BeWater

Making society an active participant in water adaptation to global change

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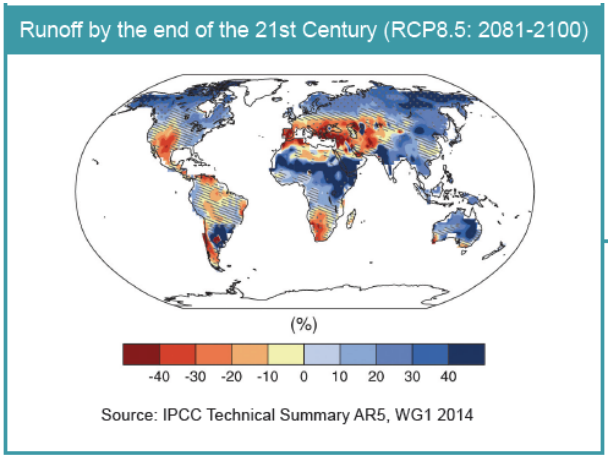
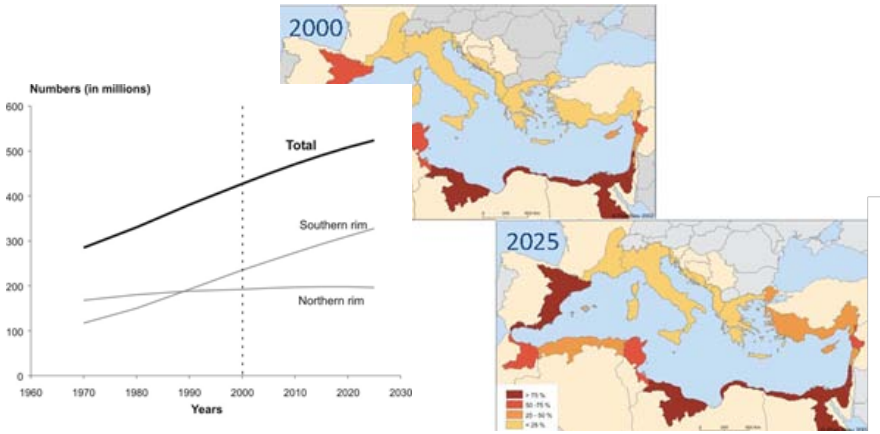
CREAF

This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 612385

A collaborative response to Global Change



Global change threatens the whole society. Uncertainty



Particular risk in Mediterranean region: increasing pressure on water resources. Complexity

ADAPTATION

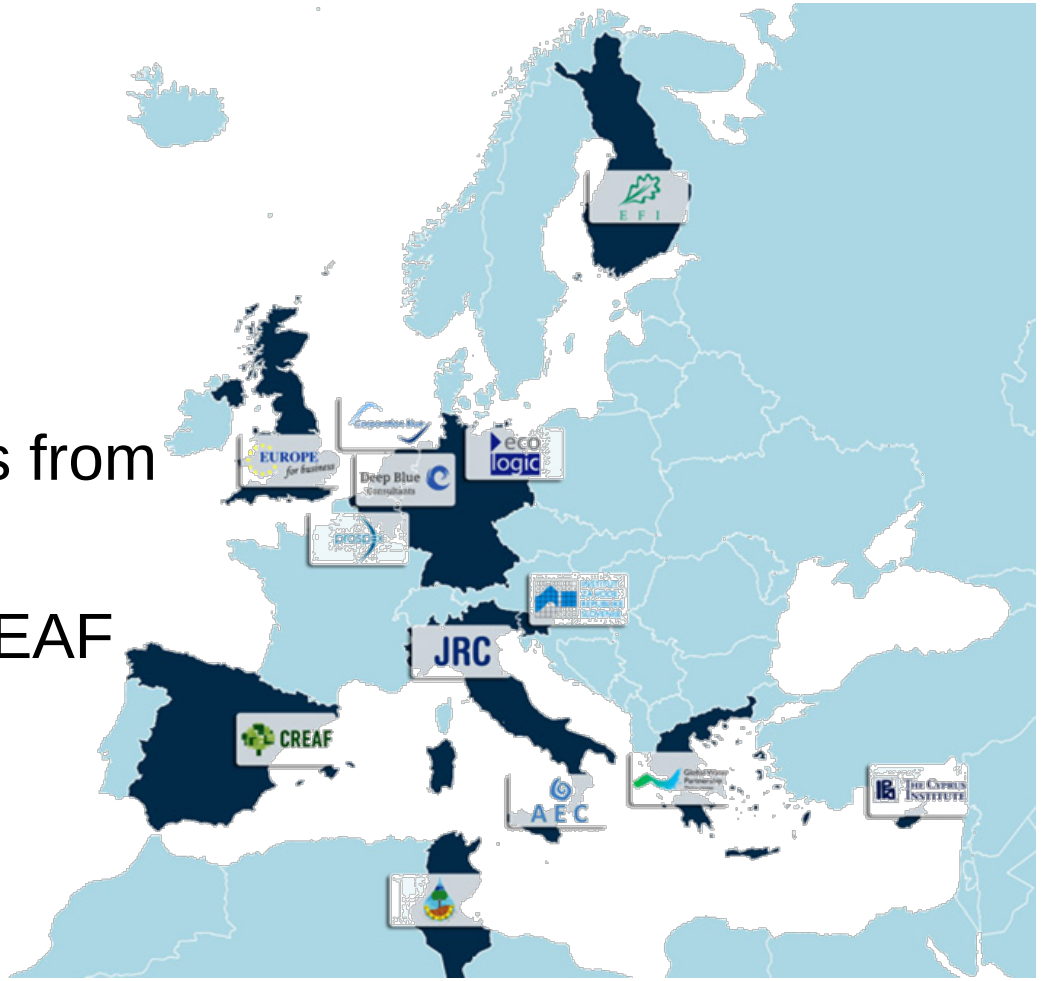
Dialogue and collaboration between science and society

Social awareness, empowerment and joint responsibility

Bottom-up approach

BeWater project overview

- Duration: 42 months
- Starting: 01/10/2013
- Consortium: 13 partners from 11 countries
- Project coordinator: CREAF



BeWater
Society Adapting to Global Change

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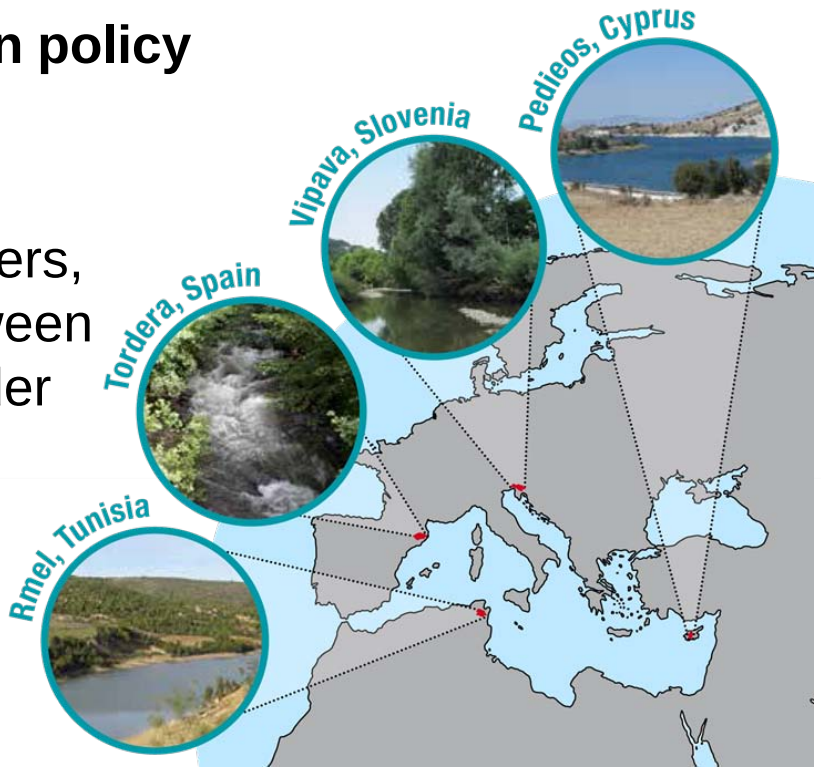
BeWater project overview

