

CASEE Conference: The EU Strategy for the Danube Region, 28-29 April 2011, Szent István University, Gödöllő



**Budapest University
of Technology and
Economics**

Future Waters in the Danube Basin: Problems and Opportunities

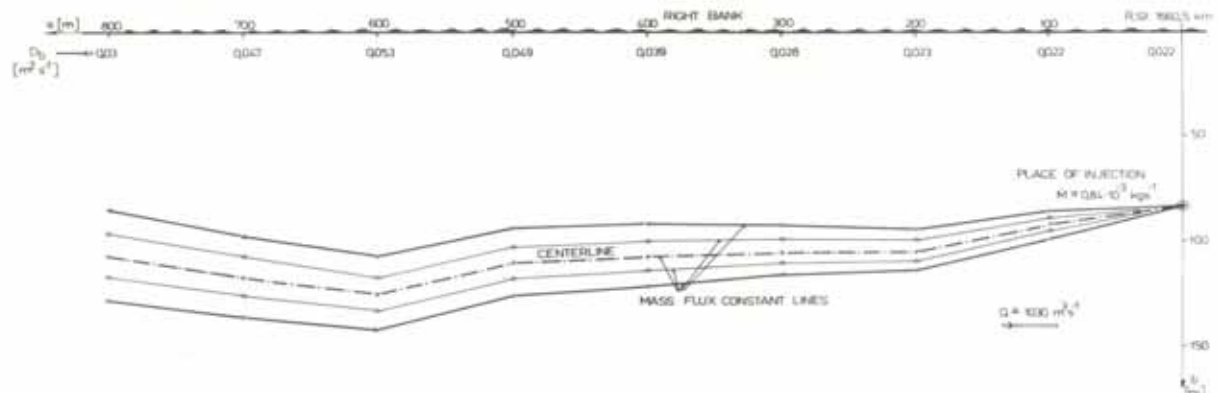
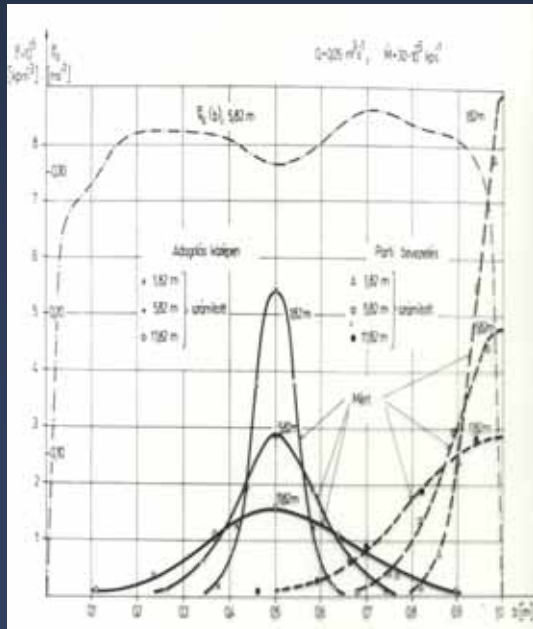
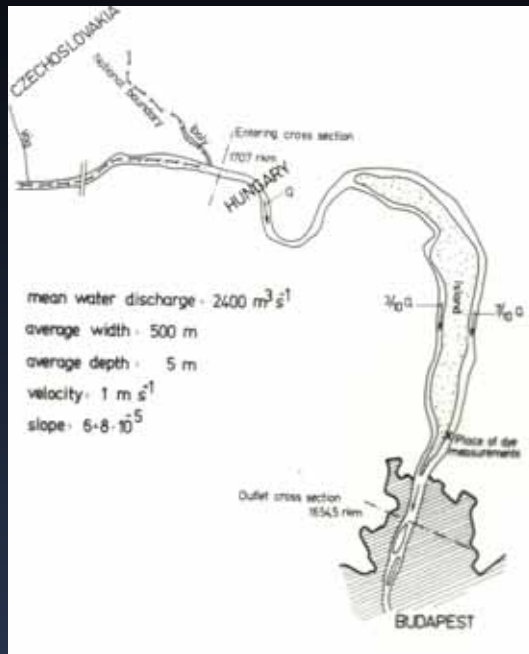
László Somlyódy



Department of Sanitary and Environmental Engineering
www.vkkt.bme.hu

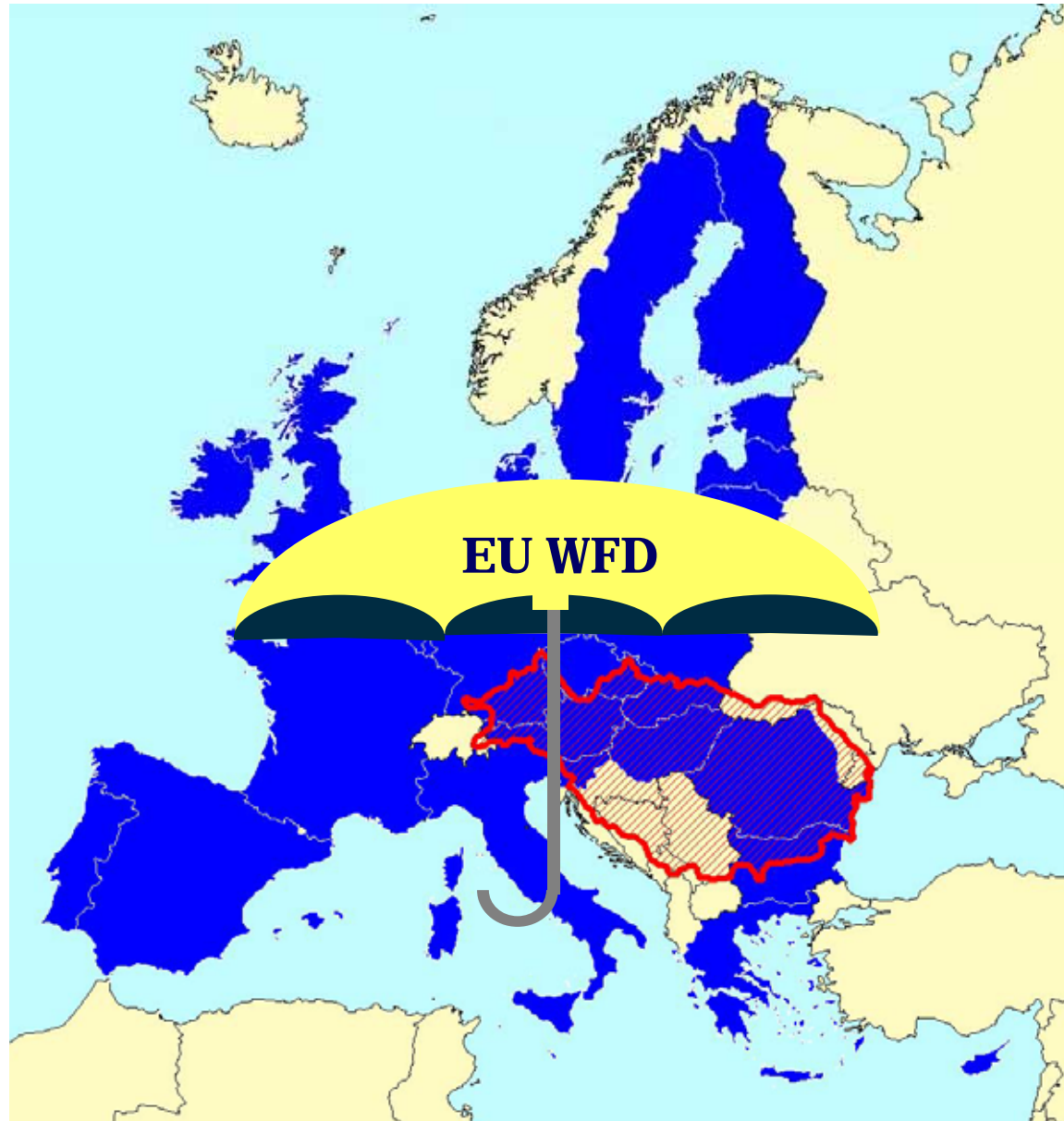


Danube mixing studies (1975)



Somlyódy (1975)

Danube Basin: EU and non-EU countries



Features of the Danube (Somlyódy, 2001)

- **Complexity**
- **More than just the name of a river. Culture, beauty. Liquid history of many nations**
- **Unique features. Steadiness and change alike**
- **Growing number of countries and huge economic disparity**
- **Nutrients, ecology and ecosystem services**
- **Environmental security, risks and conflicts**
- **Energy and navigation?**



Questions

- **Connecting? Corridor? Bridge?**
- **Danube Basin as a melting pot?**
- **Danubian identity?**
- **An artery of life influencing the development of Europe?
Life line in Greater Europe?**
- **What is the Danube? What will be?**
- **Today: problems and unexplored opportunities. Future?**

EU Strategy for the Danube Region

Four pillars and 11 Priority Areas:

(A) Connecting the Danube Region

1. Transport 2. Sustainable energy 3. Culture and tourism

(B) Protecting the Environment in the Danube Region

4. Water quality 5. Environmental risks 6. Biodiversity, landscape, air, soil

(C) Building Prosperity in the Danube Region

7. Research, education and IT, 8. Competitiveness 9. Innovation

(D) Strengthening the Danube Region

10. Institutions and cooperation 11. Security and decreasing crime

Action plans for priority areas. Projects

Financing: no new funding. Structural Funds, IPA, ENPI....

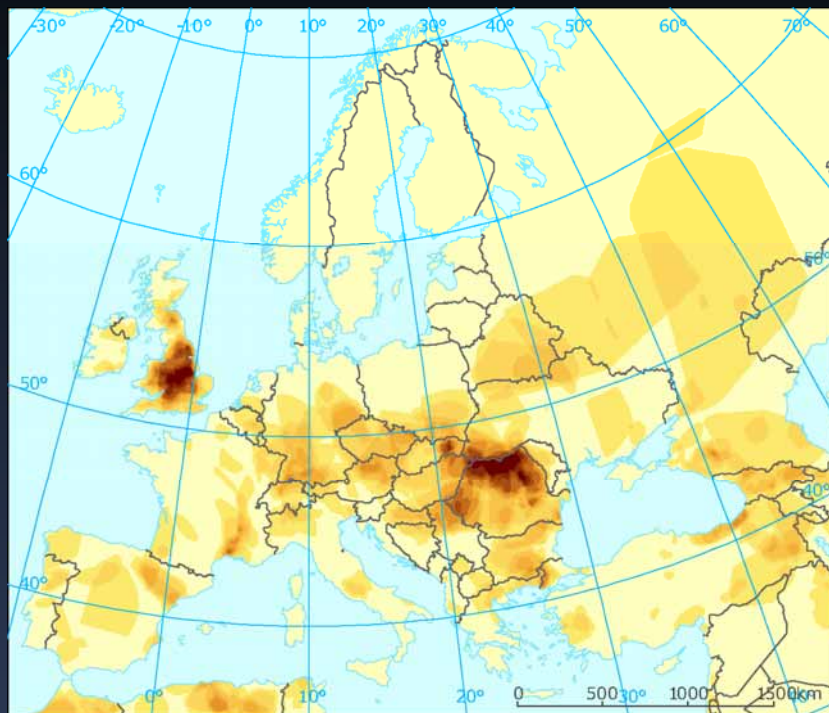
All in a changing world...



