DHI

WATER & ENVIRONMENT

DHI Water & Environment

- DHI is an independent, self-governing research and consultancy organisation (non-profit)
- DHI builds competence and promotes technological development relevant to the water and the environment
- DHI has ongoing activities world-wide
- DHI has a total staff of about 440

DHI - Worldwide

DHI's Mission

- *We transform knowledge of water into value for customers and welfare for the global community*
- *We provide solutions by applying and integrating core competencies within a management and societal context*

DHI Software Products

Modelling the World of Water

WFD about modelling

Based on monitoring and

assessment of anthropogenic stresses

River Basin District Authorities

shall frequently update

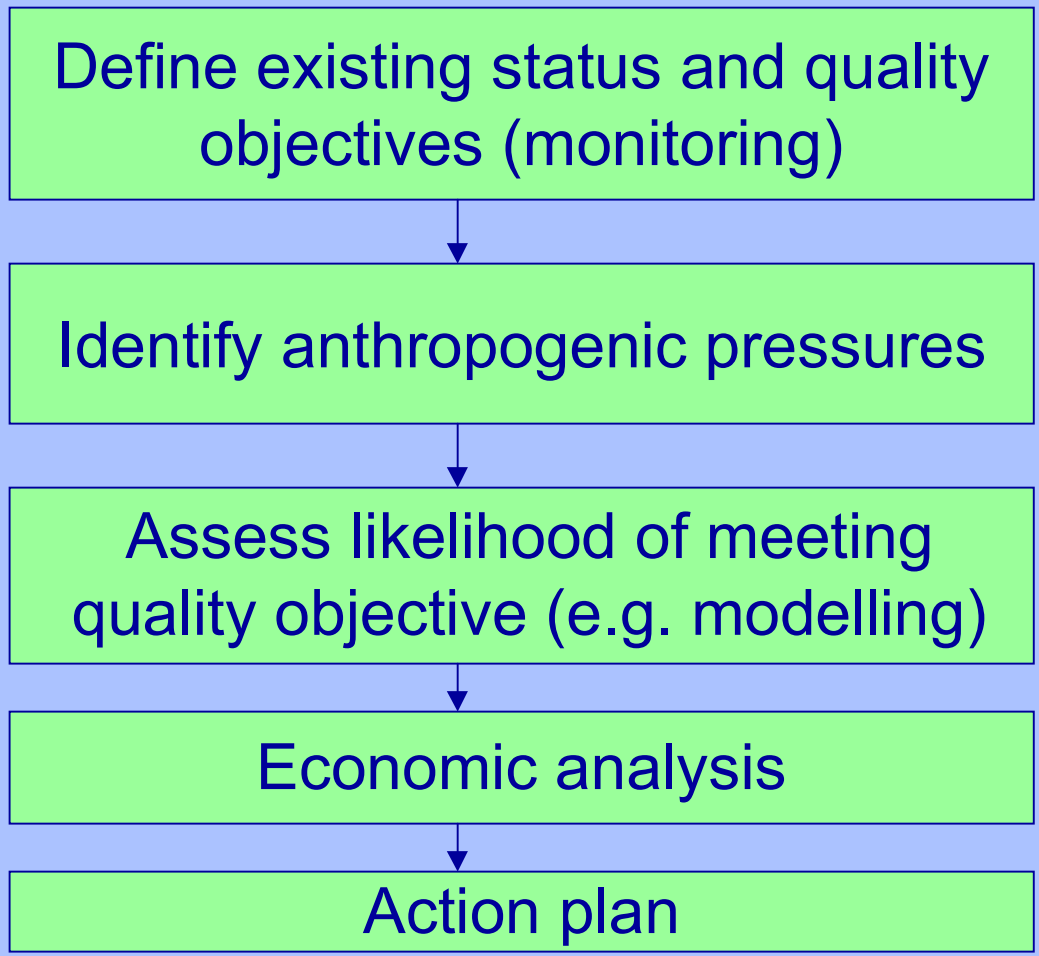
River Basin Management Plans

