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A Community-based Monitoring System to support Adaptive Water Management

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The transition towards an adaptive approach to the water resources management is causing changes also in the role of information in decision-making. In fact, the Adaptive management refers to a "learning by doing" process in which the outcomes of the implemented strategies are used to iteratively refine and improve the management policies. Adaptive management proceeds from the premise that policies can be treated as experiments in which monitoring and evaluating outcomes, and judging what has been learned are fundamental steps. In an Adaptive Management perspective, the information cannot be considered just as an initial input, but it pervades the decision process in all its phases, becoming the fundamental elements of the learning process. After the implementation of the designed alternative, the monitoring information should support the decision-makers to assess the system responses, evaluating the efficacy of the management action. Moreover, the monitoring information should support the decision-makers in revising the selected policies, introducing some adjustments. Adaptive ecosystem management requires monitoring as essential feedback to management to ensure that necessary or appropriate action is taken, despite the fact that knowledge about the ecosystem being managed may be limited. Monitoring becomes the primary tool for learning about the system and assessing the management strategies. To play this fundamental role in the adaptive management, novel monitoring systems are required to support the decision making process, able to provide timely identification and warning of emerging environmental problems and effective feedback on the adequacy of policies and programs. Moreover, the novel monitoring systems have to be able to provide information also in data poor area integrating different sources of information. In this contribution, we describe the architecture of an Advanced Monitoring Information System (AMIS), considered as the shared platform through which the scientific knowledge, resulting from the implementation of "formal" monitoring

activities, can be integrated with that deriving from a stakeholders based approach. This approach recognises that science alone cannot provide all the answers, and must be combined with a structured process of local participation that emphasises shared learning and locally-relevant indicators and methods. The challenge is to bring local and scientific knowledge systems together into a single structured information system. Collecting local knowledge for environmental monitoring has many advantages. It can facilitate the establishment of the "two-way" flow of information which recognise that knowledge must be understood in context by all those involved. This acts to reduce conflict, encourage participation and provide a co-learning environment. Furthermore, involving the local communities in monitoring activities can promote public awareness on environmental issues. Nevertheless, the use of local knowledge in environmental monitoring has been hampered by many drawbacks, such as: data credibility, non-comparability of the data, the comprehensibility of the local knowledge, the difficulties in the integration of different sources of information. Thus, exploring how the local communities express their knowledge of the environmental resources and how make this knowledge usable for the decision process is a particular challenge for our research work. The GIS technologies have been used to systematize the local knowledge to make it comprehensible for the decision-makers and functional to the decision processes. The use of Fuzzy Logic allows us to incorporate the lay geographical terms in a map. In our work, the Fuzzy Logic has been used both to define ambiguous geographical boundaries and to collect in a map the qualitative knowledge of the local communities. The preliminary results of the application of the AMIS to monitor the water resources in the Tisza basin are described in this work.