania	6748	8.43	19725	24.64	1670	2.08
Serbia	2092	11.3	3350	20	718	4.1
Slovak Republic	1413	4.35	9398	28.9	522	1.6
Slovenia	554	2.54	5410	24.83	680	3.12
Ukraine						
Total for Danube River Basin	**25298**		**198359**		**11677**	

Note: NACE codes classification-rev.1 from 1993

	3190	4.1	17824	22.9	1294	1.7

Comments:
Austria
Bosnia and Herzegovina: * Figures are for Republica Srpska only

Bulgaria
Croatia: Data in column F and G are data for activities E40 according to the NACE codes classification
Czech Republic
Germany
Hungary: Data for 2006
Moldova
Romania
Serbia
Slovak Republic
Slovenia
Ukraine

Table 3: Water abstraction/supply

	Total water abstraction	Total invoiced water used	of which: Total public water supply	Total self-supplied water (large users)	Cooling purposes in mil.m³	Water abstraction per sectors: Households	Industry	Agriculture	Others (services)
	(million m³)	(million m³)	(million m³)	(million m³)		(m³/inhabitant)	(m³/1000 EUR GVA*)	(m³/1000 EUR GVA*)	(m³/1000 EUR GVA*)
Austria	2136	433	372	61		55	26	21	1
Bosnia and Herzegovina - RS	298	179	127	52		84			
Bulgaria	4311	3905	166	3740		40	203	8	3
Croatia	384	226	146	80	4	34	16	23	1
Czech Republic	294	83	79	4		74	13	17	no data
Germany	3700	580	580	not applicable		55	36	1	not applicable
Hungary	5818	5818	803	5015		39	241	229	5
Moldova	295	276	253	23		33	259	16	18
Romania	5400	4986				56	177	41	14
Serbia	4845	4528	510	4018		51	360	37	16
Slovak Republic	910	849	333	516	363	44	97	644	
Slovenia	1037	799	105	2	692	51	13	297	2
Ukraine	1421	209				79			
Total for the Danube River Basin	**30849**	**22871**	**3474**	**13510**					

all water abstracted including for cooling purposes

Notes:

The invoicing systems are quite different in Danube countries. A common data basis exists only for water abstraction.

In column G: * To include all water abstracted, also for cooling purposes

Column C and 4: * water used for hydropower is not included
*GVA: Gross Value Added

Comments:

Austria			
Bosnia abd Herzegovina: Figures for Republika Srpska only			
Bulgaria			
Croatia: Data on cooling water refers to water which was spent in the process (difference between abstracted and returned quantity)			
Czech Republic			
Germany			
Hungary: data fo	Excluding in situ water use (14881 million m3)	Refers to public supply invoiced water	Including electricity
Moldova			
Romania			
Serbia			
Slovak Republic	Abstraction for cooling purposes is in mil.m³		
Slovenia			
Ukraine			

Table 4: Drinking water supply, wastewater services and connection rates for centralised public systems

not applicable

	Water supply production					Total collected wastewater	Population connected to public sewerage system	Population connected to wastewater treatment plant	Population connected to public water supply
	Total public water supply	Households	Industry	Agriculture	Other sectors (services)				
	(million m³)	(million m³)	(million m³)	(million m³)	(million m³)	(million m³)	(%)	(%)	(%)
Austria	2136.1	433.1	1535	100	68	1066.44	91.7	91.7	86.0
Bosnia and Herzegovina	127	85.09	15.24		26.7	161.2	33	1.7	67.0
Bulgaria	165.5	136.1	29.4			452.4	67	64	99.0
Croatia	146.3	102.4	35.1	0	8.8	135.5	41.3	24.1	69.7
Czech Republic	78.5	50.7	19.5	1.4	6.9	295.5	72.6	65.8	88.3
Germany	580	450	130	not applicable/ no data	not applicable/ no data	1220	96	95	99.0
Hungary	532.2	371.5	50.9	3.4	106.4	588.62	64.9	54.2	98.4
Moldova	251	29	144	4	74	4.5	60	54	73.0
Romania	4986	1210	3500	276	300	4565	46	31	65.0
Serbia	510	379	77	0	54	389	55	11	77.0
Slovak Republic	332.67	229.6	96.3	6.83		839	57.09	55.16	85.3
Slovenia	105.74	90.48	2.8	0	12.463	106	49	45	90.0
Ukraine	209	26.29	38.42	97.35	76.94	159.7	41		51.0
Total for Danube River Basin (DRB)	**10160.0**	**3593.3**	**5673.66**	**488.98**	**734.203**	**9982.86**			

Notes:

There are cases where although the population are not connected to the public sewerage and WWTP (wastewater treatment plant), some of the population have individual waste water treatment. This is not reflected in the table.

Comments:

Austria: Estimation for DRB share of AT

Bosnia and Herzegovina: RS only

Bulgaria: Reference year 2003. Data will be updated in M

Croatia

Czech Republic

Germany	collected wastewater" refers to wastewater collected in public sewers only			Base year for collected wastewater: 2004 Bavaria, 2007 Baden-Württemberg
Hungary		data for 2005	There is a difference between the households connected to public sewerage system and households connected to waste water treatment plant. The Budapest Central WWTP will start working at the end of 2009.	

Moldova

Romania

Serbia

Slovak Republic

Slovenia

Ukraine

Table 5: Wastewater treatment plants (WWTP)

	Wastewater treatment plants		WWTP with primary treatment		WWTP with secondary treatment		WWTP with tertiary treatment	
	Total number (number)	Total capacity (1000 PE)	Total number (number)	Total capacity (1000 PE)	Total number (number)	Total capacity (1000 PE)	Total number (number)	Total capacity (1000 PE)
Austria	1519	13954	0	0	621	639	898	13315
Bosnia and Herzegovina	1	22	1	22				
Bulgaria	19	2964	5	18	14	2843	1	103
Croatia	34	1860	14	198	19	1562	1	100
Czech Republic	508	3962	5	2	276	819	227	3141
Germany	1813	19920	23	46	876	1001	914	18873
Hungary	631	11268.245	631	11268.245	616	11230.76	269	5377.799
Moldova	18	312383	18	312383	9	87740	none	none
Romania	312	11857	100	1076	209	10083	3	699066
Serbia	32	1247	3	211	29	1036	0	
Slovak Republic	226		7		160		31	
Slovenia	152	1715	10	418	125	771	17	526
Ukraine								
Total for the Danube River Basin	**5265**		**817**		**2954**		**2361**	

Notes:

The assessment consideres reporting on urban wastewater treatment development in the DRB (agglomerations >= 2000 PE). In some cases the reporting was done on the national level using statistical data, which covers even smaller agglomerations - DE, HR, SI.

Comments:

Austria: Estimation for DRB share of AT

Bosnia and Herze RS only
Bulgaria
Croatia
Czech Republic
Germany
Hungary: Values are interpreted following the Austrian and Bulgarian examples
Moldova: Refers only to currently operating Urban WWTPs in the Moldovan part of the DRB with PE from 2000 to 10000 plus
Romania
Serbia
Slovak Republic
Slovenia
Ukraine

Table 6: Population connected to wastewater treatment plants (WWTP)

	Total population connected to treatment plant	Population connected to WWTP with primary treatment	Population connected to WWTP with secondary treatment	Population connected to WWTP with tertiary treatment	Population not connected	
	(%)	(%)	(%)	(%)	(%)	
Austria	91.7	0	4.3	87.5	8.3	from the total population
Bosnia and Herzegovina	1.7	1.7			98.3	
Bulgaria	64	1	61	2	36	
Croatia	24.1	3	20.7	0.4	75.9	
Czech Republic	65.80	0	9.8	56	34.2	
Germany	94.1	0.2	6.3	87.6	5.9	
Hungary	54.8	2.01	28.05	24.2	45.2	
Moldova	54	54	38	0	56	average in the DRB; varies from 10% not connected in Ungheni to 85% not connected in Briceni
Romania	31.26	4.29	25.65	1.32	68.74	
Serbia	11	2	9		89	
Slovak Republic	51.7	0.4	39.6	11.7	48.3	
Slovenia	45	30	14	1	55	
Ukraine						
Total for the Danube River Basin						

Note:
In some cases population shown as not connected to public sewerage systems may have individual wastewater treatment in place.

Comments:

ıstria: column F - AT average; figure for population not connected to public sewerage systems, however individual wastewater treatment in plac	
Bosnia and Herzegovina: RS only	
Bulgaria	
Croatia	
Czech Republic	
Germany	
Hungary	data for 2005
Moldova	
Romania	
Serbia	
Slovak Republic	
Slovenia	
Ukraine	

Table 7: Electricity generation in the DRB

	Total electricity capacity	HPP+ installed capacity	Total electricity generated	HPP generation	HPP	Cooling (Thermo+Nuclear)
	(MW)	(MW)	(1000 GWh)	(1000 GWh)	(1000 m³)	(1000 m³)
Austria	19182	11853	63.92	37.28	n.a.	1043
Bosnia and Herzegovina	1219.11	736.11	4.95	2.34		
Bulgaria	n.a.	159.69	n.a.	0.296	2886	n.a.
Croatia	1293	297	4794	1336	no data	3700
Czech Republic	2828		15.000		no data	no data
Germany	no data	2400	no data	no data	no data	2260000
Hungary	7222.4	22.37	35.859	0.186	4.148	1183790
Moldova	n.a.	16	n.a.	0.0002	450	n.a.
Romania	19.042		59.413			
Serbia	8355	2831	36.474	12.032	210878	2814
Slovak Republic	7921	2308.79	30.25	4.31	507	350
Slovenia	2645	707	12.57	2.97	175482	690
Ukraine						
Total for the Danube River Basin	**50685**	**21331**				

Note:
Some data will be available only in May - BG, MD
DE: Some data are not available considering different reporting basis
* HPP: Hydropower plant

Comments:
Austria
Bosnia and Herzegovina
Bulgaria
Croatia: Data on cooling waters refers to water which was spent in the process (difference between abstracted and returned quantity)
Czech Republic
Germany: Reference year for HPP installed capacity is 2008
Hungary
Moldova: according to agreement signed in 1973, Costesti-Stinca HPP constructed in 1978 operates on a parity basis with R
Romania
Serbia
Slovak Republic
Slovenia: Calculations were made from installed discharge, which is given in m3/s for each HPP in DRB.
Ukraine

Table 8: Inland navigation

	Quantity	Number of commercial harbours
	(1000 tons)	(number)
Austria	12107	7
Bosnia and Herzegovina	48.4	1
Bulgaria	3,693	14
Croatia	430	4
Czech Republic	0	0
Germany	4200	9
Hungary	80	28
Moldova	0	1
Romania	98900	13
Serbia	7746	11
Slovak Republic	1028	3
Slovenia	0	0
Ukraine	9585	
Total for Danube River Basin	**137817.4**	**91**

Comments:
Austria

Bosnia and Herzegovina: Figures only for Republika Srpska
Bulgaria
Croatia
Czech Republic
Germany: Reference year is 20(
Hungary
Moldova: Giuirgiulesti Harbour on the Danube River
Romania
Serbia
Slovak Republic
Slovenia
Ukraine

Table 9: Mineral aggregate extraction from the river bed

	Quantity	Number of mineral aggregates extraction sites
	($1000\ m^3$)	(number)
Austria	n.a	n.a
Bosnia and Herzegovina	653.97	150
Bulgaria	93	12
Croatia	2935	
Czech Republic	0	0
Germany	770	184
Hungary	12369	not available
Moldova	0	0
Romania	15903	1100
Serbia	5123	103
Slovak Republic	885.25	n/a
Slovenia	62	n/a
Ukraine		
Total for Danube Basin	**38794.22**	**1549**

Comments:
Austria
Bosnia and Herzegovina

Bulgaria: Reference year is 2003.
Croatia
Czech Republic
Germany: Reference year is 2007
Hungary
Moldova: national environmental legislation prohibits extraction of sand and gravel from river beds; these activities are being implemented illegally with no register.
Romania
Serbia
Slovak Republic
Slovenia
Ukraine

Table 10: National trends in water demand projected to 2015

	Population	Total water demand	Future demand of water abstraction per sector					
			Households	Industry	Agriculture	Electricity production	Other sector (services)	Projected specific drinking water consumption per capita
	(inhabitants)	(1000 m³)	(1000 m³)	(1000 m³)	(1000 m³)	(1000 m³)	(1000 m³)	(l/capita/day)
Austria	7938879	1708430.39	434653.63	1059414	113809	n.a.	100553	150
Bosnia and Herzegovina	1553187							180
Bulgaria	3151486	8318324	138035	5945762	2234527		12527199	120
Croatia	2938600							150
Czech Republic	2790000	295803	101100	70600	11800	105300	7003	99.3
Germany	9800000	not available	not available	not available	not available	not available	not available	not available
Hungary	9885272	5980.3	422.8	461.3	767	4141.2	189	120
Moldova	1009000	299250	36830	155610	38900	n/a	67910	100
Romania	21190	6576	1450	4490	636			55
Serbia	7700000	12953755	850000	8800000	400000	2813755	90000	150
Slovak Republic	5484000	519834.5	250101.77	567600	125392			138.8
Slovenia	1787608							
Ukraine								
Total for Danube Basin	**54059222**	**24107953.19**	**1812593.20**	**16603937.3**	**2925830.37**	**2923196.2**	**12792853.94**	

Notes:

The water demand projection is calculated based on different national methodologies, which consider minimum, average and maximum scenarios.

Figures do not include water demand for hydropower plants. Only water demand for thermo power plant for cooling is included.

Comments:

Austria
Bosnia and Herzegovina: Figures for RS only
Bulgaria
Croatia
Czech Republic
Germany
Hungary:
Moldova
Romania
Serbia
Slovak Republic
Slovenia National trends for water demand are not available yet. For year 2015 an estimation for population growth has been calculated = 1.5% (Eurostat).
Ukraine

Case studies on the assessment of current levels of cost-recovery in the DRB

icpdr iksd

International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Annex 16 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Introduction

The assessment of current levels of cost-recovery for water services is in accordance with Article 9 of the Water Framework Directive. Key elements to be investigated in the economic analysis include the status of water services, the institutional set-up for cost-recovery, the extent of the recovery of costs (financial, environmental and resource costs) of water services and the contribution of key water uses to the costs of these services, as well as the incidence of subsidies.

The presentation of the following case studies aims to highlight parallels and differences across the Danube River Basin (DRB) countries with regard to the varying aspects related to the implementation of economic analysis: **cost-recovery**.

Case study 1: Cost-recovery concerning drinking water supply in Bavaria

In the German DRB, there are regular benchmarking projects assessing cost-recovery of water services. The studies are designed and conducted by private consulting firms. Project partners include council associations, associations of water and wastewater services and state environment agencies and ministries.

One such study assesses efficiency and quality of drinking water supply in Bavarian communities and is conducted every three years.

In the 2006 study, the participating companies accounted for about 30% of all drinking water distributed in Bavaria and included companies with <0.5 to >2.5 million annual water distribution.

The study collected a wide range of information and indicators such as organisational set-up, cost and revenue structures, network properties and losses, water treatment, energy use, personnel, and many others.

With an average rate of around 100% for the participating companies, the study confirmed **full cost-recovery in the German DRB.**

Depreciation and interest accounted for over 30% of total cost; personnel, materials and services procured from third parties for approx. 20% each; taxes, fees etc. together accounted for approx. 7% of costs. On average, the participating companies invested approx. 4000 Euro per km of their total supply pipe length in 2006.

Case study 2: Cost-recovery concerning drinking water supply and wastewater services in Croatia

Case study area: County of Karlovac, 3622 km^2

Population: 141,787 (2001 census), of which 61% are connected to the public water supply, 30% are connected to the public sewerage systems with no wastewater treatment.

Cost-recovery was analysed for four utility companies (Duga Resa, Karlovac, Ogulin, and Slunj) comprising approx. 75% of all water services provided in the study area.

Water supplied: 7.2 million m^3; wastewater collected: 3.9 million m^3.

In line with the Utilities Act and the Water Management Financing Act, Croatia has a complex water price structure reflecting various cost components. The cubic metre (m^3) of water supplied to a final user is burdened with:

- Service price (expressed separately for water supply, wastewater collection and treatment, if provided);
- Water charges (obligatory expenditure set at the national level by the State Government) and development charges (facultative expenditure set at the local level by local government) which are strictly intended for recovering investment costs and the costs of water administration and management related to ensuring water availability and water quality;
- Value added tax (general tax paid to the state budget).

The assessment (see table below) shows cost-recovery of approx. 70% of the total O&M costs of providing water services in the study area (77% for drinking water supply and 45% for wastewater

services). In many cases, service prices do not reflect real costs as local authorities, whose consent is required, pursue an underestimated pricing policy. Usually the gaps are filled by the "commercial" activities of utility companies.

The assessed rate of recovering total financial costs is somewhat lower due to large investments, especially in wastewater infrastructure in the study area. Investments are co-financed from national funds (mainly from revenue from water charges that are collected at the national level and allocated without return into particular local projects according to set criteria reflecting priority and solidarity in the development of water infrastructure across the state).

Results for the study area are not representative of the whole of Croatia. Due to the principle of solidarity, the national scale is the most appropriate scale for analysing cost-recovery of investment and water administration and management costs.

	Income / cost (in 1000s of Croatian kunas)	**Water**	**Wastewater**	**Total**
Incomes (water pricing):				
1.	Service prices (revenue of water company)	29.427	4.789	34.216
2.	Water charges (revenue of Croatian Waters)	5.737	4.927	10.664
3.	Development charges (revenue of local budget)	0	0	0
Subsides (to companies):				
4.	For on-going purposes	0	0	0
5.	For investments			2.357
Costs:				
6.	**O&M costs**	**37.993**	**10.577**	**48.570**
	Payment for concession	605	0	605
	Personal costs	13.688	3.420	17.108
	Materials and Energy	7.510	2.837	10.347
	Maintenance	2.490	430	2.920
	Other running costs	13.700	3.890	17.590
7.	**Capital costs**	**7.334**	**23.028**	**30.362**
	Repayment of loans (by companies)	1.348	0	1.348
	Investments in new waterworks	5.986	23.028	29.014
8.	**Corresponding costs of water administration and management** (1)	**>0**	**>0**	**>0**
Rate of cost-recovery:				
	O&M costs (1. / 6.**):**	**77%**	**45%**	**70%**
	All financial costs ((1.+2.+3.) / (6.+7.+8.)**)** (2)	**78%**	**29%**	**57%**

(1) Not analyzed at the study area level.

(2) Costs of water administration and management are missing.

Source of data: "Economic analysis for the Danube River Basin Management Plan" (Economic Institute of Zagreb): evidence from Croatian Waters. Reference year: 2004.

