Workshop: DSS in the Euro-limpacs project

Stakeholder and endusers requirements for DSS in water management

Lessons from the Elbe-DSS

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The Elbe River Catchment

[Map of the Elbe River Catchment area with labeled regions and the North Sea.]
Existing research results in Elbe-Ecology program

Quelle: Wendland & Kunkel 2000
Lots of results in „singular“ methods

MONERIS
(Behrendt et al. 2004)
Lots of results in „singular“ databases
Aim of the Pilot-DSS for the Elbe

- accessible for practical use -

Sectoral research models + methods

Integration - accessible for practical use -
management-context

EU-WFD

- management-plans, pollutant loads, quality criteria of river morphology

New philosophy by EU in funding agriculture

- „cross-compliance“

Flood prevention

- Estimation of effects of dike shifting/ polders
- Support on planning when reconstructing dikes
management-context

Concepts for running the waterways
⇒ Improving navigability regarding ecological aspects

Land use planing in the floodplains
⇒ Dike relocation
⇒ Ecological oriented development of the river and the floodplain (UNESCO Biosphere reservations)

etc. ...

“⇒ ∑ Integrated river basin management”
Stakeholder/players

**Federal**
- Federal Ministries (Transport & Infrastructure, Environment, Agriculture)
- Federal Waterways and Shipping Directorates (WSV)
- Federal Institute of Hydrology (BfG)
- Federal Waterways Engineering and Research Institute (BAW)
- Federal Environmental Agency (UBA)

**Länder**
- Ministries of the Länder in the catchment area
- Administration for nature prevention, envirnom. affairs
- Administration for agriculture
- Administration for economy
- ..... Laender working group Elbe (ARGE-Elbe)
- river basin cooperation according to EU-WFD
- Biosphere Reservations

**communal**
- Dresden
- Magdeburg
- Stendal
- Tangermünde
- Jerichower Land
- Prignitz
- ..... Water management associations and authorities

**NGOs for the environment**
- BUND
- NABU
- WWF
- .....
Like this?
or this?
The dynamic + interactive context

System
- physical
- ecological
- sozio-
  economical
- institutional
  (system)

External impact
(external Szenarios)

resulting status of
the system
(indicators)

management options
(measures)

DSS user

aimed status
of the system
(management objective)

Elbe DSS
models and data (overview)

Catchment: precipitation/runoff nutrient transport and water balance models, bilance approach

Different types of landuse

Habitat/biotypes models (biotopes, species)

Pollution: point sources treatment plant data

Diffuse sources: N/P water budget balances

Flood prevention hydrology/hydraulic models

Hydrology

Water quality

Morphodynamics

Hydroengineering measures

Foto: Ilona Leyer
models and data (overview)

Catchment: precipitation/runoff **HBV, climate data**
- nutrient transport and water balance models, bilance approach **MONERIS**

Different types of landuse **CORINE, soil data**

- Habitat/biotypes models
  - (biotopes, species)
  - **Canoco, Mover** (rule based)

Navigation model

- flood prevention hydrology/hydraulic models
  - **HBV, HEC6, ELBA**, damage functions, DEM, cross sections

Diffuse sources: N/P water budget balances **MONERIS**

Pollution: point sources **GREAT-ER**
- treatm. Plant data

Hydrology **HEC6, ELBA**

- water quality **GREAT-ER**

- hydroengineering measures **HEC6, roughnessparam., TIMOR, Habitatmodel MZB**

Morphodynamics **Sobek**

**Foto: Ilona Leyer**
Scales and system diagram

Catchment module
- Catchment characteristics
- discharge
- Substance loads

river network module
- characteristics of river network
- water flow
- water quality

Main channel module
- characteristics of main channel
- hydraulics
- flood risk
- Water quality
- Ecology

Floodplain module
- floodplain hydraulics
- floodplain characteristics
- flood risk
- Ecology

External scenarios
Management objectives
Measures
functions of the recent DSS functionalities

⇒ showing cause-effect relations

⇒ „sensitivity analysis“ of management options

⇒ tool to prepare decisions on **strategic** level and scale:

  „which Option is better/worse?“

  „**how much is option a or b better / worse?**“ = **restricted**

⇒ „**Discussion**“ support (even to the public!)
operational level in the recent version

Decision Pyramid (after Loucks, 1995).
System architecture

- **Domain-specific research model** detailed
- **Integral policy-model** complete

1. **Access to loose & distributed models**
   - Internet

2. **Coupled models in a single system**

3. **Reformulation of existing models into 1 systems model**

4. **Systems model with access to detailed sub-models**

- **PC application for Windows NT, 2000, XP**
  (min. 256 MB, better > 512 MB)

- **Access via kontext-sensitive user interface**

- **No licences required**

- **No special IT-knowledge required**
State of the Project „Elbe-DSS“

• Pilot-DSS is available via internet and ready „to play with“

• Potential users like the idea and the functionalities, but cautious to really use it in daily practice

• Trust has to be improved by really using it …

• Elbe-DSS-development of the last 3-4 years = successful …. ?
  → now testphase!
  – exercises in coop. with administrations/NGO in their office
  – Examples of daily management tasks
  – learning and getting used to such a system

• English demo in summer available
Typical problems:
- unrealistic demands and expectations in comp. to scientific resources and technical possibilities
- unclear requirements due to involvement of different stakeholders
- demands change during project

Typical problems:
- lack of user involvement
- high-end design with insufficient scientific basis
- lack of flexibility

Typical problems:
- models and data do not address relevant problems of interest to users
- models and data inadequate in terms of software engineering
- lack of flexibility

Reflection of the Design process
General experiences/statements

- DSS are useful for Partizipation and „discussion support“! The demand for such tools is addressed to science and developers.
- Developing a DSS requires
  - a clear set of objectives,
  - readily available base material,
  - a realistic time schedule,
  - resources and expertise.
- End-user involvement from the start on is essential!
- Modellintegration is at the beginning of its development.
- Our technical solutions are not good enough yet, but more advanced than what most policy making institutions are currently ready and able to work with.
- Often resources are lacking for a good calibration, validation and uncertainty analysis, and pragmatic choices have to be made.
lessons/recommendations: user requirements (1)

• Start from policy questions instead of what data and models are available

• Find out the management tasks by asking the managers, not people who might know about it

• Find out requirements
  – of stakeholders
  – of the people on the “working” level and their requirements for DSS functions (there is knowledge of existing IT infrastructures)
  – of the decisive people and try to integrate them in the development process

• Classify scales (spatial/time) of the relevant management problems and related data and models

• develop adequate system, which is useful and effectively to solve the problems of the end users
lessons/recommendations: user requirements (2)

- Find out if there are restrictions to certain models in the user level

- Identify the indicators for representation of model results precisely according
  - to terminology of legal regulations like WFD…
  - to parameters of legal regulations

- Create interfaces for users daily work
  - Useful tools/maps etc. and availability of DSS results for their reporting e.g.

- Indicate the uncertainties of model results

- Indicate in the system clearly scientific basis of approaches
Thanks for attention!

http://elise.bafg.de/?3283