Nine water resources dilemmas in the Danube Basin

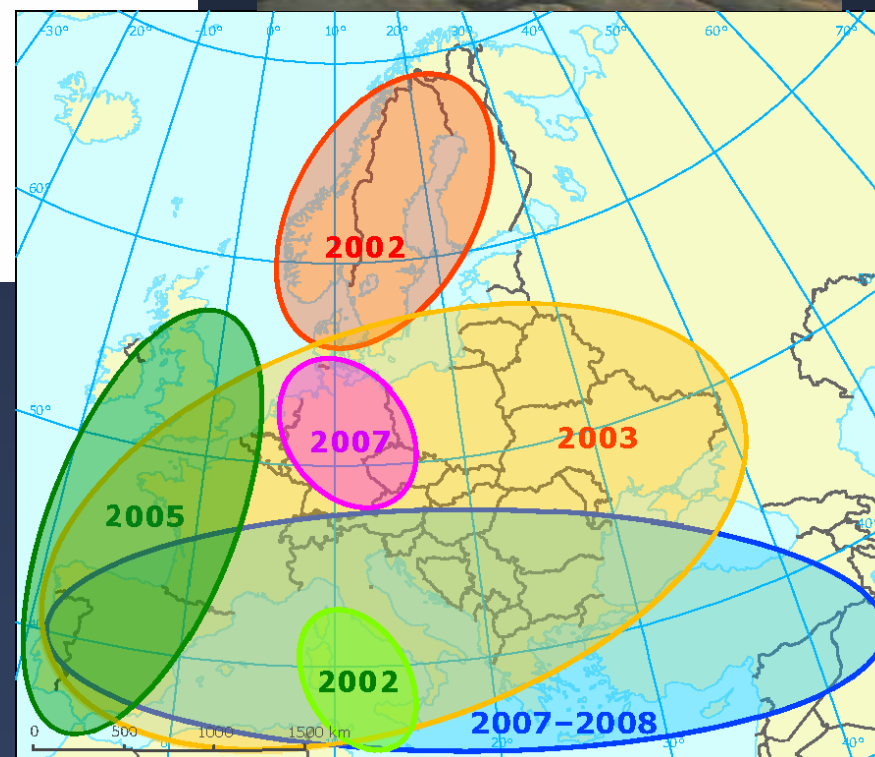
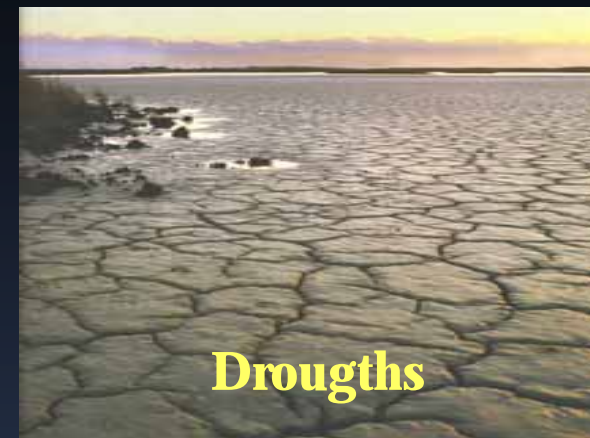
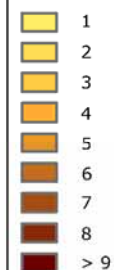


(i) Floods and droughts in Europe (last decade)



Flood events in Europe, 1998–2009

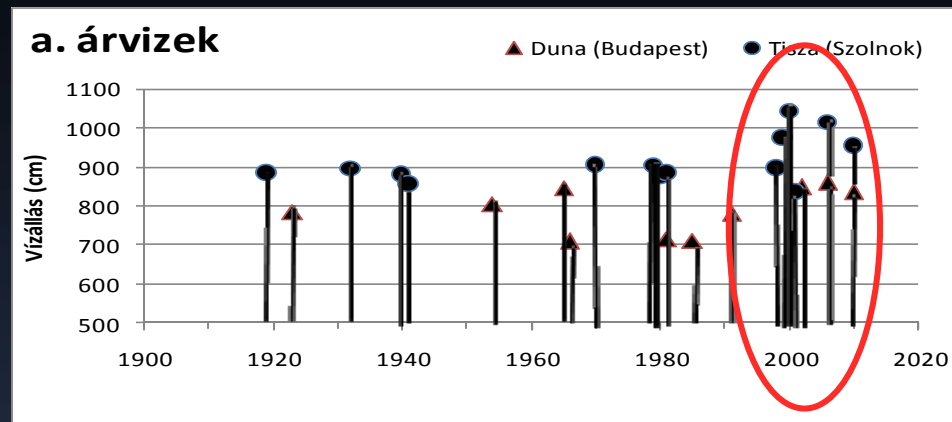
Number of events



EEA (2009)

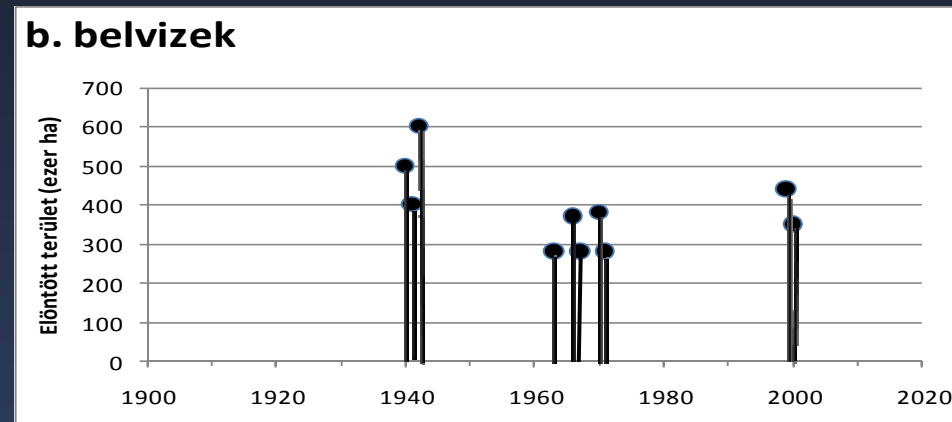
Extreme events in the 20th century (Hungary)

Floods

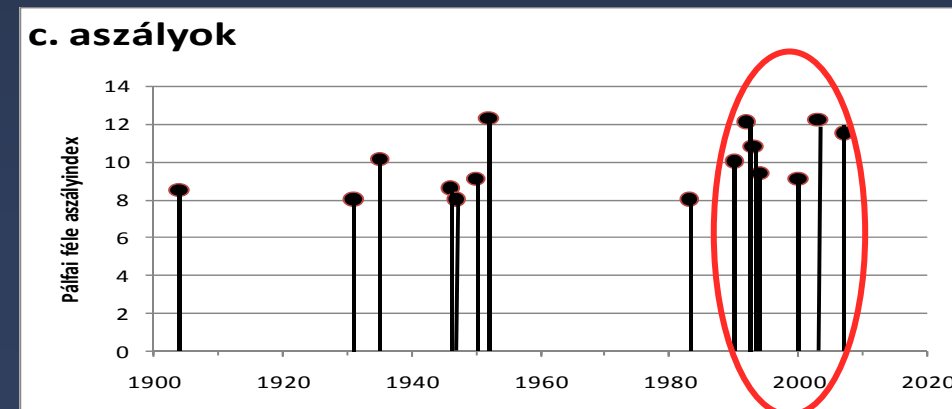


Danube and Tisza rivers

Excess waters



Droughts



Somlyódy, Nováky és Simonffy (2010)

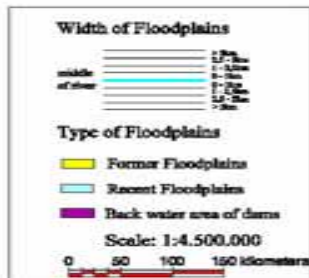
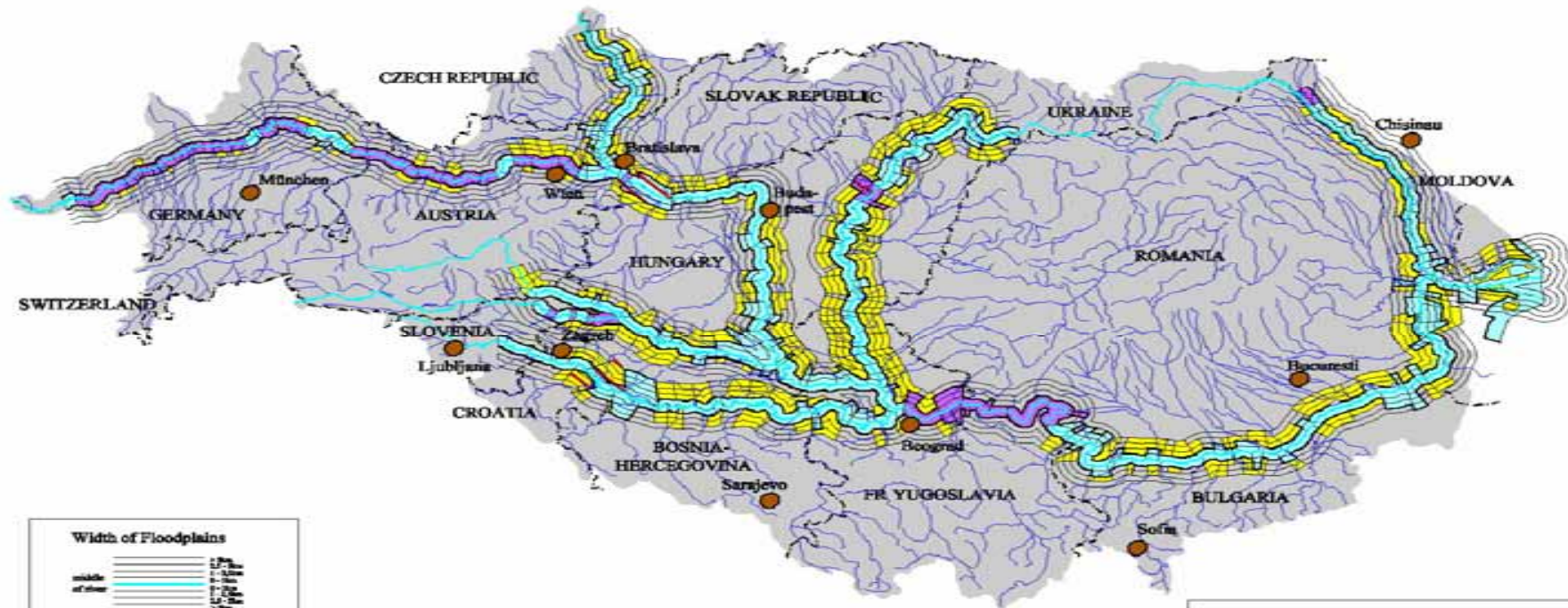
(ii) 1995-2006: 11 of the 12 years were the warmest since 1850. Climate change?



