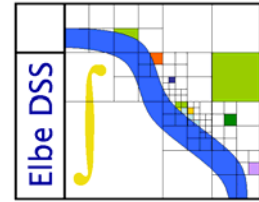


A decision support system (DSS) for river-basin management in the Elbe catchment



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Water-resources management on the river-basin scale as the Water Framework Directive of the EUROPEAN UNION demands, flood control, and also the maintenance of rivers as navigable waterways constitute together a highly complex task. The understanding of the consequences of anthropogenic interventions in river ecosystems presupposes knowledge of 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 user-interests. For this reason the GERMAN FEDERAL INSTITUTE OF HYDROLOGY (BfG) initiated the development of a Decision Support System (DSS) with the example of the River Elbe. The DSS pilot version has the purpose to make knowledge on the interactions between natural and anthropogenic factors available for administrative tasks and policy decision making in a user-friendly and practice-oriented way.

WHAT ARE THE MAIN IDEAS OF THE ELBE-DSS?

The DSS has the purpose to facilitate the assessment of the impacts of management options. It highlights cause-effect relations and the sensitivity of different actions. To this end the DSS structures complex problems. Sectoral knowledge and available models are pooled within a basic framework. By applying a customized user interface they are made applicable in the management context.

The system is developed in a participative process, thus ensuring transparency. By means of a library function, the sources of all incorporated data and models are registered and the limits of the accuracy of the system are indicated.

HOW WAS THE DSS DEVELOPED?

In order to ensure the practical relevance and to identify user interests, the DSS was developed in cooperation with potential users, such as authorities of the government and the federal states (Länder), the Elbe River-basin Association, representatives of municipalities, and environmental associations. This group selected the currently relevant management objectives (flood defence, river training, water quality, etc.). They also defined the form of presentation of indicators (maps, graphs), finalized the formulations in the dialog boxes, and tested the user-friendliness of the system interface.

A modular, scale-related system diagram was drawn up that includes the modules "catchment", "river network", "main channel" (river plus floodplain), and "river section". These modules work in different spatial and temporal resolutions.

WHICH FUNCTIONALITIES DOES THE DSS OFFER TO ITS USERS?

The parties involved in river-basin management, have diverging objectives and ideas about the actions to be taken. The users of such a system may select in the DSS and enter the planned "*measures*" by which they want to achieve their "*management objectives*". The previously defined "*indicators*" describe the degree of attainment of an *objective*. With these indicators, the user can have the consequences of his/her activity policy displayed and assessed. Additionally, the user may select previously computed "*external scenarios*", such as climate-change or land-use scenarios.

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Examples of implemented ...

... Management objectives / Indicators	... Measures/ Activity fields	... External scenarios
<ul style="list-style-type: none"> • protection of the North Sea / reduction of pollutant loads • amelioration of the ecologic and chemical state of the river network 	<ul style="list-style-type: none"> • land-use changes • agricultural practices • communal wastewater treatment • reduction of surface sealing • change in drainage systems (soil delivery ratio) • upstream/downstream migration of fish/ connectivity (attributes of weirs and dams) 	<ul style="list-style-type: none"> • climate change • agro-policy • demography • assumption of certain, statistically derived flood events (selected return periods) • dyke-break scenarios
<ul style="list-style-type: none"> • flood protection / estimation of flood risks (damage potentials, return periods of flooding) • amelioration of the ecological status of the floodplain (vegetation / biotope-distribution) • navigability (average days per year) 	<ul style="list-style-type: none"> • dyke maintenance / creation of flood retention areas / polders • river engineering measures • land-use changes (e.g. afforestation in the floodplain) • variation of ship loads and resulting drafts/ transport capacities 	

The appearance of the Elbe-DSS is that of a Windows program. Special features are an interactive system diagram and auxiliary tools like a layer viewer to display maps and dialog boxes, which enables the user to set various measures. The context-sensitive library function in an Online Help Format allows easy and fast access to additional information.

ON THE WAY FROM THE PILOT-VERSION TO THE ELBE-DSS

It is intended that different participants in river-basin management use the DDS approach presented here in the decision-making for suggesting actions to be taken or preparing decisions. Moreover, there is a chance that a DSS will be used in participative decision-making processes as provided in the plan-approval legislation. It may help to find out widely accepted solutions in conflict situations or can be used for public information purposes. The pilot-DSS for the River Elbe offers a operable system with an interface that is tailored to the specific requirements of users. It will be appropriate to speak of a genuine DSS for real-life decision-making when up-to-date data of the users are provided and functionalities are finally adapted.

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For further information see <http://elise.bafg.de/?3283>