



WHO NEEDS WATER? Managing drought in Alps. Climate change and Alpine water resource to be preserved

Drought policies and management in the Alps: a method and evidence from some pilot regions in the ADO Project

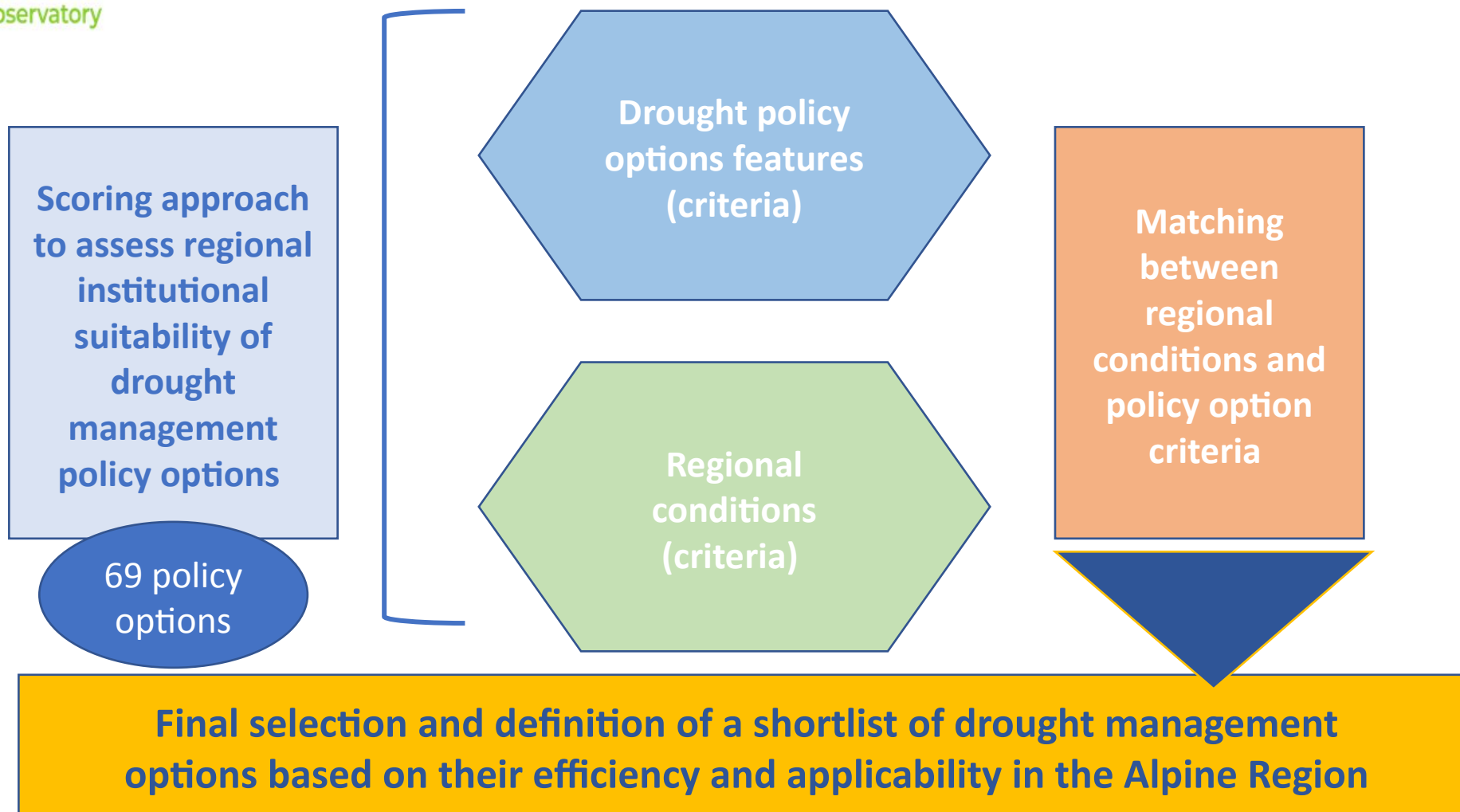


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The policy analysis approach



Drought policies categories considered in the study

1. **Structural approaches/framework:** collaboration of water services/management with other policy sectors such as housing or international legislation
2. **Regulatory tools:** drought orders and drought permits
3. **Participative and community-based:** collective management of a resource, river contracts
4. **Procedural devices:** water markets, payment schemes for drought permits.
5. **Valuing water/attitudes (behaviour):** water stewardship or water rights
6. **Abstractor group:** irrigation management, agricultural insurance contracts.
7. **Land use planning:** restoring wetlands or drought tolerant landscaping
8. **Distribute water:** bulk water agreements or sharing water
9. **Technology:** deepening a borehole
10. **Company:** pressure management
11. **Metering:** smart metering for variable tariffs/fees calculation
12. **Supply side/water creation:** water recycling, use of reservoirs or desalination plants
13. **Economic and financial tools:** drought insurance schemes, community funds for drought management, fiscal policy instruments earmarked to improvement in water service provision
14. **Policies for cities:** sewage management, distribution through aqueducts, etc.