Waltraud Grubitzsch, dpa, 2003

(iii) Shrinking floodplains

Symbolized view of floodplains in the Danube River Basin



Area of historical floodplains in the study area: 41600 km²
Area of remaining floodplains in the study area: 8000 km²
A floodplain loss of more than 80%

Danube Pollution Reduction Programme

United Nations Development Programme
Global Environment Facility
ICPDR - Programme Coordination Unit
1400 Vienna, P. O. Box 500, Austria

Produced by WWF Danube-Carpathian Programme
WWF-Austrian Institute (WWF-Germany)
Josefstr. 1, D-76437 Rastatt 1999

(iv) Disrupted ecological corridors

Danube River Basin District:
Ecological Prioritisation Regarding Restoration Measures for River and Habitat Continuity

MAP 28



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.

This ICPR product is based on national information provided by the Contracting Parties to the ICPR (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 data was used for national borders of 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 CRB of AL, IT, ME and PL.

Vienna, December 2009

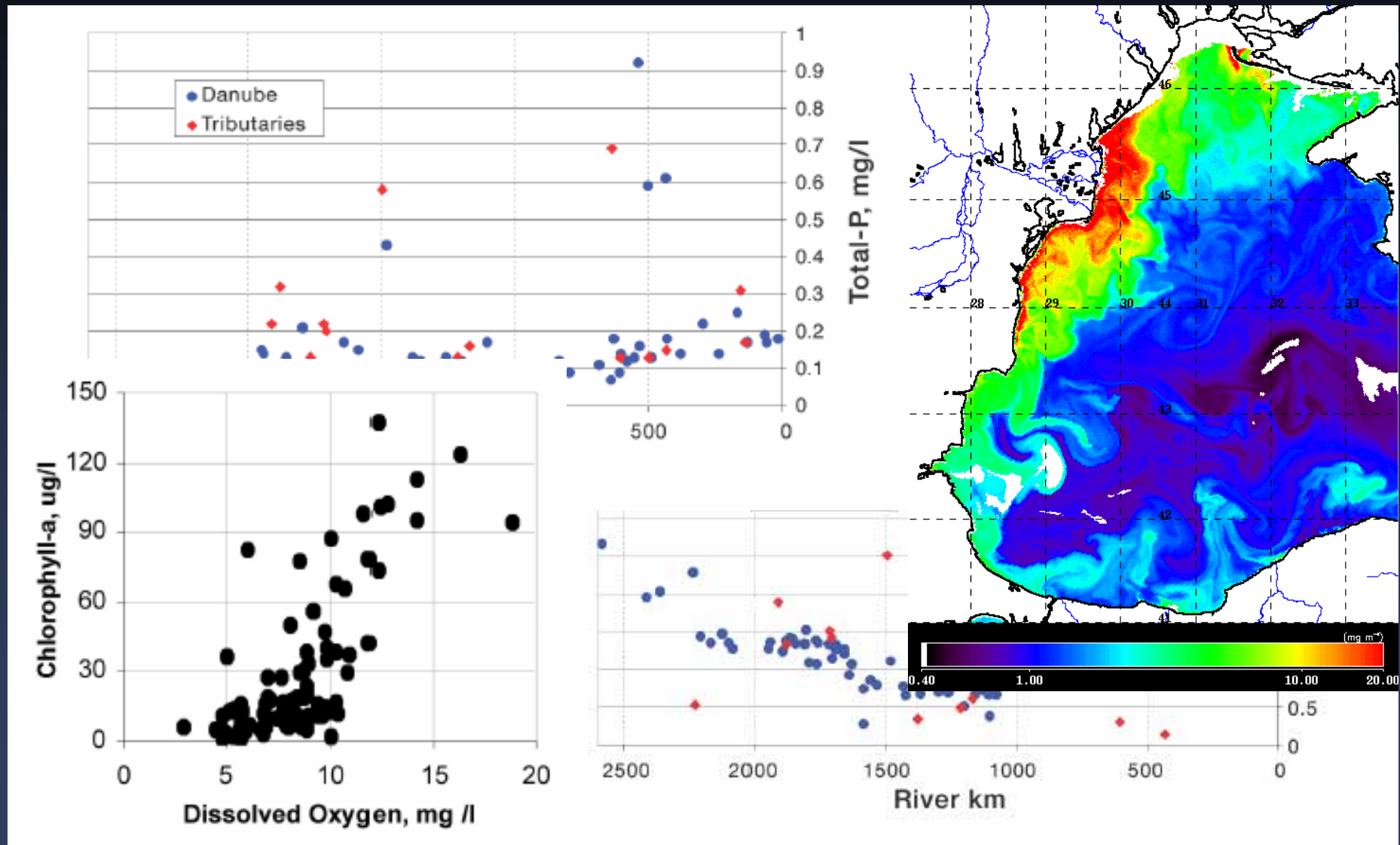
www.icpdr.org



(v) Accidental pollution: cyanide spill (2000)



(vi) Local and regional water quality: nutrients

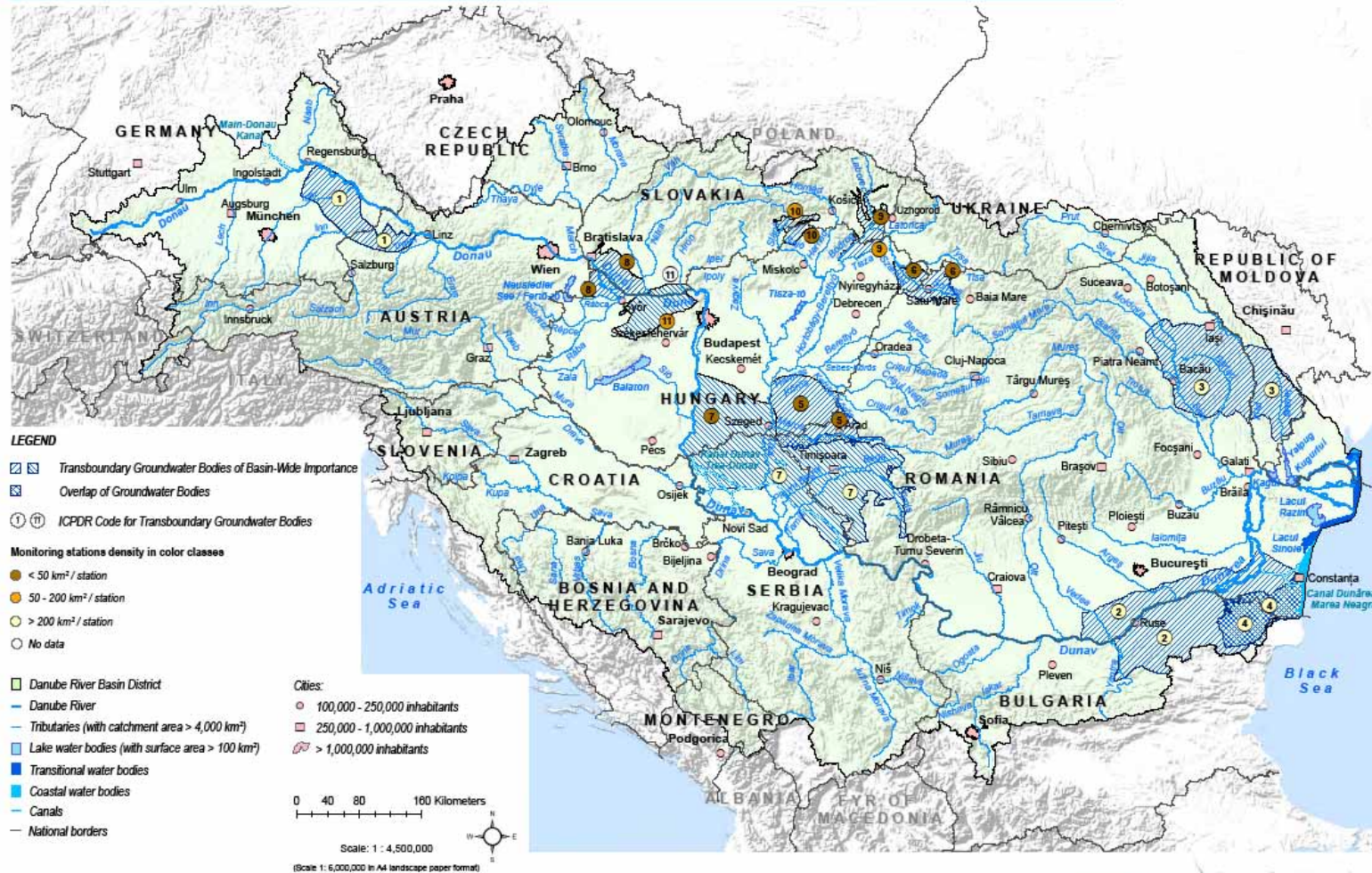


(vii) Transboundary subsurface waters

Danube River Basin District:

Transboundary Groundwater Bodies of Basin-Wide Importance and their Transnational Monitoring Network

MAP 4



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; ESR data was used for national borders of 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 Centre) was used for the outer border of the DRB of AL, IT, ME and PL.

Vienna, December 2009

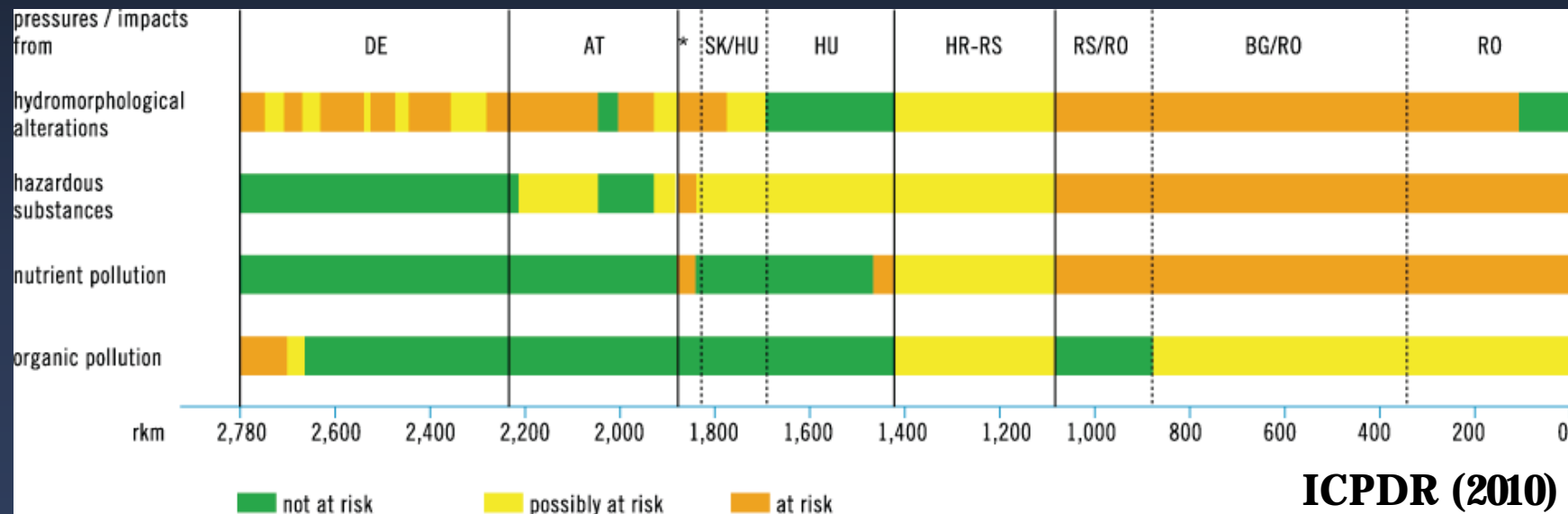
www.icpdr.org

icpdr iksd
International Commission for the Protection of the Danube River

(viii) Barrage conflict



(ix) Risk factors along the Danube (hydromorphology, hazardous substances, nutrients, organic materials)

