NUTRIENT MANAGEMENT

Final Seminar UNDP/GEF DRP
21-22 February 2007, Bucharest, Romania

Dr. Mihaela Popovici
Technical Expert Water Management, ICPDR

Structure of Presentation

- MONERIS
- Scenarios for the WFD Program of Measures
- Cost effective management options
- Open issues for discussion

MOdelling Nutrient Emissions in RIver Systems MONERIS

Estimates the nutrient emissions into the DRB by point sources and various diffuse sources

It is based on data of river flow and water quality as well as a GIS, which includes digital maps and extensive statistical information

The model considers the diffuse emissions into surface waters as a sum of different pathways.

MONERIS RESULTS DRB

Nitrogen emission: 687 ktN/year, input via:

- Groundwater -47%
- Point sources – 20%
- Tile drainage – 10 %
- Urban areas – 10%
- Surface runoff – 6%
- Erosion – 4%
- Atmospheric deposition – 3%

Nitrogen emissions: 80% from diffuse sources

(550 ktN/year) of which 24% is background and 45 % from agricultural diffuse sources.

MONERIS RESULTS DRB

Phosphorous emission: 67.8 ktP/year, input via:

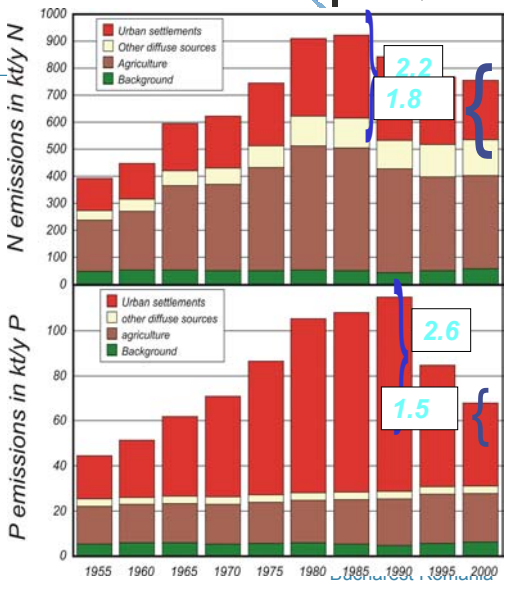
- Erosion – 37%
- Point sources – 35%
- Urban areas –13%
- Groundwater -7%
- Surface runoff –6%
- Atmospheric deposition –1%
- Tile drainage –1%

Phosphorous emissions: 65% from diffuse sources (44.1 ktP/year) of which 8.6% is background and 42.5% from agricultural diffuse sources.

Nutrients in DRB are still an issue despite nearly 2 decades of study and intervention

Results of MONERIS scenarios calculation

- The N and P emissions in the Danube in **1985** and **1990** were 2.2 and, respectively 2.6 times higher than in 1955
- The **present** level of the N and P emissions is 1.8 and, respectively 1.5 times higher than in 1955



What is the challenge for the WFD and Agriculture in the DRB?

Meeting the objectives of the WFD – achieving "good ecological status" by reducing the pressure from agricultural activities identified in Article 5 reports

Dealing with the Context – the diversity of circumstances in the DRB Countries, especially regarding preparation for EU accession and the availability of EU rural development measures

Whilst significant actions have been taken (especially in upper basin) there is **growing threat from regeneration of industry / agriculture and increasing connection to sewer**

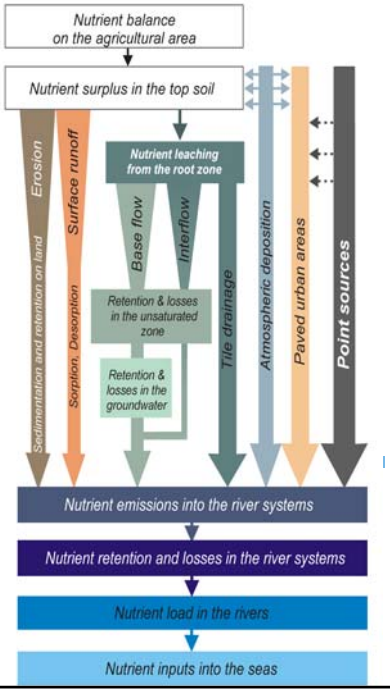
MONERIS decision support and management tool