The Water Management Strategy (adopted in 2008) provides for the implementation of reforms and the rationalisation of the water utility sector in Croatia as well as the gradual application of the cost-

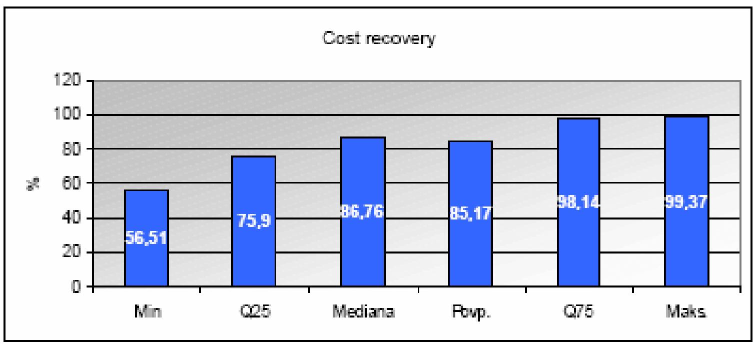
recovery principle by 2015. Local and state authorities, depending on the component of water price for which they are responsible, will develop corresponding pricing schemes, taking into account social affordability of the determined price for the population.

Case study 3: Assessing cost-recovery for ensuring sustainable water supply in Slovenia

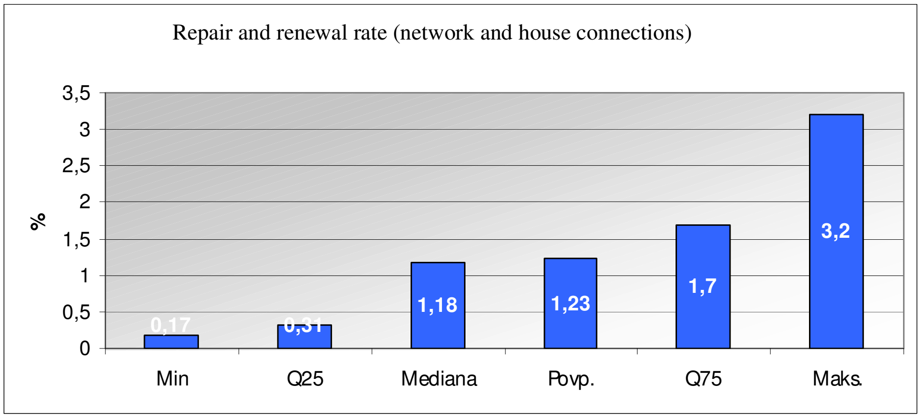
A twinning project with Germany and Austria offered 8 Slovene water supply companies the possibility to participate in a comparison of services (based on 39 indicators) with approx. 80 other companies in the same sector.

The comparison of indicators was based on international standards and included four categories: supply safety; supply quality; supply sustainability and supply efficiency. The methodology for indicator comparison is an appropriate instrument for determining adequate water prices in line with the EU Water Framework Directive (WFD) requirements, since it enables the comparison of performance and determines the potentials for improvement. A comparable methodology has been applied in Germany and Austria since 2003 and is used for the comparison of services of over 500 companies.

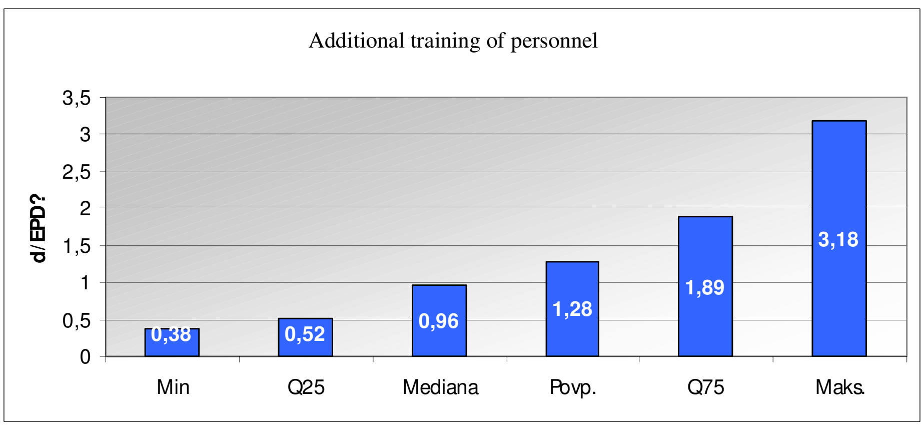
The results of the **supply sustainability** category provide information on cost-recovery analysis within the framework of the project (see diagram below).



Costs have to be covered by revenues to ensure a sustainable water supply in line with the requirements of the WFD. Therefore a **cost-recovery** of 100% has to be aimed at in the middle-term. Values over 100% are also common in Germany and Austria. Among the 8 participating companies, none of them achieved the value of 100%; three companies, however, almost achieved it. There are also companies which are far from the value needed for cost-recovery i.e. they have significant losses in the field of water supply. These companies will need to check the adequacy of their prices and adapt them in line with the requirements of the WFD.



One more indicator was considered in the cost-recovery analysis: the indicator for the **repair and renewal rate** that indicates the maintenance of the so-called technical value. The indicator shows which part of the network (including house connections) was repaired or renewed in the respective year. If, for example, 2% of the network was repaired or renewed each year, the network will be completely repaired or renewed in a period of 50 years. If a relatively long network life-span is taken into account, a long-term renewal rate of 1% to 1.5% is reasonable. This means that a network life-span of 75 to 100 years is considered. The 8 participating companies lie exactly in this range. Regarding the relatively bad network condition (water losses and pipe damages) however, this value is still too low.



The **sustainability** indicator category also allows for the time intended for the **additional training of personnel**. Water supply is a demanding and responsible task which requires highly qualified personnel. The procedures, techniques and requirements in this field develop continuously; therefore additional training of personnel is of key importance for a sustainable and high quality water supply. With only an average 1.3 days of additional training per employee per year, the value of the participating companies lies below the known comparison values in Bavaria and Austria (approx. 2 days per employee per year).

Case study 4: Investigating cost-recovery at the Podtatranska Water Company in Slovakia

Prior to presenting a summary of results for the case study realised at the Podtatranska Water Company in Slovakia, the table below shows figures outlining overall cost-recovery for the Slovakian DRB in recent years:

	Cost-recovery in %		
	2004	**2005**	**2006**
Drinking water supply:	97.27	103.53	98.81
Wastewater collection and treatment	104.92	105.99	89.66

The figures represent public water companies, the major providers of drinking water supply and wastewater treatment services (W&WW services).

There are strong indications that the current status of the cost-recovery level in Slovakian water companies has being continuously lowered. The economical pressure on water companies has, on the one hand, increased due to the growing requirements for the development of public water supply, wastewater collection and treatment, as well as the improvement of the quality of services. On the other hand, economic pressure is increased by the need to undertake the reconstruction, renovation and maintenance of infrastructure.

The Podtatranska Water Company (PWC) case study is an adaptation of a case study investigated within the UNDP/GEF Danube Regional Project in 2005, implemented in close cooperation with the ICPDR. The investigations were undertaken at the PWC, which was established in May 2003 as a share holding company. The service area is located in northeast Slovakia, in a broad mountain valley, where the main activities are tourism, engineering, chemical and food industries. The area of the PWC consists of the following settlements:

- Poprad district (includes Poprad city and 7 surrounding villages): 72,241 inhabitants; several industrial activities such as: heating/cooking equipment production, kitchen/washing machine production, automatic machines for hot and cold drinks and a brewery and canning plant. Inhabitants are connected to the drinking water supply and an old (and obsolete) wastewater treatment plant (WWTP). Industry uses the water and sewerage system to support manufacturing and non-manufacturing facilities. Prior to discharge into the public sewerage system, industrial wastewater customers must ensure that the quality of wastewater will not upset the operation of the public W&WW system. However, some industrial facilities also use private water sources for some processing activities.
- Industrial agglomeration of Svit: 9174 inhabitants (also includes one small neighbouring village). Job opportunities are in chemical and textile companies (viscose fibre and engineering production and textile production). Although the inhabitants of Svit are connected to the sewerage system, the wastewaters are discharged without treatment directly into a recipient water body. Over 90% of inhabitants are connected to the drinking water supply.
- Agglomeration of three tourist villages at Smokovce: a total of 4509 inhabitants; with several hotels, camping bungalows and motels. It is estimated that 1500 tourists per day (!) visit this area during the winter season. The agglomeration is connected to the drinking water supply; only a minor proportion of wastewater is collected and discharged directly into the recipient water body, the rest is disposed of in holding tanks.
- Agglomeration of three smaller tourist villages at Strba, located at the foot of the mountains: 7549 inhabitants with an additional 10,000 tourists per day in the tourist season. Most employment is in the tourist industry. This agglomeration is connected to a WWTP that requires replacement.

All agglomerations are connected to the drinking water supply system (connection rate is 86 - 100%) and sewerage and wastewater treatment systems (55 - 92%).

For the purposes of the case study the following groupings were made:

- *Large industry* (some 10 large factories) served by W&WW services but prior to discharge, industrial waters are pre-treated. Besides the public W&WW service, some industries have their own W&WW system for certain activities.

- *Small industry* (comprises some infrastructure enterprises and institutions - commercial offices, schools, hospital, restaurants, local brewery, meat industry, canning industry etc.).

The maximum water tariff for households in this district for 2003 was set at 16.07 SK/m^3 (including VAT) for drinking water and 10.15 SK/m^3 (including VAT) for wastewater collection and treatment.

Industrial users have individual contracts, and in 2003, the maximum tariff was set at 36.48 SK/m^3 (drinking water) and 26.22 SK/m^3 (wastewater collection and treatment).

However in Slovakia, beginning in 2006, there are now no differences in price for households and industrial users for drinking water, and from 2007, the same applies for wastewater collection and treatment (see the table below).

Development of water tariffs (including VAT) in the PWC (SK)

Year		1996	1998	2001	2003	2004	2005	2006	2007
Drinking water	Households	5.00	8.00	11.50	16.07	21.69	28.95	37.44	37.44
	Others	15.80	21.20	25.30	36.48	36.48	37.44	37.44	37.44
Sewage water	Households	3.00	4.00	7.50	10.15	13.19	17.59	22.87	29.25
	Others	10.80	15.90	18.70	26.22	26.22	29.25	29.25	29.25

Cost-recovery analysis

Based on ASTEC (Account Simulations for Tariffs and Effluent Charges Model), several scenarios were calculated, of which one scenario allowed for varying strategies for setting tariffs to cover costs. It is assumed that the tariff changes in order to reach full cost-recovery (FCR) by selected users at the minimum tariffs necessary to provide revenues that just cover costs. With an increase in pollution charges (from 8.3 million SK to 60.7 million SK), the operator runs the system at a net revenue of - 20 million SK (when 2003 tariffs are applied).

The results of the analysis are:

- The new user charge for drinking water supply will significantly impact the operator's costs (operation cost represents almost 50% of total cost of drinking water service);
- The new pollution charge has a significant impact on the increase of total costs for wastewater services. The pollution charge previously contributed to the total costs of wastewater services by 7%; after the increase, it represents 30%.

The construction of new WWTP in 2015 will bring additional costs and the operator will run the system at a net revenue of –26.5 million SK. Based upon the analysis, it can be shown that:

- Pollution charges will be lower (from 60.7 to 48.3 mill SK) but the total costs to treat wastewater will increase from 200 million SK to 222.2 million SK;
- Pollution load into the recipient body will increase due to a larger volume of wastewater collected from new clients.

The Poprad unit of the Podtatranska Water Company has a plan to complete an investment in a new WWTP and to extend the collection network for wastewater.

Results of the modelling show that to attain cost-recovery the tariffs for households should increase slightly, but industry would fare better with tariffs at almost half of the current rates.

Case study 5: Cost-benefit and institutional analysis concerning the extension and rehabilitation of water and wastewater systems in the Cluj / Salaj counties of Romania (December 2007)

The weighted average tariff of the regional operating company for water and wastewater (ROC) in 2006 was 1.38 RON/m^3 for water and 0.62 RON/m^3 for wastewater. In real terms, the tariffs in force in the project region of Cluj-Salaj in January 2007 had increased by 52% since January 2004.

The current tariff plan foresees the introduction of a unique tariff for the total service area of the ROC, which from October 2007 shall be 1.83 RON/m^3 for water supply and 0.82 RON/m^3 for wastewater. A further increase in the water tariff to 1.93 RON/m^3 was foreseen for the end of 2008.

In the *with-project* scenario, the plan proposes a real increase of tariffs in 6 steps between 2007 and 2013, two of which are already foreseen in the current tariff plan. (Tariff increases in the years 2007 and 2008 are already foreseen in the ROC's tariff plan and have remained unchanged.)

In a first step, the average tariffs are increased to achieve full recovery of the DPC-S (dynamic prime cost of the total system (existing and new infrastructure)) related to Operation and Maintenance (OM&A) by 2011.

In the case of the water tariff, this requirement is already fulfilled at present. However, the wastewater tariff will need to be notably increased to achieve the required level of cost coverage. This is mainly a consequence of the low-level of the present wastewater tariff and the relatively high amount of investments foreseen in the wastewater sector, especially the refurbishment and the extension of existing WWTPs which will generate additional OM&A costs. As a reference, the wastewater tariff presently does not even cover the DPC-S for OM&A generated by the existing and planned infrastructure. Real increases in the wastewater tariff in 2009 and 2011 are +29% and +52% in real terms (respectively), after which the tariff will achieve full recovery of the DPC-S related to OM&A. For the total tariff, this results in a real increase of +10% and +19%. A further increase of the wastewater tariff of around +6% and +20% follows in 2012 and 2013, after which all WWTP are to be completed and put into operation (total tariff increase: +3.4% and +10%).

Expressed in percentage of the DPC-S related to investments, the water tariffs proposed from 2013 onwards will cover 58%, while the wastewater tariff will cover only 27%. In the case of the total tariff (water + wastewater), the recovery of the DPC-S for investment will reach 38% in 2013. The main reason for the relatively low DPC-S recovery is the significant investment costs foreseen by the project, especially in the wastewater sector. The partial recovery of the DPC-S however does not affect the financial sustainability of the ROC, as by far the greatest part of the project investments are financed through non-reimbursable grants.

However, by the end of 2013, the determined tariffs will fully recover the DPC (equivalent to 0.03 RON/m^3 for water and 1.08 RON/m^3 for wastewater). In the case of the water tariff, a very limited increase is required to recover the additional cost generated by the project. This is because a great part of the investment cost is covered by the long-term cost savings achieved by the project investments.

Baseline Scenario-UWWT (IPPC, BAT and Nitrates Directive) and BAP from 2005/2006 to 2015

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Annex 17 of the DRBM Plan

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1. Baseline scenario (UWWTD, IPPC and BAT*) – from 2005 up to 2015

Country	*Basic / supplementary measures*									Remarks
	UWWTD implementation					IPPC and BAT		P-free detergents	Others*	
	Agglomerations >10,000 PE (and year)	*Sensitive areas* %	Estimated total costs (mil. Euro)	Funding sources (mil. Euro)		Status of implementation	Trend			
				EU	National					
Germany	Accomplished	Art. 5(8), combined with Art. 5(4)	Full compliance reached, no further significant costs	Will be made available at a later point in time	Will be made available at a later point in time	Implemented	Continuous improve-ment corres-ponding to updating BAT	P-free detergents are in use		Basic measures implemented, a minor number of projects still pending
Austria	Accomplished	Art. 5(8), combined with Art 5(4)	Full compliance reached, no further significant costs	250 (total) 90 (water-friendly)	250 (total) 90 (water-friendly)	Implemented	Continuous improve-ment corres-ponding to updating BAT	Poly-P-free detergents are in use	Advisory services for farmers	Basic measures implemented
Czech Republic	2010	Whole territory	1315	887	428	Implemented	Continuous implementa-tion	P-free detergents are in use except in industries and institutions where washing is organised by specially trained personnel	Measures are proposed in framework of the River Basin Management Plan (RBM Plan)	Supplementary measures are in progress as part of RBM Plan
Slovakia	2010	Whole territory	1604	692	912	Implemented	Unknown	in preparation		
Slovenia	2008 (Determination of NEW sensitive areas for the Danube area in process. Deadline for adaptation of new *sensitive areas* deadline is 7 years (2015)	28.7% of Danube Region. (Determination of NEW *sensitive areas* for the Danube area in process.) (100% of Danube River Basin (DRB)	884	35	State – 398 Municipal – 133 Loans - 318	Implemented	Continuous improve-ment correspond-ding to updating BAT.	P-free detergents are in use.	Advisory services for farmers.	In progress.