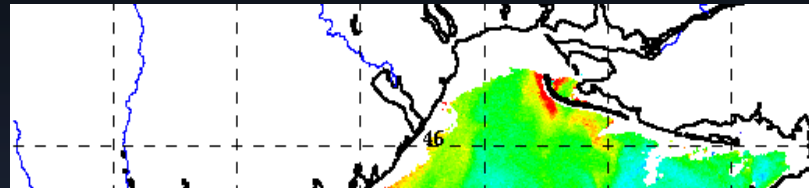


**Global, regional, upstream – downstream issues
What comes next?
Three cases**



I. Eutrophication of the Black Sea: a regional issue

Danube



Questions

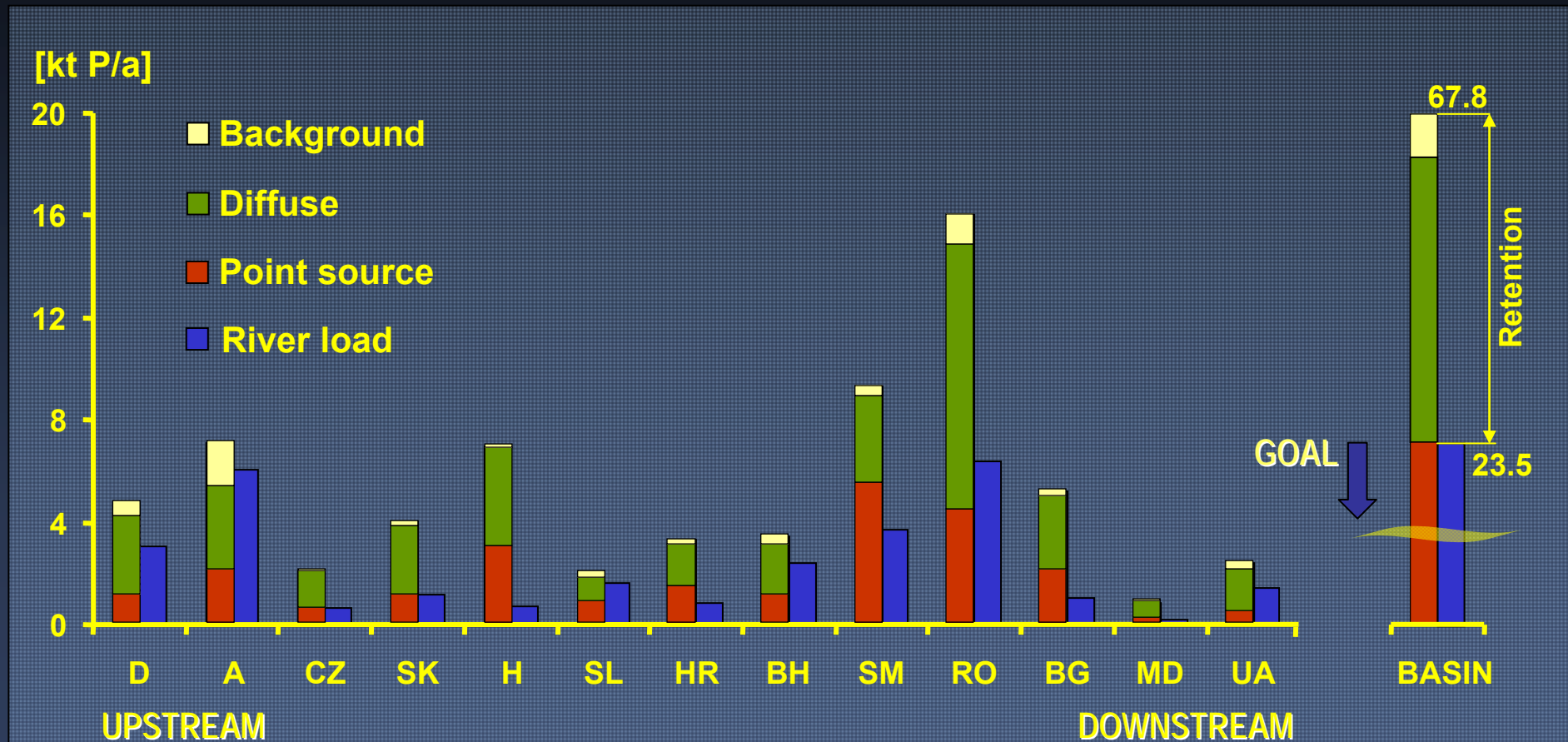
- Trade off among (i) service level, public health, local water quality and (ii) regional water quality?
- Nutrient retention by riparian countries?
- Nutrient load reduction of countries?
- Who is paying?
- Scheduling?

on

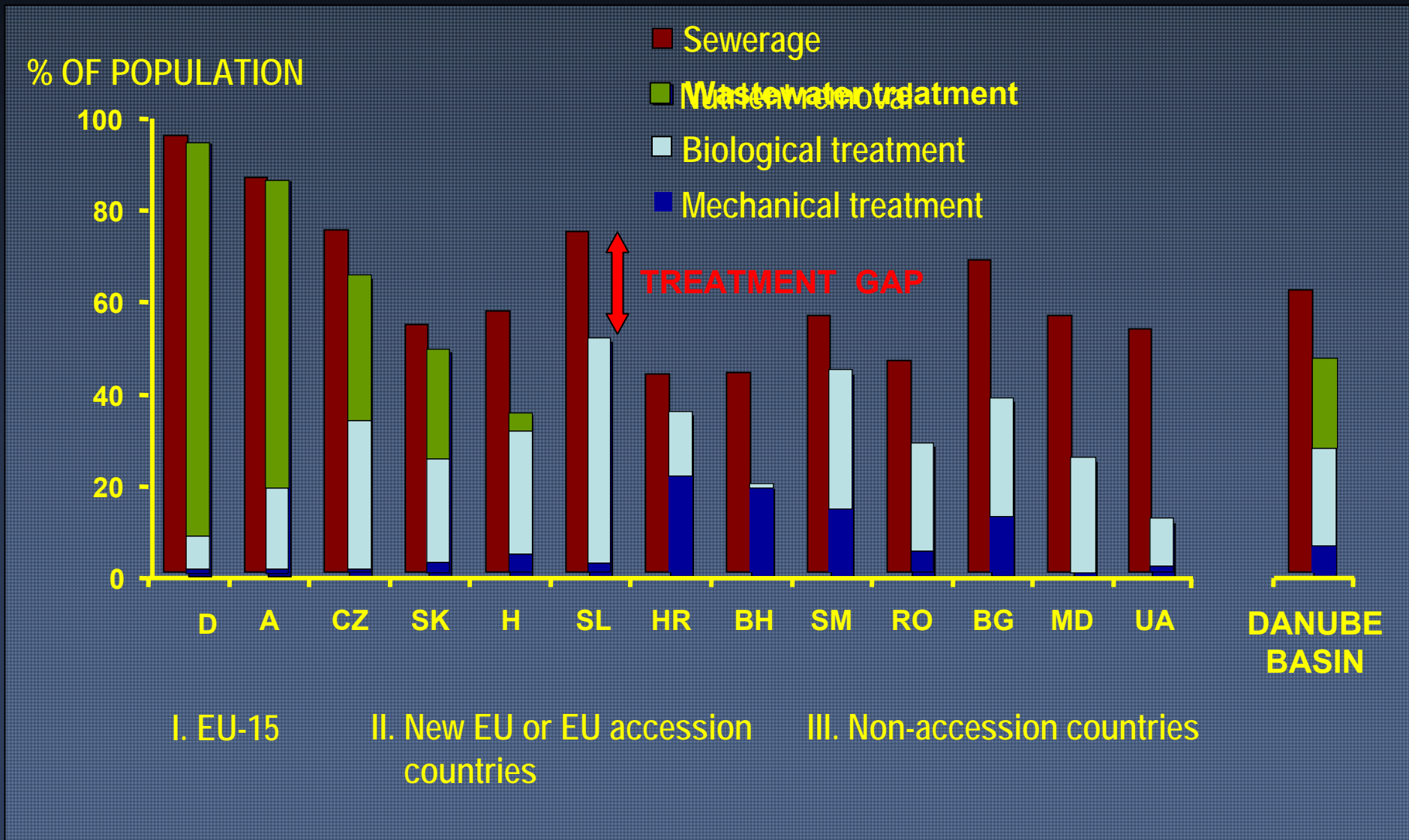
Wastewater treatment plants (ICPDR inventory)



