The Elbe DSS

Case Study

"Development of a Decision Support System (DSS) for the Elbe River Basin"

Abstract

Since a methodology and the instruments for integrated river-basin management were not available, the German Federal Institute of Hydrology (BfG) initiated the project 'Towards a generic tool for river basin management'. The ultimate goal is to develop a prototype decision-support system, which helps the water managers to formulate an effective strategy for sustainable management of the Elbe river basin. A key aspect of the design is the combination of process models and data from different scientific disciplines in an integrated systems network. In general these models differ in sensitivity and accuracy, while non-linear and qualitative models can be present. The current practice is that the experiences and preferences of the designers and practical considerations such as data availability guide the selection of models and data. Due to a lack of clear scientific guidelines the design becomes an ad hoc process, depending on the case study at hand, while selected models can be overly complex or too coarse for their purpose. The research focuses on the pitfalls and possible solutions encountered during the design and application of a decision-support system. Quantitative analyses of the integrated model system based on techniques such as sensitivity and uncertainty analyses, play a central role.

The project started in March 2002 and was completed in April 2005

Background

Waterresources management on the river-basin scale as the EC Water Framework Directive demands, flood control, and also the maintenance of rivers as navigable waterways. This constitutes a highly complex task: The understanding of the consequences of anthropogenic interventions into river ecosystems presupposes predictions on the impacts that have to be expected. Only then decisions can be taken that ensure adequate consideration of the interests of river-landscape protection as well as the social use interests. For this reason the German Federal Institute of Hydrology (BfG) initiated the establishment of a Decision Support System (DSS) with the example of the River Elbe in the process of pooling the results achieved within the BMBF Research Association "Elbe Ecology".

Objectives

The aim was to get and provide knowledge on the interactions of natural and anthropogenic factors available for administrative tasks and policy decision making in a user-friendly and

practice-oriented way. Considered topics are water quality/reducing pollutant loads, flood control/flooding risks, ecological state of floodplains, navigability, as well as external scenarios such as climate change, agricultural policy, and demographic developments.

Institutional framework and Partners

The Elbe DSS was developed within the framework of the Research Association "Ecology of the Elbe River", funded by the ministry of education and research in Germany (BMBF). The following project partners were involved: BfG/Project group Ecology of the Elbe River; Infram, Marknesse NL; Deptartment of Water Engineering & Management University of Twente NL; Institute of Environmental Systems Research, University of Osnabrück, Germany; Research Institute for Knowledge Systems (RIKS), Maastricht NL.

Results and impacts

A pilot version of the DSS was completed and provided to the authorities. It is a useful tool for decision making, by allowing the user to assess the impact of chosen measures and alternative solutions as well as those of external developments.
Existing models developed in preceding projects were made applicable for a wide circle of users. The development of the DSS followed a participative approach. The requirements of the potential system users – professional and local authorities, nature conservation associations - were integrated. Thus, it is guaranteed that the system works user-friendly and practice-oriented and that it is well accepted.

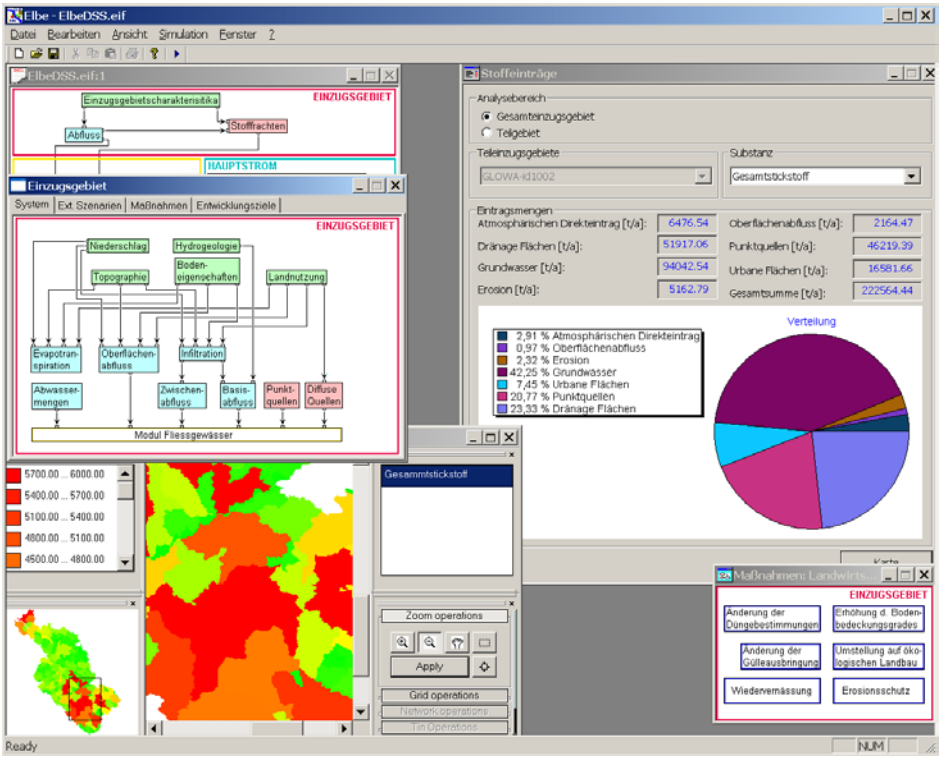

Fig 1: User screen of the pilot Elbe DSS

Barriers and conflicts

- The Czech parts of the Elbe River and its catchment area are not considered in the DSS so far. It should be included in the future and cooperation with Czech partners should be established.
- The developed DSS is just a pilot version. Future use of the DSS requires an ongoing actualisation of data.
- Highly complex and detailed models concerning the ecology of the floodplains are only applicable for a short section of the river.

Transferability

The DSS has a modular structure so that individual elements (data, models) can easily be exchanged or added, so that the application area can be expanded.
The developed form of a DSS is transferable for other catchment areas, if data and models are available.

References

http://elise.bafg.de/?618
http://www.bafg.de/servlet/is/5714/Beschreibung_DSS-Projekt.pdf
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