Croatia	Proposal: 2018 in *sensitive areas* and 2030 in normal and less sensitive areas	Preliminary identification of *sensitive areas* is under technical consultation with EC. Legal framework for issuance of Decision on *sensitive areas* still does not exist.	1950 (including agglomerations between 2000 - 10,000 PE)	Unknown	Unknown	Regulation on the procedure for establishing integrated environmental requirements (OG No. 114/08) is adopted. Transition period 2017.		P-free detergents are partially in use. Under discussion with Association of Manufacturers and Wholesale Dealers of Washing, Cleaning, and Beauty Products.		
Serbia	To be determined after the adoption of new Law on Water harmonized with EU regulation (expected in 2009)	To be determined after the adoption of new Law on Water harmonized with EU regulation (expected in 2009)	First estimates up to 4000 (including agglomerations between 2000 - 10,000 PE). It is not possible to make estimates up to 2015.	Unknown	Unknown	In progress. Law is adopted, but secondary regulation is not yet prepared.	Slow progress	All domestic factories produce P-free detergents; most of the imported products are not P-free. Under discussion with relevant bodies.		To be determined after the adoption of new Law on Water harmonized with EU regulation (expected in 2009)
Bosnia and Herzegovina	Two existing wastewater treatment plants (WWTP) >10,000 PE and three planned WWTP of same size by 2015	Will be defined by the end of 2012	First estimates about 450 (160 agglomerations with >2000 PE).	Unknown	Unknown	Full implementation is not determined yet. In preparation are 6 BAT for food industry.	Slow progress	Domestic factory produces about 50% P-free detergents, for imported product no information.		
Hungary	2015	8	3100	1900	1200	Implemented	Continuous improve-ment corres-ponding to updating BAT	Approx. 80-90% assumed as P-free by 2013 - assisted by EURO Compact project implementation.	Measures will be proposed in the framework of the RBM Plan	In progress

Bulgaria	2010	Whole Bulgarian part of the Danube River District	352.06 (including Urban WWTP and collecting systems)	178.36 (According to implementation programme of Directive 91/271/EEC)	173.7 (According to Implementation program of Directive 91/271/EEC)	Under implementation	Issue of permits corres-ponding to IPPC require-ments	Measures haven't been planned yet	Basic measures will be proposed in the framework of the RBM Plan	
Romania	2015 (2018 for agglomerations between 2000 - 10,000 PE)	Whole territory	13,400 (including agglomerations between 2000 - 10,000 PE)	2700(Cohesion Fund for the period 2007-2013)	500 (National co-finance for EU Fund 2007-2013) 1792 (Loans at different International Finance Institutions for the period 2006-2009)	Under implementation (maximum transition period obtained December 2015)	Continuous improve-ment corres-ponding to IPPC permits	The average % of P in AWM detergents in 2008 is 5.3 which represents a 66% decrease compared with 2005. The accelerated decrease in trend is continuing [study GfK and PwC].	Measures are proposed in the framework of the RBM Plan	In progress
Moldova	2015	not applicable	19,320	3864	15,456			Not applicable	In progress	Not developed
Ukraine	2020	not applicable	317.9 (including agglomerations between 2000 - 10,000 PE)		317.9 (According to National Law "Programme for Drinking Water" adopted 3rd March 2005)	National regulatory system to control the impact to water from industry was adopted in 1994 - 1999 and updated in 2002 - 2005	Continuous improve-ment	Not applicable	In progress	Not developed

* UWWTD: Urban Wastewater Treatment Directive; IPPC: Directive for Integrated Pollution Prevention and Control; BAT: Best Available Techniques.
Others*: legal, European Commission instruments and training

2. Baseline scenario (Nitrates Directive and Best Agricultural Practices BAP)– from 2005 to 2015

Country	Land use development assessment (% change)			Livestock trends	Inorganic fertilisers application	Nitrogen (N) surplus (trends)	Nitrates Directive implementation		Rural Development Programmes (Axis 2) (mil Euro)
	Cultivated agricultural area	Forestation	Urban area				Year	Vulnerable zones %	
Germany	-1[1]	0	+1	-14%[2]	No changes	declining due to further increases in N-efficiency; estimate at present – 5%	1996	Action Programme for the whole German territory	Will be made available at a later point of time
Austria	Slightly declining, with an estimate of –0.4	Slight increase due to climate change and use of marginal agricultural land	Increasing, but an estimate cannot be given	-6% [3]	4% [4]	Declining due to further increases in N-efficiency; estimate at present – 5%	Fully implemen-ted	Action Programme for the whole Austrian territory i.e. Austria accepts Black Sea waters as a *vulnerable zone*	Will be made available at a later point in time
Czech Republic	-0.57	0.2	0.34	No changes	10%	No changes	2004	47.75 (from 1st September 2007)	2815.5 (without state financial aid) or 3616.0 (inclusive of state financial aid) - all for 2007-2013
Slovakia	-1.5	0.5	1	No changes	50% (60 kg N)	+	2008		1242.697
Slovenia	Slightly increasing	Slightly increasing	Increasing	Declining trends	Declining trends	Declining trends	2004	Action Programme for the whole territory of Slovenia.	Axis 2: 588 mil EUR (80% from EAFRD, 20% national co-financing)

[1] National statistics for total area; near total area are used at present
[2] Data from Bavarian Grassland Study 2008
[3] Data from AT Nitrates Report 2008
[4] Data from AT Nitrates Report 2008

Croatia	n/a	n/a	n/a	n/a	n/a	n/a	2019	Preliminary identification of vulnerable zones is under technical consultation among responsible ministries and with EC. Legal framework for issuance of Decision on vulnerable zones still does not exist.	
Serbia	-1.5	0.5	1	No changes	46 kg N	-	-	-	2000 (for period 2007-2011)
Bosnia and Herzegovina	n/a	n/a	n/a	n/a	n/a	n/a	Full implement-tation is expected end 2021.	Identification of vulnerable zones is expected end 2012.	n/a
Hungary	-1	0.7	0.3	No changes	20%	n.a.	2008	40	1627 (for the period 2007-2013)
Bulgaria	Slight increase of the arable area and decrease of the total agricultural area	Slightly increasing	Slightly increasing	For the *livestock equivalent* indicator it is expected to increase by up to 2.5% by 2013	It is expected to increase regarding the use of inorganic fertilisers.	Total balance of nutrients in the soil is negative. N surplus is not expected.	2004: Identifi-cation of vulnerable zones 2006: First Action Programme	34	For the whole country: 3242 – National Rural Development programme 2007-2013, of which 777 for Axis 2 - Nature protection including protection of water resources.
Romania	-0.6	0.5	0.2	Increasing but still far behind EU average 20-25%	Increasing but still far behind EU average 24%	It could increase, but N surplus is still very low compared with other EU member	2007-2010 (first action plan)	6.70 (for the first Action Plan) 57.97 (for the second Action Plan)	2327.682 for Axis 2 including national co-financing

						states			
Moldova	2	0.9	2	+	30%	+	n/a	n/a	150[5]
Ukraine	-0.9	+17.0 Forestation by region: Zakarpatska-51%; Ivano-Frankivska–41.5%; Ternopilska-13.9%; Chernivetska-29.4%	Increasing but an estimate cannot be given	-4.2 Cattle: -8 Pigs: -14.6 Sheep: 1.1 Poultry: 4.9	0.16 By region: Zakarpatska-0.03%; Ivano-Frankivska –0.20%; Ternopilska-0.17%; Chernivetska-0.23%	+	n/a	n/a	16,057 - State Special Programme of Rural Development (for period 2007 – 2015)

[5] World Bank, European Bank for Reconstruction and Development, International Development Association: 126 (EU Support for Poverty Reduction and Economic Growth)

Ecological prioritisation of measures to restore river and habitat continuity in the DRBD

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Annex 18 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Developing a methodology and carrying out an ecological prioritisation of continuum restoration in the Danube River Basin to form part of the Danube River Basin District Management Plan

Version 1.0, 29.4.2009

S. Schmutz & C. Trautwein

Vienna, April 2009

Prepared for the International Commission for the Protection of the Danube River (ICPDR)

1. Objectives

All fish species of the Danube River Basin (DRB) are migratory to some extent, however, the importance of migrations for the viability of fish populations considerable vary among species. Migrations are different in terms of migration distances, migration direction (upstream, downstream, lateral), spawning habitats, seasons, life stages, etc.. In general, in the DRB migratory requirements are more distinct in lowland than in head water fish communities (Fig.1). Long-distance-migrants (LDM) such as beluga (*Huso huso*) migrated up to several thousand kilometres from the Black Sea to the barbel zone in the DRB. Medium-distance-migrants (MDM, so called potamodromous fish species) like nase (*Chondrostoma nasus*) and barbel (*Barbus barbus*) migrate within the river over distances of 30 to 200 km (Waidbacher & Haidvogl 1998). A significant number of lowland fish species depend on floodplain spawning habitats during spring season. Contrarily, headwater fish species migrate comparable short distances as living and spawning habitats are mostly not far away. Nevertheless, in the long term all species need an open continuum for e.g. re-colonisation after catastrophic events and for genetic exchange.

The overall goal of continuity restoration in the DRBD should be free fish migration routes within the entire DRB. However, due to the high number of barriers and limited resources a prioritisation of measures is necessary. The approach provides indications on a step-wise and efficient implementation of restoration measures on the basin-wide scale. It provides useful information on the estimated effects of the national measures in relation to their ecological effectiveness on the basin-wide scale. The approach serves as a supportive tool for future measure implementation. Therefore, it also supports the feedback from the international to the national level and vice versa in the DRB. Therefore, the prioritisation tool represents an important component of the DRB Management Plan and will be an essential basis for the

hydromorphological component on river and habitat interruptions within the Joint Programmes of Measures (JPM).

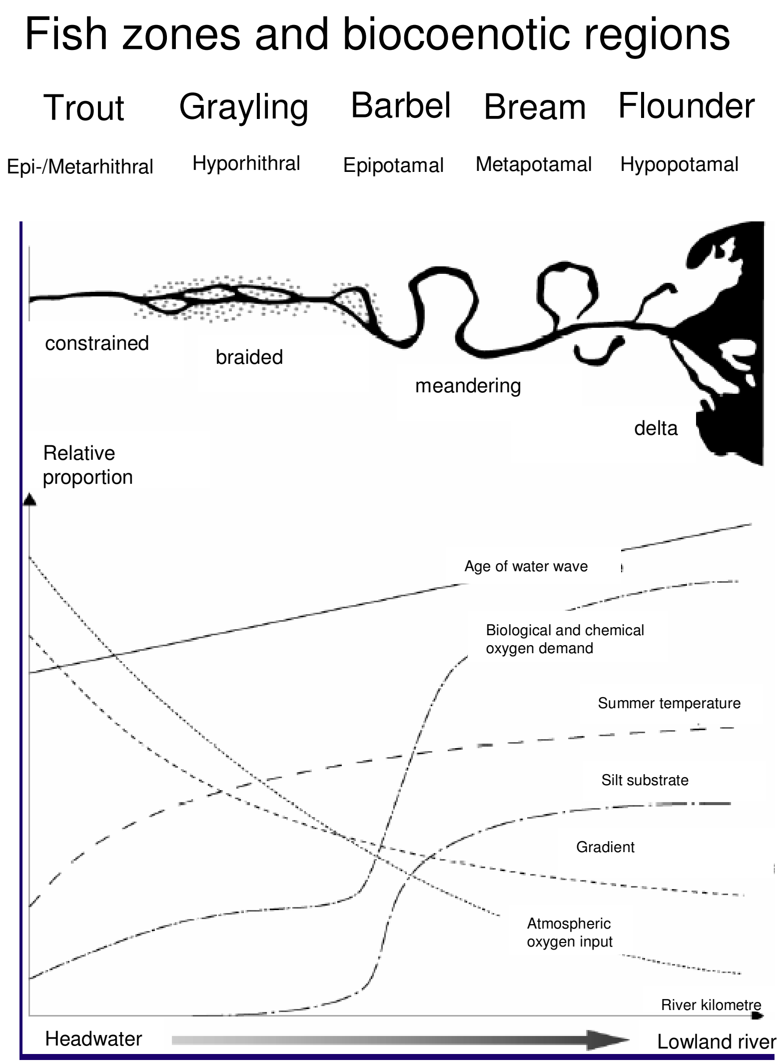

Fig.1: Fish zones and abiotic conditions in running waters (adapted from Jungwirth et al. 2003)

2. Distribution of long and medium-distant migrants (LDM) in the DRB

2.1. Methodology

Historic upstream occurrence of long-distance migrants (LDM) in the DRB is dominated by sturgeon species as those species are known to have migrated further upstream than other species. The historic occurrence of LDMs is based on historical information going back centuries. The historical information serves the definition and use as reference conditions corresponding to entirely or almost entirely undisturbed natural conditions. The distribution of MDMs is based on modelled data that has been calibrated with current information. The Sturgeon migration map provided by the ICPDR was compared and updated with recent literature reviews and results of the EU-project EFI+ (Evaluation and improvement of the European Fish Index, http://efi-plus.boku.ac.at).

Currently, the information on the distribution of medium-distant migrants (MDM) in the DRB is scarce and incomplete. Therefore, the potential distribution (habitat) of MDM was modelled using data from EU-project EFI+ including data from the DRB and other catchments in Europe.

Within the frame of the EU-project EFI+ most of the European fish species have been classified according to their migratory behaviour, i.e. long-distance-migrants (LDM), medium-distance-migrants (MDM) and resident species (RS). Out of the 58 fish species classified as MDM we selected 9 key species occurring in the DRB (Tab. 2).

Tab.1: Examples for long distance migrants (LDM) in the DRB (based on EFI+ guild classification, see http://efi-plus.boku.ac.at)

Nr.	Sientific name	English name
1	*Huso huso*	Great stugeon, beluga
2	*Acipenser guldenstaedti*	Russian sturgeon
3	*Acipenser nudiventris*	Ship sturgeon
4	*Acipenser stellatus*	Stellate sturgeon
5	*Alosa caspia*	Caspian shad
6	*Alosa immaculate (pontica)*	Pontic shad

Tab.2: List of medium-distance migrants (MDM) in the DRB (based on EFI+ guild classification, see http://efi-plus.boku.ac.at) used for modelling habitat of MDM in the DRB

Nr.	Scientific name	English name
1	*Abramis brama*	Common bream
2	*Abramis sapa*	Danubian bream
3	*Acipenser ruthenus*	Sterlet
4	*Aspius aspius*	Asp
5	*Barbus barbus*	Barbel
6	*Chondrostoma nasus.*	Nase
7	*Hucho hucho*	Danube salmon
8	*Lota lota*	Burbot
9	*Vimba vimba*	Vimba

The consolidated EFI+ database comprises about 10,000 sites all over Europe. About 1,000 sites are located in the DRB. Unfortunately, the number of sites from the Danube catchment with occurrence of MDM is small (379 sites) and not sufficient for model calibration. Therefore, we used data from additional European catchments comparable with the DRB. By restricting the selection of data to Illies's ecoregions 3 to 16 we tried to avoid a bias from Mediterranean (Iberian) and Nordic (Scandinavia) influences, as the distribution of MDM might follow different rules in those areas. Out of the resulting 3,800 sites we selected all sites (1,268 sites) where MDM were recorded and randomly a similar sized set of data from sites where MDM did not occur. In total, about 2,500 sites were used to calibrate the model.

We used Regression Tree techniques for modelling MDM occurrence as this technique allows using also non-normally distributed data. All modelling was done with the open source software R®. The Regression Tree function of R® (rpart) includes an internal validation as the variable selection and splitting process is repeated 500 times. The results were additionally validated by using only data from the DRB.

For calculating predictive environmental variables such as catchment size, elevation and river gradient we used the CCM river model developed by the JRC in Ispra (Vogt et al. 2007) that was also used for the EFI+ project. The CCM is a modelled river network and hence there are

slight deviations between the modelled river courses and the real ones. This is mainly true in the headwaters where the CCM sometimes selects different tributaries compared to other maps. Another problem may occur in lowland rivers with very low gradient in plain terrain where the actual and modelled river course may deviate. The deviations do not significantly affect the results as environmental variables used for the modelling are quite stable against river course deviations.

2.2. Results

The figure 3 shows the information on status of historic occurrence of LDM sturgeon species in the DRB. According to additional data from the EFI+ project and information received from national fish experts of the DRB contacted via the ICPDR slight changes of the original ICPDR maps have been made: The occurrence of sturgeon species in the Isar river (Bavaria) was restricted to the lower part of the river. LDM sturgeons occurrence has been added to the lower Inn river and lower Salzach river (Austria).

The modelled distribution of the MDM in the DRB using Regression-Tree analyses shows that the presence and absence of medium-distance migrants (MDM) is mainly determined by the size of the catchment (Fig. 2). River segments with upstream catchment areas (AREA_ctch) less than 284 km^2 have a very low probability of MDM. In addition, river segments with an upstream catchment size of less than 1,401 km^2 and a mean elevation of the upstream catchment (ELEV_MN_du) of more than 819 m have also a low probability of MDM. All other river segments have a high probability of occurrence of MDM. The model explains the variability of probability of occurrence by about 42 %. Applying the model to the data, presence and absence can be explained by about 82 % and 78 %. Applying the model to only the data from the DRB reveals similar predictions of presence (78 %) and absence (81 %) approving the applicability of the model to the DRB. Fig. 3 clearly shows the

separation between the habitat of the LDM, MDM and the head waters above the MDM in the DRB.

Results of modelled MDM habitat were checked by the countries of the DRB and only minor deviations from the real conditions were reported and included in the final map.

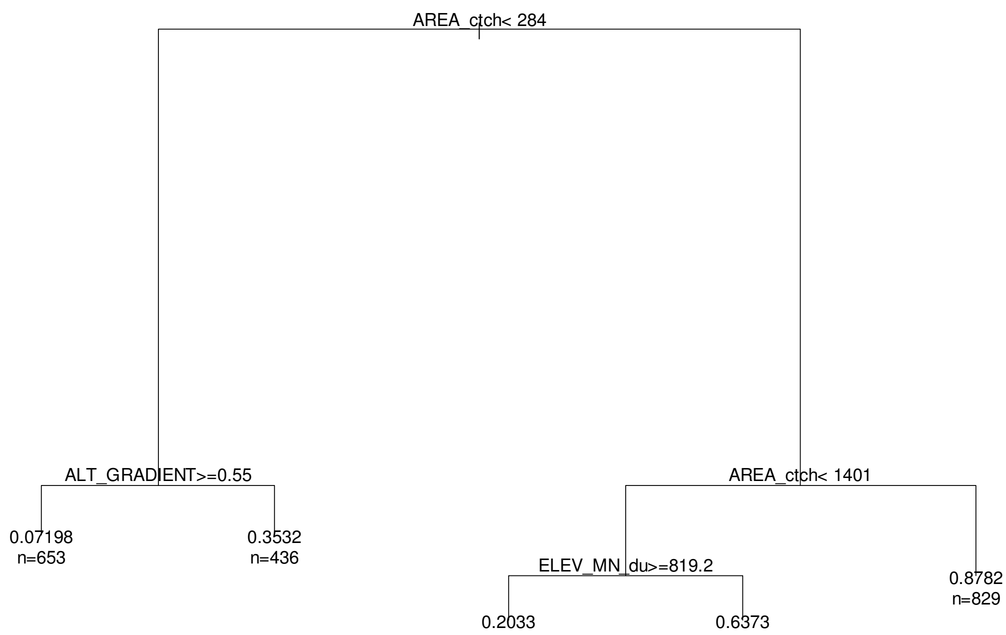

Fig.2: Regression-Tree model for medium-distance migrants using data from the EFI+ project: Probability of occurrence and number sites of each branch (upstream catchment areas: AREA_ctch, mean elevation of the upstream catchment: ELEV_MN_du, gradient of river segment: ALT_GRADIENT).

3. Development of a prioritisation index for restoring continuity

3.1. Methodology

The selection of prioritisation criteria for continuity restoration is mainly based on the migratory behaviour of LDM and MDM in the DRB (Tab.3). The prioritisation principle follows the idea that LDM within the Danube receive the highest priority (weight 4) followed by LDM within the tributaries (weight 2). MDM receive less priority (weight 1) and head waters are excluded from the prioritisation process (weight 0). Within this prioritisation framework obstacles at the mouth of a river receive higher priority than upstream obstacles and giving more emphasis on the Danube than on the tributaries. The more distant an obstacle is located from the river mouth the less priority is given to the obstacle. In order to give higher weight to river segments that are less fragmented by continuity interruptions we weighted the length of the reconnected habitat depending on the length of river segments. For this criterion we defined different river lengths classes for the Danube and the tributaries to consider river size. The final criterion is related to the protection status. Obstacles within protected areas of the NATURA2000 network receive higher priority as it is more likely that those river segments are maintained in good habitat status and will be restored to a larger degree than un-protected river segments.

