

Supporting Decision Making for Integrated Water Resource Management under the pressure of Climate Change

Methodologies and tools for a harmonized integration of socio-ecosystem modeling, public participation and decision analysis

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Climate Change (CC)

(IPCC Technical Paper VI, 2008)

- freshwater resources are **vulnerable** and potentially strongly impacted by CC
- **consequences** for human societies and ecosystems
- Current water management practices **may not be robust enough** to cope with the impacts of CC
- Improve the **incorporation of information** about current climate variability into water-related management
- inadequate tools to facilitate **integrated assessment** of adaptation and mitigation options across multiple water-dependent sectors

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Integrated Water Resources Management (IWRM)

(GWP 2000)

- “system thinking”
- interdisciplinary approach
- promotes cross-sectoral coordination and partnerships among stakeholders and government agencies.
- suitable balance between socio-economic and ecological needs



Complexity
(interdependency, heterogeneity, nested hierarchies):
Inter/intra relations of actors/component, information, process

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Objective of research

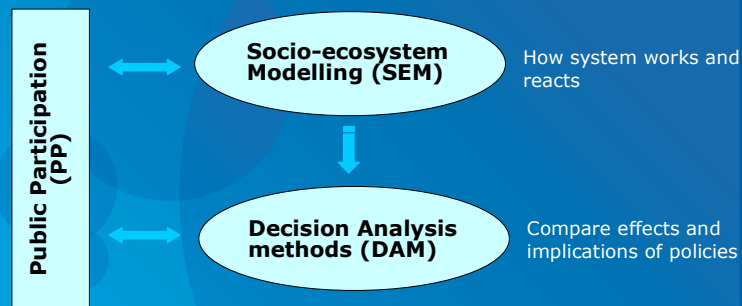
How to manage complexity and support Decision Making in the implementation of IWRM?

- implementing a **holistic approach**, involvement of different disciplines (i.e. economics, ecology, hydrology, social and political sciences) and different approaches of study:
 - to **understand** the elements and behaviour of the complex system (interconnection, cause-effect relations..)
 - Overcome **language** barriers
 - to **elicit the conflicting interests at stake**, in relation to both human and environmental needs;
 - to facilitate the identification of **compromise agreements** and the resolution of conflicts;
 - to facilitate transparency and credibility;
 - to respond to Climate Change pressures.

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Methodologies integration

An harmonized analytical framework:



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Social Eco-system Modeling

- Simplification of a complex system (ecological + socio-economic)
- to understand the behaviour and interactions of systems
- to explore the potential impacts caused by changes in system component/relations
- to construct scenarios
- to built, test and communicate knowledge

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Multi Criteria Decision Analysis (MCDA)

Analyses a complex problem comparing a set of relevant **alternatives** (policies or scenarios) according to a set of **evaluation criteria** assumed to be relevant for the specific decision problem (Belton, Stewart 2002)

quantitative, qualitative or both information

criteria = **points of view** = preference on one alternative wrt the others.

Helps to:

- cope with conflicting alternatives: not unique "best" solution
- explore implications of alternatives
- analyze social conflicts and identify compromise solution
- facilitate communication (within the decision making body and between the community)

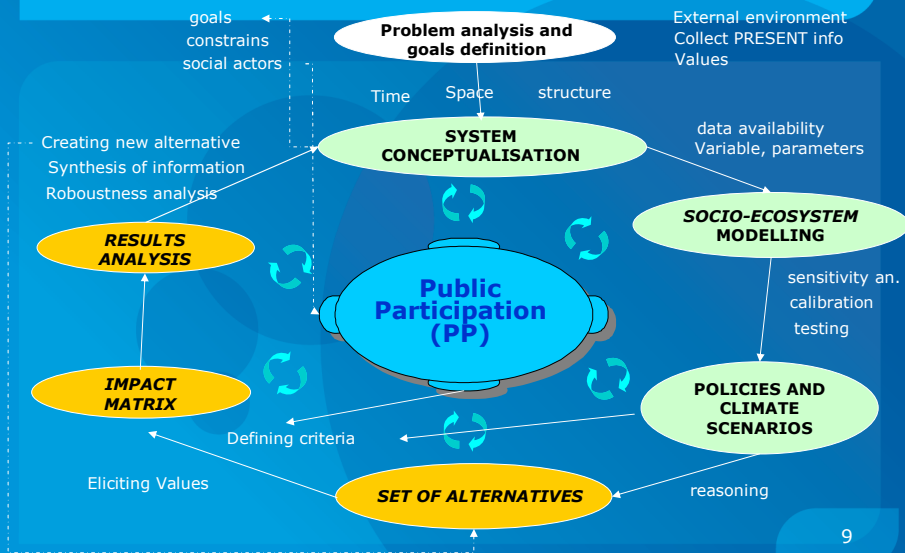
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Stakeholder Participation

- Research quality**
 - Better construction of problem and system definition
 - Incorporation of unknown or underestimated points of view (=interests at stake)
 - Appropriate selection of indicators for the comparison of different WM strategies;
 - Validation of research structure
- Decision making**
 - Facilitate the relation btw scientific research and decision making
 - Set priorities
 - Effectiveness of policies
 - Consensus building
- Community**
 - Knowledge building
 - balance btw the needs of majorities and minorities and btw conflicting interests at stake.
 - Transparency

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Integrated framework



Key nodes

- Complexity of model depends on **case study**, time, budget constrains
- Be involve in a real-world decision making process
- SH participation with scientific robustness (incentive, social actor analysis, selection, representativeness, bias, trust..)
- Control power mechanisms and guaranty minorities active involvement
- Be open to review assumptions and unexpected findings
- Don't forget that it is a no-ending process based on continuous knowledge building!