UFZ-Bericht Nr. 18/2004

11th Magdeburg Seminar on Waters in Central and Eastern Europe: Assessment, Protection, Management

Proceedings of the international conference
18-22 October 2004 at the UFZ

Walter Geller, Jan Blachuta, Šarka Blažková, Evelyn Claus, Alfred Dubicki, Hildegard Feldmann, Helmut Guhr, Edeltrauda Helios-Rybicka, Hubert Holzmann, Wiwiana Szalinska, Wolf von Tümpling, Gulay Záray (Eds.)

Department Inland Water Research
UFZ Centre for Environmental Research Leipzig-Halle

Integrative and interdisciplinary evaluation of river basin management strategies in the context of global change – Results from the Spree River basin

FRANK MESSNER
UFZ, Department Economics, Sociology and Law, PO Box 500136, 04301 Leipzig, email-contact: Frank.Messner@ufz.de; http://www.ufz.de

1. Summary

In the context of the interdisciplinary analyses in the GLOWA Elbe project different river basin management strategies were analysed and evaluated in an interdisciplinary way, taking different scenarios of global change into account. The evaluation was performed by integrating socio-economic and hydrological evaluation and transfer functions directly into the water management model ArcGRM. The results indicate that the current water management strategy in the Spree River basin is not optimal and could be improved by complementary policy options like additional water transfers and/or changes in water allocation priorities. Furthermore, the research results reveal that different water users in the Spree River basin are affected very differently by potential alterations due global change or policy reform.

2. Results

Starting point of the integrated evaluation of water management strategies for the Spree River basin were hydrological and water management analyses using the model ArcGRM to reveal the impact of global change and policy change on water availability. Based on these results the socio-economic impacts of changing water availability were examined for the most important water users in the basin. In a first step of the socio-economic analyses the dependence of the water users on water availability was examined qualitatively, using literature reviews and stakeholder interviews. After that socio-economic evaluation functions were created, among others by means of benefit-cost methods, to estimate major welfare effects of changing water availability.

In most cases socio-economic evaluation functions do not show a direct relation to the variable *certainty of water availability*, which is the most important variable of the water management model ArcGRM. Therefore, transfer functions were defined in order to create the link between relevant economic variables and the model ArcGRM. E.g., for inland fisheries the size of fish ponds filled with water during the year is a relevant economic variable to calculate the yields of economic actors. Thus, in the respective transfer function this pond size is calculated, using the results of the water management model as input data.

The creation of the linkage between the water management model and the transfer and evaluation functions paves the way to link socioeconomic evaluation directly to water management modelling. As a consequence, it becomes possible to simulate scenarios with regard to water availability in a river basin and, simultaneously, to assess the resulting socioeconomic effects. However, it should be mentioned that this integration did not work optimally for all water users due to methodological inconsistencies between the methods of socioeconomic evaluation and the water management model. Therefore, in some cases only second-best solutions regarding economic evaluation were used.

a) The particular results of modelling and evaluating policy and global change scenarios with the model ArcGRM can be figured out as follows: It was revealed that the effects of five different water management strategies for the Spree River were each similar

under different conditions of global change with regard to its general trend and direction. Considering the results for different water users, there is not a single case showing that one policy strategy would perform totally different under different global change conditions. This general result makes it easier to choose the best policy strategy because the uncertainty connected to global change processes proved to be smaller than expected.

b) However, at the same time it must be stated that considerable differences in modelling and evaluation results can be observed concerning the extent of impacts under different conditions of global change. E.g., water availability in the regions of Berlin and the Spreewald wetland is significantly lower in all scenarios with climate change compared to the scenarios with stable climate conditions. Furthermore, it was revealed that water users who are heavily dependent on societal and economic conditions (like tourism and inland fisheries) are also very vulnerable with respect to socioeconomic change (like changing national or EU subsidies). As a consequence, the sensitivity of some water users is higher with regard to climate and socioeconomic change than to changes in water management strategies.

c) Finally, as regards the assessment of the most favourable strategy of water management in the Spree River basin under conditions of global change, it must be stated that the current strategy is not optimal at all and should not be further pursued in the long term. Rather it should be considered to complement the current strategy by policy options like additional water transfers from the Oder River or to change the water allocation priorities in favour of accelerated filling of mining ponds and securing the ecological minimum flows. A most favourable strategy cannot be derived from the scientific results, but must (and will) be found in cooperation with the stakeholders and decision makers of the region, by taking their specific preferences into account.

References

BTU, UFZ and WASY 2002, Ergebnisse des Stakeholder Fachgesprächs „Wasserbewirtschaftung unter geänderten Rahmenbedingungen" am 18.6.2002, Report, 2002, 70 S.

Koch, H., M. Kaltofen, U. Grünewald, F. Messner, M. Karkuschke, O. Zwirner und M. Schramm, Scenarios of Water Resources Management in the Lower Lusatian Mining District, Germany. In: Hüttl, R. F. (Hg.), International Conference „Disturbed Landscapes", Ecological Modelling, Special Issue (in review).

Messner, F. Kaltofen, M. (Eds.) 2004, Nachhaltige Wasserbewirtschaftung und regionale Entwicklung – Analyse und Bewertung von Szenarien zum Wassernutzungskonflikt im bergbaubeinflussten Einzugsgebiet der Oberen Spree, UFZ-Bericht 1/2004, Leipzig, Dresden und Cottbus, 95 S.

Messner, F., Kaltofen, M., Grünewald, U., Karkuschke, M., Koch, H., Schramm, M., Zwirner, O., Bergbaubeeinflusstes Einzugsgebiet Obere Spree – Nachhaltige Wasserbewirtschaftung und regionale Entwicklung, Abschlussbericht zum Teilgebietsprojekt Obere Spree im Rahmen des GLOWA-ELBE-Projektes, Cottbus, Leipzig und Dresden, Oktober 2003, 79 S.