The criteria are combined by computing a prioritisation index (PI) by weighting the first criteria, migratory habitat, by the cumulated weight of the 4 other criteria using the following formula:

PI = migratory habitat x (1 + first obstacles upstream + distance from mouth + reconnected habitat + protected site)

The maximum possible value of the PI is 36 and the minimum is 0 (only in head waters). Finally, the PI was grouped into 5 classes: utmost priority (PI >13), very high priority (PI 10-12), high priority (PI 7-9), medium priority (4-6) and low priority (PI 1-3).

For calculating the PI we used again the CCM river network (Vogt et al. 2006). Rivers with more than 4.000 km² catchment size were extracted from the CCM. Rivers Lech, Altmühl, Crisul Negru, and Somesul Mic were also extracted because they are considered as important rivers in the basin management plan. River segments are defined as the river stretch between two tributaries.

1688 locations of barriers were provided by the ICPDR (status 30. October 2009). The following criteria were applied during preselection for prioritisation (total N=946):

- select barriers not passable for fish in 2009 (FISH_AID = NO OR UNKNOWN). N=932
- select barriers passable in 2009 but within long distant migrants reaches (assuming sturgeons cannot pass fish aid). N=14

Continuity interruptions provided by the ICPDR were allocated to the CCM (snap to closest segment). A number of 85 barriers of 946 for prioritisation could not be allocated because they are situated in artificial water bodies (canals) or there are differences of CCM to the official ICPDR network at the headwaters. Using various GIS tools the first obstacle upstream the mouth, the distance from the mouth, the length of reconnected habitat, and proximity of protected areas is calculated and the PI computed.

1.	**Migratory habitat**	
•	Long-distance migrants Danube	4
•	Long-distance migrants habitat	2
•	Medium-distance migrants habitat	1
•	Short-distance migrants (head waters)	0
2.	**Obstacles in first river segment upstream river mouth**	
•	Yes – in Danube	2
•	Yes	1
•	No	0
3.	**Distance from mouth**	
•	First river segment upstream of mouth	3
•	Second river segment upstream of mouth	2
•	Third river segment upstream of mouth	1
•	River segments upstream of third river segment	0
4.	**Length of reconnected habitat**	
•	>50 km (>100 km Danube)	2
•	20-50 km (40-100 km Danube)	1
•	<20 km (<40 km Danube)	0
5.	**Protected site (Natura2000)**	
•	Yes	1
•	No	0

Tab.3: Prioritisation criteria and weighting factors for restoring continuity in the DRB

An additional criterion, habitat quality of reconnected habitats, could be added in future versions of the PI, when consistent information on habitat quality will be available within the entire DRB.

3.2. Results

The downstream – upstream prioritisation concept is clear visible in the map of prioritisation (Fig. 4). The results show that according to the defined prioritisation criteria continuity disruptions in the lower Danube (Iron Gate) receive the highest priority with values ≥ 20. In the upper Danube the PI ranges between 8 and 16 as long as the Danube is classified as LDM habitat. Within the LDM habitat the obstacles in Bavaria generally receive higher values compared to Austria because longer habitats are reconnected and most obstacles are within Natura2000 areas. Within the tributaries the lowest obstacle and following upstream obstacles generally have a higher PI than obstacles located further upstream. In total, 946 continuum interruptions have been considered. More than a quarter of the barriers (27 %) are not of priority (PI=0) because in headwaters or canals. Out of the 681 prioritised barriers, 39 barriers

(4 %) have a high to utmost priority, 99 barriers (10 %) are of medium and 543 barriers are of low priority (58 %). The importance of upstream located barriers will increase in future when downstream barriers will have been restored (Fig. 4).

The results reveal clear ecological priorities for continuity restoration within the DRB. The proposed prioritisation should used as a guideline whereby the final decision where and when to restore a continuity interruption also depends on the technical feasibility to build fish passes or to find other solutions (e.g. removal of barriers) and will be also determined by the relevance for national restoration and conservation programmes.

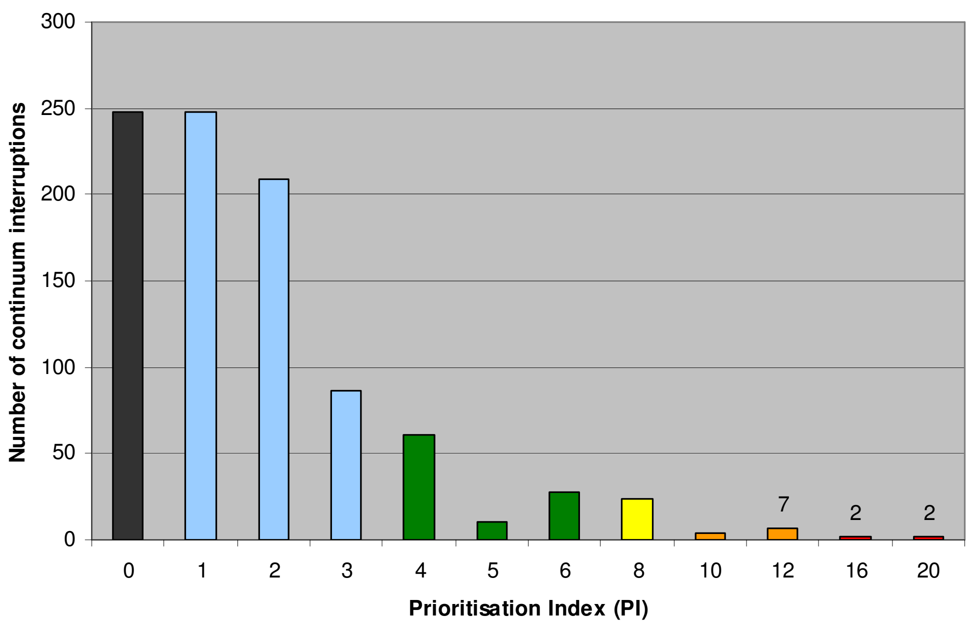

Fig. : Number of barriers per Prioritisation Index (PI)

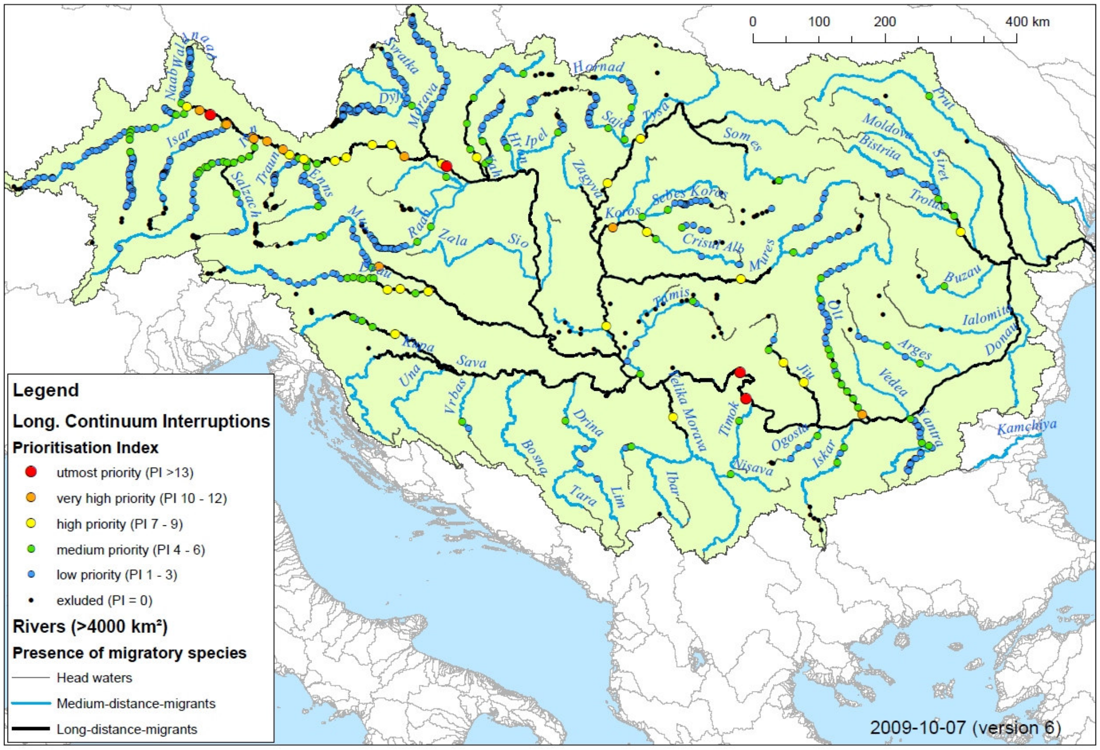

Fig. 4: Prioritised continuity restoration of obstacles within the DRB using the Prioritisation Index (PI) within habitat of long-distance- and medium-distance-migrants

4. References

References

Hensel, K. & J. Holcik (1997); Past and current status of sturgeons in the upper and middle Danube River. Environmental Biology of Fishes 48: 184-200.

Jungwirth, M., Haidvogl, G., Moog, O., Muhar, S., Schmutz, S. (2003): Angewandte Fischökologie an Fließgewässern. p552; Facultas Universitätsverlag,Wien; ISBN 3-8252-2113-X.

Vogt, J.V. et al. (2007): A pan-European River and Catchment Database. European Commission - JRC, Luxembourg, (EUR 22920 EN) 120 pp.

Waidbacher, H. & G. Haidvogl (1998): Fish migration and fish passage facilities in the Danube: Past and present. -In: Jungwirth, M., Schmutz, S. & Weiss, S. (eds.): Fish Migration and Fish Bypasses. Oxford, -Fishing News Books: pp.85-98.

Step-by-step approach regarding sturgeon migration in the DRB

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Annex 19 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Step-by step approach for sturgeon and other migratory species in the Danube River Basin

The step-by-step approach shown below was agreed upon at the 9th Ordinary Meeting. It describes the vision and required management steps to ensure river and habitat continuity for sturgeon and other migratory species at the basin-wide scale. It serves as the basis for the definition of respective management objectives and the performance/development of the Iron Gates I & II feasibility study. Further details on sturgeons in general, the Action Plan for Conservation of sturgeons in the DRB under the Bern Convention (SAP) and future protection activities in the DRB can be taken from the ICPDR Sturgeon Background Document[1] that has been elaborated by the ICPDR's Sturgeon Task Group.

Step-by-step approach for sturgeon and other migratory species in the DRB	
STEP 1	**Sturgeon species:** Performance of a feasibility study on enabling free passage of sturgeon sp. at Iron Gates I & II and habitat restoration in the lower Danube section below the Iron Gate and in relevant tributaries (evaluation of habitat restoration feasibility and effect/performance of habitat restoration measures)[1]. The feasibility study should take into account the issue of downstream migration. Both down and upstream migration should also be ensured for other migratory species. The feasibility study requires fieldwork and so will last approx. 3 years. Investigations on potential funding of the study are taking place. **Other migratory species:** Investigation of presence/absence of tributaries connectivity to Danube (basin-wide scale) and longitudinal continuity of Danube and respective tributaries (basin-wide approach >4000km^2) using other migratory species as indicators. Investigation based on national knowledge and Programmes of Measures.
STEP 2	Based on the outcomes of the feasibility study at the Iron Gates I & II: plan, design and implement passage facilities for Iron Gates I & II.
STEP 3	As soon as the decision is made to assist sturgeon species and other migratory species to bypass the Iron Gate I & II, undertake: ⇨ Habitat restoration for sturgeons and other migratory sp. in the middle Danube, upstream of Iron Gates to the Gabcikovo Dam incl. relevant tributaries (evaluation of restoration effect and feasibility; performance of concrete measures). ⇨ Performance of a feasibility study on enabling sturgeon and other migratory species free passage at the Gabcikovo Dam and habitat restoration in the lower Danube section below the Iron Gate and in relevant tributaries. The feasibility study should take the issue of downstream migration into account.
STEP 4	Based on the outcomes of the feasibility study at Gabcikovo Dam: plan, design and implement passage facilities at the Gabcikovo Dam.
STEP 5	Once the decision is made to assist sturgeon species bypass the Gabcikovo Dam: ⇨ Habitat restoration specific for sturgeons in the upper Danube, upstream of the Gabcikovo Dam to the original sturgeon spawning grounds (evaluation of restoration effect and feasibility; performance of concrete measures). ⇨ Feasibility study on sturgeon passage at potentially effected hydropower plants. Consider downstream migration and involve the hydropower stakeholders.

[1] Sturgeon Background Document – Overlaps of the Sturgeon Action Plan and the DRBM Plan. ICPDR Document IC WD 264, 2006.

[1] Considering the fact that most Danube sturgeon species are very close to extinction, the Sturgeon Task Group recommends an immediate implementation of measures in Step 1. This would significantly support the Romanian government which has, based on the dramatic situation, endorsed a Ministerial Order on "Conservation of Wild Sturgeon Populations and the Development of Sturgeon Aquaculture in Romania" in May 2006.

Detailed list on hydrological alterations in the DRBD

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Annex 20 of the DRBM Plan

Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Србија //// Crna Gora //// România //// България //// Moldova //// Україна

Explanations

Hydrological Alteration Types:
(Y) yes, N (no)

Residual water discharge:
(Y) yes, N (no), U (unknown)

Hydropeaking - Water level fluctuation > 1m /day:
(Y) yes, N (no), U (unknown)

Water abstraction purpose:
A=Agriculture, forestry and fishing (including fish farms) canals
E=Production of electricity (cooling)
H=Hydro-energy (not for cooling)
I=Irrigation
M=Manufacturing industry
A=Abstractions for navigation
O=Other major abstractions
P=Public water supply
Q=Quarries/open cast coal sites

Measure implementation by 2015:
Y=Yes
N4=No due to exemption Art 4.4
N5=No due to exemption Art 4.5
0=Yet to be determined (only applicable for non-EU countries or preliminary uploads)

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
DE	Donau	DEBW_6-05	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBW_6-05	n.a.	N	Y	N		U	U	H			
DE	Donau	DEBY_AP002	n.a.	Y	N	N	14.8	U	U	H			
DE	Main-Donau-Kanal	DEBY_AP144	n.a.	Y	N	N	8.1	U	U	H			
DE	Main-Donau-Kanal	DEBY_AP144	n.a.	Y	N	N	8.1	U	U	H			
DE	Main-Donau-Kanal	DEBY_AP144	n.a.	Y	N	N	8.1	U	U	H			
DE	Donau	DEBY_AP_02	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_AP_02	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_AP_02	n.a.	Y	N	N	9.2	U	U	H			
DE	Donau	DEBY_AP_02	n.a.	Y	N	N	9.2	U	U	H			
DE	Donau	DEBY_AP_02	n.a.	Y	N	N	9.2	U	U	H			
DE	Donau	DEBY_AP_02	n.a.	Y	N	N	9.2	U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	N	N	Y		U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Donau	DEBY_IL001	n.a.	Y	N	N	4.4	U	U	H			
DE	Lech	DEBY_IL329	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL329	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL329	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL329	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL329	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL329	n.a.	Y	N	N	2.8	U	U	H			
DE	Lech	DEBY_IL329	n.a.	Y	N	N	2.8	U	U	H			
DE	Lech	DEBY_IL329	n.a.	Y	N	N	2.8	U	U	H			
DE	Lech	DEBY_IL329	n.a.	Y	N	N	2.8	U	U	H			
DE	Lech	DEBY_IL329	n.a.	Y	N	N	2.8	U	U	H			
DE	Lech	DEBY_IL330	n.a.	Y	N	N	6.8	U	U	H			
DE	Lech	DEBY_IL330	n.a.	Y	N	N	6.8	U	U	H			

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
DE	Lech	DEBY_IL332	n.a.	Y	N	N	5.6	U	U	H			Y
DE	Lech	DEBY_IL332	n.a.	N	Y	N		U	U	H			Y
DE	Lech	DEBY_IL333	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL333	n.a.	Y	N	N	3.6	U	U	H			
DE	Lech	DEBY_IL333	n.a.	Y	N	N	3.6	U	U	H			
DE	Lech	DEBY_IL335	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL335	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL335	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL335	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL335	n.a.	Y	N	N	2.5	U	U	H			
DE	Lech	DEBY_IL335	n.a.	Y	N	N	2.5	U	U	H			
DE	Lech	DEBY_IL335	n.a.	Y	N	N	2.5	U	U	H			
DE	Lech	DEBY_IL335	n.a.	Y	N	N	2.5	U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	N	N	Y		U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Lech	DEBY_IL337	n.a.	Y	N	N	2.6	U	U	H			
DE	Donau	DEBY_IN002	n.a.	Y	N	N	9.0	U	U	H			

