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Applying a social learning approach to participative forecasting: coastal aquifers management in a context of climate change

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Introduction : Why participation in groundwater management?

International agreements, European legislation as well national regulations demand the involvement of affected parties in the management of natural resources (OECD, 1999; Framework Directive, 2000). Participation is often viewed as both a prerequisite of polycentric governance and an element of sustainable management of natural resources. This is so because, only through participation it is possible to build the adaptive capacity and social learning required for the development and maintenance of resilient and sustainable socioecological systems: its outcomes are not only technical improvements but also relational, such as an improved capability of stakeholders to come to cooperative agreements. Many research projects focus, therefore, on developing and evaluating participatory approaches in water management, instigated by the European Water Framework Directive. Participation thus becomes a *secular duty* or even a ritual for research teams with the additional risk of participation becoming a new mode of governance (Henkel and Stirrat, 2004).One of the issues under debate is exactly the assessment of instruments of participatory processes, the role of experts and scientists, and the capacity to promote continuity of the processes triggered.

Our study focuses on a social learning approach to the management of groundwater in 3 coastal aquifers located in Morocco, France and Portugal. These aquifers (even if in different levels) are at risk of overexploitation and/or quality degradation, due to recent droughts and increasing anthropogenic pressures (groundwater abstraction in particular). The growing imbalance between uses and available resources, in a context of climate change, requires an urgent adaptation of groundwater resource management strategies. But given that the intensive exploitation of aquifers dates only from one or two generations ago, the majority of groundwater institutions are still in the early age of development in most countries. Most aquifers still lack clear governance institutions and many of those that exist do not yet prove to be effective and participative.

This presentation will give an account of the AQUIMED project and its use of participative methodology, considered as an iterative process of techniques and animation methods, to achieve the social learning necessary to adaptation behaviours. In AQUIMED methods of forecasting analysis were developed to support local stakeholders' capacity to anticipate future changes and identify innovative groundwater management strategies so as to lay the ground for a sustainable use of these resources.

This paper wishes to answer two questions:

1) Why should participation (in the context of a research project) be undertaken for forecasting analysis on groundwater management in a context of climate change?
2) What limits, risks and value added in the achievement of the sustainable management of these aquifers, in the implementation of such research-led initiatives?

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Objectives and methodology of participation

The participatory process performed in AQUIMED has supported the reflection on the issues of water and climate change. The project has also defined a specific objective in terms of knowledge sharing between stakeholders and researchers. Still another objective was to, informally, initiate a dialogue between a variety of local stakeholders, farmers, policy makers, scientists, ONG's, leading to the sustainable management of the aquifer.

Workshop design and performance

The participatory approach was based on a series of workshops with a variety of stakeholders which were divided in two types of groups: 1) farmers; 2) institutional actors e.g. policymakers, researchers, ONG's. The Portuguese case study was the one which performed the most extensive cycle of workshops and as such will be the one given more emphasis during the presentation. The design of the series of workshop was adapted to local context and to local socio-economic, agricultural, hydro geological and climatological conditions. Previous knowledge of each case study also influenced the number of workshops carried out.

Workshop design:

1) **Interviews and/or workshop to construct a socio-economic, hydro geological and climate diagnostic:** Prior to workshop inception, participants were interviewed to find out, among others, their perception on the issues such as water and climate. This first step was essential to obtain relevant information for the preparation of workshops. The first workshop conducted had the goal of constructing a diagnosis of the area at the present time, an identification of the probable evolution of the area , and the detection of the main factors driving such diagnosis
2) **Workshop for the discussion of socio-economic scenarios.** The second series of workshops used the method of foresight analysis at a horizon of approximately 15/20 years. In the French and Portuguese case, scenarios were pre-constructed based on interviews to farmers and other stakeholder plus documental information on the economy of the region with an emphasis on agriculture, and hydro geological data. In the Moroccan case scenarios were constructed during the workshop Discussions focused on deconstructing these scenarios and reflecting on which were the most probable and desirable for the region
3) **Workshop for the discussion of climate change** previsions and its impact on water and agricultures. Scientific models were presented to workshop participants and a discussion ensued concerning for instance the measures to be implemented to face such weather scenarios
4) **Workshop for the discussion of management of the aquifer**. Farmers were again invited to do a prospective discussion which consisted on reflecting on the management of the aquifer in a context of water scarcity due to climate change
5) A **final workshop** was conducted so as to allow a multi-stakeholder dialogue. In this workshop both farmers and institutional actors discussed matters related to the management of the aquifer in a context of scarcity with the objective of opening the way for more fruitful dialogue and cooperation to achieve this common goal. The advantages of the participatory process were also debated.,

The participatory forecasting experiment - results and discussion

The exercise of foresight analysis was one of the main challenges of the study. Participants expressed that it was not easy to engage in a prospective exercise, but as the project went along it

became more “natural” to talk about the future and about future scenarios (20-30 years from now). Participants evaluated this experience very positively. Their engagement, commitment and enthusiasm throughout all the process showed that, despite the huge economic problems they currently face, they are open to discuss prospectively the issues of water scarcity and climate change in view of adapting their own behaviour as farmers and develop individual and collective projects. Farmers believe that participative workshops were useful; they evaluate positively the contents discussed and the possibility of debate with colleagues, as well the workshops design (supports, explanations, documents, and animation). These findings are the more significant as water scarcity was just a concern of Moroccan farmers and climate change was not yet expressed as a concern at all in any of the three case studies. Another idea that came out from the workshops was that aquifer management had to be conceived and implemented in a bottom-up manner with indispensable support from government agencies. Thus, this study has stimulated a prospective reflection which will possibly have effects on adaptation to climate change at the level of users but also at the level of policies and research. Moreover the study by opening up the dialogue among farmers and between farmers and other stakeholders has made a first step towards building the adaptive capacity and social learning required for sustainable management of these aquifers. Still, for farmers, the real value added of the project would be that the social learning that took place would have an impact in policies enabling the sustainable management of the aquifer.

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