Eurac research: adapted from Grecksch & Landström, 2021.

SCORING APPROACH: MULTI-CRITERIA ANALYSIS (MCA)

Definition of 5 criteria for **regional analysis** and 6 criteria for **policy options analysis**

Regional criteria:

1. Excludability of the asset (technical)
2. Regional impacts (intensity)
3. Affected regional sectors (impacts)
4. Inter-sector conflicts and opportunity costs
5. Information (datasets) (supply)

Policy options criteria:

1. Overall and specific goal (consistency)
2. Incentives (drivers)
3. Co-benefits (other sectors)
4. Data availability (demand)
5. Conflicts and trade-offs (presence)
6. Excludability (policy requirement)

RSPI and WSPSI INDICES

Regional scoring

Regional Suitability Policy Index (RSPI): assessing the overall quality of the regional conditions to host drought management policies

$$(RSPI = P_{i=1...n} = w_1 V_1 * ... * w_n V_n)$$

Policy scoring

Water Scarcity Policy

Suitability Index (WSPSI): assessing the suitability of a given policy to address water scarcity satisfactorily

$$(WSPSI = P_{i=1...n} = w_1 V_1 * ... * w_n V_n)$$

For both indices:

V: value to each criteria for the region/policy option in a range from 1 to 4.

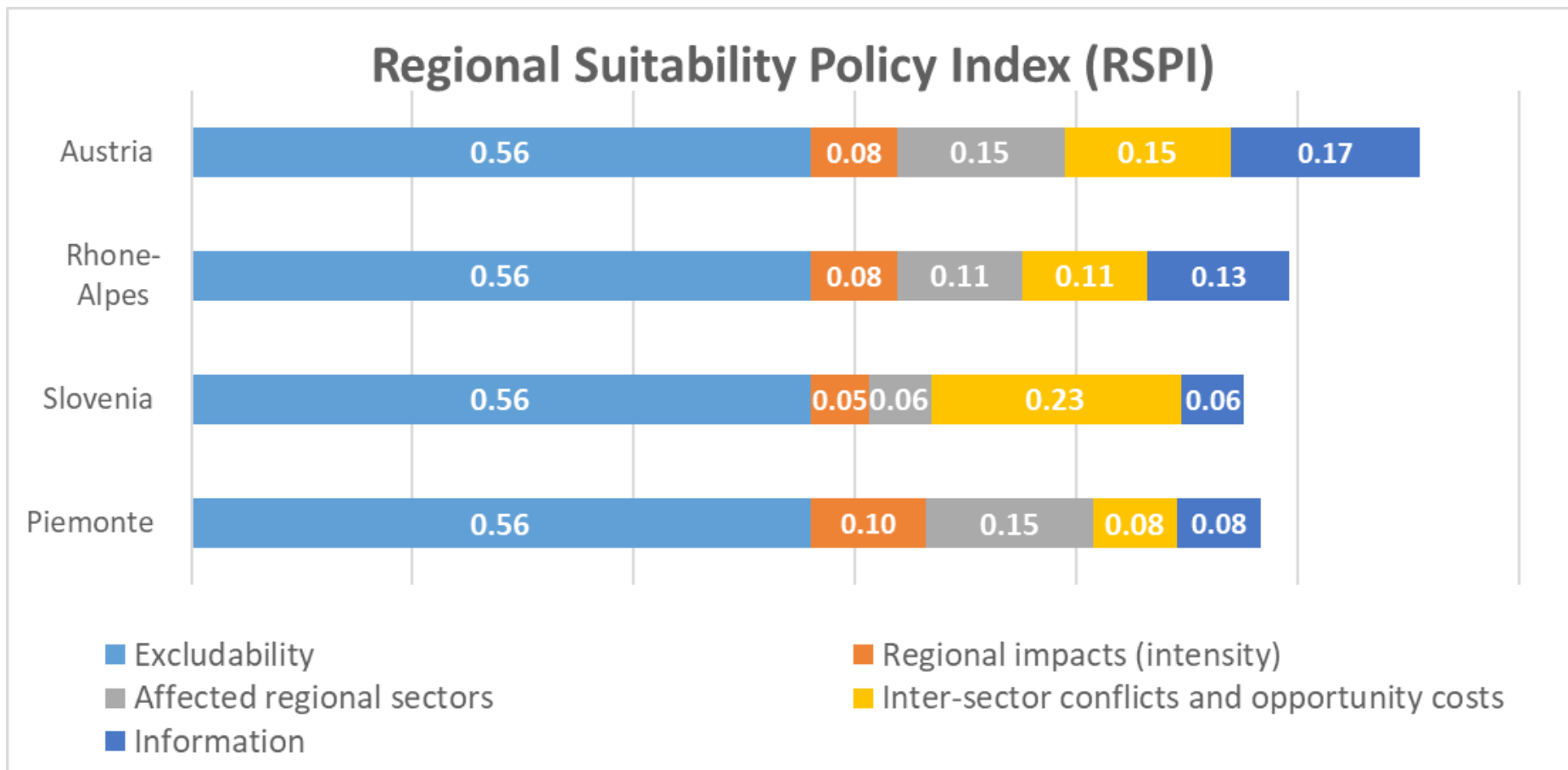
VALUE	MEANING
1	Not present
2	Scarcely present
3	Significantly present
4	Fully present