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
DE	Donau	DEBY_IN002	n.a.	Y	N	N	9.0	U	U	H			
DE	Donau	DEBY_IN004	n.a.	Y	N	N	16.0	U	U	H			
DE	Inn	DEBY_IN153	n.a.	Y	N	N	6.4	U	U	H			
DE	Inn	DEBY_IN153	n.a.	Y	N	N	6.4	U	U	H			
DE	Inn	DEBY_IN153	n.a.	Y	N	N	6.4	U	U	H			
DE	Inn	DEBY_IN153	n.a.	Y	N	N	6.4	U	U	H			
DE	Inn	DEBY_IN153	n.a.	Y	N	N	6.4	U	U	H			
DE	Inn	DEBY_IN153	n.a.	Y	N	N	6.4	U	U	H			
DE	Inn	DEBY_IN153	n.a.	Y	N	N	6.4	U	U	H			
DE	Inn	DEBY_IN156	n.a.	Y	N	N	7.6	U	U	H			
DE	Inn	DEBY_IN156	n.a.	Y	N	N	7.6	U	U	H			
DE	Inn	DEBY_IN156	n.a.	Y	N	N	7.6	U	U	H			
DE	Inn	DEBY_IN158	n.a.	Y	N	N	3.2	U	U	H			
DE	Inn	DEBY_IN158	n.a.	Y	N	N	3.2	U	U	H			
DE	Inn	DEBY_IN158	n.a.	Y	N	N	3.2	U	U	H			
DE	Inn	DEBY_IN158	n.a.	Y	N	N	3.2	U	U	H			
DE	Inn	DEBY_IN158	n.a.	Y	N	N	3.2	U	U	H			
DE	Inn	DEBY_IN158	n.a.	Y	N	N	3.2	U	U	H			
DE	Inn	DEBY_IN159	n.a.	Y	N	N	7.8	U	U	H			
DE	Inn	DEBY_IN159	n.a.	Y	N	N	7.8	U	U	H			
DE	Inn	DEBY_IN159	n.a.	Y	N	N	7.8	U	U	H			
DE	Inn	DEBY_IN159	n.a.	Y	N	N	7.8	U	U	H			
DE	Inn	DEBY_IN159	n.a.	Y	N	N	7.8	U	U	H			
DE	Inn	DEBY_IN162	n.a.	Y	N	N	7.6	U	U	H			
DE	Inn	DEBY_IN162	n.a.	Y	N	N	7.6	U	U	H			
DE	Inn	DEBY_IN162	n.a.	Y	N	N	7.6	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS082	n.a.	Y	N	N	4.3	U	U	H			
DE	Isar	DEBY_IS084	n.a.	Y	N	N	3.8	U	U	H			
DE	Isar	DEBY_IS086	n.a.	Y	N	N	9.1	U	U	H			
DE	Isar	DEBY_IS090	n.a.	Y	N	N	5.0	U	U	H			
DE	Isar	DEBY_IS090	n.a.	Y	N	N	5.0	U	U	H			
DE	Isar	DEBY_IS090	n.a.	Y	N	N	5.0	U	U	H			
DE	Isar	DEBY_IS091	n.a.	Y	N	N	2.7	U	U	H			
DE	Isar	DEBY_IS091	n.a.	Y	N	N	2.7	U	U	H			
DE	Isar	DEBY_IS093	n.a.	N	Y	N		U	U	H			Y
DE	Isar	DEBY_IS094	n.a.	Y	N	N	4.1	U	U	H			
DE	Isar	DEBY_IS094	n.a.	Y	N	N	4.1	U	U	H			
DE	Isar	DEBY_ISS11	n.a.	Y	N	N	3.6	U	U	H			

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
DE	Donau	DEBY_NR002	n.a.	Y	N	N	17.8	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR020	n.a.	Y	N	N	3.5	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Naab	DEBY_NR021	n.a.	Y	N	N	2.9	U	U	H			
DE	Donau	DEBY_NR_01	n.a.	Y	N	N	14.5	U	U	H			
DE	Donau	DEBY_NR_01	n.a.	Y	N	N	14.5	U	U	H			
DE	Donau	DEBY_NR_01	n.a.	Y	N	N	14.5	U	U	H			
AT	Raab	AT1000960015	n.a.	Y	N	N	0.4	N	N	H			N4
AT	Raab	AT1000960019	n.a.	N	Y	N		Y	N	H			N4
AT	Raab	AT1000960019	n.a.	Y	N	N	0.1	N	N	H			N4
AT	Raab	AT1000960019	n.a.	N	Y	N		Y	N	H			N4
AT	Raab	AT1000960019	n.a.	Y	N	N	0.1	N	N	H			N4
AT	Raab	AT1000960020	n.a.	N	Y	N		Y	N	H			N4
AT	Raab	AT1001040098	n.a.	Y	N	N	1.1	N	N	H			Y
AT	Raab	AT1001040098	n.a.	Y	N	N	1.2	N	N	H			Y
AT	Raab	AT1001040098	n.a.	Y	N	N	0.4	N	N	H			Y
AT	Raab	AT1001040098	n.a.	Y	N	N	0.7	N	N	H			Y
AT	Raab	AT1001040098	n.a.	Y	N	N	1.0	N	N	H			Y
AT	Raab	AT1001040098	n.a.	N	Y	N		Y	N	H			N4

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
AT	Raab	AT1001040098	n.a.	Y	N	N	0.7	N	N	H			Y
AT	Raab	AT1001040098	n.a.	Y	N	N	0.2	N	N	H			Y
AT	Raab	AT1001040098	n.a.	N	Y	N		Y	N	H			N4
AT	Raab	AT1001040098	n.a.	Y	N	N	0.2	N	N	H			Y
AT	Raab	AT1001040105	n.a.	Y	N	N	2.1	N	N	H			Y
AT	Raab	AT1001040105	n.a.	Y	N	N	1.3	N	N	H			Y
AT	Raab	AT1001040105	n.a.	Y	N	N	1.2	N	N	H			Y
AT	Raab	AT1001040105	n.a.	Y	N	N	0.6	N	N	H			Y
AT	Raab	AT1001040108	n.a.	N	Y	N		Y	N	H			Y
AT	Raab	AT1001040108	n.a.	Y	N	N	0.4	N	N	H			N4
AT	Raab	AT1001040108	n.a.	N	Y	N		Y	N	H			Y
AT	Raab	AT1001040108	n.a.	Y	N	N	0.2	N	N	H			N4
AT	Raab	AT1001040109	n.a.	N	N	Y		N	Y	H			N4
AT	Rabnitz	AT1001790035	n.a.	N	Y	N		Y	N	H			Y
AT	Raab	AT1002160000	n.a.	N	Y	N		Y	N	H			N4
AT	Lech	AT301500000	n.a.	N	Y	N		Y	N	H			N4
AT	Lech	AT302370006	n.a.	N	Y	N		Y	N	H			Y
AT	Lech	AT302370009	n.a.	N	Y	N		Y	N	H			Y
AT	Donau	AT303070000	n.a.	Y	N	N	20.0	N	N	H			N4
AT	Salzach	AT304690001	n.a.	N	Y	N		Y	N	H			Y
AT	Salzach	AT304690002	n.a.	Y	N	N	1.0	N	N	H			Y
AT	Salzach	AT304690003	n.a.	N	N	Y		N	Y	H			N4
AT	Salzach	AT304690004	n.a.	N	N	Y		N	Y	H			N4
AT	Salzach	AT304690004	n.a.	N	Y	N		Y	N	H			N4
AT	Salzach	AT304690005	n.a.	N	Y	N		Y	N	H			N4
AT	Salzach	AT304690006	n.a.	N	Y	N		Y	N	H			N4
AT	Salzach	AT304690007	n.a.	N	Y	N		Y	N	H			N4
AT	Inn	AT304980001	n.a.	N	N	Y		N	Y	H			Y
AT	Inn	AT304980001	n.a.	N	Y	N		Y	N	H			N4
AT	Inn	AT304980003	n.a.	Y	N	N	32.0	N	N	H			Y
AT	Inn	AT304980003	n.a.	N	Y	N		Y	N	H			Y
AT	Inn	AT304980006	n.a.	N	N	Y		N	Y	H			N4
AT	Inn	AT304980007	n.a.	N	Y	N		Y	N	H			Y
AT	Inn	AT304980007	n.a.	N	N	Y		N	Y	H			N4
AT	Inn	AT304980007	n.a.	N	Y	N		Y	N	H			Y
AT	Inn	AT305340003	n.a.	Y	N	N	14.6	N	N	H			N4
AT	Inn	AT305340005	n.a.	Y	N	N	16.5	N	N	H			N4
AT	Inn	AT305340007	n.a.	Y	N	N	12.7	N	N	H			N4
AT	Inn	AT305340009	n.a.	Y	N	N	12.1	N	N	H			N4
AT	Inn	AT305340010	n.a.	Y	N	N	7.5	N	N	H			N4
AT	Salzach	AT305350001	n.a.	Y	N	N	3.8	N	N	H			Y
AT	Salzach	AT305350001	n.a.	Y	N	N	5.1	N	N	H			Y
AT	Salzach	AT305350001	n.a.	Y	N	N	4.3	N	N	H			Y
AT	Salzach	AT305350001	n.a.	Y	N	N	4.4	N	N	H			Y
AT	Salzach	AT305350003	n.a.	N	N	Y		N	Y	H			N4
AT	Salzach	AT305350003	n.a.	Y	N	N	2.2	N	N	H			Y
AT	Salzach	AT305350003	n.a.	Y	N	N	1.2	N	N	H			Y
AT	Salzach	AT305350006	n.a.	Y	N	N	5.3	N	N	H			Y

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
AT	Salzach	AT305360002	n.a.	Y	N	N	3.1	N	N	H			Y
AT	Salzach	AT305360002	n.a.	Y	N	N	3.0	N	N	H			Y
AT	Salzach	AT305360002	n.a.	N	N	Y		N	Y	H			Y
AT	Salzach	AT305360002	n.a.	Y	N	N	2.0	N	N	H			Y
AT	Inn	AT305850004	n.a.	Y	N	N	2.9	N	N	H			Y
AT	Inn	AT305850005	n.a.	N	N	Y		N	Y	H			Y
AT	Lech	AT307080000	n.a.	N	N	Y		N	Y	H			N4
AT	Salzach	AT307200001	n.a.	Y	N	N	5.1	N	N	H			N4
AT	Enns	AT400240105	n.a.	N	Y	N		Y	N	H			N4
AT	Enns	AT400240106	n.a.	N	Y	N		Y	N	H			N4
AT	Donau	AT409040009	n.a.	Y	N	N	26.4	N	N	H			N4
AT	Donau	AT409040011	n.a.	Y	N	N	30.3	N	N	H			N4
AT	Donau	AT409040012	n.a.	Y	N	N	26.3	N	N	H			N4
AT	Traun	AT409920001	n.a.	N	Y	N		Y	N	H			Y
AT	Traun	AT409920001	n.a.	N	Y	N		Y	N	H			Y
AT	Enns	AT409970000	n.a.	N	N	Y		N	Y	H			N4
AT	Donau	AT410360002	n.a.	Y	N	N	22.3	N	N	H			N4
AT	Donau	AT410360003	n.a.	Y	N	N	40.0	N	N	H			N4
AT	Donau	AT410360005	n.a.	Y	N	N	16.0	N	N	H			N4
AT	Donau	AT410360007	n.a.	Y	N	N	27.0	N	N	H			N4
AT	Donau	AT410360009	n.a.	Y	N	N	25.0	N	N	H			N4
AT	Donau	AT410360012	n.a.	Y	N	N	35.3	N	N	H			N4
AT	Traun	AT411130013	n.a.	Y	N	N	5.0	N	N	H			N4
AT	Traun	AT411130014	n.a.	Y	N	N	10.0	N	N	H			N4
AT	Traun	AT411130016	n.a.	Y	N	N	7.8	N	N	H			N4
AT	Traun	AT411130018	n.a.	N	Y	N		Y	N	H			N4
AT	Traun	AT411130020	n.a.	Y	N	N	0.8	N	N	H			N4
AT	Traun	AT411130027	n.a.	Y	N	N	3.5	N	N	H			N4
AT	Traun	AT411130028	n.a.	N	Y	N		Y	N	H			Y
AT	Traun	AT411130030	n.a.	Y	N	N	1.1	N	N	H			N4
AT	Traun	AT411130031	n.a.	Y	N	N	3.0	N	N	H			N4
AT	Traun	AT411130031	n.a.	N	Y	N		Y	N	H			N4
AT	Traun	AT411130032	n.a.	Y	N	N	1.2	N	N	H			N4
AT	Traun	AT411130035	n.a.	N	Y	N		Y	N	H			Y
AT	Traun	AT411130035	n.a.	Y	N	N	1.4	N	N	H			N4
AT	Traun	AT411130035	n.a.	Y	N	N	0.2	N	N	H			N4
AT	Traun	AT411130035	n.a.	N	Y	N		Y	N	H			Y
AT	Traun	AT411130035	n.a.	Y	N	N	0.6	N	N	H			N4
AT	Traun	AT411130035	n.a.	N	Y	N		Y	N	H			Y
AT	Traun	AT411130035	n.a.	Y	N	N	0.3	N	N	H			N4
AT	Traun	AT411130035	n.a.	Y	N	N	1.0	N	N	H			N4
AT	Enns	AT411250006	n.a.	Y	N	N	3.0	N	N	H			Y
AT	Enns	AT411250008	n.a.	N	Y	N		Y	N	H			N4
AT	Enns	AT411250008	n.a.	Y	N	N	1.3	N	N	H			N4
AT	Enns	AT411250012	n.a.	Y	N	N	3.1	N	N	H			N4
AT	Enns	AT411250012	n.a.	N	Y	N		Y	N	H			N4
AT	Enns	AT411250012	n.a.	Y	N	N	2.5	N	N	H			N4
AT	Enns	AT411250012	n.a.	N	Y	N		Y	N	H			N4

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
AT	Enns	AT411250012	n.a.	Y	N	N	2.9	N	N	H			N4
AT	Enns	AT411250012	n.a.	N	Y	N		Y	N	H			N4
AT	Enns	AT411250014	n.a.	Y	N	N	5.7	N	N	H			N4
AT	Enns	AT411250016	n.a.	Y	N	N	6.0	N	N	H			N4
AT	Enns	AT411250018	n.a.	Y	N	N	8.6	N	N	H			N4
AT	Enns	AT411250020	n.a.	N	N	Y		N	Y	H			N4
AT	Enns	AT411250021	n.a.	N	Y	N		Y	N	H			N4
AT	Enns	AT411250021	n.a.	Y	N	N	5.1	N	N	H			N4
AT	Enns	AT411250023	n.a.	Y	N	N	7.5	N	N	H			N4
AT	Enns	AT411250025	n.a.	Y	N	N	7.8	N	N	H			N4
AT	Enns	AT411250027	n.a.	Y	N	N	8.9	N	N	H			N4
AT	Enns	AT411250029	n.a.	Y	N	N	13.1	N	N	H			N4
AT	Enns	AT411250031	n.a.	Y	N	N	9.0	N	N	H			N4
AT	Enns	AT411250035	n.a.	Y	N	N	6.9	N	N	H			N4
AT	Enns	AT411250036	n.a.	N	N	Y		N	Y	H			N4
AT	Enns	AT411250036	n.a.	N	Y	N		Y	N	H			Y
AT	Enns	AT411250036	n.a.	Y	N	N	1.8	N	N	H			Y
AT	Traun	AT411970000	n.a.	N	Y	N		Y	N	H			N4
AT	Traun	AT411970000	n.a.	Y	N	N	0.1	N	N	H			N4
AT	Traun	AT411980001	n.a.	Y	N	N	0.4	N	N	H			N4
AT	Traun	AT411980001	n.a.	N	Y	N		Y	N	H			N4
AT	Traun	AT411980001	n.a.	Y	N	N	0.1	N	N	H			N4
AT	Traun	AT411980001	n.a.	N	Y	N		Y	N	H			N4
AT	Traun	AT411980002	n.a.	N	Y	N		Y	N	H			N4
AT	Traun	AT411980002	n.a.	Y	N	N	0.1	N	N	H			N4
AT	Traun	AT412100002	n.a.	Y	N	N	1.7	N	N	H			N4
AT	Thaya	AT500010030	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010030	n.a.	Y	N	N	17.8	N	N	H			N4
AT	Thaya	AT500010030	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010030	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010030	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010030	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010031	n.a.	Y	N	N	0.7	N	N	H			N4
AT	Thaya	AT500010036	n.a.	N	Y	N		Y	N	H			Y
AT	Thaya	AT500010036	n.a.	Y	N	N	8.6	N	N	H			N4
AT	Thaya	AT500010036	n.a.	N	Y	N		Y	N	H			Y
AT	Thaya	AT500010036	n.a.	Y	N	N	1.6	N	N	H			N4
AT	Thaya	AT500010036	n.a.	Y	N	N	4.3	N	N	H			N4
AT	Thaya	AT500010036	n.a.	Y	N	N	1.4	N	N	H			N4
AT	Thaya	AT500010036	n.a.	N	Y	N		Y	N	H			Y
AT	Thaya	AT500010036	n.a.	Y	N	N	3.2	N	N	H			N4
AT	Thaya	AT500010036	n.a.	N	Y	N		Y	N	H			Y
AT	Thaya	AT500010038	n.a.	Y	N	N	2.0	N	N	H			N4
AT	Thaya	AT500010038	n.a.	Y	N	N	0.2	N	N	H			N4
AT	Thaya	AT500010038	n.a.	Y	N	N	0.5	N	N	H			N4
AT	Thaya	AT500010038	n.a.	Y	N	N	0.6	N	N	H			N4
AT	Thaya	AT500010038	n.a.	Y	N	N	0.2	N	N	H			N4
AT	Thaya	AT500010038	n.a.	N	Y	N		Y	N	H			N4

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
AT	Thaya	AT500010038	n.a.	Y	N	N	0.5	N	N	H			N4
AT	Thaya	AT500010038	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010038	n.a.	Y	N	N	0.1	N	N	H			N4
AT	Thaya	AT500010038	n.a.	Y	N	N	1.0	N	N	H			N4
AT	Thaya	AT500010038	n.a.	Y	N	N	0.5	N	N	H			N4
AT	Thaya	AT500010038	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	1.7	N	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	0.2	N	N	H			N4
AT	Thaya	AT500010043	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	3.5	N	N	H			N4
AT	Thaya	AT500010043	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	0.8	N	N	H			N4
AT	Thaya	AT500010043	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	0.9	N	N	H			N4
AT	Thaya	AT500010043	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	0.4	N	N	H			N4
AT	Thaya	AT500010043	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	1.1	N	N	H			N4
AT	Thaya	AT500010043	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	1.8	N	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	1.5	N	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	0.7	N	N	H			N4
AT	Thaya	AT500010043	n.a.	N	Y	N		Y	N	H			N4
AT	Thaya	AT500010043	n.a.	Y	N	N	2.7	N	N	H			N4
AT	Thaya	AT500040002	n.a.	Y	N	N	0.3	N	N	H			N4
AT	Thaya	AT500040002	n.a.	Y	N	N	0.9	N	N	H			N4
AT	Thaya	AT500040002	n.a.	Y	N	N	0.7	N	N	H			N4
AT	Mur	AT801180004	n.a.	N	N	Y		N	Y	H			N4
AT	Mur	AT801180005	n.a.	N	N	Y		N	Y	H			N4
AT	Mur	AT801180007	n.a.	N	Y	N		Y	N	H			Y
AT	Mur	AT801180007	n.a.	Y	N	N	0.4	N	N	H			Y
AT	Mur	AT801180008	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT801180008	n.a.	Y	N	N	0.3	N	N	H			N4
AT	Mur	AT801180009	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT801180029	n.a.	Y	N	N	1.6	N	N	H			Y
AT	Mur	AT801180029	n.a.	Y	N	N	2.4	N	N	H			Y
AT	Mur	AT802710002	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710002	n.a.	Y	N	N	1.0	N	N	H			N4
AT	Mur	AT802710002	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710002	n.a.	Y	N	N	1.2	N	N	H			N4
AT	Mur	AT802710002	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710002	n.a.	Y	N	N	0.7	N	N	H			N4
AT	Mur	AT802710002	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710002	n.a.	Y	N	N	0.5	N	N	H			N4
AT	Mur	AT802710002	n.a.	Y	N	N	1.2	N	N	H			N4
AT	Mur	AT802710008	n.a.	Y	N	N	2.3	N	N	H			N4
AT	Mur	AT802710009	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710009	n.a.	Y	N	N	0.9	N	N	H			N4