DANUBE AND ITS BASIN: TOTAL PHOSPHORUS EMISSIONS AND LOADS

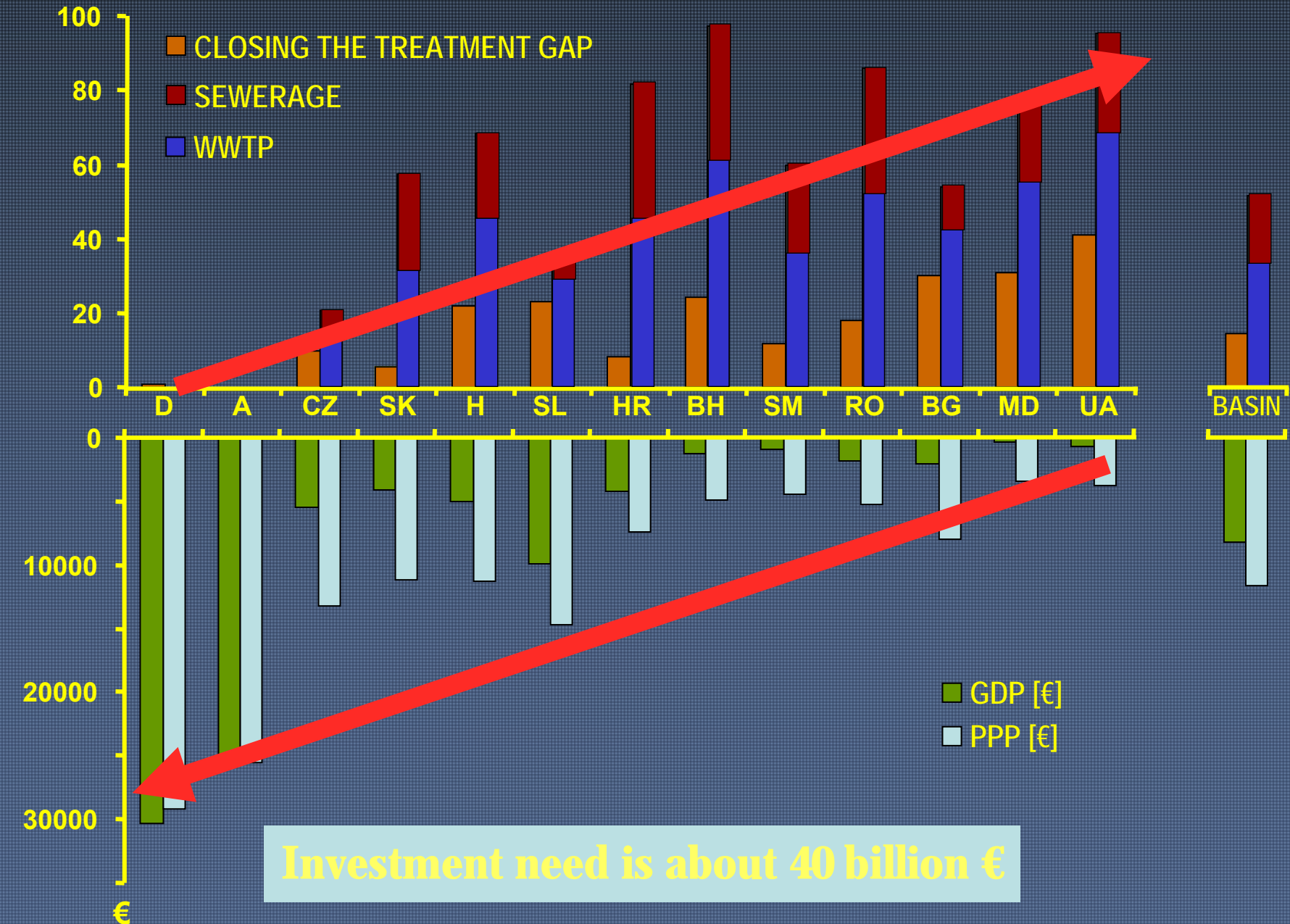


WASTEWATER MANAGEMENT IN DANUBIAN COUNTRIES



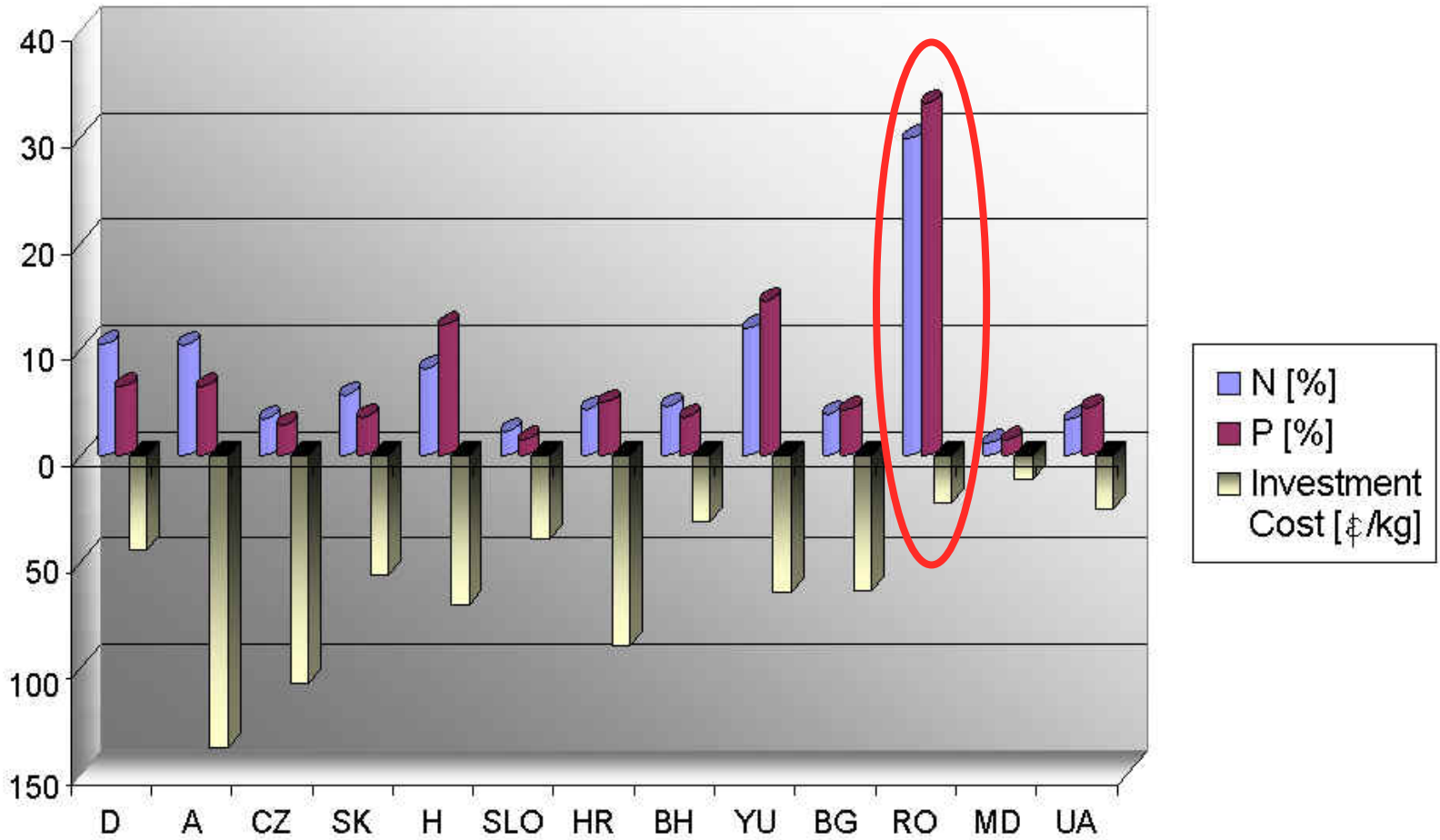
Development goal: 80 % service level

% OF POPULATION



Emission trading (ICPDR, 2000)

[Percentage of the total DB
emission]



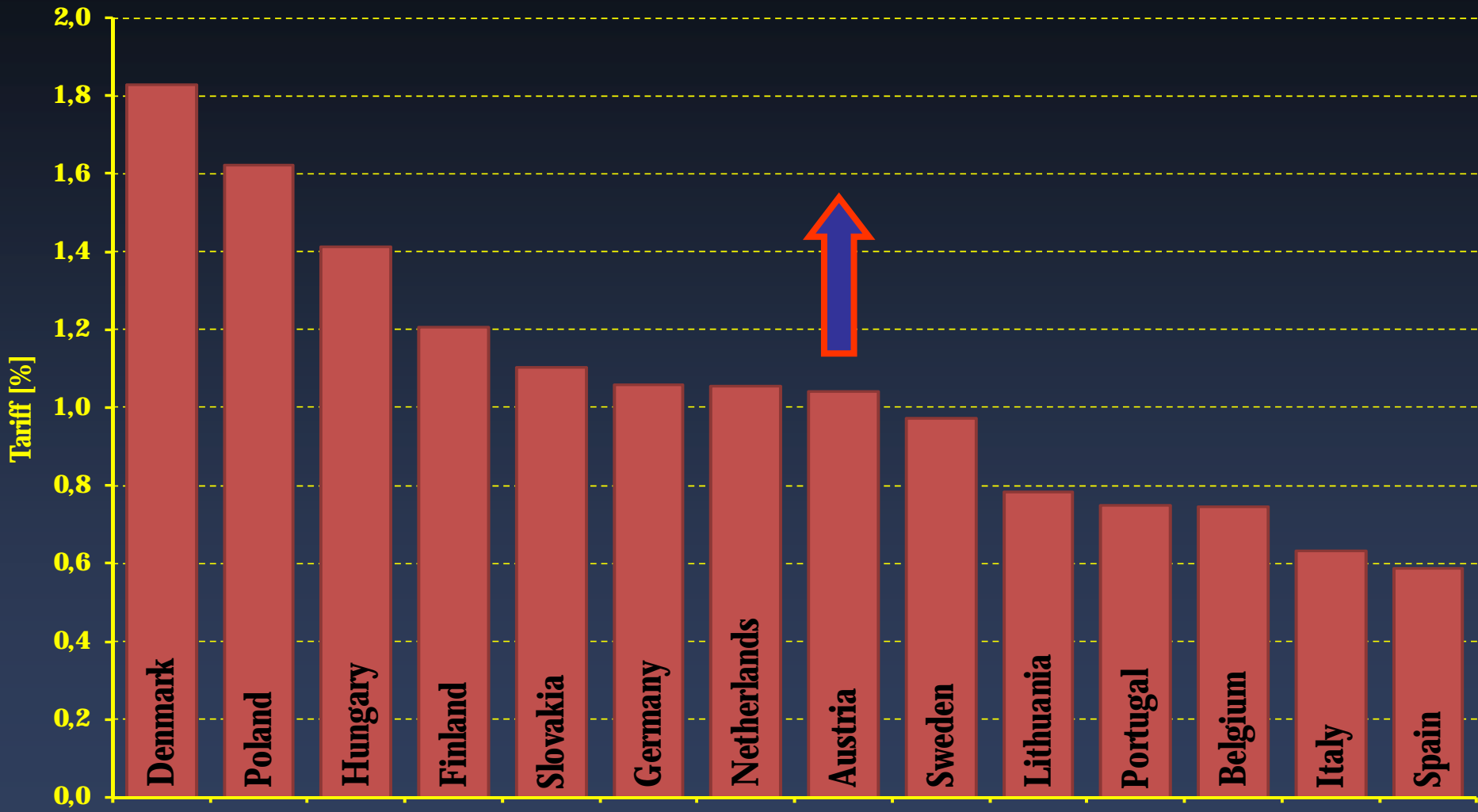
[\$/kg]

State of utilities in Danubian countries (CEE region)

COUNTRY	WATER LOSS (%)	UTILITY RISK INDEX	NON-PAYMENT (%)	NO. OF UTILITIES
CZ	20-25	1-2	~ 0	1600
SK	20-25	1-2	~ 0	11
H	15-20	1-2	~ 0	377
CR	45-50	2-3	15	130
BH	30-60	4-5	25	106
RO	35-40	3-4	~ 0	565
BU	65-70	3-4	18	50
MO	40-60	4-5	50-55	51

Risk index (1-5): high value indicates low reliability and severe financial conditions;
Non-payment: case study examples

Annual water and wastewater tariff/net income in PPP [%] Households (2008)



Source: IWA International Statistics for Water Services ((2010)
Tárki European Social Report (2008)

Eutrophication of the Black Sea

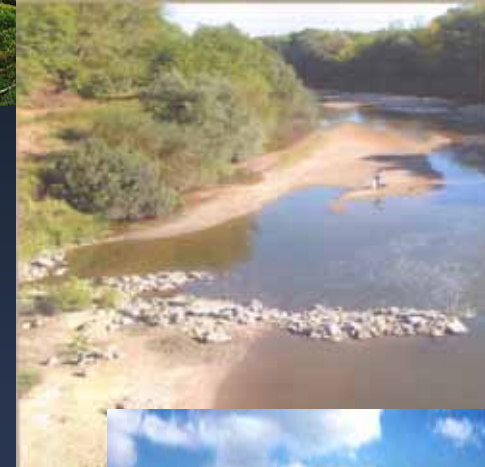
Conclusions (I)

- Huge investments needs**
- Ecology vs economy**
- Affordability, scheduling and time span**
- Tariff will increase**
- Need to create proper financial resources and to develop long-term rehabilitation programs (asset management)**
- Regional cooperation, solidarity and shared responsibility**