to ascertain accomplishment of quality criteria and objectives

For quantification of measures

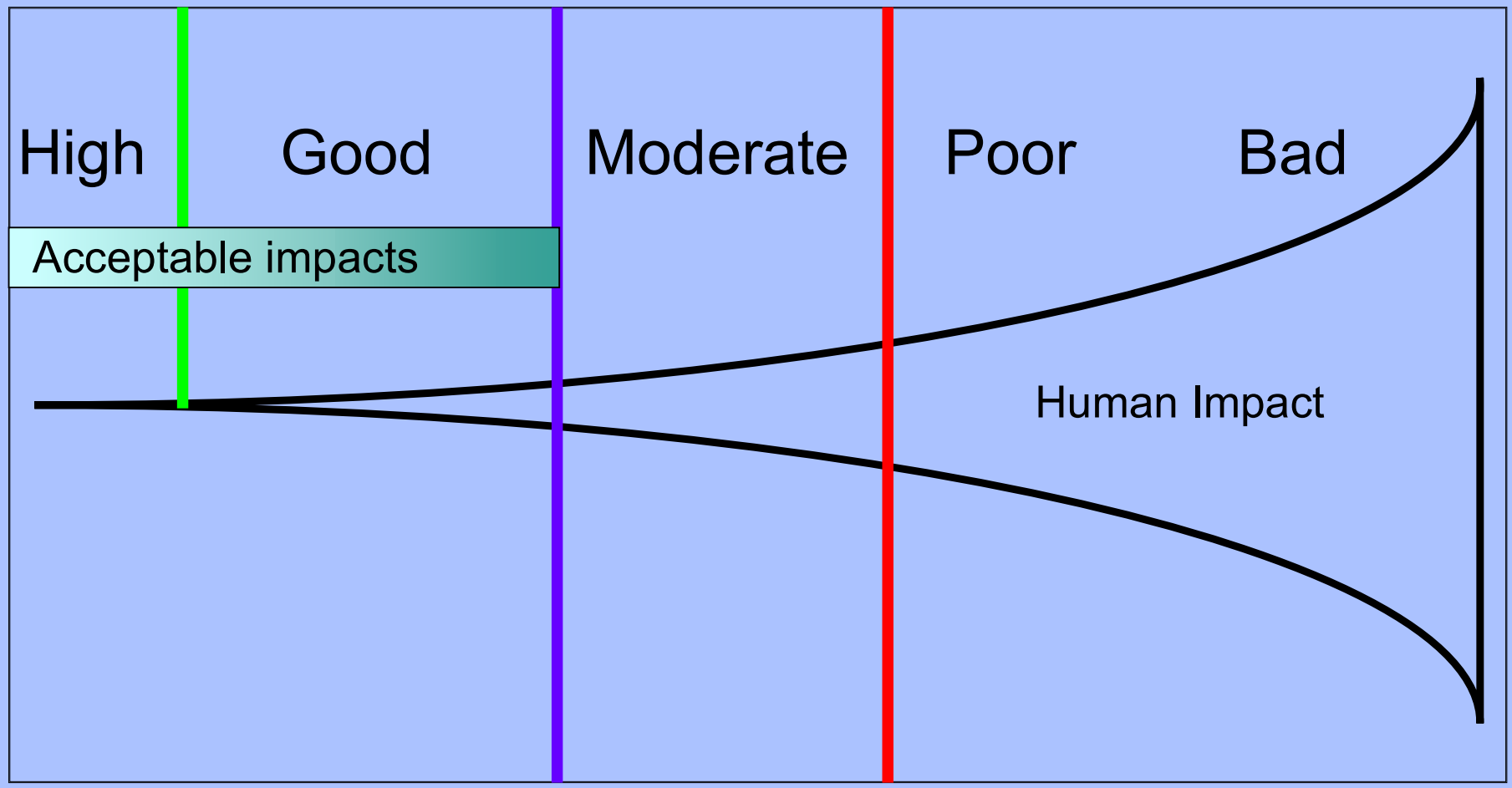
mathematical modelling is recommended

WFD - preparation of action plans



Classes of ecological status

Water Framework Directive



Definition of ecological status

Example: Fish fauna

High status:

- Species composition and abundance: almost undisturbed.
- All the type-specific sensitive species are present.
- Age structures: little disturbance; no reproduction failure.

Good status:

- Species composition: …slight changes…
- Age structures: ..signs of disturbance.. some classes missing

Moderate status:

- Species composition: …differs moderately…
- Age structures: ... major signs of disturbance... moderate proportion absent

How to apply WFD

MAKE IT OPERATIONAL!