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	River	Waterbody Code	Name of alteration	Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
AT	Mur	AT802710009	n.a.	Y	N	N	3.0	N	N	H			N4
AT	Mur	AT802710009	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710009	n.a.	Y	N	N	2.3	N	N	H			N4
AT	Mur	AT802710009	n.a.	Y	N	N	3.1	N	N	H			N4
AT	Mur	AT802710009	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710009	n.a.	Y	N	N	0.9	N	N	H			N4
AT	Mur	AT802710009	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710009	n.a.	Y	N	N	2.4	N	N	H			N4
AT	Mur	AT802710009	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802710009	n.a.	Y	N	N	5.0	N	N	H			N4
AT	Mur	AT802710014	n.a.	Y	N	N	5.4	N	N	H			N4
AT	Mur	AT802710014	n.a.	Y	N	N	4.2	N	N	H			N4
AT	Mur	AT802710014	n.a.	Y	N	N	5.3	N	N	H			N4
AT	Mur	AT802710014	n.a.	Y	N	N	3.6	N	N	H			N4
AT	Mur	AT802710014	n.a.	Y	N	N	7.3	N	N	H			N4
AT	Mur	AT802710014	n.a.	Y	N	N	3.0	N	N	H			N4
AT	Mur	AT802720001	n.a.	Y	N	N	0.8	N	N	H			N4
AT	Mur	AT802720003	n.a.	Y	N	N	2.4	N	N	H			N4
AT	Mur	AT802720005	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802720005	n.a.	Y	N	N	4.6	N	N	H			N4
AT	Mur	AT802720005	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802720005	n.a.	N	Y	N		Y	N	H			N4
AT	Mur	AT802720005	n.a.	Y	N	N	0.6	N	N	H			N4
AT	Mur	AT802720005	n.a.	Y	N	N	3.1	N	N	H			N4
AT	Drau	AT900470001	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470001	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470003	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470003	n.a.	Y	N	N	5.6	N	N	H			N4
AT	Drau	AT900470003	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470003	n.a.	Y	N	N	4.5	N	N	H			N4
AT	Drau	AT900470003	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470003	n.a.	Y	N	N	4.3	N	N	H			N4
AT	Drau	AT900470022	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470051	n.a.	Y	N	N	2.6	N	N	H			N4
AT	Drau	AT900470051	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470051	n.a.	Y	N	N	5.8	N	N	H			N4
AT	Drau	AT900470051	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470051	n.a.	Y	N	N	16.4	N	N	H			N4
AT	Drau	AT900470055	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470055	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470055	n.a.	Y	N	N	10.5	N	N	H			N4
AT	Drau	AT900470055	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470055	n.a.	Y	N	N	7.4	N	N	H			N4
AT	Drau	AT900470055	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470055	n.a.	Y	N	N	6.6	N	N	H			N4
AT	Drau	AT900470055	n.a.	N	N	Y		N	Y	H			N4
AT	Drau	AT900470056	n.a.	N	Y	N		Y	N	H			N4
AT	Drau	AT900470057	n.a.	Y	N	N	9.7	N	N	H			N4

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	**River**	**Waterbody Code**	**Name of alteration**	**Impound-ment**	**Abstraction**	**Hydro-peaking**	**Impound-ment Length in km**	**Residual Water Dis-charge**	**Hydropeaking - Water level fluctuation > 1m /day**	**First (key) water abstraction purpose**	**Second water abstraction purpose**	**Third water abstraction purpose**	**Measure implementation by 2015**
AT	Drau	AT903540002	n.a.	N	Y	N		Y	N	H			N4
AT	Drau	AT903540003	n.a.	N	Y	N		Y	N	H			N4
AT	Drau	AT903770000	n.a.	N	N	Y		N	Y	H			N4
CZ	Dyje	CZ41172000	VD Vranov - přehrada	Y	N	N	27.8	N	N	O	P	A	
CZ	Dyje	CZ41277001	VDNM-horní hráz	Y	N	N	9.7	N	N	I	O	O	
CZ	Svratka	CZ41315000	VD Vír I, přehrada	Y	N	N	8.1	N	N	O	P	H	
CZ	Svratka	CZ41416000	VD Brno	Y	N	N	8.5	N	N	O	I	H	
CZ	Dyje	CZ41948000	VDNM-střední hráz	Y	N	N	4.1	N	N	I	O	O	
CZ	Dyje	CZ41958000	VDNM-dolní hráz	Y	N	N	7.8	N	N	I	O	O	
SK	Dunaj	SKD0017	Dunaj pod haťou Čunovo	N	Y	N		N	N	H	N		
SK	Dunaj	SKD0019	hať Čunovo	Y	N	N	19.4	N	N	H	N		
SK	Hornád	SKH0003	VN Ružín I	Y	N	N	15.1	N	N	H	M		
SK	Hornád	SKH1001	VN Ružín II - Malá Lodina	Y	N	N	4.5	N	N	H			
SK	Ipeľ	SKI0001	VN Málinec	Y	N	N	2.9	N	N	P			
SK	Ipeľ	SKI0004	stupeň Litke / Trenč (HU)	N	Y	N		N	N	P			
SK	Ipeľ	SKI0004	hať Boľkovce	Y	N	N	4.0	N	N	I			
SK	Ipeľ	SKI0004	stupeň Holiša	Y	N	N	8.5	N	N	M	I		
SK	Ipeľ	SKI0004	hať Trebeľovce	Y	N	N	4.0	N	N	I			
SK	Ipeľ	SKI0004	hať Kalonda	Y	N	N	10.0	N	N	I			
SK	Ipeľ	SKI0004	hať Balog nad Ipľom / Dejtár (HU)	Y	N	N	2.8	N	N	I			
SK	Ipeľ	SKI0004	hať Veľká Ves nad Ipľom / Ipolyvece (HU)	Y	N	N	5.8	N	N	I	O		
SK	Ipeľ	SKI0004	hať Šahy	Y	N	N	6.0	N	N	I	O		
SK	Ipeľ	SKI0004	hať Vyškovce nad Ipľom	Y	N	N	9.1	N	N	I	O		
SK	Ipeľ	SKI0004	hať Kubáňovo	Y	N	N	9.2	N	N	I	O		
SK	Ipeľ	SKI0004	hať Ipeľský Sokolec / Tésa (HU)	Y	N	N	6.2	N	N	I	O		
SK	Ipeľ	SKI0004	hať Malé Kosihy / Ipolytölgyes (HU)	Y	N	N	9.0	N	N	I	O		
SK	Hron	SKR0005	VN Kozmálovce	Y	N	N	4.1	N	N	E			
SK	Váh	SKV0005	VN Liptovská Mara	Y	N	N	8.4	N	N	H			
SK	Váh	SKV0006	VD Krpeľany	Y	N	N	6.2	N	N	H			
SK	Váh	SKV0006	Váh pod VD Krpeľany	N	Y	N		Y	N	H			Y
SK	Váh	SKV0007	VD Žilina	Y	N	N	7.4	N	N	H			
SK	Váh	SKV0007	VD Hričov	Y	N	N	5.1	N	N	H			
SK	Váh	SKV0007	Váh pod VD Hričov	N	Y	N		Y	N	H			Y
SK	Váh	SKV0007	VD Nosice	Y	N	N	10.3	N	N	H			
SK	Váh	SKV0007	Váh pod VD Nosice	N	Y	N		Y	N	H			Y
SK	Váh	SKV0007	hať Dolné Kočkovce	Y	N	N	5.6	N	N	H			
SK	Váh	SKV0007	Váh pod haťou Dolné Kočkovce	N	Y	N		Y	N	H			Y
SK	Váh	SKV0007	hať Trenčianske Biskupice	Y	N	N	5.0	N	N	H			
SK	Váh	SKV0007	Váh pod haťou Trenčianske Biskupice	N	Y	N		Y	N	H			Y
SK	Váh	SKV0008	VN Slňava	Y	N	N	5.9	N	N	H			
SK	Váh	SKV0019	Váh pod VN Slňava	N	Y	N		Y	N	H			Y
SK	Váh	SKV0019	VD Kráľová	Y	N	N	11.8	Y	N	H			Y
SK	Váh	SKV0027	VD Selice	Y	N	N	4.0	Y	N	H			Y
SK	Váh	SKV1001	VN Bešeňová	Y	N	N	3.2	N	N	H			

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	**River**	**Waterbody Code**	**Name of alteration**	**Impound-ment**	**Abstraction**	**Hydro-peaking**	**Impound-ment Length in km**	**Residual Water Dis-charge**	**Hydropeaking - Water level fluctuation > 1m /day**	**First (key) water abstraction purpose**	**Second water abstraction purpose**	**Third water abstraction purpose**	**Measure implementation by 2015**
HU	Duna	HUAEP443	Dunakiliti duzzasztó és fenékküszöb	Y	Y	N	8.0	N	N	O			Y
HU	Duna	HUAEP443	Duna Szigetköznél Q hiány	N	Y	N		Y	N				Y
HU	Fehér-Körös	HUAEP471	Fehér-Körös duzzasztómû	Y	Y	N	2.0	N	N	O	M		N4
HU	Fehér-Körös	HUAEP471	Fehér-Körös	Y	N	N	7.0	N	N				Y
HU	Fekete-Körös	HUAEP475	Fekete-Körös	Y	N	N	20.0	N	N				Y
HU	Hármas-Körös	HUAEP567	Hármas-Körös Békésszentandrási-vízlépcsõ	Y	N	N	44.0	N	N	O	I	A	N4
HU	Hernád	HUAEP579	Hernád alsó, Bõcsi- duzzasztás	Y	Y	N	7.0	N	N	H			N4
HU	Hernád	HUAEP580	Hernád felsõ duzzasztás, Felsõdobsza	Y	N	N	5.0	N	N	H			N4
HU	Hernád	HUAEP580	Hernád felsõ duzzasztás, Gibárt	Y	N	N	7.0	N	N	H			N4
HU	Hernád	HUAEP580	Hernád felsõ duzzasztás, Hernádszurdok	Y	Y	N	3.0	N	N	I			N4
HU	Hortobágy-fõcsatorna	HUAEP595	Hortobágy-fõcsatorna Borsósi-duzzasztó	Y	Y	N	31.0	N	N	A	I		N4
HU	Kettõs-Körös	HUAEP668	Kettõs-Körös Békési- duzzasztó	Y	Y	N	11.0	N	N	I	O		N4
HU	Kettõs-Körös	HUAEP668	Kettõs-Körös	Y	Y	N	26.0	N	N	I			Y
HU	Mosoni-Duna	HUAEP812	Mosonmagyaróvári Mosoni-Duna duzzasztó	Y	Y	N	3.0	N	N	I			Y
HU	Rába	HUAEP899	Rába (Csörnöc-Herpenyõtõl) - Nicki-duzzasztó	Y	N	N	1.0	N	N	H	I		Y
HU	Rába	HUAEP900	Rába, Ikervári-duzzasztó	Y	Y	N	14.0	N	N	H			Y
HU	Rába	HUAEP900	Rába, (Lapincstól) Körmendi-duzzasztó	Y	Y	N	1.0	N	N	H			Y
HU	Rába	HUAEP903	Rába (határtól) - Alsószölnöki-duzzasztó	Y	Y	N	4.0	N	N	M			Y
HU	Rába	HUAEP903	Rába (határtól) - Szentgotthárdi-duzzasztó	Y	Y	N	3.0	N	N	M			Y
HU	Rába	HUAEP903	Rába (határtól) - Csörötneki-duzzasztó	Y	Y	N	8.0	N	N				Y
HU	Sebes-Körös	HUAEP953	Sebes-Körös felsõ Biharugrai-fenékgát	Y	Y	N	3.0	N	N	A			N4
HU	Sebes-Körös	HUAEP953	Sebes-Körös felsõ	Y	N	N	15.0	N	N				Y
HU	Sebes-Körös	HUAEP954	Sebes-Körös alsó, Körösladányi-duzzasztó	Y	Y	N	1.0	N	N	I			Y
HU	Sebes-Körös	HUAEP954	Sebes-Körös alsó	Y	N	N	14.0	N	N				Y
HU	Sió	HUAEP959	Sió-árvízkapu	Y	N	N	25.0	N	N				Y
HU	Tisza	HUAEQ059	Tiszalöki-víztározó	Y	Y	N	97.0	N	N	I	A	P	Y
HU	Tisza	HUAIW389	Kiskörei-víztározó	Y	Y	N	116.0	N	N	A	I	H	Y
SI	Sava	SISI1VT170	HE Mavčiče	Y	N	Y	7.0	N	U	H			N4
SI	Sava	SISI1VT170	HE Medvode	Y	N	Y	6.0	N	U	H			N4
SI	Sava	SISI1VT713	HE Vrhovo	Y	N	Y	10.0	N	U	H			N4
SI	Sava	SISI1VT739	HE Boštanj	Y	N	Y	10.0	N	U	H			N4
SI	Sava	SISI1VT739	HE Blanca	Y	N	Y	9.0	N	U	H			N4
SI	Sava	SISI1VT739	HE Krško	Y	N	Y	9.0	N	U	H			N4
SI	Drava	SISI3VT359	HE Dravograd	Y	N	Y	10.0	N	U	H			N4
SI	Drava	SISI3VT359	HE Vuzenica	Y	N	Y	12.0	N	U	H			N4
SI	Drava	SISI3VT359	HE Vuhred	Y	N	Y	13.0	N	U	H			N4
SI	Drava	SISI3VT359	HE Ožbalt	Y	N	Y	13.0	N	U	H			N4

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	**River**	**Waterbody Code**	**Name of alteration**	**Impound-ment**	**Abstraction**	**Hydro-peaking**	**Impound-ment Length in km**	**Residual Water Dis-charge**	**Hydropeaking - Water level fluctuation > 1m /day**	**First (key) water abstraction purpose**	**Second water abstraction purpose**	**Third water abstraction purpose**	**Measure implementation by 2015**
SI	Drava	SISI3VT359	HE Fala	Y	N	Y	8.0	N	U	H			N4
SI	Drava	SISI3VT359	HE Mariborski otok	Y	N	Y	16.0	N	U	H			N4
HR	Drava	HRDRA_S0002	Akumulacija HE Dubrava	Y	N	N	11.0	Y	N				0
HR	Drava	HRDRA_S0011	Akumulacija HE Varaždin	Y	N	N	3.6	Y	N				0
HR	Drava	HRDRA_S0012	Akumulacija HE Čakovec	Y	N	N	9.0	Y	N				0
HR	Drava	HRDRA_T0009	Hydropeaking from HE Dubrava	N	N	Y		Y	Y				0
RS	Begej	RSBEG	Uspor od ustave Stajicevo	Y	N	N	29.8	N	N				N
RS	Dunav	RSD2	Akumulacija HE Djerdap II	Y	N	N	81.0	N	N				N
RS	Dunav	RSD3	Akumulacija HE Djerdap I do usca Nere	Y	N	N	136.4	N	N				N
RS	Dunav	RSD4	Akumulacija HE Djerdap I od usca Nere do usca Velike Morave	Y	N	N	32.9	N	N				N
RS	Dunav	RSD5	Akumulacija HE Djerdap I od usca Velike Morave do usca Save	Y	N	N	67.5	N	N				N
RS	Dunav	RSD6	Akumulacija HE Djerdap I od usca Save do usca Tise	Y	N	N	44.6	N	N				N
RS	Dunav	RSD7	Akumulacija HE Djerdap I od usca Tise do Novog Sada	Y	N	N	40.8	N	N				N
RS	Drina	RSDR_2	Akumulacija HE Zvornik	Y	N	N	20.3	N	N				N
RS	Drina	RSDR_4	Akumulacija HE Bajina Basta	Y	N	N	23.7	N	N				N
RS	Ibar	RSIB_5	Akumulacija HE Gazivode	Y	N	N	25.6	N	N				N
RS	Lim	RSLIM_3	Akumulacija HE Potpec	Y	N	N	14.8	N	N				N
RS	Sava	RSSA_1	Akumulacija HE Djerdap I od usca Save u Dunav do Sapca	Y	N	N	98.9	N	N				N
RS	Tamis	RSTAM_1	Uspor od ustave Opovo	Y	N	N	41.5	N	N				N
RS	Tamis	RSTAM_1	Uspor od ustave Pancevo	Y	N	N	38.8	N	N				N
RS	Tamis	RSTAM_2	Uspor od ustave Tomasevac	Y	N	N	36.4	N	N				N
RS	Tisa	RSTIS_1	Akumulacija HE Djerdap I od usca Tise u Dunav do brane Novi Becej	Y	N	N	60.8	N	N				N
RS	Tisa	RSTIS_2	Akumulacija brane na Tisi kod Novog Beceja	Y	N	N	99.5	N	N				N
RS	Velika Morava	RSVMOR_1	Akumulacija HE Djerdap I od usca Velike Morave u Dunav do Ljubicevskog mosta	Y	N	N	13.0	N	N				N
RS	Zapadna Morava	RSZMOR_3	Akumulacije Parmenac, Medjuvrsje i Ovcar banja	Y	N	N	30.6	N	N				N
RO	Arges	ROLW10.1_B1	AC. VIDRARU	Y	N	N	4.7	Y	N	H			N5
RO	Arges	ROLW10.1_B2	CONTINUA : ARGES - SECTOR INTRARE AC. OESTI - AMONTE CONFL	Y	N	N	23.4	N	N	H	P		0
RO	Arges	ROLW10.1_B3	CONTINUA - ARGES: SECTOR AMONTE CONF. VALSAN - INTRARE AC	Y	N	N	17.3	N	N	H	P		N4
RO	Arges	ROLW10.1_B4	CONTINUA - ARGES: SECTOR INTRARE AC. PRUNDU (PITESTI) - AV	Y	N	N	12.9	N	N	H	P	I	N4
RO	Arges	ROLW10.1_B5	AC. ZAVOIU ORBULUI	Y	N	N	3.7	N	N	P	I		N4
RO	Arges	ROLW10.1_B6	AC. FRONTALA OGREZENI	Y	N	N	3.3	N	N	P			N4
RO	Arges	ROLW10.1_B7	AC. MIHAILESTI	Y	N	N	11.9	N	N	H			N4