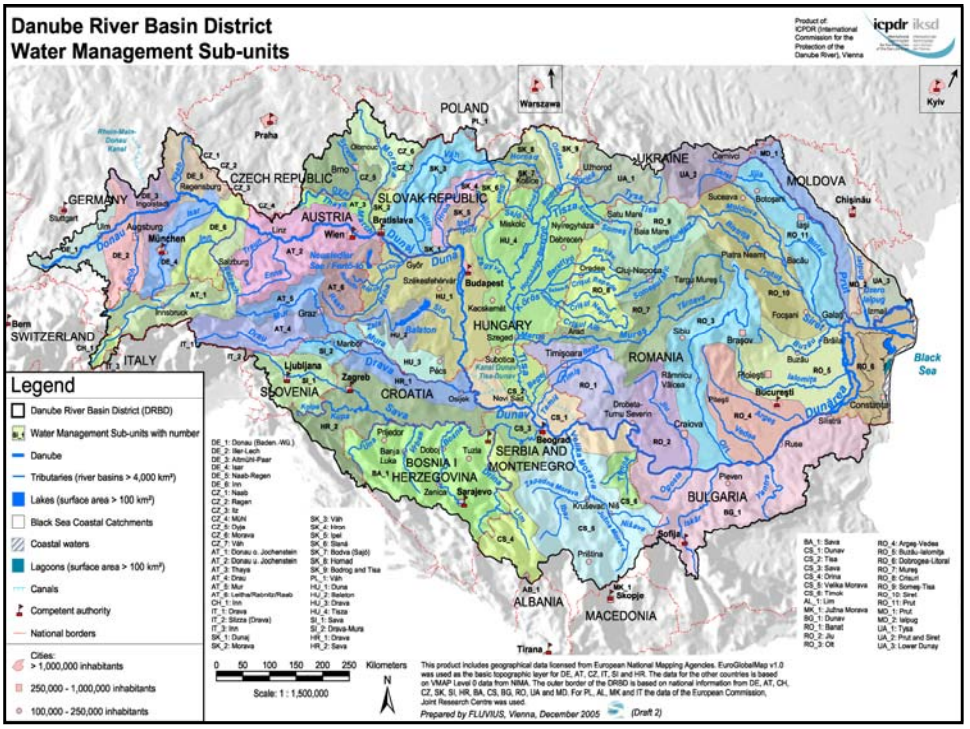
Concept for **integration of data** required by the EU directives for MONERIS calculations

Basin wide overview of point and diffuse pollution sources

Calculation of scenarios for possible changes of nutrients loads within the Danube river systems and into the Black Sea

Evaluation of Program of Measures





DPSIR analytical framework for pressure and impact analysis

icpdr iksd

Driving force
e.g: Population growth

Pressure
e.g:Sewage discharge

State
e.g: Increased nutrients

Impact
e.g: Algal and plant growth

Response
e.g: Control of discharge

Bucharest Romania

Main sources of nutrient pollution in the DRB

1. Agricultural activities
2. Inadequate WWT
3. P-free detergents

1 Agricultural activities

- Best Agricultural Practices
- Advisory services
- Investments

2 Implementation of UWWTD

- Only N/P removal above 10,000 p.e.
- What about under this value?
- Percentage of population connected in <10000 p.e.
- Cost and time issues associated with investments
- On-going threat to Black Sea

3 P- Free Detergents

Detergents offer quick, low cost solution for Governments

Need to have P-free, if benefits from UWWTD are not reduced

What is the most cost effective measure or combination of measures

Issues of concern

Cost effective – how to achieve mid-1990s level problem?

Even if countries implement directives will this reduce levels of N/P to acceptable levels?

Sensitive areas require more stringent treatment e.g. the removal of N and/or P, microbiological treatment.

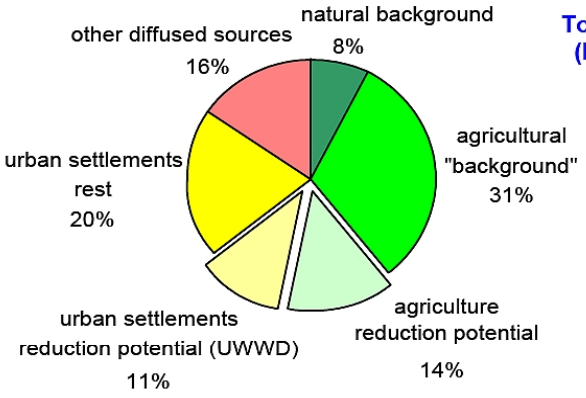
Need to go further than directives (WFD offers best legislative instrument for encouraging more than UWWTD or Nitrates Directive.)

WFD Approach on the selection of measures

- ⇨ BASIC MEASURES:
  - ⇨ minimum set of obligatory measures
  - ⇨ WFD Art. 11/3 and Annex VI part A
    - ➢ UWWT-Directive
    - ➢ Nitrates Directive incl. Action Programme etc.
- ⇨ SUPPLEMENTARY MEASURES:
  - ⇨ set of additional measures to reach the environmental objectives
  - ⇨ WFD Art. 11/4 and Annex VI part B
    - ➢ Legislative, administrative, economic instruments
    - ➢ educational projects, research etc.