- Includes an **innovative, stakeholder-driven method** of societal transition towards a **less vulnerable** more **sustainable and adaptive river basin management**
- Promotes the **transfer** of BeWater results **into management and adaptation policy**
- Promotes **mutual and multi-directional learning** among partners, entities and actors within and between the river basins and with the broader society
- Enhances **social participation** and builds **societal resilience**



Research framework: Adaptive water management

Learning approach: continuous update and adjustment

Feedback and focus update

Identify challenges and objectives

Analyse and evaluate

Develop proposals

Ecosystem based Management

BeWater: building resilience

Dialogue and collaboration between science and society

Participatory methodology

Iterative approach

Science based work: CSLs, project partners

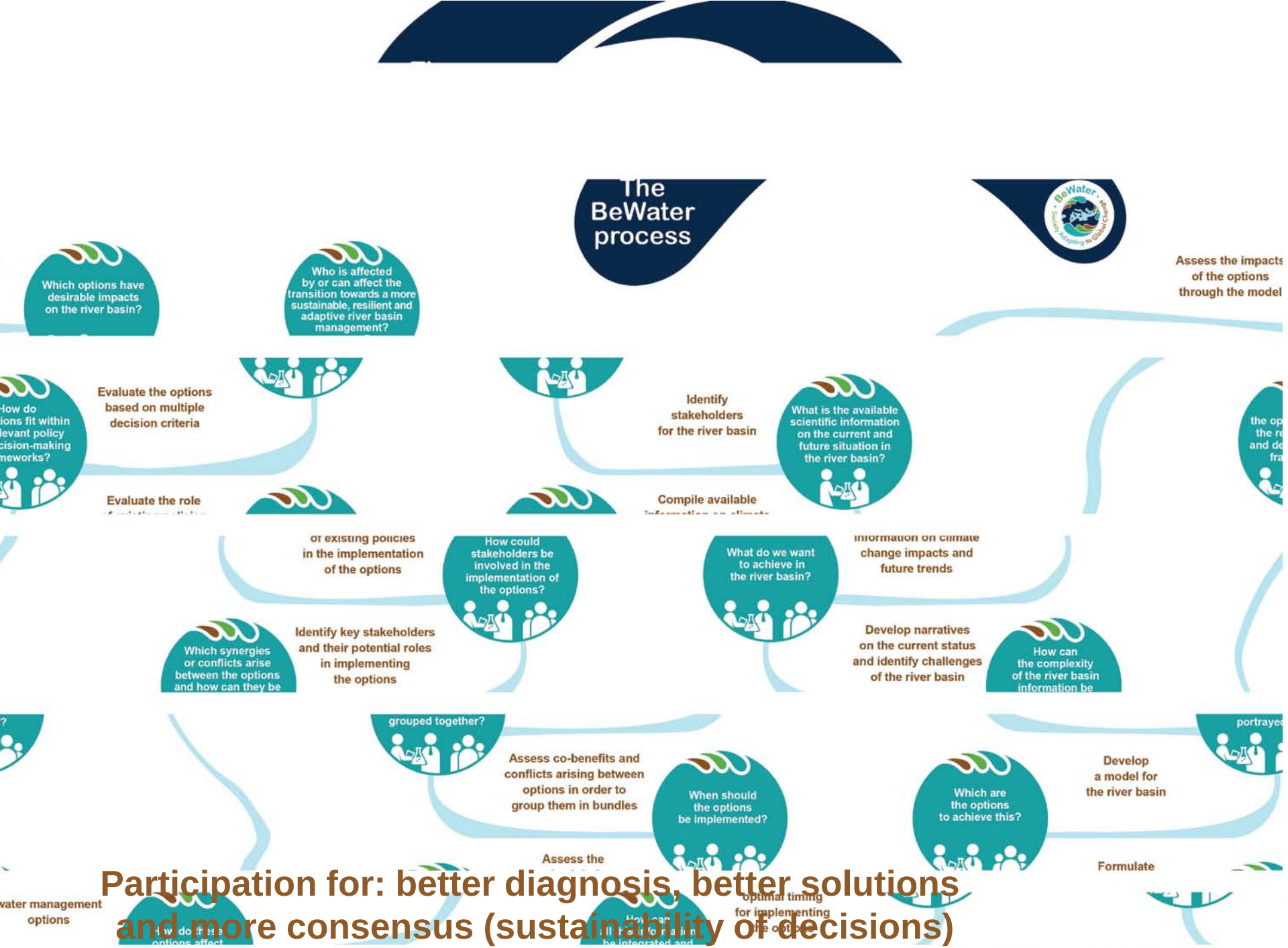
Participatory events: views of SHs

Science based work Build on outcomes

.....

Co-creation of specific Adaptive River Basin water management plans

Outscaling results to other areas

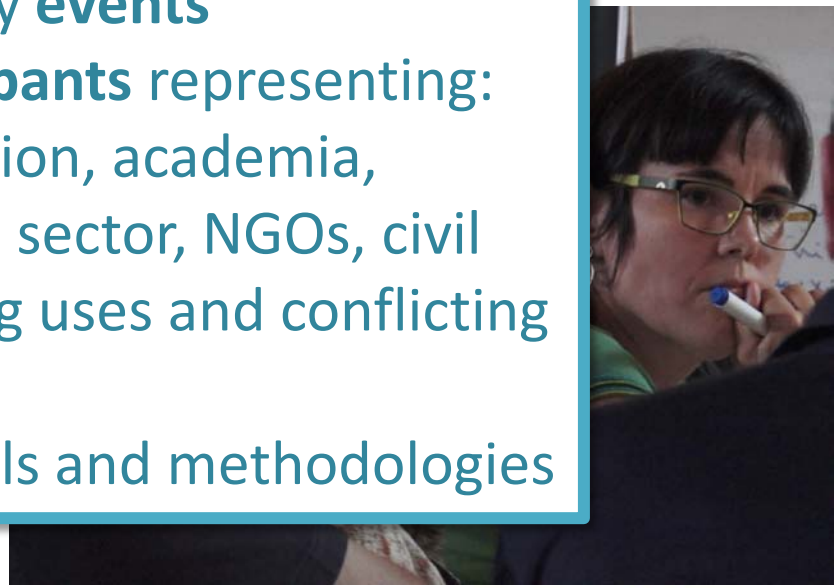


Participation for: better diagnosis, better solutions and more consensus (sustainability of decisions)

Stakeholder workshops

A participatory and stakeholder-driven approach applied in 4 case studies:

- 16 RBAP co-production **workshops**
- 25 complementary **events**
- About **800 participants** representing: public administration, academia, education, private sector, NGOs, civil society. Competing uses and conflicting goals.
- Use of diverse tools and methodologies



Problem scoping:
Identify challenges and objectives

Participated diagnosis:
current and future state of the basins

Science-based input information:

- Series of meteorological data
- Climate projections at regional scale
- Land use changes
- Demographical trends
- DPSIR analysis
- Biophysical and socio-economic vulnerability and impact analysis
- …

Stakeholders input information:

- Climate change impacts on local government, economic sectors, nature and quality of life for citizens.
- Drivers of global change in the basin
- Relationship between key factors characterizing the basin's dynamics
- Current and planned regional and local policies
- Citizen perceptions on current challenges
- Common vision on desired state
- …

River basins challenges

Vipava (Slovenia):

- Water availability during droughts in growing season
- Flood risk reduction
- Appropriate water quality

Rmel (Tunisia):

- Water quantity
- Water quality
- Agriculture
- Forest & biodiversity management
- Awareness of civil society
- Human resource and employment

Tordera (Spain):

