



## **The Elbe-Expert-Toolbox - A modeling system for integrated river basin management under global change**

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### **Background**

The Elbe-Expert-Toolbox is being developed as the product of the GLOWA-Elbe research project, which is coordinated by the Potsdam Institute for Climate Impact Research. The project is studying the effects of changing climatic and socio-economic boundary conditions on water resources, the environment and society in the German and Czech Elbe river basin. Potential paths of climatic and socio-economic development have been bundled in scenarios. The basic data for all water resources investigations in the GLOWA-Elbe project is based on the IPCC SRES scenarios (Intergovernmental Panel on Climate Change – Special Report on Emission Scenarios). Based on the results of the project, scientifically sound suggestions on scenarios of the development of water quality and quantity in the future and management advice to deal with possible changes can be offered to decision makers.

In the first (2000-2003) and second (2004-2007) project phase, simulation models for various aspects of global change, for example climatic change, land use change, development of the agriculture, energy and water sectors, were established for the Elbe catchment. In addition to this, models for the management of water quantity and quality were implemented in these phases to analyse the effects of global change and provide possible integrated solutions. Regional as well as catchment scale research was conducted. Several management strategies were designed and assessed.

### **Elbe-Expert-Toolbox**

At present, the toolbox is being designed by the 13 project partners. Once established, it will be applied to the main use cases of the toolbox. These encompass managing water resources and nutrient immissions. This will help to analyse and, if necessary, improve the capabilities of the toolbox in handling real world water resources tasks.

The tools can be differentiated by their primary functions:

**Scenario-Tools:** These models provide the important scenario data for all further investigations. Some tools, for example RAUMIS, also allow a separate analysis.

**Analysis-Tools:** These models present the heart of the toolbox. They provide the user with an integrated approach to water resources analysis in the Elbe catchment.

**Assessment-Tool:** To help the user better understand how effective the individual management plans are, it is possible to conduct a cost-benefit analysis with the help of this tool.

**GIS-Tool:** The GIS based Water Information System WISYS will provide for a consistent database and visualise the results of the scenario- and analysis-tools.

## Conclusions and Outlook

One of the greatest challenges in river basin management today is the consideration of all possible types of influences, their interactions and the resulting consequences for water resources. The Elbe-Expert-Toolbox offers an integrated modeling system to cope with this challenge.

The research conducted until now by the GLOWA-Elbe team has shown that global change will have an effect on the water resources and the water quality of the Elbe basin. The exact development in the future cannot be forecast. However, with the help of scenarios, a certain spectrum of the possible trends can be analysed. This will give decision makers an idea of the possible effects of global change in the Elbe river basin and allow for anticipatory river basin management. A key advantage of the Elbe-Expert-Toolbox is the possibility to investigate the effects of new climatic development scenarios with relatively little effort, because the models are already trimmed to exchanging data with little user interaction.

After the completion of the toolbox, expected for the beginning of 2010, the German Federal Institute of Hydrology (BfG) will provide training on using the toolbox. Comprehensive documentation of the toolbox and of the individual models will be provided by the project partners. After the end of the project, the toolbox will be made available to interested users on request.