Supplementary Measures / potential for reduction N

potential of reducing N-Emissions

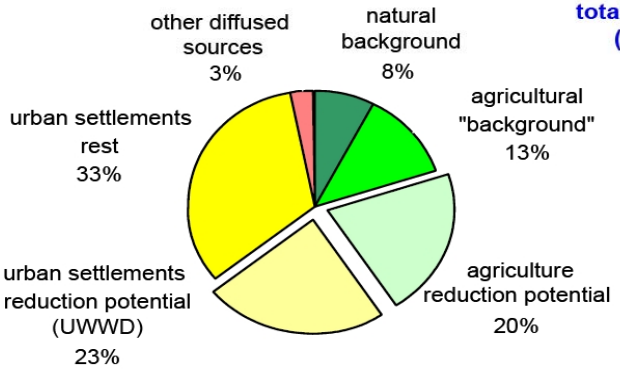


Total N-emissions about 700 kt/a (N to Black Sea 420 kt/a (60%))

- hardly to be reduced
- can be reduced during next 10 years
- can be reduced and increased with a delay of ≥ 10 years between implementation and response

Supplementary Measures / potential for reduction P

potential of reducing P-Emissions



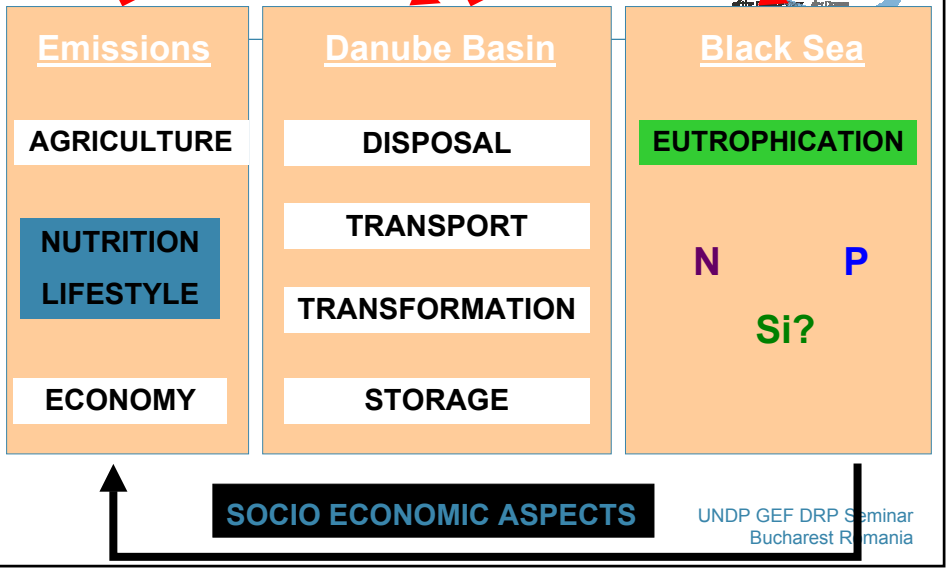
total P-emissions about 70 kt/a (P to Black Sea 20 kt/a + P in Iron Gate 8 kt/a)

- hardly to be reduced
- can be reduced during next 10 years
- can be reduced

Scenarios development

- daNUbs and MONERIS
- Broad range of expertise
- Scenarios data collection and assessment by countries
- Scenarios – these are needed to utilise MONERIS and to link with PoM priorities.
- Need to discuss how this will be developed –DRP 'expert' meeting on Nutrients in March 2007

daNUbs and MONERIS CONCEPT



Nutrient management options

Cost-effective **collective nutrient management** options – a specific **longer-term scenario** where countries working together may achieve a nutrient reduction for less collective cost than all countries working independently

An empirical example of the political goal of achieving 50% nutrient reduction in the Baltic Sea

	Costs (mill EUR)	Reduction in %	Costs (mill EUR)	Reduction in %
Sweden	171	42	213	50
Germany	58	15	4,816	50
Poland	358	59	124	50
Estonia	47	54	34	50
Latvia	147	66	29	50
TOTAL (all Baltic Sea countries)	1,328	50	5,711	50

The costs of joint action *vs.* unilateral action → joint action leads to lower overall costs (cost-effective solution!)

Results of a study by Gren et al. (1997): *Cost-effective Nutrient Reductions to the Baltic Sea*.

Open issues for discussion

Data collection and assessment

Scenarios development

Cost-effective measures or combination of measures for nutrient management

Funding of the work

Thank you!

UNDP GEF DRP Seminar
Bucharest Romania

Basic data

1. Forecast of development up to 2015 for integrated water bodies
2. Review of main water management problems
3. Assessment of risk of failure of reaching the environmental objectives by 2015

Local data

1.Development strategies and operational programs (for regions, districts and communes)

2.Sectorial programs (national, regional local),

3.Land development plans (for region, district, communes)

4.Studies and trends of land development

5.Programs of environmental protection (for regions, districts, communes)

Examples of assumptions (1)

Some examples of assumptions

- To reach the UWWTD until 2015 and P removal in wastewaters treatment plants,
- To increase efficiency up to 80% of individual treatment systems having an adverse impact on the environment,
- Stable level of industry wastewater discharges – the increase of discharges would be compensated by the progress in production processes,
- To implement BAP

Examples (2)

As a base of development forecast to 2015

In urban management:

- Increase of population connection to water supply and sewage systems

In agriculture:

- Decrease of 5% arable land area;
- increase of 10 % number of cattle in the farms;
- increase of 15 % mineral fertilizer consumption

In industry:

- Increase of water and wastewater management;
- Stability in water consumptions for industrial needs;
- Increase of plants with own wastewater treatment plant;
- For existing industrial wastewater treatment plants – decrease of pollution loads in treated wastewaters by increasing the degree of treatment;
- Decrease of load discharged in currently non-treated wastewaters by 50%