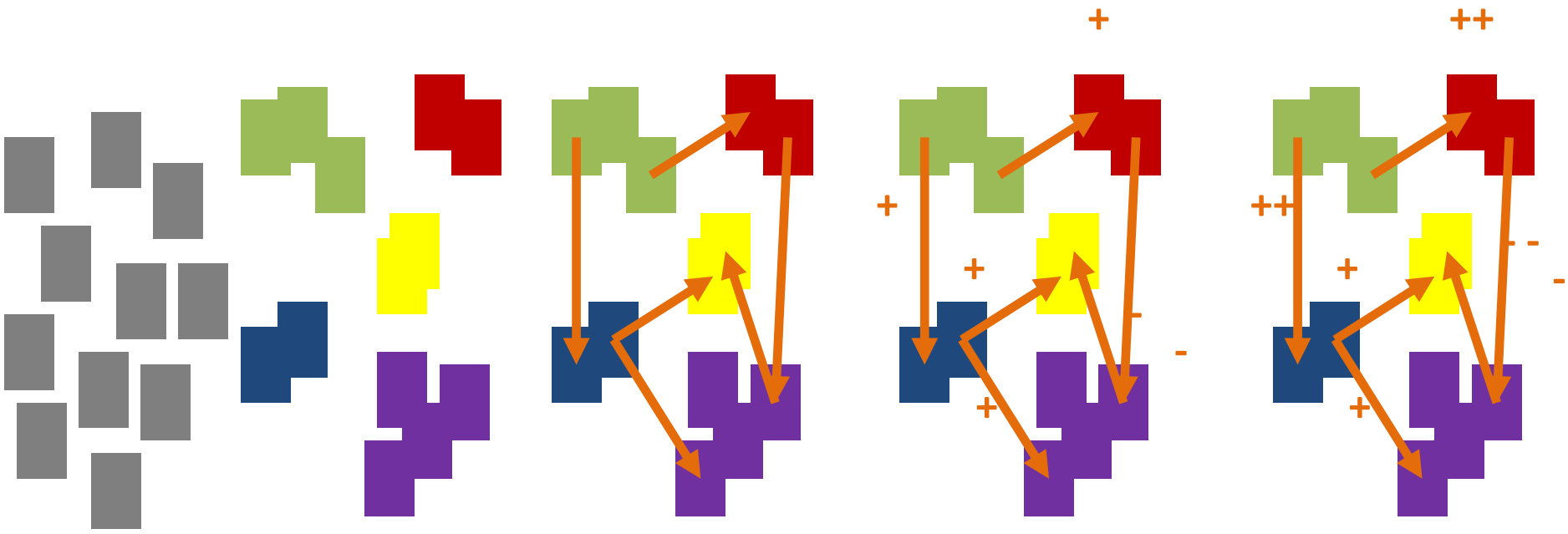
- Water quantity
- Water quality
- Health of forests & water ecosystems
- Integrated Water Management

Pedieos (Cyprus):

- Quantitative and qualitative status of groundwater
- Quantitative and qualitative status of surface water
- Flooding from the river

Basin dynamics: Fuzzy Cognitive Maps

Building the map



Stakeholder's **input** information

Adjustments and **clustering** of map factors (drivers, challenges,…)