Translate biological quality objectives

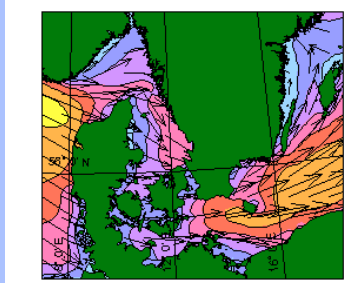
into

physical and chemical quality objectives

and

relate it to loading and other anthropogenic pressures

MODELLING IS A POWERFUL TOOL!



WFD - how to use models

Models are mentioned in the WFD as tools to help attaining e.g. "**Good Ecological Status**" through:

- Identification of reference situation/status
- Calculation of the present load
- Evaluation of effect of anthropogenic stresses
- Scenarios for future loads
- Ranking of impacts from point sources
- Prioritisation of investments
- Inter-linked surface and ground water studies

Example of model use - Poland

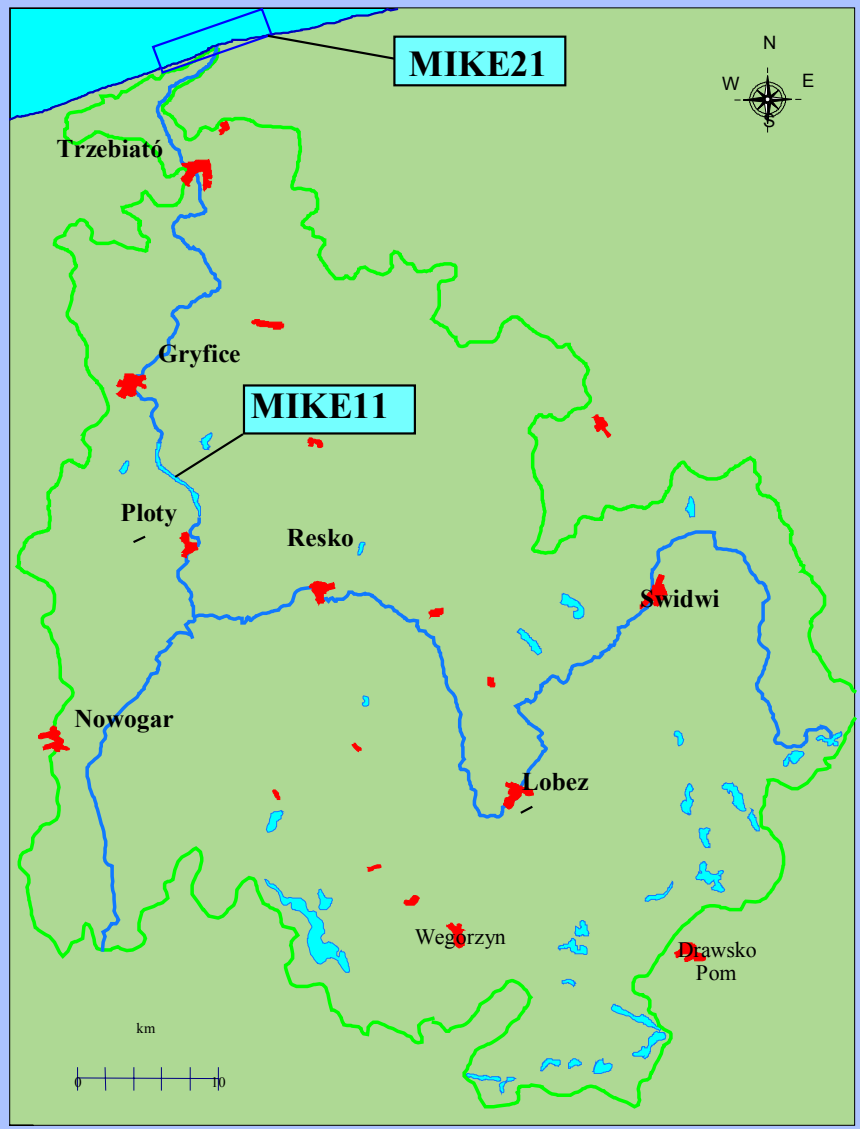
Rega River,

Poland

Linked models:

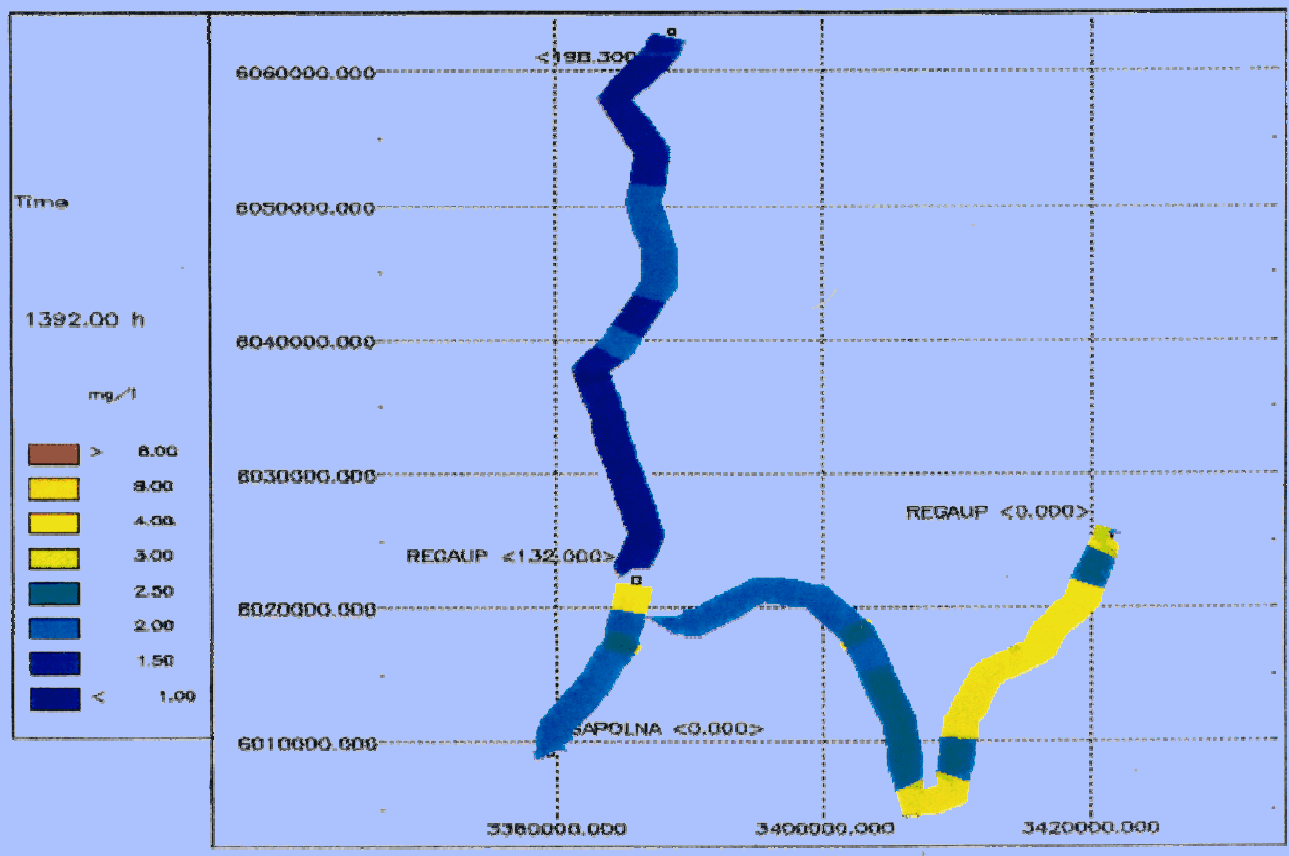
MIKE 11 - river

MIKE 21 - coast



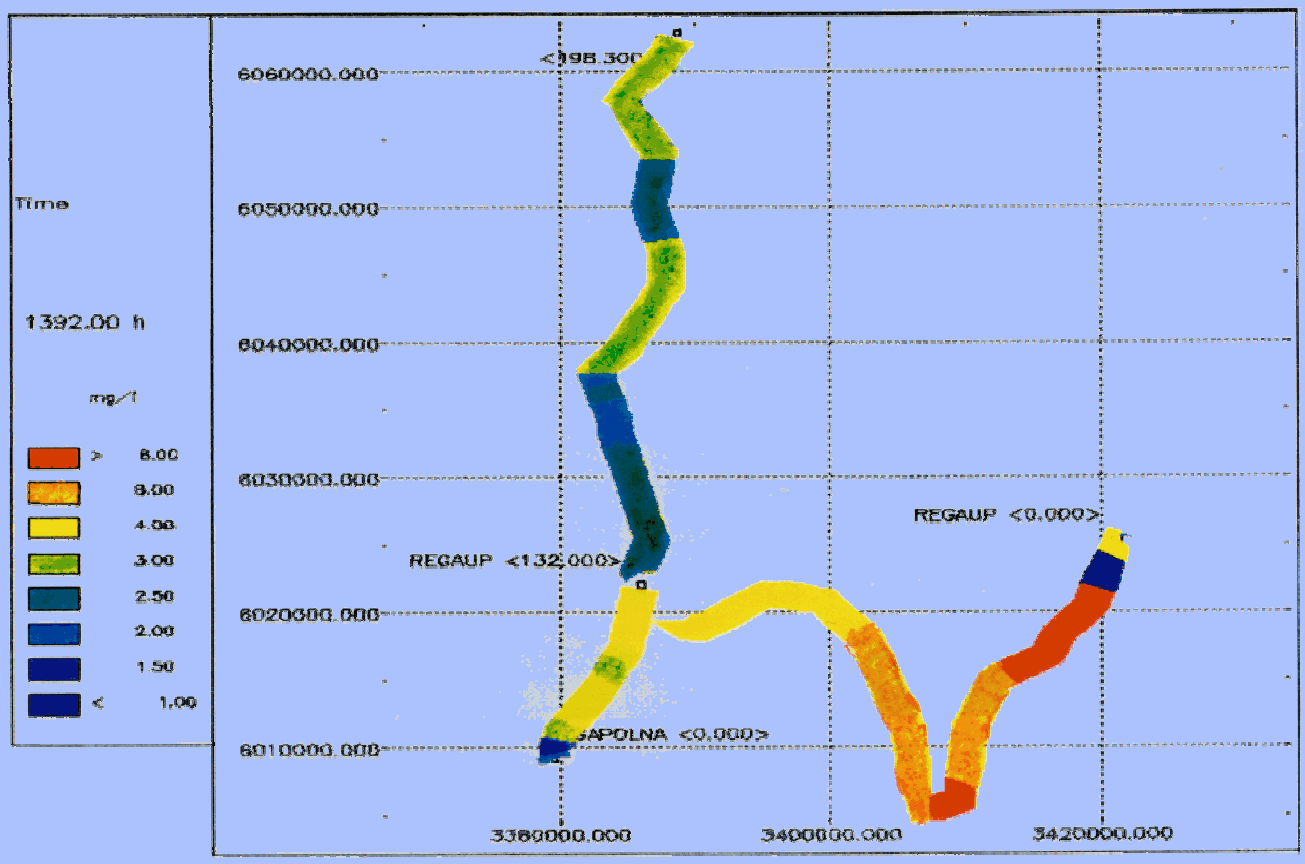
