

Strategic decision making under climate change: a case study on Lake Maggiore water system

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Abstract Water resources planning processes involve different kinds of decisions that are generally evaluated under a stationary climate scenario assumption. In general, the possible combinations of interventions are mutually compared as single alternatives. However, the ongoing climate change requires us to reconsider this approach. Indeed, what have to be compared are not individual alternatives, but families of alternatives, characterized by the same structural decisions, i.e. by actions that have long-term effects and entail irrevocable changes in the system. The rationale is that the structural actions, once they have been implemented, cannot be easily modified, while the management decisions can be adapted to the evolving conditions. This paper considers this methodological problem in a real case study, in which a strategic decision has to be taken: a new barrage was proposed to regulate Lake Maggiore outflow, but, alternatively, either the present barrage can be maintained with its present regulation norms or with a new one. The problem was dealt with by multi-criteria decision analysis involving many stakeholders and two decision-makers. An exhaustive set of indicators was defined in the participatory process, conducted under the integrated water resource management paradigm, and many efficient (in Pareto sense) regulation policies were identified. The paper explores different formulations of a global index to evaluate and compare the effectiveness of the classes of alternatives under both stationary and changing hydrological scenarios in order to assess their adaptability to the ongoing climate change.

Key words decision making; climate change; multi-criteria analysis; reservoir planning and management