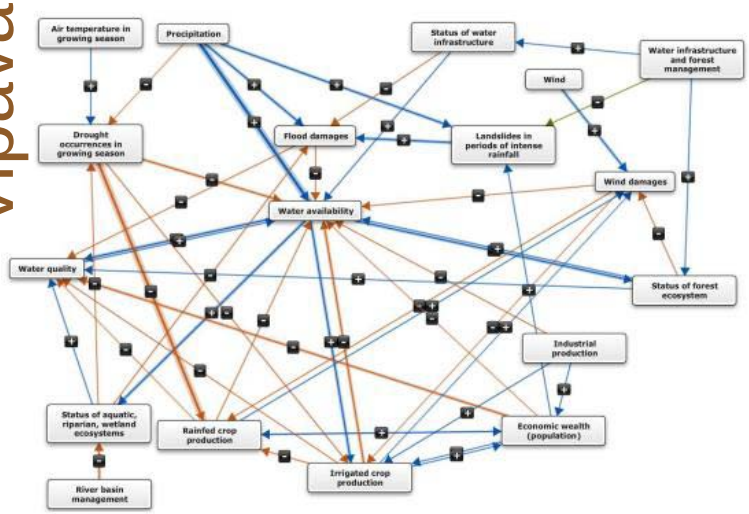
Identify **relations** between factors

Identify the **direction** of the relation between factors

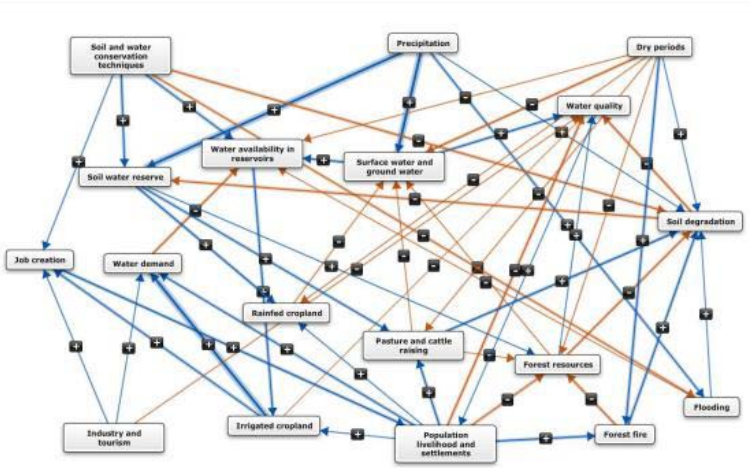
Weighting the relations between factors

Basin dynamics: Fuzzy Cognitive Maps

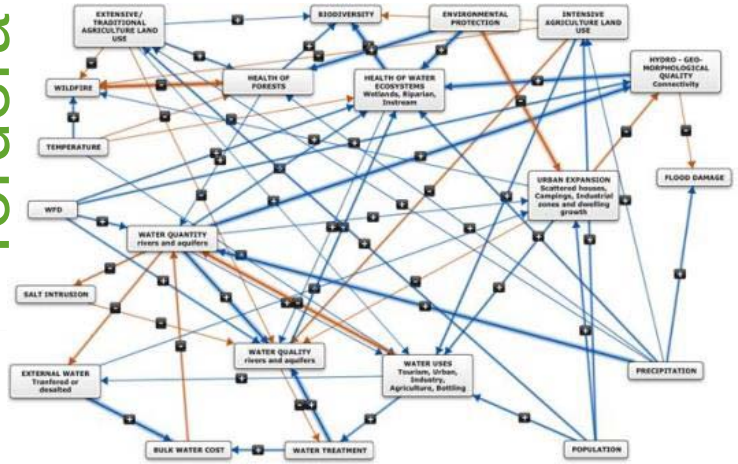
Vipava



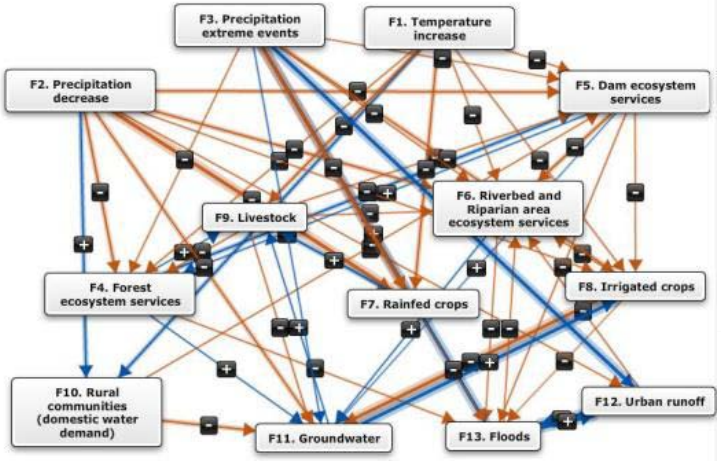
Rmel



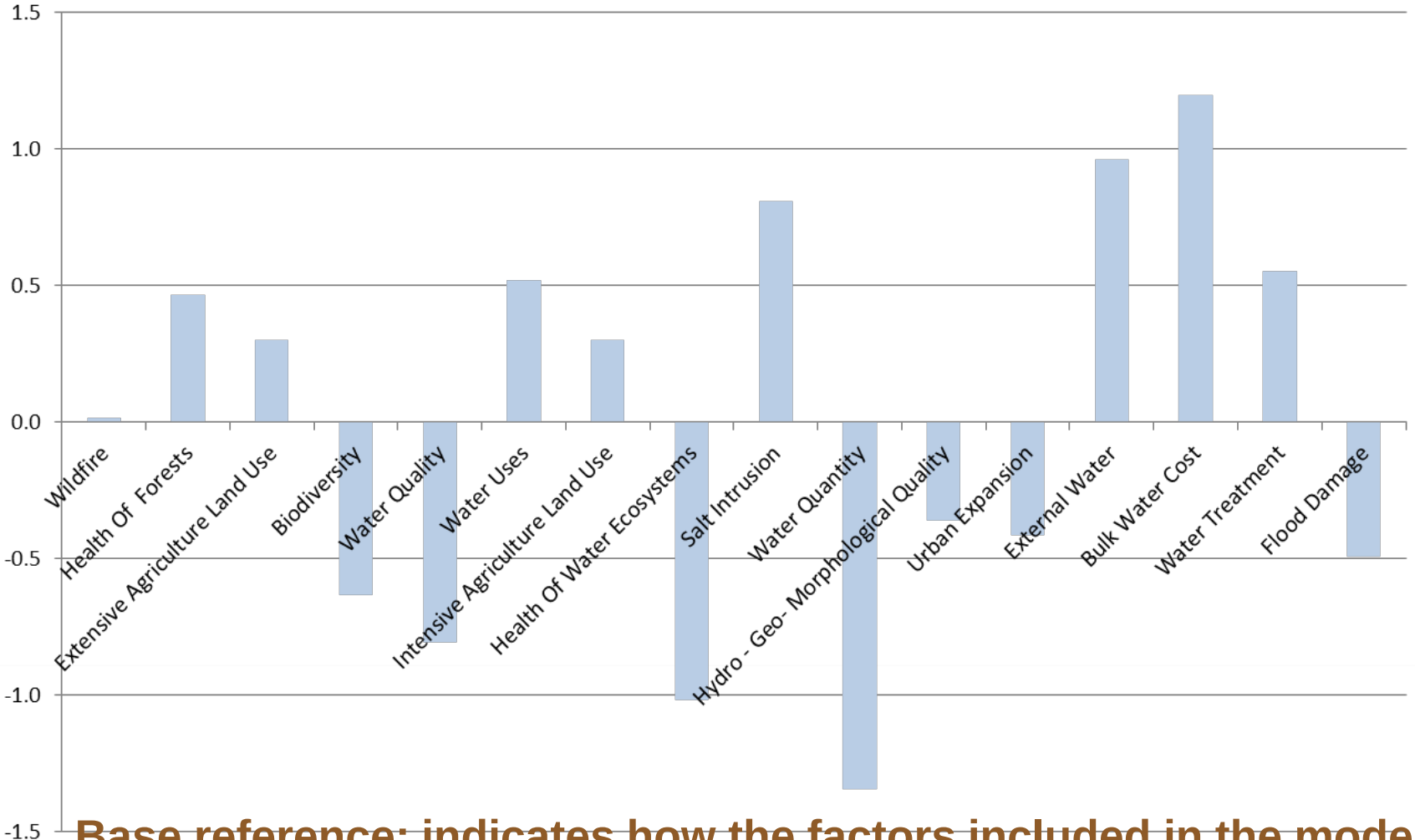
Tordera



Pedieos



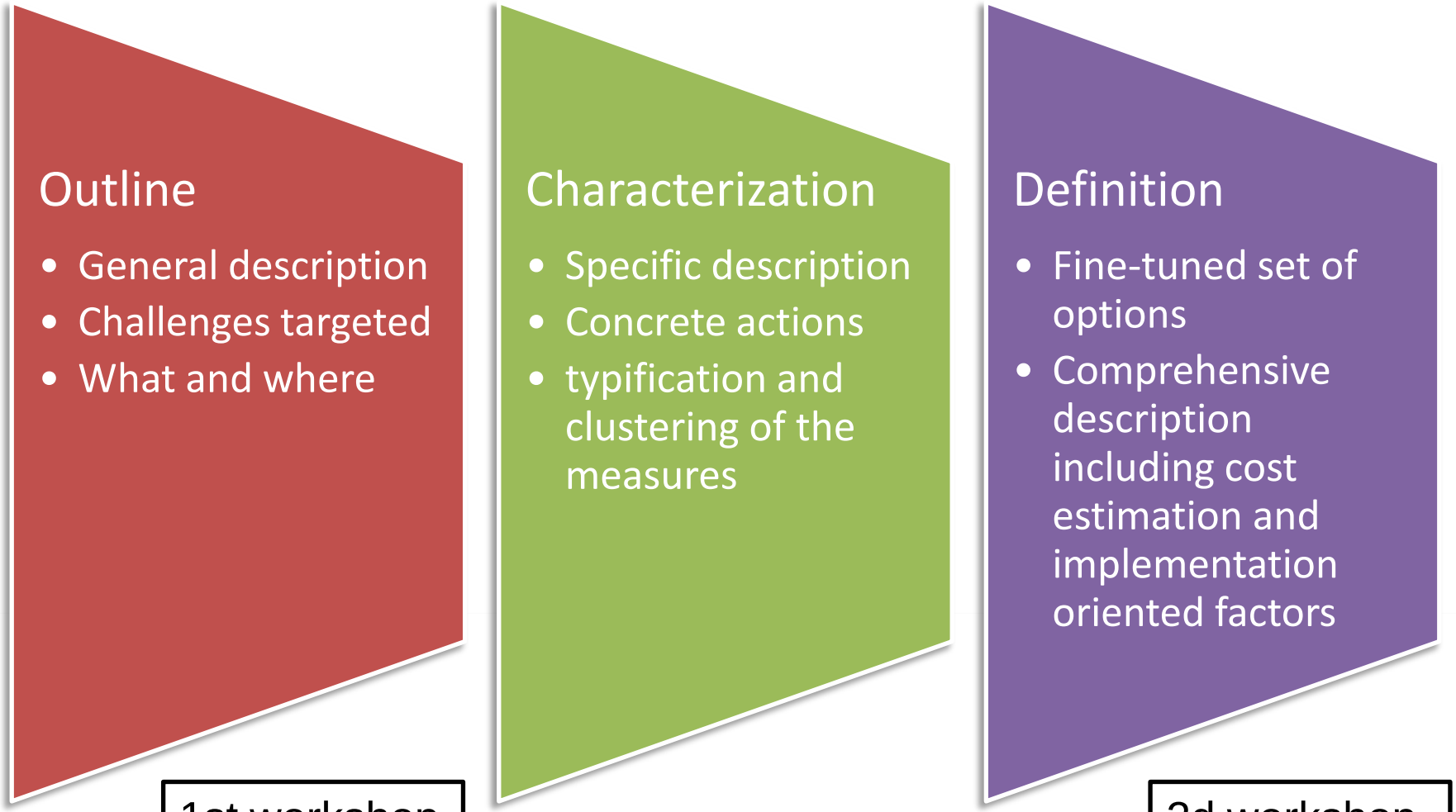
Results of the FCM: Model of the River basins dynamics



Base reference: indicates how the factors included in the modeled map relate to each other.