Existing situation: dissolved oxygen

Rega River - without load reduction



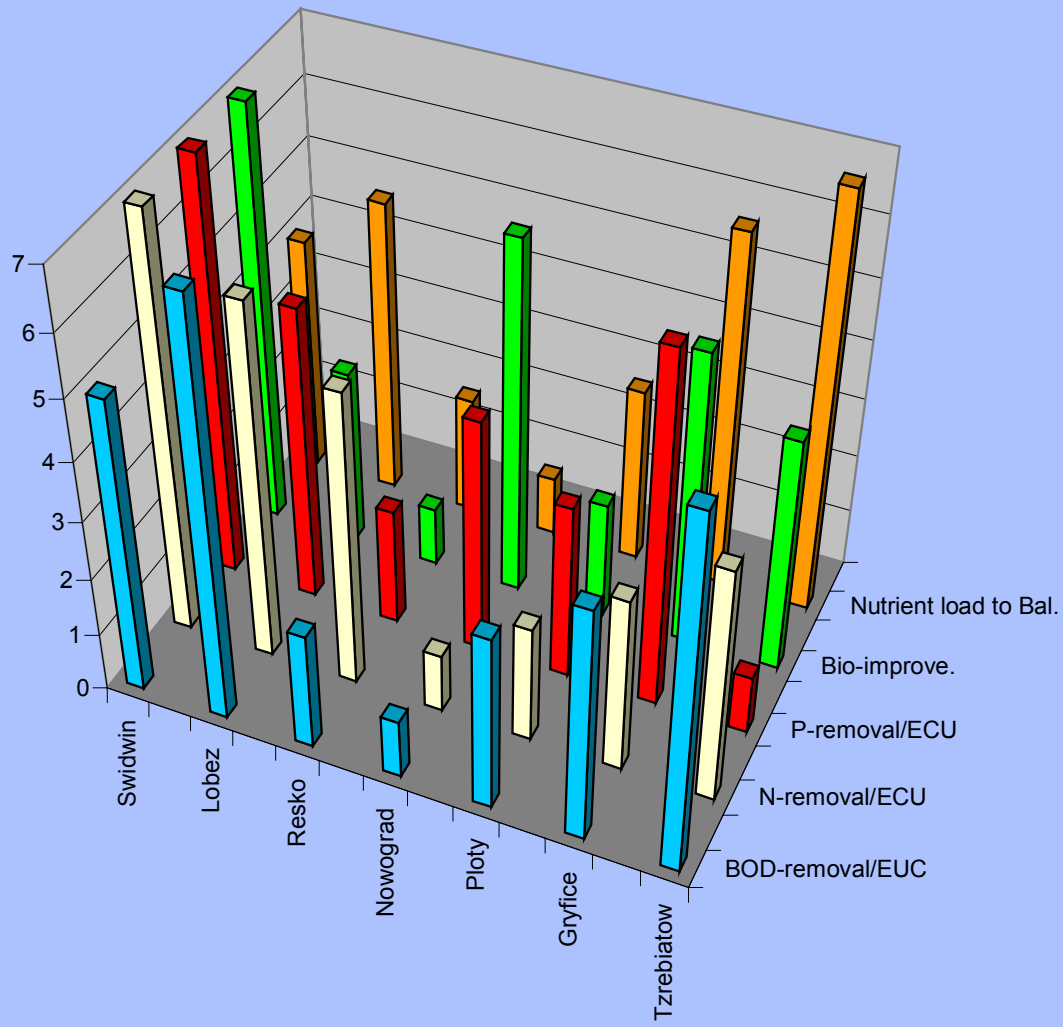
Future scenario: dissolved oxygen

Rega River - with load reduction (at all sources)



