

# Decreasing water quality hazards of foreign origin – case study and recommendations

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#### **Structure of presentation**



★ Context★ Case study★ Conclusions



### Context

 145 countries are situated in shared catchments
40 countries ratified the Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes
35 countries ratified the Convention on the Law of the Non-navigational uses of Transboundary Watercources

Besides ratifying bi- and multilateral agreements, downstream countries may need some trump cards.





### **Case study**



#### ...that profoundly changes ecological status of the Tisza River (Mean mg Chl *a* m<sup>-3</sup> in summer 1994-2006)

#### +25-30% nutrient concentrations 10 times more Chl

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**TISZA** 247 m<sup>3</sup>s<sup>-1</sup> SOMEŞ 120 m<sup>3</sup>s<sup>-1</sup>

64

#### **Case study objectives**



- Quantify the impact of WFD management measures in the Someş catchment on the ecological status of the Tisza River
- Formulate recommendations for improved River Basin Management Planning

#### Input data

Welly, Manuficantes

#### HYDROLOGIC TREE

- DEM <u>http://gdem.ersdac.jspacesystems.org.jp</u>
- Lakes & reservoirs (coordinates, volumes) Environmental reports
- MEAN HYDROLOGY
  - Physical soil type map <u>http://www.eusoils.jrc.ec.europa.eu</u>
  - Landuse map Corine CLC100, <u>http://www.epa.europa.eu/</u> <u>themes/landuse/interactive/clc-download</u>
  - Meteorology <u>http://www.ncdc.noaa.gov</u>

#### DIFFUSE EMISSION OF NUTRIENTS (NUTS\_5)

#### Input data

	Hungary	Romania
Area & yield of main crops	National Statistical Offices	
Mineral & organic fertilizers	National Statistical Offices	
		Environmental reports
Livestock (type, numbers & farm size)	National Statistical Offices	
	E-PRTR database ( <u>http://prtr.ec.europa.eu</u> )	
	EU WFD compilation	
		Environmental permissions
		Environmental reports
		Catastrophe management plans
		National agricultural portal http://www.agroazi.ro



POINT EMISSION OF NUTRIENTS (NUTS\_5)

	Hungary	Romania
Population	National Statistical Offices	
Administrative borders		http://earth.unibuc.ro
Public water supply	National Statistical Office	Cocean and Göncz, 2012
Sewerage	National Statistical Offices	
		Apele Române, 2009
WWTPs (site, technology, capacity, nutrient removal efficiency & recipient)	E-PRTR database ( <u>http://prtr.ec.europa.eu</u> )	
	National Statistical Office	Environmental reports
	FETIKÖFE	Apele Române, 2009
	http://www.teszir.hu	Catastrophe management plans
		SC Aquabis SA
		Compania de Apa SOMES SA

#### **Data for verification**

- CATCHMENT MAP Apele Române, 2009
  - DISCHARGE Apele Române, 2009; Hydrography Yearbooks (VITUKI)
  - WATER QUALITY (suspended load, forms of P & N, chlorophyll a,
  - phytoplankton composition, etc.)
    - Environmental reports in Romania sporadic data
    - http://www.rivermonitoring.hu
    - National Water Quality Database in Hungary
    - Istvánovics et al., 2010

Biweekly samplings every 20-30 km along the Someş River

#### DATA AVAILABILITY



# The PhosFate model – a GIS based, coupled catchment and water quality model



#### + emission and transport of N + phytoplankton growth

## Main outputs



# Model performance



# RECOMMENDATIONS

• P and N loads must be decreased by 25-30% until 2020-2025

 This can be achieved by applying best available technology (BAT) in large WWTPs and best management practice (BMP) in agriculture.

- Upgrade 9 large WWTPs
- Introduce best agricultural management practice in1% of the catchment to decrease soil erosion
- Establish buffer zones along low order streams where they are edged with arable land
- Stringently control nutrient emissions from industrialized animal farms

#### Present RBMP vs. recommended measures

- RBMP: official river basin management plan (intense sewerage development & moderate development of treatment)
- BAT-BMP: recommended measures



Algal biomass mg Chl m<sup>-3</sup>

Upper Tisza River: -25-30% nutrient concentration, -55% phytoplankton biomass

#### Two additional recommendations (1)



Maintain the nearly natural hydromorphological status potential for a good ecological status

- Rapid algal growth reflects good hydromorphological status
- Variety of aquatic habitats
- Lateral connectivity



#### **Two additional recommendations (2)**



• STOP emission of toxic pollution delivered by the Lapuş River to the Someş!

Toxic pollution is emitted from both point sources (industrial and mining water) and from diffuse sources (mining pits, abandoned mines, tailings).



# Conflict between environmental and economic-political rationality

- To improve the ecological status of the HungarianTisza River (ca. 600 km), the Someş River must be managed.
- Nearly each measure should be realized in Romania
  - Planned measures reflect Romanian interests and would further deteriorate the status of the Tisza River
  - Current RBMP likely needs massive EU funding
  - Our recommendations do not necessarily provide short-term advantage to Romania







# Conclusions

EU WFD §(35): "...where use of water may have transboundary effects, ...all programmes of measures, should be coordinated for the whole of the river basin district." should be turned operative.

- Downstream countries should evaluate the impacts of upstream RBMPs.
- If they feel negatively affected, an independent catchment-scale impact assessment should be initiated at EU level.
- No EU support should be provided for sewerage development without mutual agreement on RBMPs between all concerned parties.









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**European Union** 

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