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Participatory modelling to support decision making in water management under uncertainty: Two comparative case studies in the Guadiana river basin, Spain

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Description / Abstract

A participatory modelling process has been conducted in two areas of the Guadiana river (the upper and the middle sub-basins), in Spain, with the aim of providing support for decision making in the water management field. The area has a semi-arid climate where irrigated agriculture plays a key role in the economic development of the region and accounts for around 90% of water use. Following the guidelines of the European Water Framework Directive, we promote stakeholder involvement in water management with the aim to achieve an improved understanding of the water system and to encourage the exchange of knowledge and views between stakeholders in order to help building a shared vision of the system. At the same time, the resulting models, which integrate the different sectors and views, provide some insight of the impacts that different management options and possible future scenarios could have. The methodology is based on a Bayesian network combined with an economic model and, in the middle Guadiana sub-basin, with a crop model. The resulting integrated modelling framework is used to simulate possible water policy, market and climate scenarios to find out the impacts of those scenarios on farm income and on the environment. At the end of the modelling process, an evaluation questionnaire was filled by participants in both sub-basins. Results show that this type of processes are found very helpful by stakeholders to improve the system understanding, to understand each other's views and to reduce conflict when it exists. In addition, they found the model an extremely useful tool to support management. The graphical interface, the quantitative output and the explicit representation of uncertainty helped stakeholders to better understand the implications of the scenario tested. Finally, the combination of different types of models was also found very useful, as it allowed exploring in detail specific aspects of the water management problems.

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