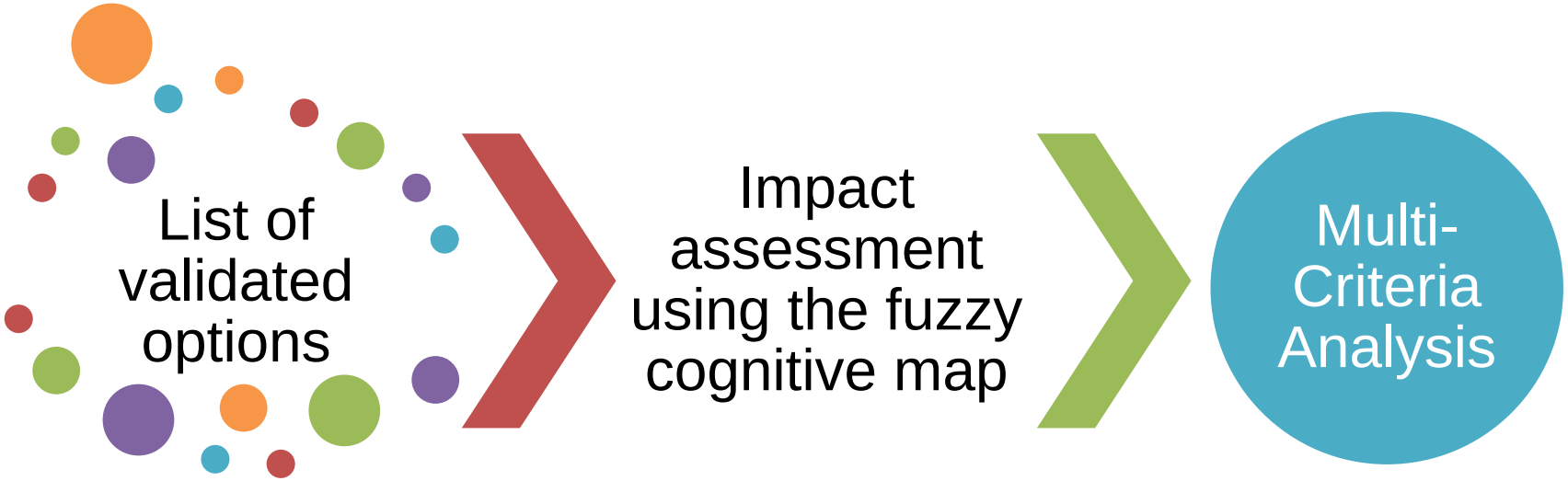
Problem solving:
Develop proposals

Formulation of Water Management Options



Challenges and solutions in Pedieos

Evaluation of water management options



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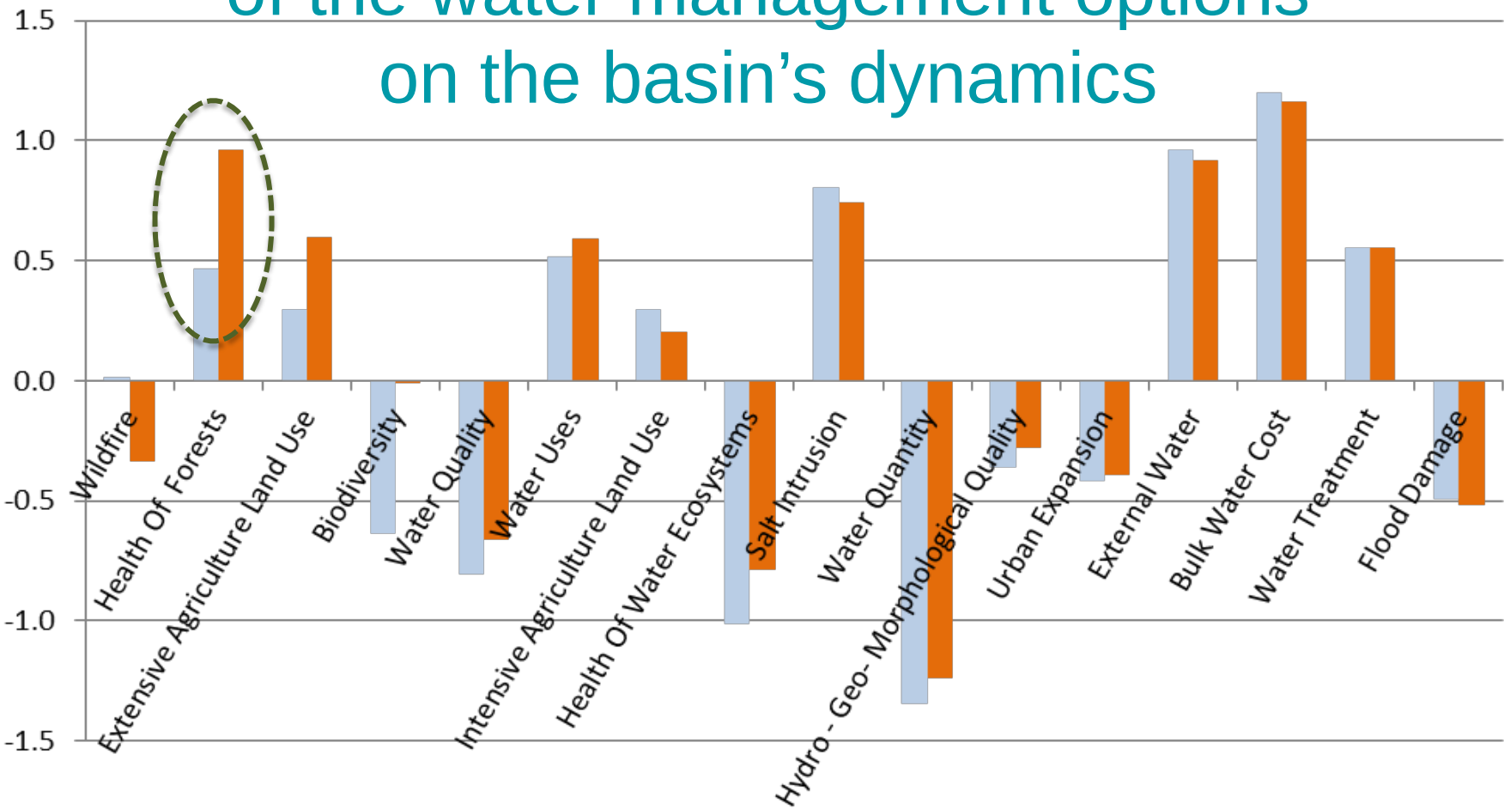
Characterization of water management options

List of options

List of descriptors : targets, implementation timeline, costs, scope of the actions proposed, viability, acceptability, …

	WMO	Water status				Water bodies		River section				Target water use sector								Target land use										Extreme events					Implementation scale				Implementation time horizon			Expected lifetime			Timelag between		
		Quantity	Chemical quality	Ecological quality	Hydrogeomorphological quality	Surface water	Groundwater	Up	Middle	Down	River as a whole	Local population	Tourism	Industry	Agriculture	Forestry	Energy	Water management	Others (please specify at the end of the row)	Arable land (rainfed)	Arable land (irrigated)	Permanent crops (rainfed)	Permanent crops (irrigated)	Grassland	Forests	Built-up	Wetlands & deltas	Beaches & salines	Other	Drought	Flooding	Storms	Wildfires	Not related	National	Regional	Municipal	Basin	Short (< 5 yrs)	Medium (5-20 yrs)	Long (> 20 yrs)	Short (< 5 years)	Medium (5-20 years)	Long (> 20 years)	Short (< 5 years)	Medium (5-20 years)	Long (> 20 years)
13	Create Basin Council	1	1	1	1	1	1				1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1		1	1	1	1				1	1			1			1		
14	Develop a water traceability label for agriculture products	1				1	1				1				1						1		1										1		1	1	1	1			1			1		
15	Create Municipal Adaptation coordination board	1	1	1	1	1	1				1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1		1	1	1	1				1	1			1			1		
16	Enhance soft depuration plants in small municipalities and scattered houses		1	1		1	1				1	1	1					1								1			1							1		1			1			1		
17	Create an Integrated Plan for the protection of the Tordera delta	1	1	1	1	1	1			1		1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1		1	1	1	1				1		1		1			1		
19	Foster selective fishing			1		1					1	1	1		1														1								1	1			1			1		
20	Integrate adaptation indicators into EIAs	1	1	1	1	1	1				1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1		1	1	1	1			1	1	1	1			1			1		
21	Awareness rising	1	1	1	1	1	1				1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1		1	1	1	1				1	1			1			1		
22	Modernize irrigation techniques	1	1			1	1	1		1					1						1		1							1					1		1		1			1			1		
23	Revise water service contracts	1				1	1				1	1	1	1	1		1	1			1		1				1							1	1	1	1	1			1			1		
24	Increase environmental protected areas	1	1	1	1	1	1				1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1		1	1	1	1				1	1			1				1	
25	Increase all service supply fix levy for holiday houses	1	1			1	1				1	1	1					1								1			1							1		1			1			1		
26	Recovery of wetlands and their connectivity	1	1	1	1	1	1				1							1									1			1	1						1	1			1			1		
27	Ban the use of Gliphosphate from Municipal parks and gardening practices.		1			1	1				1	1	1		1	1				1	1	1	1	1	1	1	1						1			1		1					1	1	
28	Create a catchment agreement to reduce diffuse pollution		1	1		1	1				1	1			1					1	1	1	1	1			1							1			1	1			1			1		
29	publish drinkwater quality data online		1			1	1				1	1	1													1								1			1	1			1			1		
30	increase the number of gauging stations	1			1	1					1							1			1		1			1			1	1						1	1			1			1		
31	Protect groundwater recharge areas	1			1		1				1	1	1	1	1			1		1	1	1	1	1	1	1	1			1	1						1	1		1			1		
32	Implement environmental flow regime	1			1	1					1							1			1		1			1	1	1		1	1						1		1			1		
33	Recover and protect river space				1	1					1	1	1	1	1			1		1	1	1	1	1		1	1				1						1		1			1		
34	Constrain criteria for bulk water supply	1				1	1				1							1			1		1			1				1	1					1	1			1			1		
35	Modify perverse subsidies	1	1	1	1	1	1				1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1			1	1	1	1		1	1	1	1			1			1		
36	Increase legislative coordination	1	1	1	1	1	1				1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1		1	1	1	1		1	1	1	1			1			1		
37	Revision and actualization of water entitlements	1				1	1				1	1	1	1	1		1	1			1		1			1				1				1			1			1			1		
39	Develop a River custody agreements				1	1					1	1		1	1			1		1	1	1	1			1	1	1			1						1	1			1			1		