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	**River**	**Waterbody Code**	**Name of alteration**	**Impound-ment**	**Abstraction**	**Hydro-peaking**	**Impound-ment Length in km**	**Residual Water Dis-charge**	**Hydropeaking - Water level fluctuation > 1m /day**	**First (key) water abstraction purpose**	**Second water abstraction purpose**	**Third water abstraction purpose**	**Measure implementation by 2015**
RO	Ialomita	ROLW11.1_B1	Acumularea Bolboci	Y	N	N	2.0	N	N	H	I	M	0
RO	Ialomita	ROLW11.1_B3	Acumularea Dridu	Y	N	N	9.5	N	N	P	H	O	0
RO	Bistrita	ROLW12.1.53_B3	Ac Izvoru Muntelui	Y	N	N	29.1	N	N	H			0
RO	Bistrita	ROLW12.1.53_B5	Ac Pangarati-Viisoara-Vaduri-Batca Doamnei	Y	N	N	7.3	N	N	H			0
RO	Bistrita	ROLW12.1.53_B7	Ac Racova-Garleni-Lac Agrement-Lilieci-Bacau II	Y	N	N	16.4	N	N	H			0
RO	Buzau	ROLW12.1.82_B1	Acumularea Siriu	Y	N	N	11.0	N	N	I	H	O	0
RO	Buzau	ROLW12.1.82_B2	Acumularea Candesti	Y	N	N	2.3	N	N	P	H	A	0
RO	Siret	ROLW12.1_B1	Ac Rogojesti	Y	N	N	10.4	N	N	P		H	0
RO	Siret	ROLW12.1_B3	Ac Bucecea	Y	N	N	6.8	N	N	P	H		0
RO	Siret	ROLW12.1_B6	Ac Galbeni-Racaciuni-Beresti	Y	N	N	32.5	N	N	H			0
RO	Siret	ROLW12.1_B8	Ac Calimanesti	Y	N	N	9.3	N	N	H			0
RO	Jijia	ROLW13.1.15_B2	Jijia CONTINUA - ac. Ezer	Y	N	N	4.0	Y	N	I			0
RO	Prut	ROLW13.1_B2	Prut CONTINUA - ac. Stanca - Costesti	Y	N	N	42.0	Y	N	P	H	I	0
RO	Somesul Mic	ROLW2.1.31_B1	Acumularea Fintinele-Belis	Y	N	N	19.4	N	N	H			Y
RO	Somesul Mic	ROLW2.1.31_B2	Acumularea Tarnita	Y	N	N	8.7	N	N	H			0
RO	Somesul Mic	ROLW2.1.31_B3	Acumularea Somesul Cald	Y	N	N	4.3	N	N	H	P		0
RO	Somesul Mic	ROLW2.1.31_B4	Acumularea Gilau	Y	N	N	2.5	N	N	P	H		Y
RO	Crisul Repede	ROLW3.1.44_B5	Baraj Ac. Tileagd	Y	N	N	7.5	N	N	H			N4
RO	Crisul Repede	ROLW3.1.44_B5	Baraj Ac. Lugasu	Y	N	N	7.0	N	N	H			0
RO	Tarnava (Tarnava Mare)	ROLW4.1.96_B2	TARNAVA ac. Zetea	N	N	Y		N	Y	O	H		0
RO	Jiu (Jiul de Vest, Jiul Romanesc)	ROLW7.1_B120	Ac. Isalnita	Y	N	N	6.6	N	N	P	E		0
RO	Jiu (Jiul de Vest, Jiul Romanesc)	ROLW7.1_B26	Ac. Vadeni+Tg. Jiu	Y	N	N	5.5	N	N	H			0
RO	Jiu (Jiul de Vest, Jiul Romanesc)	ROLW7.1_B56	Ac. Turceni	Y	N	N	7.2	N	N	H	E		0
RO	Olt	ROLW8.1_B10	Olt -sub ac.Ionesti, Zavideni, Dragasani, ..., Slatina, Ip	Y	N	Y	87.0	N	N	H			0
RO	Olt	ROLW8.1_B11	Olt -sub acumulare Rusanesti si Izbiceni	Y	N	Y	40.0	N	N	H			0
RO	Olt	ROLW8.1_B7	Olt - (sub acumularile: Voila, Vistea, Arpas, Scorei si av	Y	N	Y	67.0	N	N	H			0
RO	Olt	ROLW8.1_B9	Olt - (sub ac:Robesti,Gura Lotrului,Turnu,Calimanesti,Daes	Y	N	Y	77.0	N	N	H			0
RO	Arges	RORW10.1_B2	ARGES: SECTOR AVAL AC. VIDRARU - INTRARE AC. OESTI	N	N	N		Y	N	H			N5
RO	Ialomita	RORW11.1_B2	Ialomita_Ac.Bolboci_Cf.Ialomicioara1	Y	N	N	2.3	Y	N	H			0
RO	Jijia	RORW13.1.15_B5	Jijia Veche - N.H. Chiperesti - confl. Prut	N	Y	N		Y	N	A			0
RO	Prut	RORW13.1_B3	Prut - sector av. ac. Stanca - conf. Solonet	N	N	N		Y	N	P			0
RO	Dunarea	RORW14.1_B1	Iron Gate I	Y	N	N	132.0	N	N	H	P		0
RO	Dunarea	RORW14.1_B2	Iron Gate II	Y	N	N	80.0	N	N	H	P	N	0

Country	River	Waterbody Code	Name of alteration	Hydrological Alteration Types			Indication ICPDR Significance Criteria						
				Impound-ment	Abstraction	Hydro-peaking	Impound-ment Length in km	Residual Water Dis-charge	Hydropeaking - Water level fluctuation > 1m /day	First (key) water abstraction purpose	Second water abstraction purpose	Third water abstraction purpose	Measure implementation by 2015
RO	Crisul Repede	RORW3.1.44_B2	Deficit de debit cauzat de sistemul hidro Dragan-Iad	N	Y	N		N	N	H			0
RO	Crisul Repede	RORW3.1.44_B6	Derivatie debit in canalul de fuga Tileagd	N	Y	N		N	N	H			Y
RO	Crisul Repede	RORW3.1.44_B7	Baraj priza industriala Oradea	Y	N	N	1.5	N	N	E	M		0
RO	Tarnava (Tarnava Mare)	RORW4.1.96_B3	TARNAVA, sector ac. Zetea - Bradesti si afluentii	N	N	Y		N	Y	O	H		0
RO	Tarnava (Tarnava Mare)	RORW4.1.96_B4	TARNAVA Bradesti - Sighisoara	N	N	N		Y	N	P	M		0
RO	Mures	RORW4.1_B10	MURES, sector Lipova - Arad	N	N	N		Y	N	P			0
RO	Mures	RORW4.1_B11	MURES, sector Arad - Romanian/Hungarian border	N	N	N		Y	N	P			0
RO	Mures	RORW4.1_B5	MURES, sector conf. Pietris - conf. Petrilaca (Teleac)	N	N	N		Y	N	P	M		0
RO	Mures	RORW4.1_B7	MURES, sector conf. Aries - conf. Cerna	N	N	N		Y	N	P			0
RO	Mures	RORW4.1_B8	MURES, sector conf. Cerna - conf. Dobra	Y	N	N	5.0	Y	N	E			0
RO	Mures	RORW4.1_B9	MURES, sector conf. Dobra - Lipova	N	N	N		0	N	P			0
RO	Bega	RORW5.1_B1	Timis - Ac. Trei Ape	Y	N	N	1.7	Y	N	N			0
RO	Bega	RORW5.1_B3	BEGA - cf. Chizdia-cf. Behela	Y	Y	N	35.0	N	N	P	I	H	N4
RO	Bega	RORW5.1_B4	BEGA - cf. Behela-frontiera RO-SMR	Y	Y	N	44.0	N	N	P	I	H	N4
RO	Timis	RORW5.2_B2	TIMIS - Ac. Trei Ape-cf.Fenes	N	Y	N		N	Y	H	M		0
RO	Timis	RORW5.2_B5	TIMIS - cf. Tapia-evacuare GC Lugoj	Y	Y	N	21.0	N	Y	P	M	H	0
RO	Timis	RORW5.2_B6	TIMIS - evacuare GC Lugoj-cf. Timisana	N	Y	N		N	Y	P	M	H	0
RO	Olt	RORW8.1_B2	Olt - aval confluenta Sipos - aval confluenta Cad	Y	Y	N	1.2	N	N	P			0
BG	Iskar	BG1IS135R026	weir Reselets	Y	Y	N	1.7	N	N	I			
BG	Iskar	BG1IS135R026	weir Karlukovo	Y	Y	N	1.6	Y	N	H			0
BG	Iskar	BG1IS135R026	weir Pisarovo	Y	Y	N	1.3	Y	N	O			0
BG	Iskar	BG1IS135R026	weir Koinare	Y	Y	N	1.9	Y	N	I	H		0
BG	Iskar	BG1IS135R026	weir Chomakovtsi	Y	Y	N	2.0	Y	N	H			0
BG	Iskar	BG1IS135R026	weir Chisti vodi	Y	Y	N	0.6	N	N	I			
BG	Iskar	BG1IS135R026	weir Lakatnik	Y	Y	N	1.5	Y	N	H			0
BG	Iskar	BG1IS135R026	weir Kaleto	Y	Y	N	1.6	Y	N	H			0
BG	Iskar	BG1IS135R026	weir Mezdra	Y	Y	N	2.1	Y	N	H			0
BG	Iskar	BG1IS135R026	weir Brusen	Y	Y	N	1.7	Y	N	H			0
BG	Iskar	BG1IS135R026	weir Iskra	Y	Y	N	2.5	Y	N	H			0
BG	Iskar	BG1IS135R026	Dam Pancherevo	Y	Y	N	2.8	Y	N	M	I		N4
BG	Iskar	BG1IS135R026	discharge of Metizi-the town of Roman	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of Sofia Frans Auto - Sofia	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of airport Sofia	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of Hemus-M - the town of Mezdra	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of Ogneuporni glini - the town of Pleven	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	severage of the village of Gornik	N	N	N		Y	N				Y

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	**River**	**Waterbody Code**	**Name of alteration**	**Impound-ment**	**Abstraction**	**Hydro-peaking**	**Impound-ment Length in km**	**Residual Water Dis-charge**	**Hydropeaking - Water level fluctuation > 1m /day**	**First (key) water abstraction purpose**	**Second water abstraction purpose**	**Third water abstraction purpose**	**Measure implementation by 2015**
BG	Iskar	BG1IS135R026	discharge of airport Sofia-Lot1	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of Interstroi Kaleto-the town of Mezdra	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	severage and WWTP-the tawn of Iskar	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	WWTP-the tawn of Svoge - east, residential district Drenov	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	WWTP-the tawn of Svoge-centre	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of Metizi-the town of Roman 2	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	sewerage of the town of Cherven bryag-stream 2	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	sewerage of the town of Cherven bryag-stream 1	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of Hydrostroi - Sofia	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of Metizi-the town of Roman 3	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	sewerage of the town of Svoge-stream 1	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	sewerage of the town of Svoge-stream 2	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	WWTP-the city of Sofia	N	N	N		Y	N				Y
BG	Iskar	BG1IS135R026	discharge of Zebra - Sofia	N	N	N		Y	N				Y
BG	Iskar	BG1IS700R006	Dam Iskar	Y	Y	N	13.9	Y	N	P			N4
BG	Iskar	BG1IS700R006	Dam Pasarel	Y	Y	N	2.8	Y	N	H			N4
BG	Iskar	BG1IS789R004	weir Dragoshinovo	Y	Y	N	0.3	Y	N				0
BG	Iskar	BG1IS789R004	WWTP-the tawn of Samokov	N	N	N		Y	N				Y
BG	Iskar	BG1IS789R004	WWTP-the tawn of Samokov, draining water	N	N	N		Y	N				Y
BG	Skat	BG1OG307R013	Dam Ogosta	Y	Y	N	10.2	Y	N	H			N4
BG	Skat	BG1OG307R013	weir Gromshin	Y	Y	N	0.4	N	N	I			
BG	Skat	BG1OG307R013	weir Beli Brod	Y	Y	N	0.9	N	N	I			
BG	Skat	BG1OG307R013	sill Vladimirovo	N	N	N		N	N				
BG	Skat	BG1OG307R013	weir Sofronievo	Y	Y	N	2.7	N	N	I			
BG	Skat	BG1OG307R013	sewerage of the town of Montana - stream 2	N	N	N		Y	N				Y
BG	Skat	BG1OG307R013	sewerage of the town of Montana - stream 3	N	N	N		Y	N				Y
BG	Skat	BG1OG307R013	WWTP-the tawn of Montana	N	N	N		Y	N				Y
BG	Skat	BG1OG307R013	sewerage of the town of Boichinovtsi	N	N	N		Y	N				Y
BG	Skat	BG1OG307R013	sewerage of the village of Lehchevo	N	N	N		Y	N				Y
BG	Skat	BG1OG307R013	sewerage of the town of Montana - stream 1	N	N	N		Y	N				Y
BG	Ogosta	BG1OG789R001	sill Chiprovtsi	N	N	N		N	N				
BG	Ogosta	BG1OG789R001	sill before Chiprovtsi	N	N	N		N	N				
BG	Ogosta	BG1OG789R001	Dam Martinovo	Y	Y	N	0.6	Y	N	M			N4
BG	Yantra	BG1YN130R029	weir Beltsov	N	N	N		N	N				
BG	Yantra	BG1YN130R029	sill Djuliunitsa	N	N	N		N	N				
BG	Yantra	BG1YN130R029	weir Krivina	Y	N	N	2.3	Y	N				0

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	**River**	**Waterbody Code**	**Name of alteration**	**Impound-ment**	**Abstraction**	**Hydro-peaking**	**Impound-ment Length in km**	**Residual Water Dis-charge**	**Hydropeaking - Water level fluctuation > 1m /day**	**First (key) water abstraction purpose**	**Second water abstraction purpose**	**Third water abstraction purpose**	**Measure implementation by 2015**
BG	Yantra	BG1YN307R027	sill Varbitsa	N	N	N		N	N				
BG	Yantra	BG1YN307R027	sill Draganovo	N	N	N		N	N				
BG	Yantra	BG1YN307R027	sill Radanovo	N	N	N		N	N				
BG	Yantra	BG1YN307R027	sill Polsko Kosovo	N	N	N		N	N				
BG	Yantra	BG1YN307R027	weir Biala	N	N	N		N	N				
BG	Yantra	BG1YN307R027	weir before Kutsina	N	N	N		N	N				
BG	Yantra	BG1YN307R027	sill Kutsina	N	N	N		N	N				
BG	Yantra	BG1YN307R027	sill Starmen	N	N	N		N	N				
BG	Yantra	BG1YN307R027	sill Botrov	N	N	N		N	N				
BG	Yantra	BG1YN307R027	discharge of Vini Korp - Pleven - the village of Tsenovo	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	WWTP-the tawn of Gorna Oryahovitsa, Dolna Oryahovitsa and Lyaskovets	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	sewerage of the town of Gabrovo - stream 1	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	sewerage of the town of Gabrovo - stream 2	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	sewerage of the town of Gabrovo - stream 4	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	sewerage of the town of Gabrovo - stream 3	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	severage of the village of Petko Karavelovo	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	WWTP of the village of Tsenovo	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	discharge of Modul - the town of Byala - stream 2	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	discharge of Modul - the town of Byala - stream 1	N	N	N		Y	N				Y
BG	Yantra	BG1YN307R027	discharge of Feshko Feshion - the town of Byala	N	N	N		Y	N				Y
BG	Yantra	BG1YN700R017	weir before Samovodene	Y	N	N	0.3	N	N				
BG	Yantra	BG1YN700R017	weir Samovodene	Y	N	N	0.8	N	N				
BG	Yantra	BG1YN700R017	discharge of Hermis B - the town of Veliko Tarnovo	N	N	N		Y	N				Y
BG	Yantra	BG1YN700R017	WWTP-the town of Veliko Tarnovo	N	N	N		Y	N				Y
BG	Yantra	BG1YN700R017	discharge of Zaharni zavodi - the town of Gorna Oriahovitsa - stream 1	N	N	N		Y	N				Y
BG	Yantra	BG1YN700R017	discharge of Zaharni zavodi - the town of Gorna Oriahovitsa - stream 2	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	sill Pushevo	N	N	N		N	N				
BG	Yantra	BG1YN900R015	sill before Kalomen	N	N	N		N	N				
BG	Yantra	BG1YN900R015	sill Chukovo	N	N	N		N	N				
BG	Yantra	BG1YN900R015	weir Gostilitsa	Y	N	N	0.3	N	N				0
BG	Yantra	BG1YN900R015	sill Slaveikovo	N	N	N		N	N				
BG	Yantra	BG1YN900R015	sill before Slaveikovo	N	N	N		N	N				
BG	Yantra	BG1YN900R015	weir Yantra-HPS	Y	Y	N	0.9	Y	N	H			N4
BG	Yantra	BG1YN900R015	sill Grablevtsi	Y	Y	N	0.1	Y	N	H			0
BG	Yantra	BG1YN900R015	weir Ledenik	Y	Y	N	0.4	Y	N	H			0

				Hydrological Alteration Types			Indication ICPDR Significance Criteria						
Country	**River**	**Waterbody Code**	**Name of alteration**	**Impound-ment**	**Abstraction**	**Hydro-peaking**	**Impound-ment Length in km**	**Residual Water Dis-charge**	**Hydropeaking - Water level fluctuation > 1m /day**	**First (key) water abstraction purpose**	**Second water abstraction purpose**	**Third water abstraction purpose**	**Measure implementation by 2015**
BG	Yantra	BG1YN900R015	weir Kalomen	Y	Y	N	0.4	Y	N	H			0
BG	Yantra	BG1YN900R015	discharge of Toplofikatsia Gabrovo-stream 3	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	sewerage of the town of Gabrovo - stream 8	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	sewerage of the town of Gabrovo - stream 6	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	Local WWTP of dairy farm-the village Gostilitsa	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	discharge of Kapitan Dyado Nikola - the town of Gabrovo - stream 1	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	discharge of Kapitan Dyado Nikola - the town of Gabrovo - stream 2	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	discharge of Kapitan Dyado Nikola - the town of Gabrovo - stream 3	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	discharge of Toplofikatsia Gabrovo-stream 2	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	discharge of Toplofikatsia Gabrovo-stream 1	N	N	N		Y	N				Y
BG	Yantra	BG1YN900R015	sewerage of the town of Gabrovo - stream 4	N	N	N		Y	N				Y
MD		MD1	Costesi - Stanca	Y	N	N	42.0	Y	N	P	H	I	0

Summary of eventual main impacts on water resources due to climate change and list of selected climate change projects relevant to the DRBD

Annex 21 of the DRBM Plan

1. Eventual main impacts of climate change on water resources in the DRB

There have been a number of recent and ongoing international research initiatives on climate change that are of relevance to the Danube River Basin (DRB). They are useful in identifying some of the issues that may impact the environment of the DRB. A summary of the key relevant projects is given in section 2 below.