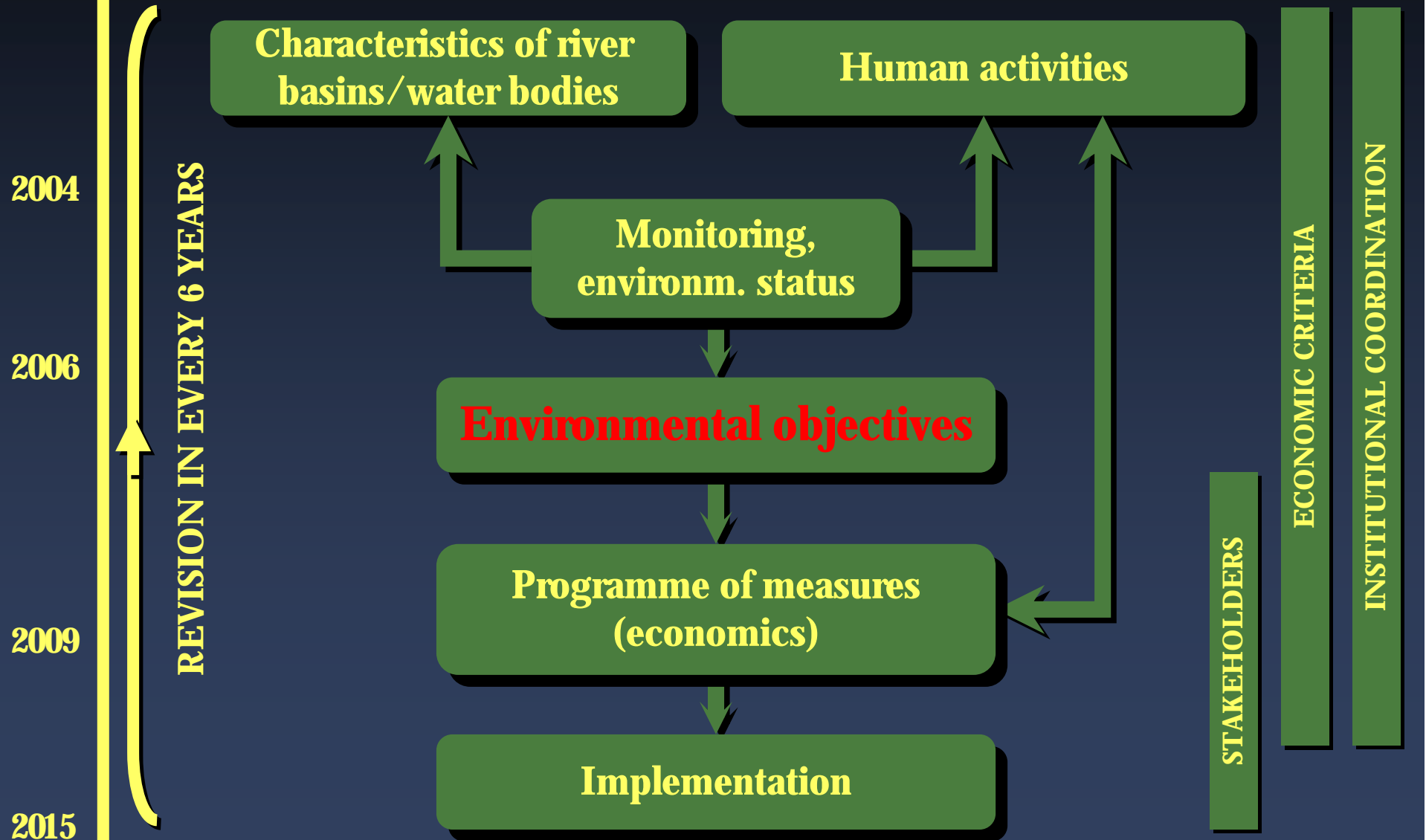
(II) Water Framework Directive

Objectives

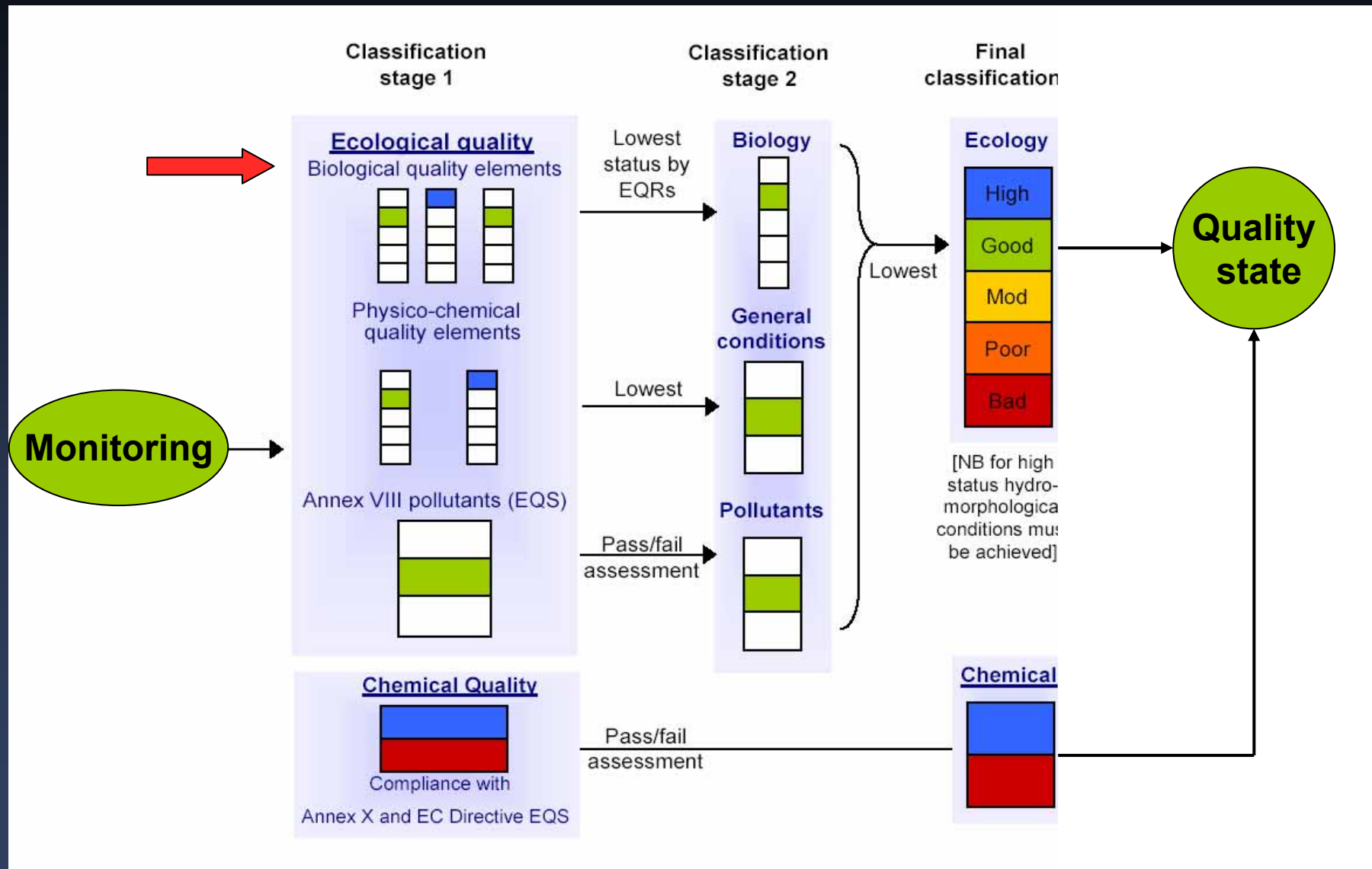
- ☞ To achieve the „good ecological status” of waters for different eco-regions.**
- ☞ Programmes of measures under the condition of full cost recovery and public participation.**
- ☞ Details and the institutional settings are left to countries.**



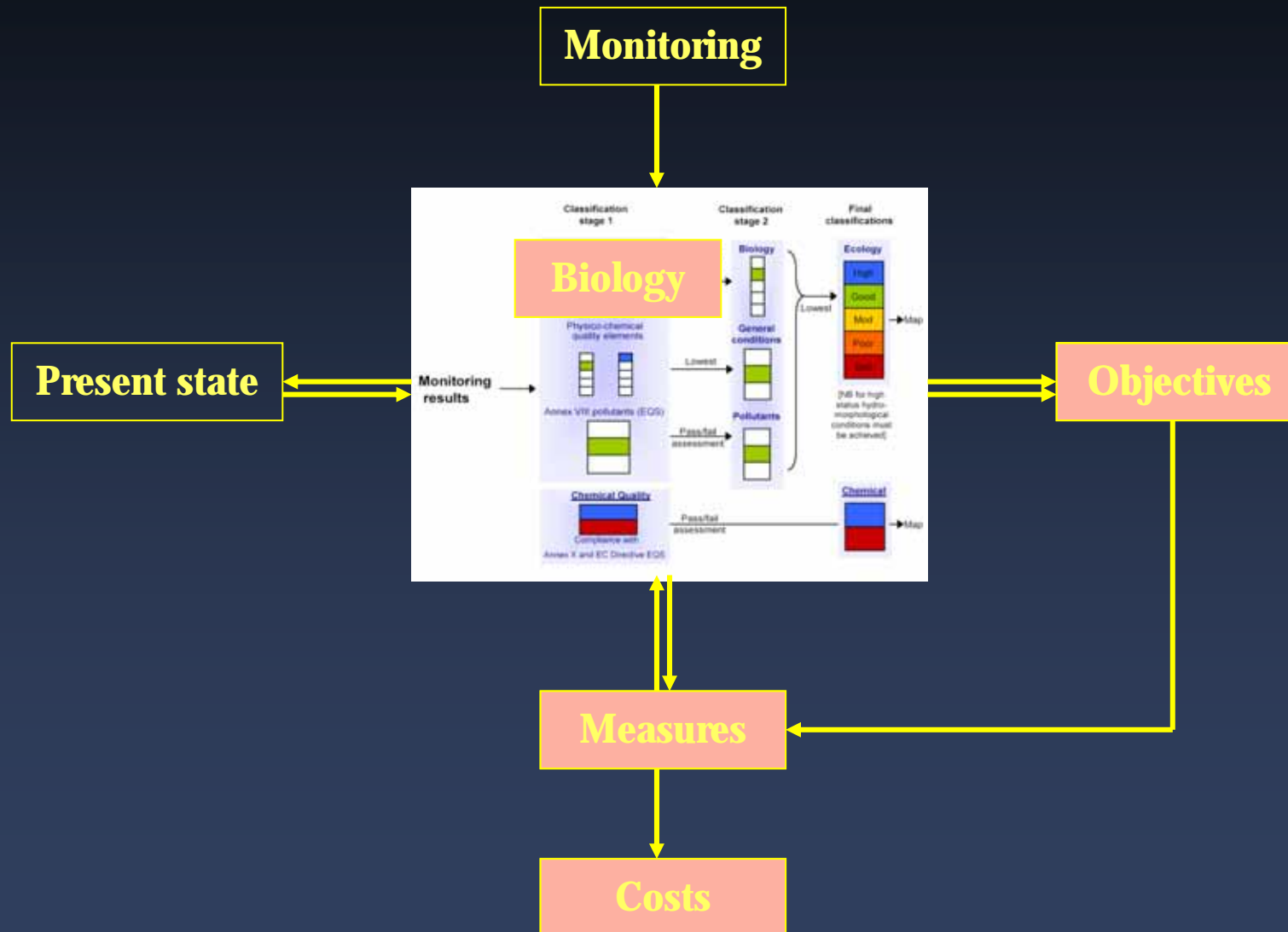
River Basin Management Plan (RBMP)