Impact assessment
of the water management options on the basin's dynamics



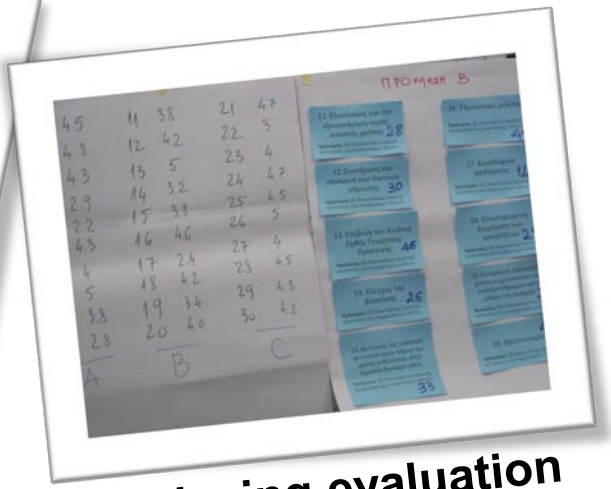
- The option affects the **relation** between factors in the map.
- Allows to **compare** the FCM reference model with a new state of the basin's dynamics indicating the **changes induced by the WMO.**

Multi-Criteria Analysis

Presenting BeWater

Selecting evaluation criteria

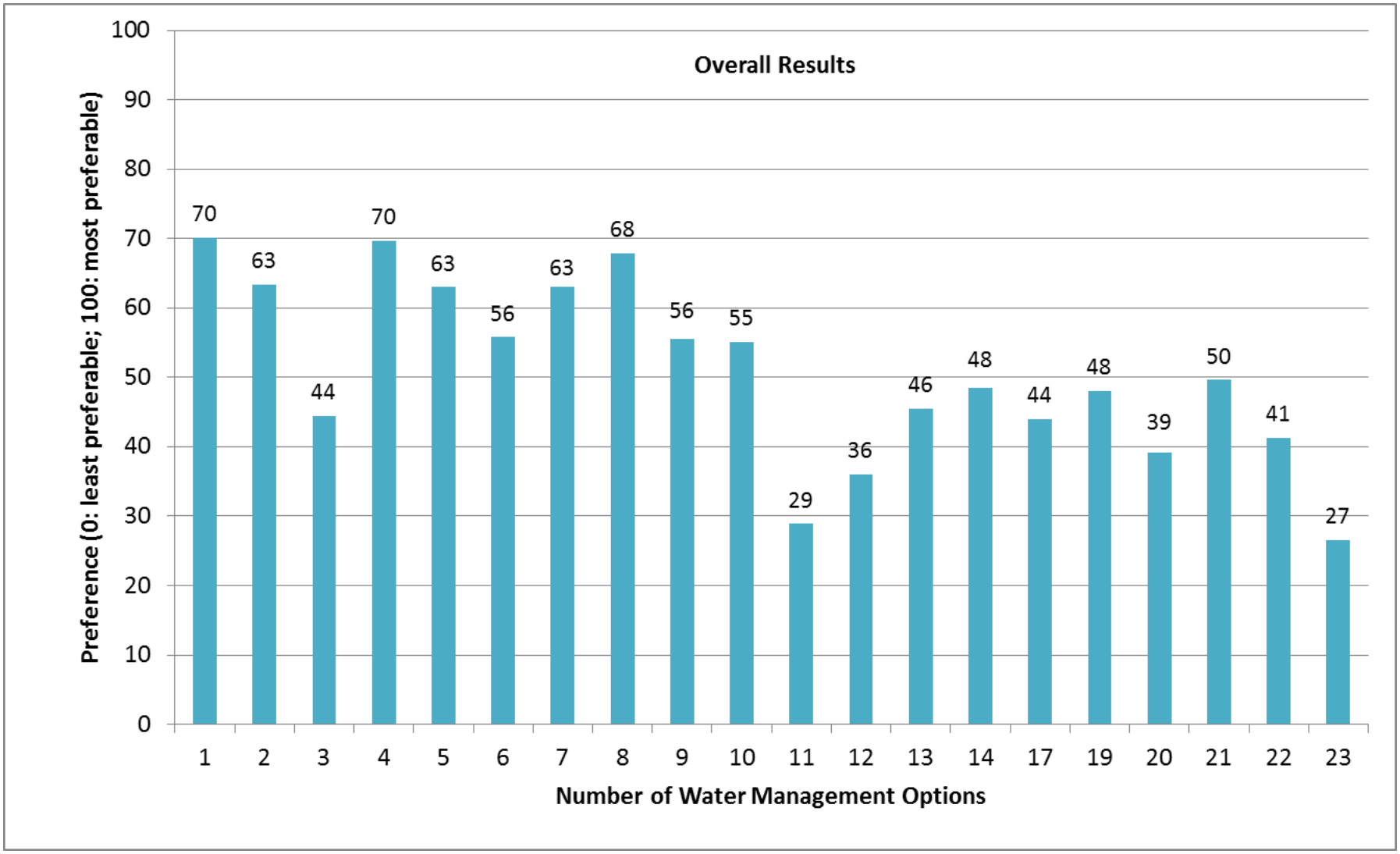
Indicating preferences



Analysing evaluation results

Discussing water management options

Multi-Criteria Analysis: Vipava basin (Slovenia)



Prioritized water management options

Vipava (Slovenia):

- Reconstruction of existing water reservoir and construction of new ones, and irrigation systems.
- Construction of dry reservoirs.
- Awareness campaigns for experts, farmers and local public together with inter-municipal working group.

Tordera (Spain):

- Environmental flows and recovering groundwater levels.
- Information access and availability, and citizens engagement.
- Adaptive forest management agreements.

Rmel (Tunisia):

- Promote new water and soil conservation techniques
- Use of water irrigation technologies
- Reduction of society pressure on forests
- Involving stakeholders in all steps of the study and decision making

Pedieos (Cyprus):

- Dynamic dam water management.
- Enforcement of the Code of Good Agricultural Practices.
- Restoration and maintenance of riverbed.

102 options in total!