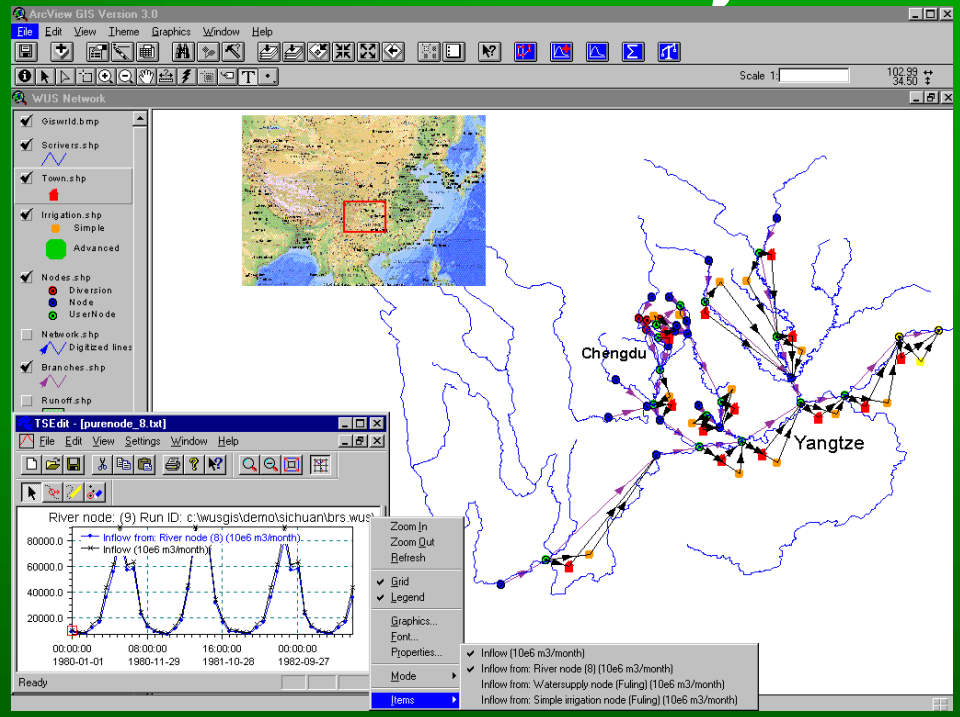
Comparison of efficiency

Rega River - Prioritisation



MIKE BASIN

- a basin-wide representation of the entire river system



Water availability

Domestic - industry

Irrigation - hydropower

Env. req. - waste water

Infrastructure

Diversion - reservoirs

Wells - treatment plants

Multisectoral demands

Domestic - industry

Irrigation - hydropower

Env. req. - waste water

Regulations

Water rights

Priority uses

Standards

Economy

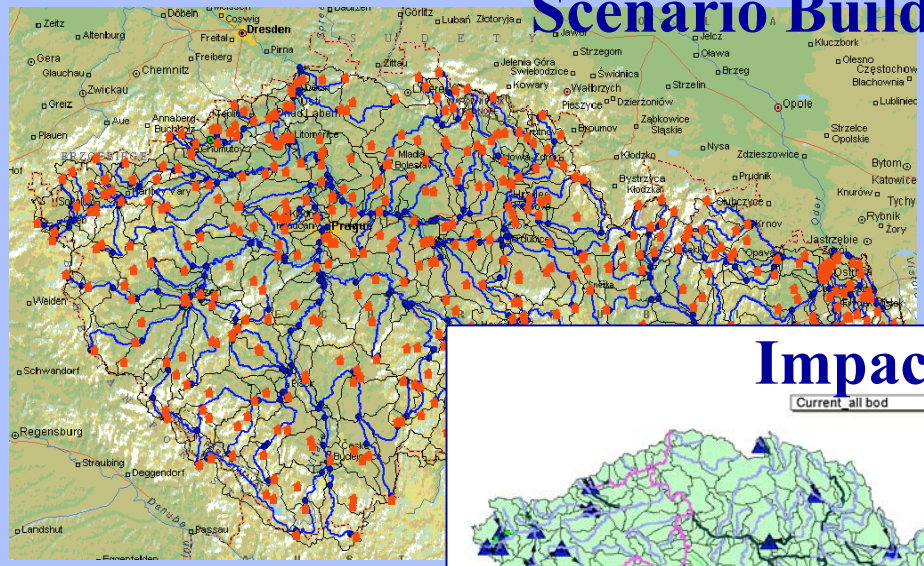
Supply costs

Env. cost

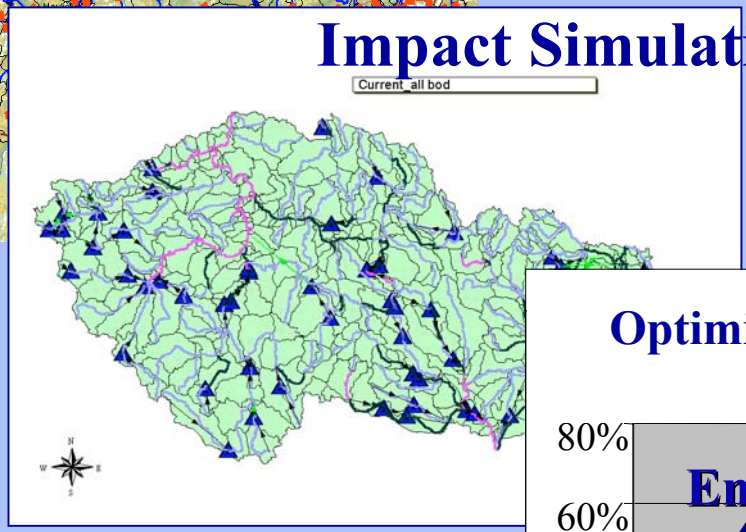
Economic value

Czech Rep: Wastewater treatment

Scenario Building



Impact Simulation



Optimising Infrastructure Investment

WFD - the challenges in modelling

- Habitat modelling
  From physico/chemical conditions to environmental conditions?
- Simulation under uncertainty
  How to deal with it technically and how to convey the results?
- Participatory approaches
  How to simplify and/or stabilize decision support tools for use by stakeholders or in workshops (games)?
- Better scenario evaluation
  How to assess environmental and social values?