Based on the findings of these initiatives, a set of impacts from climate change can be anticipated within the DRB. Direct climate change impacts that may have adverse effects on the wider environment can be identified (e.g. changes in precipitation; changes in ecoregions) but also impacts can be identified that specifically affect aquatic ecosystems and their populations. Further, indirect climate change impacts may be expected as a result of climate effects on the industrial and agricultural sectors, which may in consequence impact on the environment. For both groups, the key impacts on the aquatic environment are summarised below:

Direct climate change impacts can provoke hydrological alterations within the waters of the DRB through extreme events such as drought and floods. Respective pressures can negatively affect the *ecological* and *chemical status* of the water:

- In the case of **drought events**, hydrological alterations such as significant decreases in water flows; disconnection of active wetland/floodplain areas; changes in sediment transport; increases in local pollution concentrations and insufficient groundwater recharge may impact water status.
- In the case of **flood events**, hydrological alterations can result in, for example, an increased mobilisation of pollutants and increased land erosion impacting on aquatic populations. In addition, occurrence of flood events at different frequencies can adversely impact water status.

Direct climate change impacts can also have adverse effects on basic physical and chemical conditions relevant for the aquatic environment (e.g. water temperature, pollution concentrations, etc.) and thus affect water status. Further, issues such as **salt water intrusion** in coastal areas due to sea level rise and/or the reduction of river levels are also potentially significant pressures.

Indirect climate change impacts result in additional threats to the DRB environment:

- **Drought events** may provoke an increase in water demand from various sectors including agriculture, water supply, navigation, hydropower and thermal energy generation. The additional need for water abstraction from listed water users could potentially increase the already existing pressure on the aquatic environment and thereby further decrease water status.
- Increased **flood events** can result in the need for additional flood defence measures that, if they don't take into account the needs of the aquatic environment as part of the planning process, can provoke negative impacts on water status. Wherever possible and without putting humans and settlement at risk, alternative flood defence solutions (such as flood retention areas) that are also beneficial to the aquatic environment, should be considered.

In summary, respective actions need to be taken to ensure that additional water use and flood defence measures will be *climate proof* in the future. *Climate proof* measures will ensure that additional impacts on the aquatic environment and water status are prevented and the achievement of environmental objectives ensured.

2. List of climate change projects relevant to the DRBD

1. ADAM:[2] Adaptation and Mitigation Strategies - supporting European climate policy.

Funded by the European Commission and co-ordinated by the Tyndall Centre for Climate Change Research in the UK, ADAM is an integrated research project running from 2006 to 2009 that will lead to a better understanding of the trade-offs and conflicts that exist between adaptation and mitigation policies. ADAM will support EU policy development in the next stage of the development of the Kyoto Protocol and will inform the emergence of new adaptation strategies for Europe.

Evidence so far from the Tisza region suggests that successful adaptation requires both formal regulatory rules and informal social relations.

The Tisza River Basin: Adaptation to climate change in floodplain management

Water management in the Hungarian Tisza region offers an attractive case to study mainstreaming adaptation and mitigation. Climate change is connected to the three main water-related problems of the Tisza region: floods, in-land water stagnation and droughts. The new water management plan calls for rural development, water retention and the revitalisation of floodplains. Implementation of the plan is hard, however, since the benefits remain unquantified and property rights are ill-defined. Opportunities are thereby missed to capitalize on the potential of ecosystems to regulate floods and droughts.

In the spring of 2003, the Hungarian government issued a decree that marked a substantial shift in addressing water management. The new water management plan for the Tisza River in Eastern Hungary recognised rural development and nature conservation as important objectives next to flood protection. Floodplain revitalisation and land-use change were introduced as strategies to replace or complement prevailing engineering approaches. This was surprising because for 150 years water management had been dominated by river regulation, the construction of embankments and drainage. Water management had served mostly the interests of large-scale agriculture.

The ADAM project is studying what happened in Hungary in the period leading up to the breakthrough year of 2003 and in the following years when actors had to deliver on the new direction taken in water management. It is examining under what conditions floodplain revitalisation, land-use change and rural development reduce climate-related risks in the Hungarian Tisza River Basin. The multidisciplinary team assesses the agricultural and hydrological consequences of climate change, as well as the institutional setting conducive to climate change adaptation and mitigation.

Evidence from the Tisza region so far suggests that successful adaptation requires both formal regulatory rules and informal social relations. Informal relations are crucial in strengthening autonomous adaptation and to capitalise on local traditions and experience. At the same time, formal rules can mainstream adaptation into policy cycles and are required to include adaptation in longer term planning, investment and large-scale infrastructure. Yet, the regulatory framework and operational implementation are hardly addressed in regional adaptation policy-making. Government organisations are under-prepared to mainstream and to finance integrated adaptation policies where the cooperation among ministries is crucial. The importance of informal relations is often overlooked in policy-making. This includes creating ‘space for learning and feedback’ pilots and facilitating new ways of working between academics, stakeholders, experts and policy-makers. Allowing actors to clarify and change their roles and responsibilities in both policy development and implementation can support adaptation and deserves more attention. The sharing of costs and benefits between actors is central to the successful implementation of adaptation and has to be addressed in vulnerability studies and adaptation planning.

[2] ADAM - www.adamproject.eu/

2. CECILIA[3]: Central and Eastern Europe Climate Change Impact and vulnerability Assessment.

The main objective of CECILIA is to deliver a climate change impact and vulnerability assessment in targeted areas of Central and Eastern Europe. Emphasis is given to applications of regional climate modelling studies at a resolution of 10 km for local impact studies in key sectors of the region. The project contains studies of hydrology, water quality and water management (focusing at medium-sized river catchments and the Black Sea coast); air quality issues in urban areas (Black Triangle - a polluted region around the common borders of the Czech Republic, Poland and Germany); agriculture (crop yield, pests and diseases, carbon cycle); and forestry (management, carbon cycle). Very high resolution simulations over this region are necessary due to the presence of complex topographical and land-use features. Climate change impacts on large urban and industrial areas modulated by topographical and land-use effects (which can be resolved at the 10 km scale), are investigated by CECILIA. The high spatial and temporal resolution of dense national observational networks at high temporal resolution and of the CECILIA regional model experiments will uniquely feed into investigations of climate change consequences for weather extremes in the region under study. Comparison with the results based on statistical downscaling techniques will also be provided. Statistical downscaling methods for verification of the regional model results will be developed and applied, and assessments of their use in localization of model output for impact studies will be performed.

3. CIRCLE[4]: Climate Impact Research Co-ordination for a Larger Europe

Different regions face different problems: in low-lying coastal areas, researchers are looking at the effects of rising sea levels, while in high mountain areas, melting glaciers that increase the risk of mass movements will attract attention. Some institutes are carrying out numerical modelling of climate patterns, while others are looking at the social and economic impact of change. Coordinated information about these national research programmes will enable partners to learn from each other, and avoid duplication.

CIRCLE is organised into four activities to integrate what is already being done at the national level and to take it forward as a unified effort.

The first activity involves *learning from each other*: CIRCLE requires an interdisciplinary approach to integrate indicators of climate change. As well as climatology, meteorology, hydrology, biology, soil sciences, marine sciences and forestry, building technologies, sociology and medicine come into play in respect to impacts on human health, for example, impacts due to heat waves and the possible spread of vector-borne infectious diseases.

Learning will involve *exchange of knowledge and experience* gained on national programmes, their scientific focus and management practices.

This leads to *planning*: defining tangible ways for the national programmes to support each other on specific issues. It should then be possible to set up working links by connecting national programmes for their mutual benefit.

The fourth and major strand is to fulfil the criteria for an *ERA-NET* (European Commission scheme aimed at integrating and enhancing European research) by establishing trans-national research programmes and joint calls for proposals that aim at a stepwise alignment of national research agendas.

[3] CECILIA - www.cecilia-eu.org/

[4] CIRCLE - www.circle-era.net/

4. CLAVIER[5] – Climate Change and Variability: Impact on Central and Eastern Europe

The nations in Central and Eastern Europe (CEE) face the triple challenge of ongoing economic and political transition; continuing vulnerability to environmental hazards; and the longer term impacts of global climate change. The overall aim of the EU Sixth Framework Programme (6thFP) project, CLAVIER, is to make a positive contribution to successfully coping with these challenges. Three representative CEE Countries are studied in detail: Hungary, Romania, and Bulgaria.

In the framework of CLAVIER, ongoing and future climate changes are analysed based on existing data and very detailed climate projections in order to fulfil the needs of local and regional impact assessment. Researchers from 6 countries and various disciplines are investigating linkages between climate change and its impact on weather patterns, air pollution, extreme events and water resources. Furthermore, an evaluation of the economic impact on agriculture, tourism, energy supply and the public sector is being conducted.

5. ENSEMBLES[6]: Providing ensemble-based predictions of climate and their impacts

This project involves computation of climate change signals using Regional Climate Models driven by various Global Models assuming one IPCC (Intergovernmental Panel on Climate Change) emission scenario (A1B). The project aims to:

- Develop an ensemble prediction system for climate change based on the principal state-of-the-art, high resolution, global and regional *Earth System* models developed in Europe, validated against quality controlled, high resolution gridded datasets for Europe. This will produce for the first time, an objective, probabilistic estimate of uncertainty in future climate at the seasonal to decadal and longer timescales.
- Quantify and reduce the uncertainty in the representation of physical, chemical, biological and human-related feedbacks in the *Earth System* (including water resource, land-use and air quality issues, and carbon cycle feedbacks).
- Maximise the exploitation of the results by linking the outputs of the ensemble prediction system to a range of applications, including agriculture, health, food security, energy, water resources, insurance and weather risk management.

6. GLOCHAMORE[7]: Global Change in Mountain Regions

GLOCHAMORE was a support action of the EU's 6thFP on "Sustainable Development, Global Change and Ecosystems". The project aimed at the development of a state-of-the art integrated and implementable research strategy to gain a better understanding of the causes and consequences of global change in a selection of 28 UNESCO Mountain Biosphere Reserves (MBRs) around the world.

The results of this research strategy serve as a basis for MBR managers and other stakeholders to develop sustainable development policies for their respective MBRs. In order to meet its objectives, the project has integrated activities and knowledge from both (natural and social) science and from UNESCO Mountain Biosphere Reserve managers.

7. MICE[8]: Modelling the Impact of Climate Extremes

MICE uses information taken directly from climate models to explore future changes in extreme events across Europe in response to global warming.

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[5] CLAVIER – http://www.clavier-eu.org

[6] ENSEMBLES - http://ensembles-eu.metoffice.com/

[7] GLOCHAMORE - http://mri.scnatweb.ch/projects/glochamore/

[8] MICE - http://www.cru.uea.ac.uk/projects/mps/html/mice.html

The objectives are:

- To identify and catalogue extremes in observed and modelled climate data;
- To evaluate the extent to which state-of-the-art climate models can successfully reproduce the present-day occurrence of extremes;
- To analyse future changes in climate extremes using a range of statistical techniques including Extreme Value Theory;
- To assess the impact of these changes in extremes on selected activity sectors;
- To communicate the results to stakeholders.

By looking at results from a number of climate model experiments, MICE will explore the uncertainties associated with predicting the future occurrence of extremes. These experiments will be selected to look at the effects of changing the model resolution (comparing regional and global climate model experiments); of using different scenarios of atmospheric greenhouse gas concentrations (which in turn reflect different visualizations of economic futures); and of using different model ensemble members (analysing relationships between natural variability and forced change).

The impact sectors to be investigated range from those where the relationships between climate and impact are well understood (agriculture, energy use) and those where the potential implications of climate change are multi-faceted/complex and only just beginning to be appreciated (forestry, winter sports and beach holidays).

8. PRUDENCE[9]: Prediction of Regional scenarios and Uncertainties for Defining European Climate risks and effects

This project involves computation of climate change signals using Regional Climate Models (>10) all driven by one Global Model (HadAM3H GCM) under one IPCC emission scenario (A2).

PRUDENCE is a European-scale investigation with the following objectives:

- To address and reduce deficiencies in projections;
- To quantify our confidence and the uncertainties in predictions of future climate and its impacts, using an array of climate models and impact models and expert judgement on their performance;
- To interpret these results in relation to European policies for adapting to or mitigating climate change.

Climate change is expected to affect the frequency and magnitude of extreme weather events, due to higher temperatures, an intensified hydrological cycle or more vigorous atmospheric motions. A major limitation in previous studies of extremes has been the lack of: appropriate computational resolution (obscures or precludes analysis of the events); long-term climate model integrations (drastically reduces their statistical significance); and co-ordination between modelling groups (limits the ability to compare different studies). These three issues are all thoroughly addressed in PRUDENCE by using state-of-the-art, high resolution climate models; by co-ordinating the project goals to address critical aspects of uncertainty; and by applying impact models and impact assessment methodologies to provide the link between the provision of climate information and its likely application to serve the needs of European society and economy.

PRUDENCE will provide a series of high-resolution climate change scenarios for 2071-2100 for Europe, characterising the variability and level of confidence in these scenarios as a function of uncertainties in model formulation, natural/internal climate variability, and alternative scenarios of future atmospheric composition. The project will provide a quantitative assessment of the risks arising from changes in regional weather and climate in different parts of Europe by estimating future changes in extreme events such as flooding and windstorms and by providing a robust estimation of the likelihood and magnitude of such changes. The project will also examine the uncertainties in potential impacts induced by the range of climate scenarios developed from the climate modelling results. This will provide useful information for climate modellers on the levels of accuracy in climate scenarios required by impact analysts. Furthermore, a better appreciation of the uncertainty range in calculations of future impacts from climate change may offer new insights into the scope for adaptation and

[9] PRUDENCE - http://prudence.dmi.dk/

mitigation responses to climate change. In order to facilitate this exchange of new information, the PRUDENCE work plan places emphasis on the wide dissemination of results and preparation of a non-technical project summary aimed at policy makers and other interested parties.

9. STARDEX[10]: Statistical and Regional dynamical Downscaling of Extremes for European regions

The climate of the 21st century is likely to be significantly different from that of the 20th because of anthropogenically-induced climate change. The Kyoto Protocol and future initiatives, together with actions taken by the EU, are expected to reduce the impacts of the changes, but significant changes will still occur. These changes will be perceived by European citizens mostly through increases in some types of extreme weather. STARDEX aims to provide scenarios of expected changes in the frequency and intensity of extreme events (such as heavy precipitation and resultant flooding and high temperatures) which are likely to have an impact on human lives and activities and on the environment. Climate change scenarios, particularly those for extremes, are needed for all aspects of future design (e.g. water resources, agriculture, irrigation, storm and land drainage, road, railway and building design and other sectors such as tourism) where the weather and climate are key determinants of everyday life. In all these aspects there is a clear European-wide need for more reliable, high-resolution scenarios of extremes. STARDEX will not be making predictions, but providing information on the likely changes in extremes. If work of this kind is not undertaken, future designs will not be able to incorporate the latest information about changes in extreme climate in the future.

STARDEX will achieve its aims by a rigorous and systematic inter-comparison of the three main downscaling methods (statistical, dynamical and statistical-dynamical) that are used to construct scenarios of extremes at the time and space scales where they are most needed. STARDEX will identify the more robust downscaling techniques and apply them to provide reliable and plausible future scenarios of temperature and precipitation-based extremes for selected European regions for the 2071-2100 timeframe. The extreme scenarios will incorporate three forms of uncertainty related to the specific downscaling method, different future emission paths and inter- and intra-model variability. To achieve these aims, STARDEX will develop standard observed and climate model data sets and a diagnostic software tool for calculating a standard set of extreme statistics across Europe. Two of the major climate models in Europe (HadCM3 and ECHAM4/OPYC) will be extensively validated, with the particular emphasis on extremes. The inter-comparison of downscaling methods will take place using observed climate data from the second half of the 20th century. Finally, recent extremes across Europe will be analysed. What were their causes and impacts? Was anthropogenic climate change a factor? What can be learned from the recent past? The analysis of the recent past will bring together representatives from the re-insurance industry and the climate modelling and climate impact communities in an expert advisory panel.

The impacts of STARDEX will be improved methodologies for the development of scenarios of extremes, with recommendations as to which are best for different regions across Europe and for different variables. The various sectors listed above will be able to find off-the-shelf scenarios of extremes relevant to their business, incorporating all the various uncertainties. The scenarios will be used for many aspects of design (e.g. modification of dam design criteria, agricultural potential and alteration to insurance premiums) where extremes of weather are crucial determinants. The results will be made available through standard methods of scientific publications and reports, conferences and the World-wide Web.

9. GLOWA[11]. Danube project (Impact of Global Change on the Upper Danube

GLOWA-Danube is a research and development program focusing on the comprehensive analysis of the future of water resources of the Upper Danube. In GLOWA-Danube the impact of Climate Change of a broad range of sectors is investigated. Furthermore the project identifies and simulates strategies

[10] STARDEX - www.cru.uea.ac.uk/projects/stardex/

[11] GLOWA - www.glowa-danube.de

for adaptation to and mitigation of the consequences of Climate Change and tests their effectiveness. In GLOWA-Danube a team of researchers from different natural and socio-economic science disciplines work closely together in an interdisciplinary, university-based competence network since 2001.

The aim of GLOWA-Danube is to investigate with different scenarios the impact of change in climate, population and land use on the water resources of the Upper Danube and to develop and evaluate regional adaptation strategies. For this purpose the decision support system DANUBIA was successfully set up within the first and second project stage (2001-2006).

DANUBIA is a coupled simulation model. It includes for the first time model components for natural science as well as socio-economic processes and their interactions. With the intension of being predictive DANUBIA uses results of regional climate models for predictions on Climate Change. Physical and physiological components describe natural processes (hydrology, hydro-geology, plant physiology, yield, and glaciology). For the simulation in the included sectors (farming, economy, water supply companies, private households and tourism) DANUBIA uses deep multi-actors models which represent the decisions of the involved actors based on the structure of societies, their framework as well as their interests. All components of DANUBIA run parallel on an inexpensive LINUX-cluster. DANUBIA was carefully and successfully validated with comprehensive data sets of the years 1970-2005 and is now available in the third stage of the project for common use for project researchers and stakeholder. DANUBIA will be made available as "Open Source" at the end of the third project stage in2010 and will particularly serve decision makers from policy, economy, and administration as tool for a foresighted planning of water resources against the background of Global Change. DANUBIA is applied to the watershed of the Upper Danube.