W: a weight is assigned* to each criteria: not all the criteria hold the same importance

$$Sw_{i, i=1-n} = 1 \rightarrow \text{sum of weights is 1}$$

Weighting is obtained by asking **5 experts in water management and environmental policies (both for regional and policy options).*

REGIONAL ANALYSIS

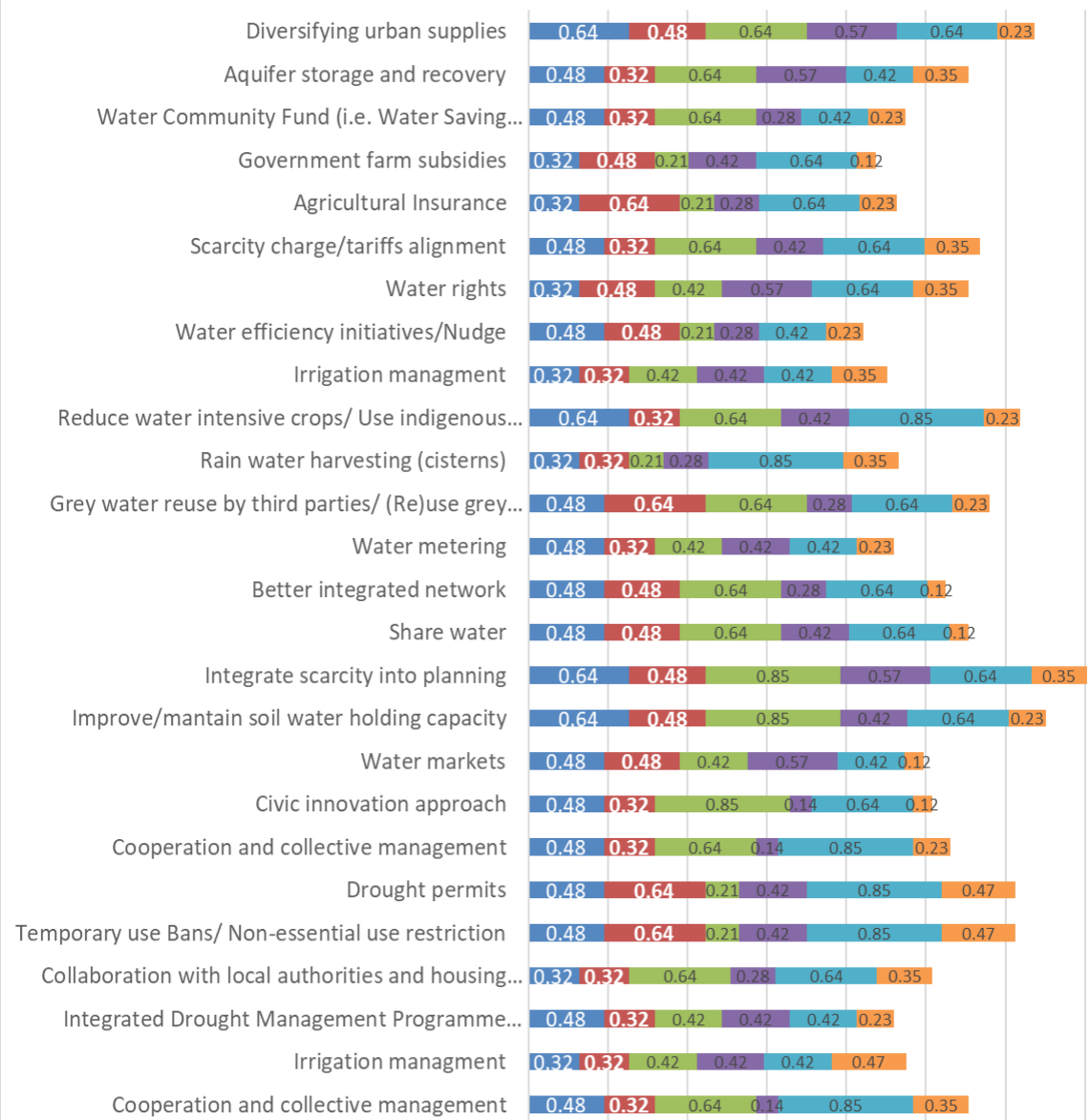


POLICY OPTIONS ANALYSIS

provides **index values** for each policy option* based on the assessment of its performance against 6 criteria

**70 policies identified through literature review and case-study analysis, organized in 14 categories*

Water Scarcity Policy Suitability Index (WSPSI)



Overall and specific goal

Incentives (drivers)

Co-benefits

Data availability

Conflicts and trade-offs

Excludability (policy)

Matching regional features & policy criteria to assess the suitability of a policy option to address a specific regional context

REGIONAL CRITERIA	Excludability	Regional impact intensity	Affected regional sectors	Intersector conflicts and opportunity cost	Information
POLICY CRITERIA	Excludability of policies	Incentives	Co-benefits	Conflicts and trade-offs	Data availability

Analysis of the difference between the scores assigned to a selection of 5 criteria for regions and policy options to assess the level of **matching** between policies and regional features



		Excludability	Regional impact intensity	Affected regional sectors	Intersector conflicts and opportunity cost	Information	Score (0-1)	Score (%)
	Weights regional criteria	0.14	0.26	0.18	0.18	0.24		
Structural approaches/framework	Integrated Drought Management Programme (IDMP)	0	0.26	0.18	0	0.24	0.68	68%
Structural approaches/framework	Collaboration with local authorities and housing developers to ensure water and energy saving	0	0.26	0	0	0	0.26	26%
Regulatory tools	Temporary use Bans/ Non-essential use restriction	0.14	0	0	0.18	0.24	0.56	56%
Regulatory tools	Drought permits	0.14	0	0	0.18	0.24	0.56	56%
Participative and community based	Cooperation and collective management	0	0.26	0	0.18	0	0.44	44%
