

FRAUNHOFER WATER SYSTEMS ALLIANCE (SYSWASSER)



1 Dried-up section of the River Yongding, south of Beijing

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BEIJING WATER: OPTIMIZED MANAGEMENT OF WATER RESOURCES IN BEIJING

Background

There are many parts of the world in which rapid economic development is taking place, frequently associated with a population explosion. Where the area has an arid or semi-arid climate, there is a corresponding shortage of drinking water.

Sustainability and management of the water resources is essential to ensure the communities will be able to survive for further generations. The core elements of the water cycle and the technology of the water procurement, distribution and treatment should be viewed as a whole, or sustainability will not be achieved. To meet the challenge of such complex and intricate management, the use of modern decision support methods and information systems is essential.



Methods

A dynamic model of the surface water system for the province of Beijing was first developed with the help of Matlab/ Simulink software by combining models of the various components: catchment areas, reservoirs, water channels and waterworks.

The MRD section of the Fraunhofer IITB, which works on measurement systems, began by using the FEFLOW Finite Element Tool to develop a model in 3D spatial resolution of the ground water aquifers serving Beijing. Linking this model directly to Matlab/Simulink enabled the entire water system to be simulated and thus the water resource could be included in the decision support procedure without any exceptions.

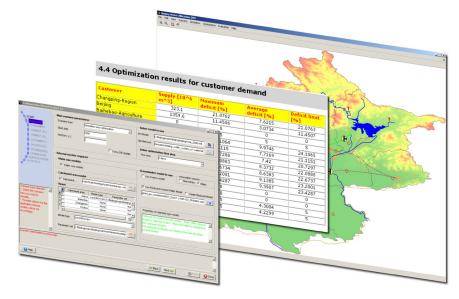
Using the methods of optimal regulation to reduce the model, it is possible to derive proposed decisions on the management of the water utility. The issues on supported issues range from those of best possible management of the reservoirs on a yearly basis to those concerning strategies in the use of water resources under a variety of assumed conditions to reflect possible environmental and economic changes over more than a decade.

Results

A joint Chinese and German project is currently being run to develop a prototype management system. Using the prototype, the water resources of China's capital city, Beijing, are already being managed. The validity of the approach has been corroborated in a dynamic model of Beijing's regional water system and various optimised commercial management strategies additionally worked out for selected application scenarios. As the project proceeds, modules so far developed are being integrated into a general graphic user interface and, on the spot, interfaces for the actual process management system are being fully implemented.

Partners

The management system is being developed jointly with the Beijing Water Authority and the MRD section of the Fraunhofer IITB in Karlsruhe (MRD stands for Mess-, Regelungs- und Diagnosesysteme: the section works in measurement, control and diagnosis). Funding is received from the BMBF (German Federal Education and Research Ministry) within the project O2WA1035.



2 Training of chinese project partners in Beijing