



Global change impact on water resources at the regional scale - a reflection on participatory modeling

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Participatory modeling (PM) has become an essential part of environmental impact assessment and planning in the field of water resources research and management. This is mainly because of the notion that models developed by scientists for scientific purposes are often not suitable for practical management for several reasons, such as (too) high complexity, low user-friendliness and lack of problem/solution orientation. Participation is seen as a key concept for bridging the gap between modelers and stakeholders.

In this submission we focus on the PM-process in the GLOWA-Danube (GD) project (German Ministry of Education and Research, 2001-2011). GD was carried out by an interdisciplinary consortium of 17 research organizations. The main goal was to develop and to use the integrated modelling system DANUBIA as a tool to evaluate the impact of global change on the Upper Danube Catchment (Southern Germany, 77,000 km²) and to discuss the implications with relevant stakeholders. An intensive stakeholder dialogued was carried out to include the perspective of stakeholders and end-users in the model and scenario development - with the final goal of facilitating implementation of DANUBIA in practical management after termination of the scientific project. This contribution looks at the specific conditions for PM in the field of global change scenarios and complex integrated models. The different phases of the PM process in GD are presented along with a discussion of the respective results.

Overall, the impact of stakeholder interaction on the model development was much lower than expected. The ultimate goal of using the PM process to develop DANUBIA as a tool used in practical management after termination of the scientific project was not reached. However, implications of climate change and modelling could be discussed with the stakeholders involved and relevant learning processes on both sides (scientists and stakeholders) were facilitated in the final phase. In the discussion we therefore focus on the following three questions:

- Can a stakeholder dialogue be successfully used to support the development of new, complex modelling systems, in particular at the regional scale?
- What is the right timing for stakeholder interaction in the case of unclear problem definition – i.e. global (climate) change impact on regions where climate is not (yet) a threat to water or land use related demands and activities?
- To what degree can scientists be motivated to carry out participatory research at all?

We conclude that the PM process in GD was only partly successful because the project set overambitious goals, including the application of fundamentally new approaches to interdisciplinary science, the use of new modelling technologies, the focus upon and evaluation of potential and therefore characteristically uncertain future problems, including stakeholder demands, and the development of a ready-to-use, user-friendly tool. Furthermore, GD also showed that an externally and professionally moderated stakeholder dialogue is an absolute necessity to achieve successful participation of stakeholders in model development. The modelers themselves neither had the time, the skills and the ambitions to do this. Furthermore, there is a lack of incentives for scientists, particularly natural scientists, to commit to PM activities. Given the fact that the outcomes of PM are supposed to be relevant for societal decision making, this issue needs further attention.