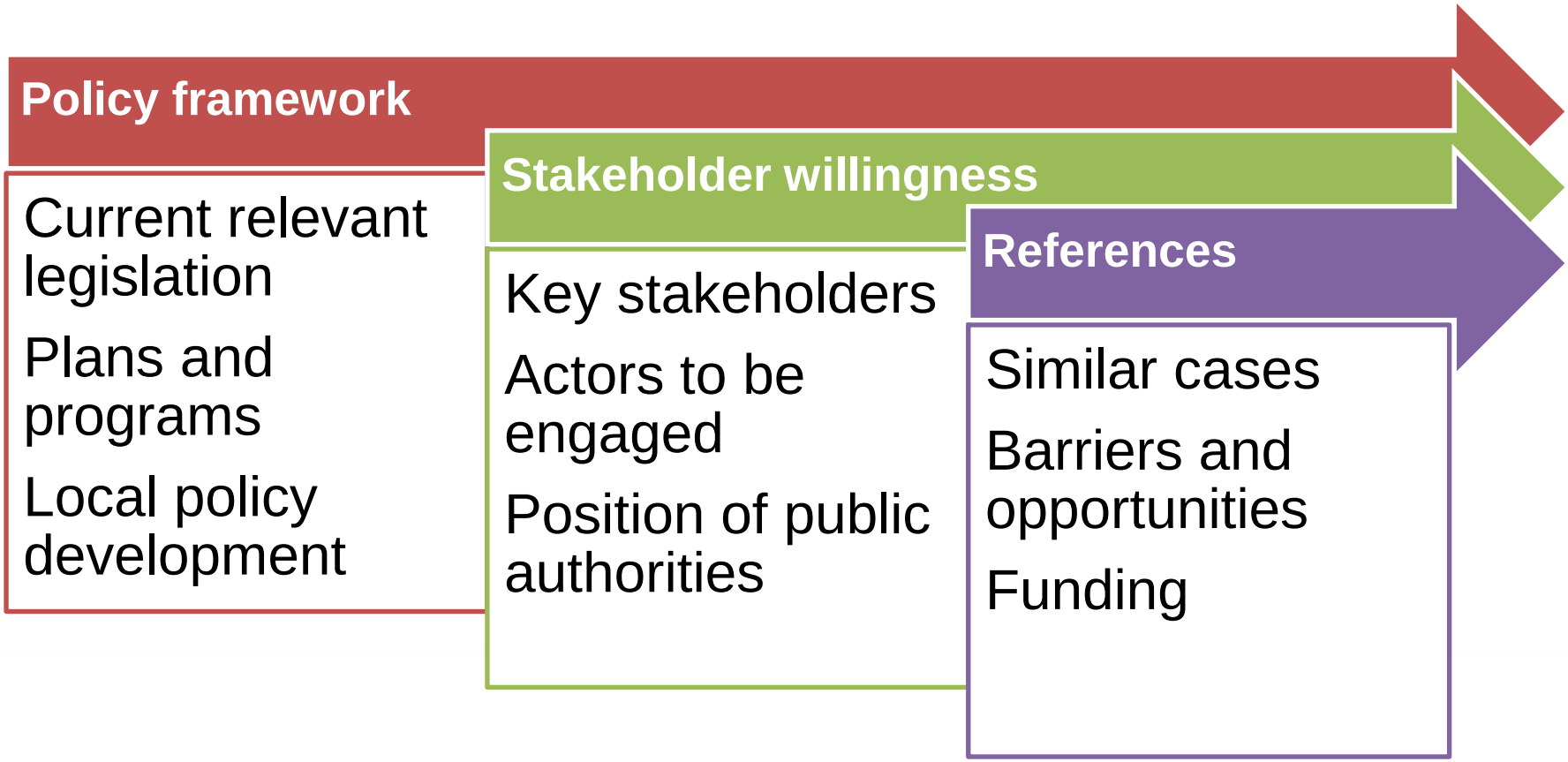
Preparing Adaptation Plans

Bundling of options

Group of options which could be implemented jointly:

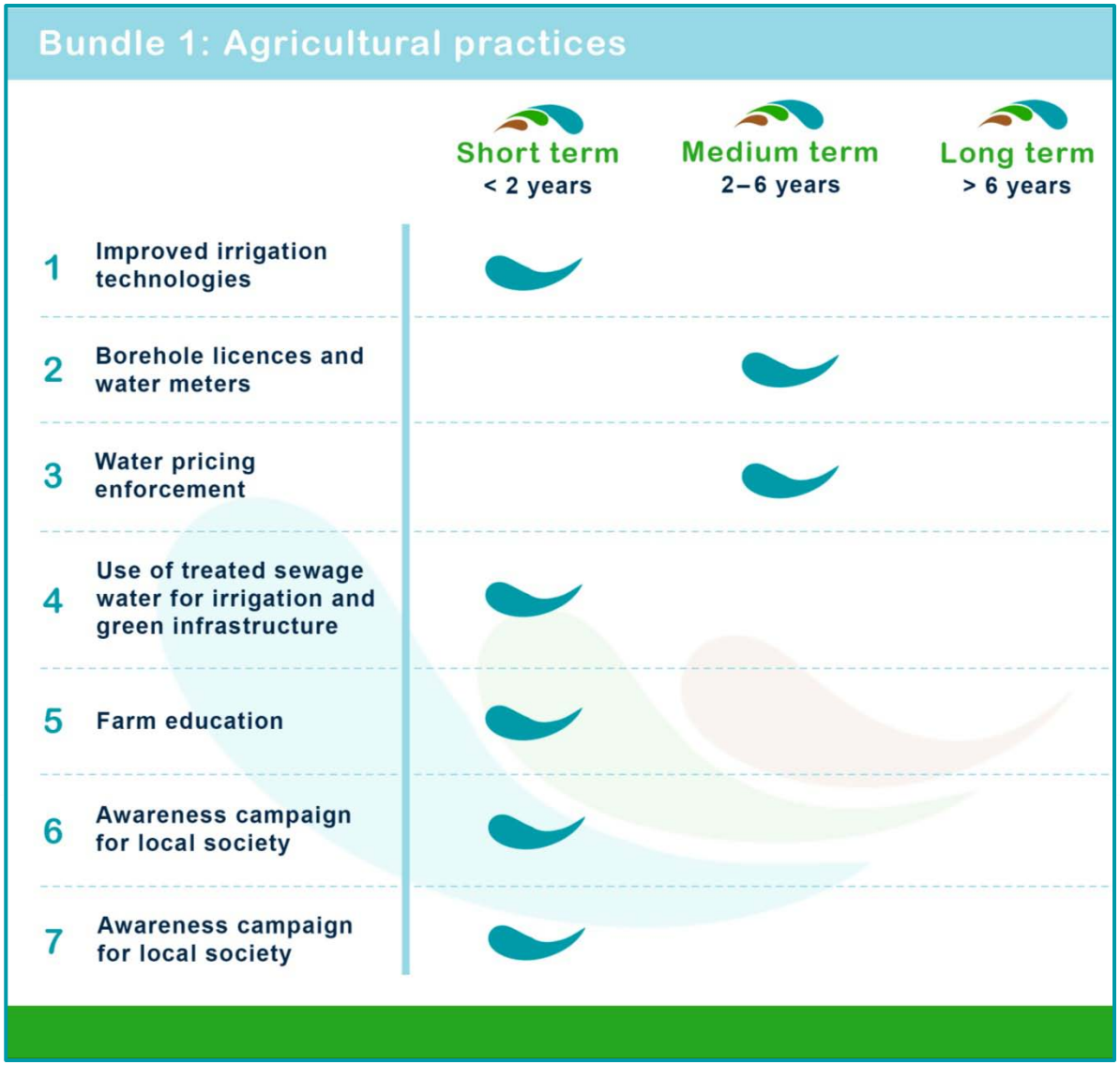
- **Enhance co-benefits**
- **Take into account conflicts**
- **Inter-dependence**
- **Preconditions**
- **Opportunities for up-take**