WFD quality classification

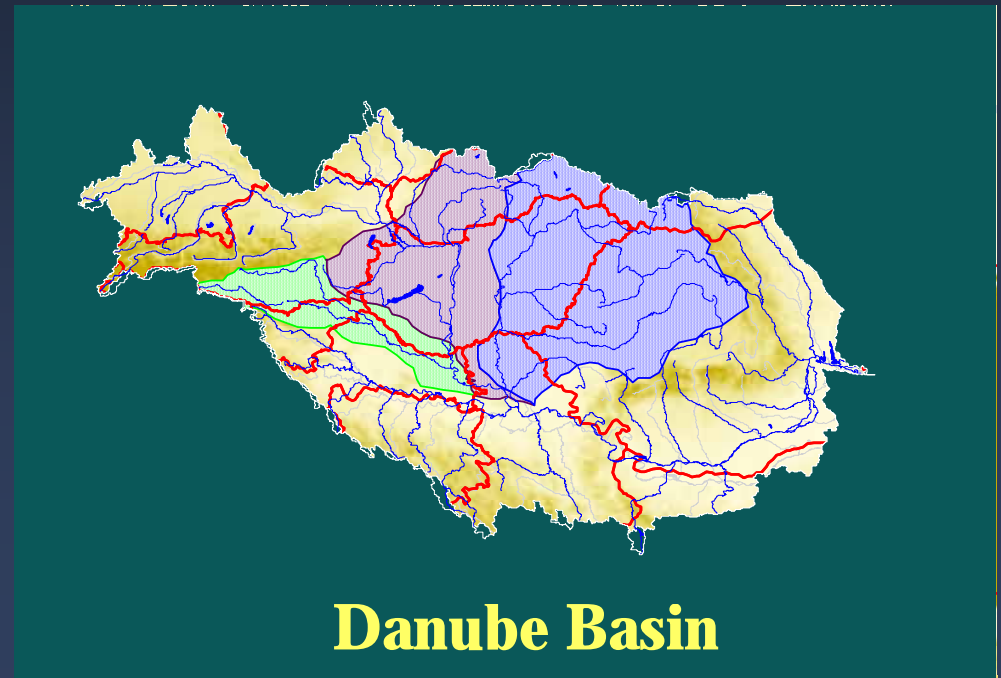
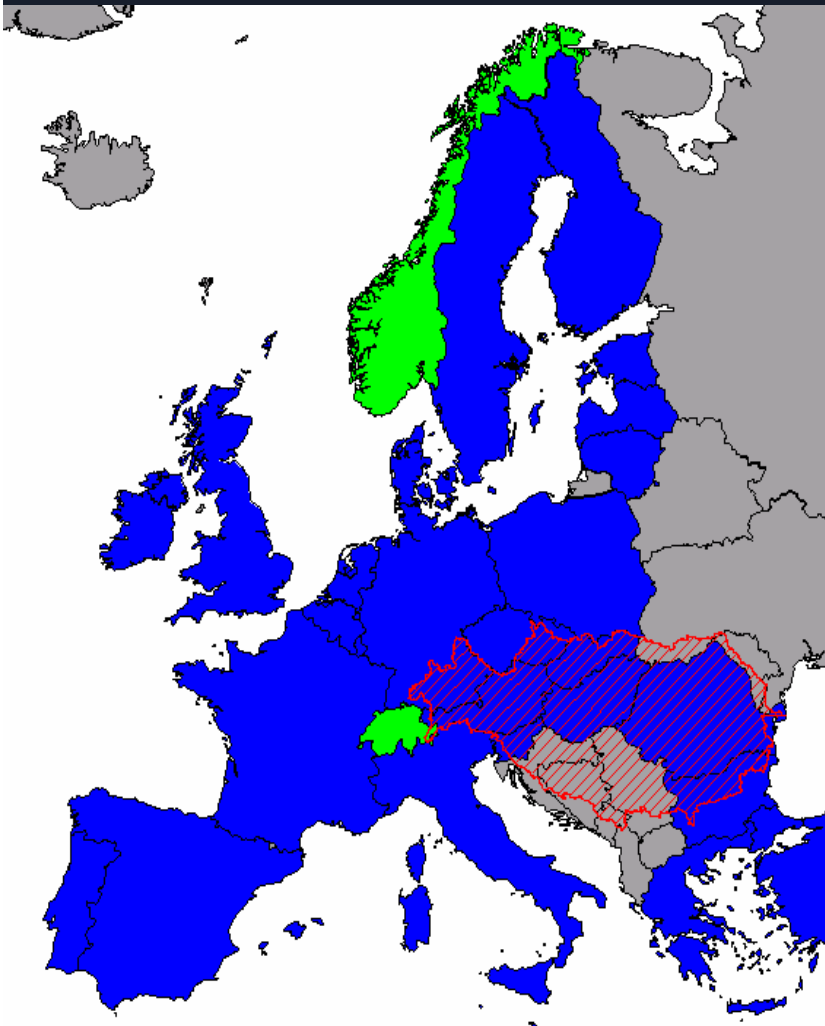


Uncertainties in applying the WFD

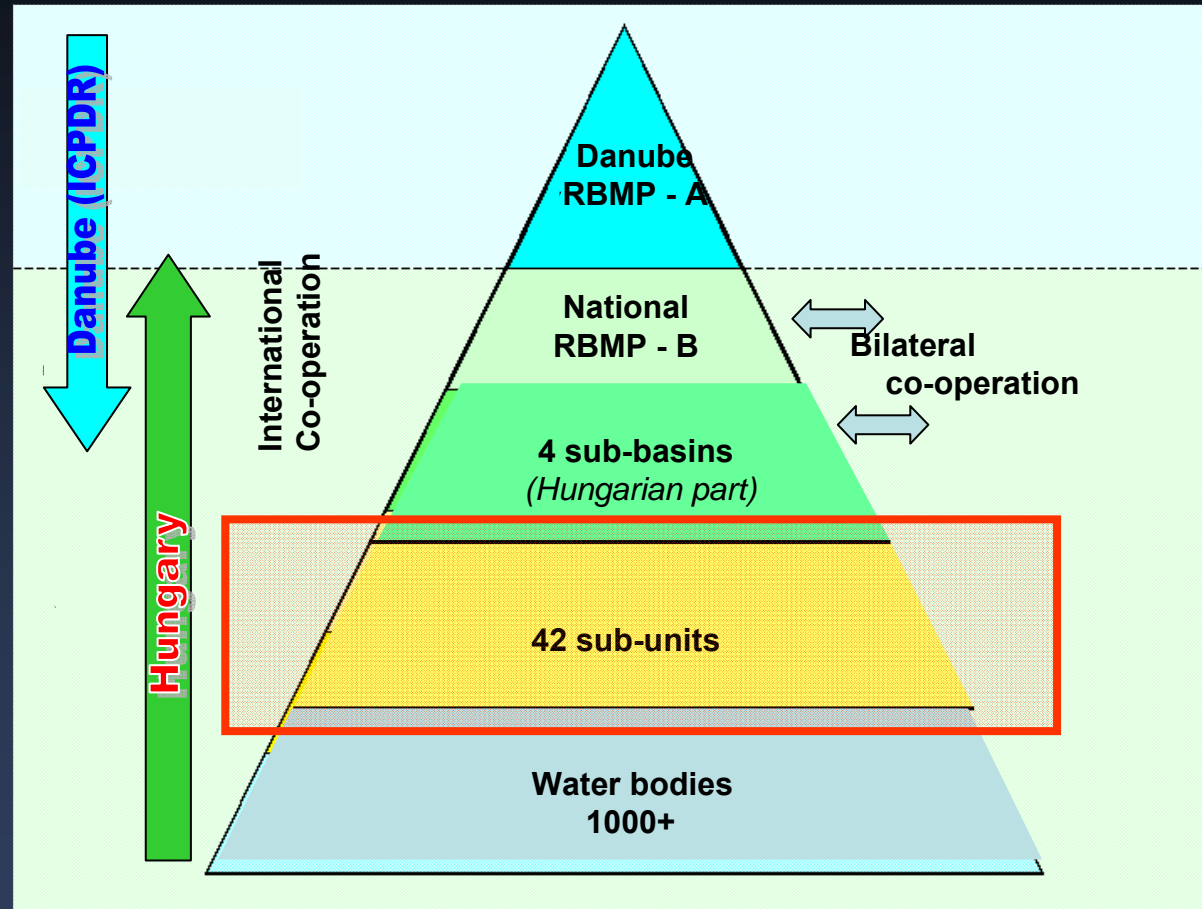


RBMP: Is Integration and Coordination on Different Levels Easy?

- Large river basins (e.g. Danube)
- Sub-basins
- Countries
- Water bodies/planning units