Preparing Adaptation Plans
Implementation oriented information

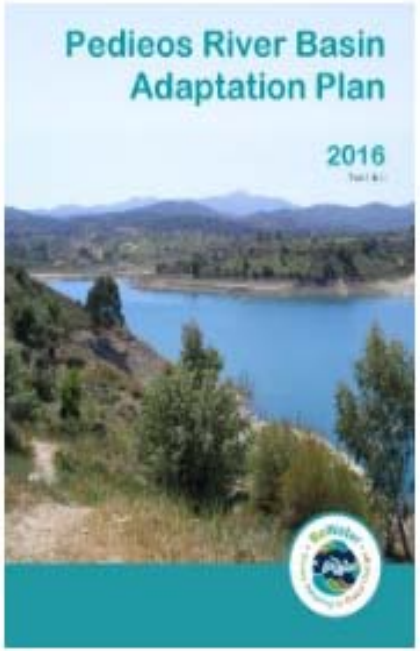


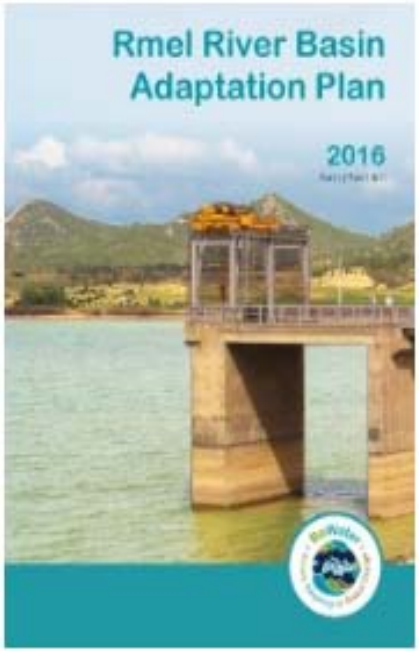
Adaptation pathways

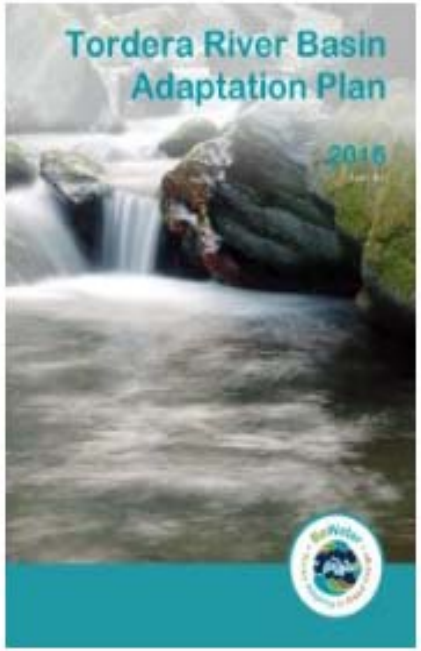
Participants designed the best combination of water management options and a sound timing to implement them in according to synergies and opportunities identified previously.



4 Adaptation Plans







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BeWater: facing challenges for inclusive governance

- Level of interest: local societies are **willing to contribute** to pursue the solutions to the impacts of global change.

- Consolidation of approach and methods: applied to 4 pilot **case study river basins**.

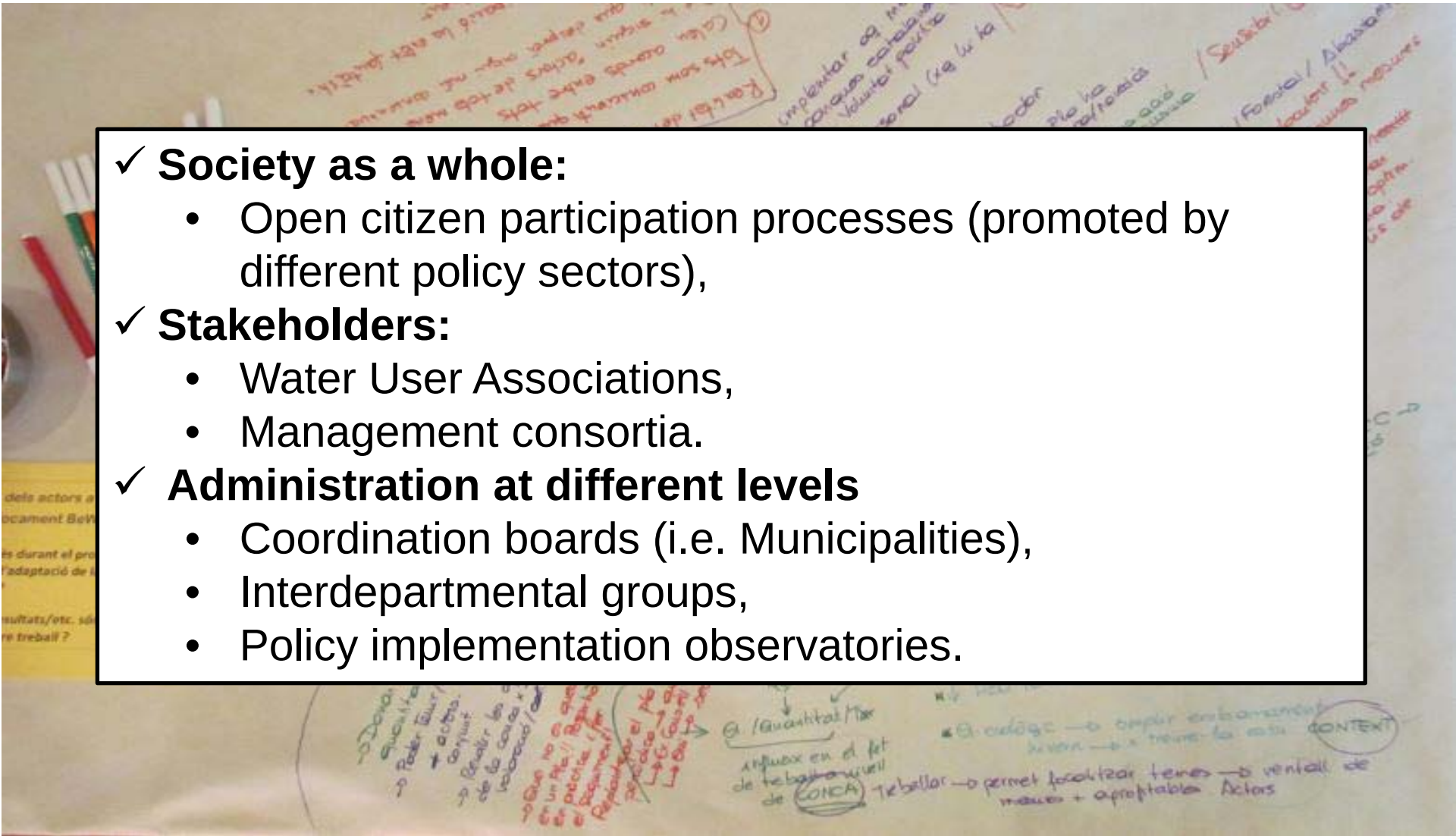
- Sound scientific diagnosis but including local society knowledge (**vulnerability** analysis and **uncertainty** assessment).

- Social-ecological **trade-off's:** increase **resilience by** fostering problem solving processes that reach **compromises**.
- Multi-level governance, intense and active involvement of society

Promoting inclusive governance

- Identifying key actors and developing targeted **engagement strategies**;
- Linking **actor groups** and creating opportunities for **interaction;**
- Fostering citizen's **empowerment and awareness and convergent targets**;
- Enhancing inter-sectoral **knowledge sharing**;
- Increasing **transparency** (access, format, timing) of relevant information;
- Delivering key messages to **decision makers**;
- Promoting **institutional changes** to allow consolidation of inclusive governance practices.

Proposals for improved governance in BeWater Case studies



- ✓ **Society as a whole:**
  - Open citizen participation processes (promoted by different policy sectors),
- ✓ **Stakeholders:**
  - Water User Associations,
  - Management consortia.
- ✓ **Administration at different levels**
  - Coordination boards (i.e. Municipalities),
  - Interdepartmental groups,
  - Policy implementation observatories.

Governance for Adaptive Water Management: what do we need?

- New regulations and new institutional structures;
- Increased collaboration between competent authorities and policy makers;
- Transparency and sound planning;
- Include all citizens into decision making processes;
- Guarantee continuity of deliberative spaces;
- Accountability on uptake and implementation;
- Social learning processes.

Thank you!

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