Main structure of RBMP in the Danube basin



Macro-scale,
aggregated

Micro-scale,
many details

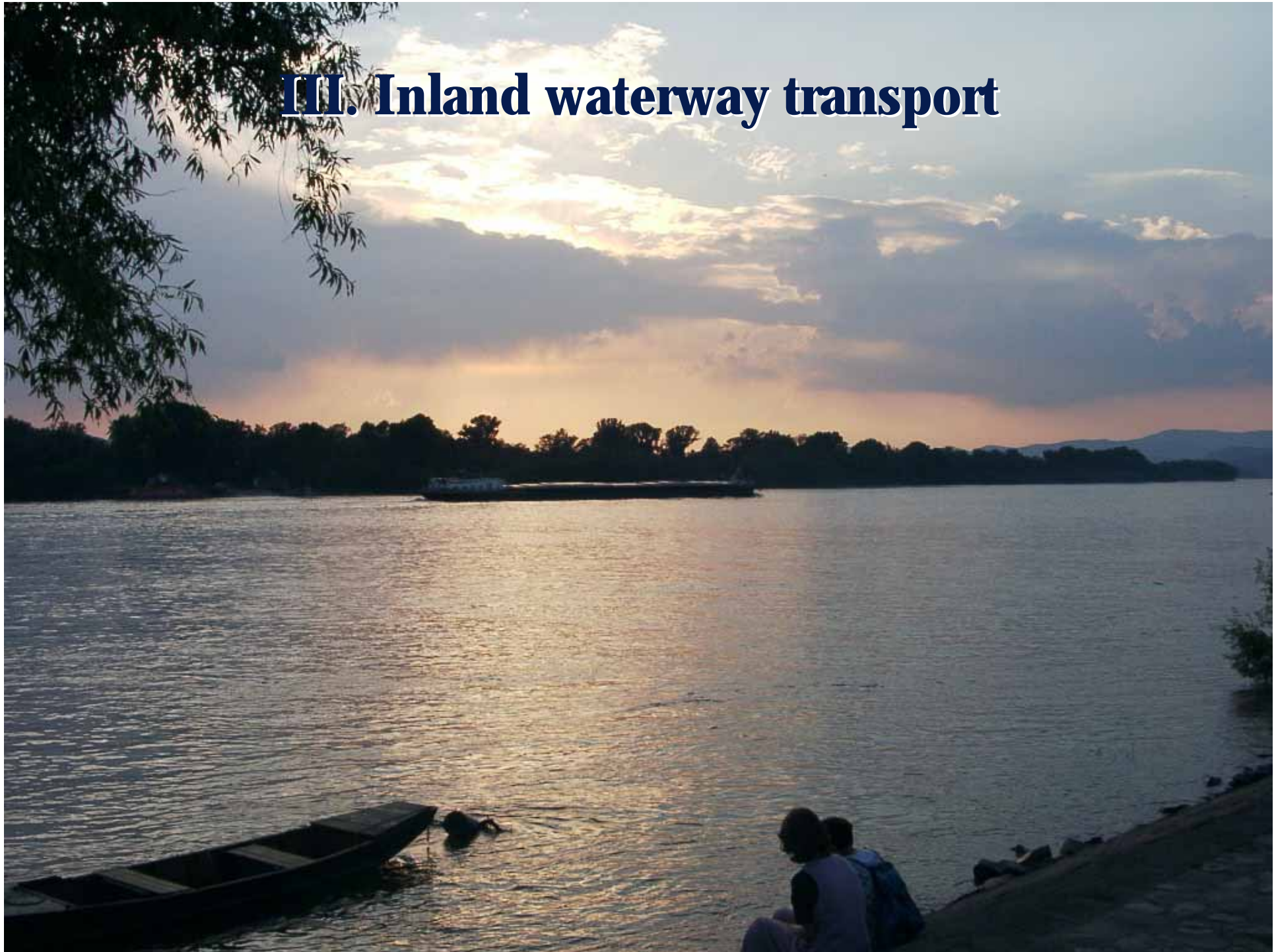
Be as specific as needed and as general as possible.
Iterative process of „top-down” and „bottom up” approach



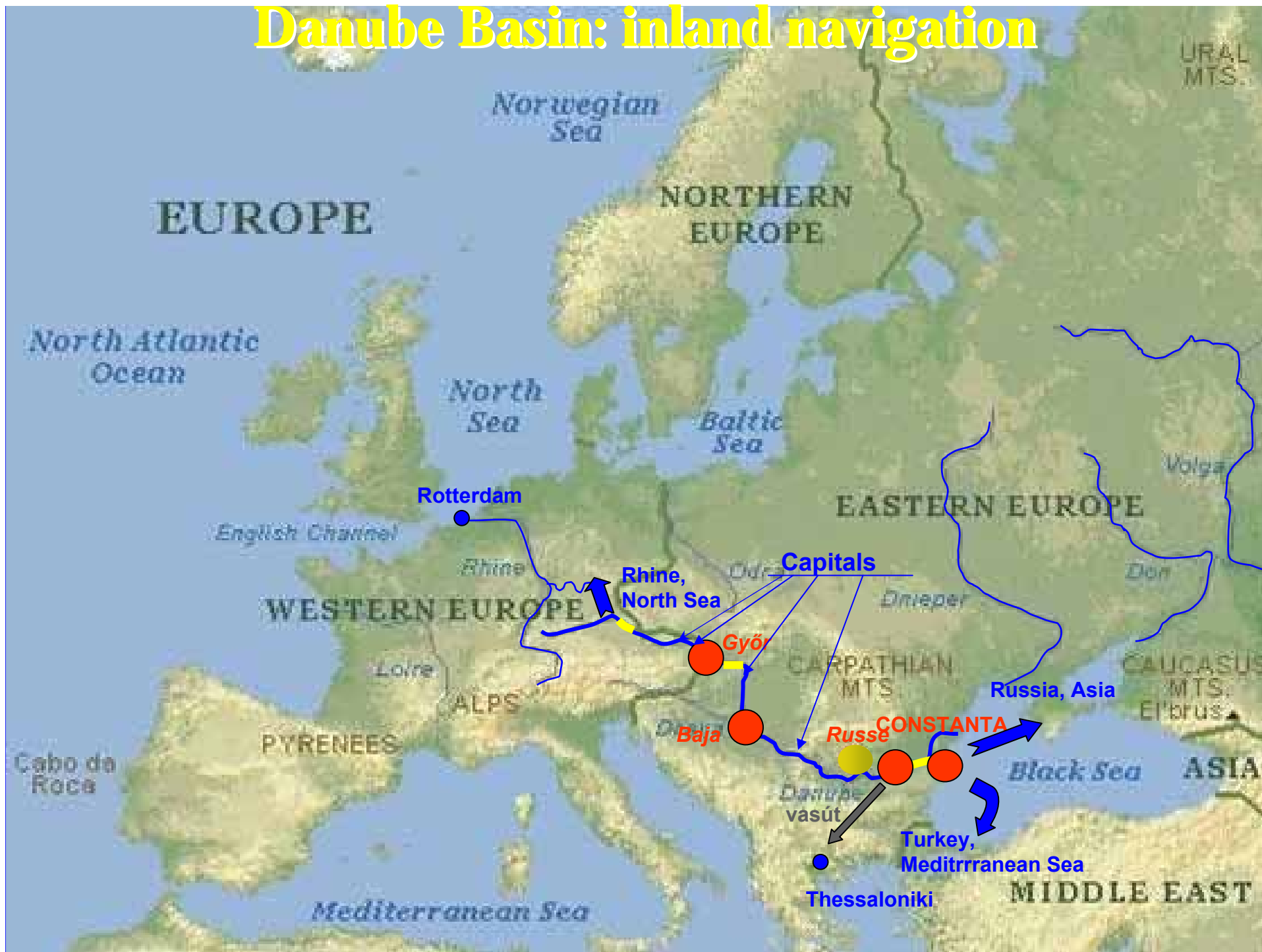
Water Framework Directive Conclusions (II)

- ➡ **Leading concept world wide**
- ➡ **Lack of sufficient amount of monitoring data: biological classification is extremely uncertain**
- ➡ **Measures vs biological state vs costs? Research needs**
- ➡ **Integrating the WFD, the flood directive, draught management, CAP and spatial planning?**
- ➡ **„Blueprint process” of the EC to be completed in 2012**

III. Inland waterway transport



Danube Basin: inland navigation



Danube Basin: inland navigation of the future?

- ➡ **TRANSPORT TYPES: 1. air, 2. road, 3. railway, 4. water, 5. mix**
- ➡ **BOTTLENECKS and competitiveness**
- ➡ **ALTERNATIVES of inland navigation: 1. draught (less than 2.5 m?), 2. one-way navigation and RIS, 3. river regulation, 4. barrage system**
- ➡ **CRITERIA: 1. investment cost, 2. OMR cost, 3. beneficiary countries, 4. burdens vs gains, 5. ecological status and impacts, 6. impacts on hydromorphology, drinking water resources, Natura 2000 and others**
- ➡ **OPEN PLANNING AND POLITICS**



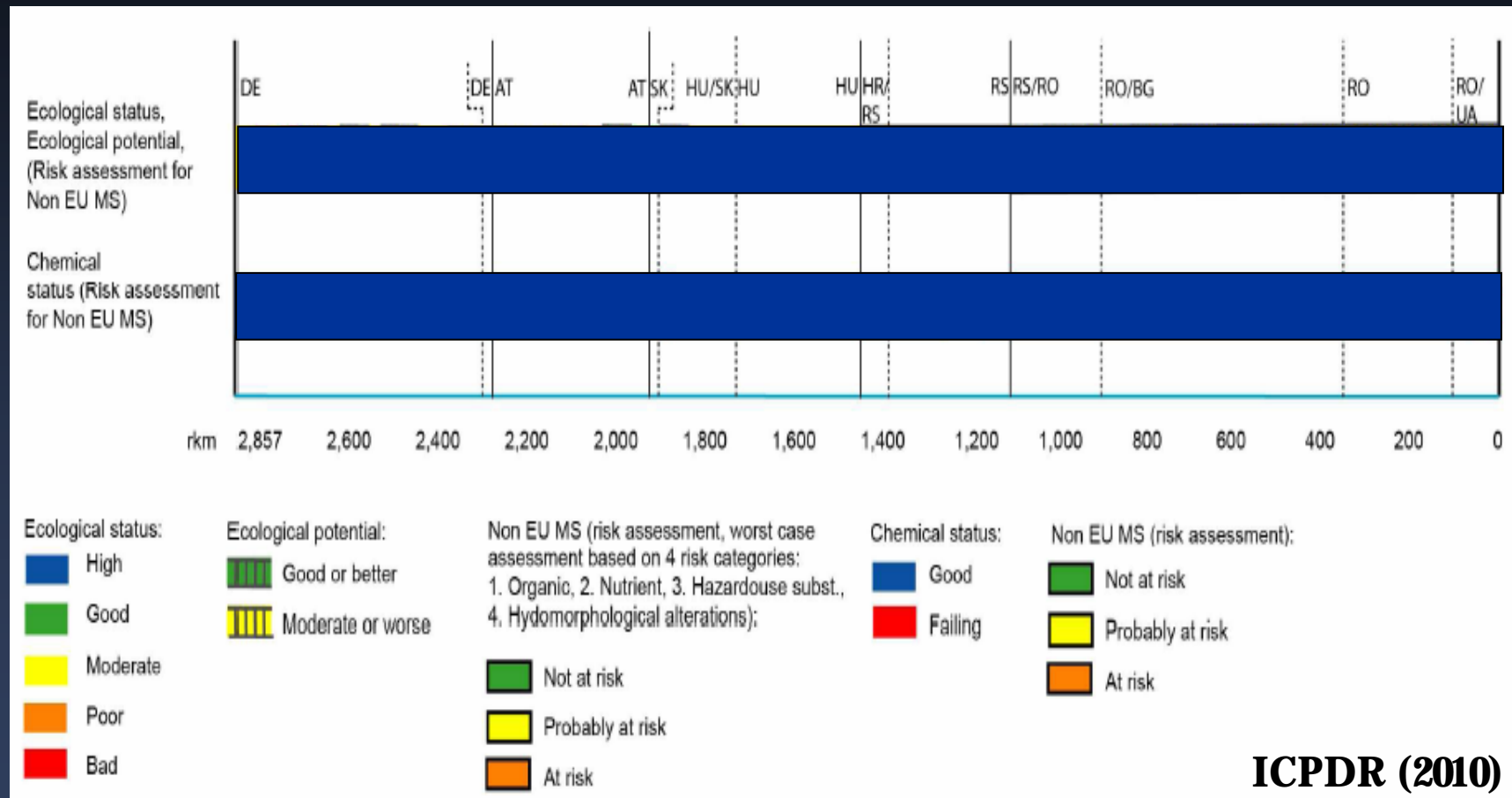
Inland navigation Conclusions (III)



- ➡ **Symbol of creating connections**
- ➡ **Opportunity of the future**
- ➡ **Test of the success of the Danube Region Strategy**

Ecological status: another test

Fractur



„To settle at last our common affairs remain our task and none too small it is”. József Attila: A Dunánál (By the Danube)



**EU Strategy for the
Danube Region**