Participative and community based	Civic innovation approach	0	0.26	0	0	0	0.26	26%
Procedural device	Water markets	0	0	0.18	0	0	0.18	18%
Land use planning	Improve/maintain soil water holding capacity	0	0	0	0	0.24	0.24	24%
Land use planning	Integrate scarcity into planning	0	0	0	0	0	0	0%
Distribute water	Share water	0	0	0	0	0.24	0.24	24%
Company	Better integrated network	0	0	0	0	0	0	0%
Metering	Water metering	0	0.26	0.18	0	0.24	0.68	68%
Supply side/ water creation	Grey water reuse by third parties/ (Re)use grey water	0	0	0	0	0	0	0%
Supply side/ water creation	Rain water harvesting (cisterns)	0	0.26	0	0.18	0	0.44	44%
Abstractor group: agriculture	Reduce water intensive crops/ Use indigenous crops	0	0.26	0	0.18	0.24	0.68	68%
Abstractor group: agriculture	Irrigation management	0	0.26	0.18	0	0.24	0.68	68%
Valuing water/attitudes (behaviour)	Water efficiency initiatives/Nudge	0	0	0	0	0	0	0%
Valuing water/attitudes (behaviour)	Water rights	0	0	0.18	0	0	0.18	18%
Economic and financial tools	Scarcity charge/tariffs alignment	0	0.26	0	0	0.24	0.5	50%

"Shortlisted policies" by
suitability
to address alpine
regional contexts
(average values of the
matching from the ADO
responding pilot
regions)

Policy option	Weighted Policy Matching Index (Average all PRs)
Share water	0.43
Better integrated network	0.43
Improve/maintain soil water holding capacity	0.385
Temporary use Bans/ Non-essential use restriction	0.37
Drought permits	0.37
Collaboration with local authorities and housing developers to ensure water and energy saving	0.365
Grey water reuse by third parties/ (Re)use grey water	0.365
Scarcity charge/tariffs alignment	0.365
Government farm subsidies	0.34
Reduce water intensive crops/ Use indigenous crops	0.32

Best matching 10 policy options in the ADO PRs

Policy options by threshold as analysed for ADO Pilot Regions ->Regione Piemonte (Italy)

Policy option	Weighted Policy Matching Index Regione Piemonte	Threshold
Reduce water intensive crops/ Use indigenous crops	0.68	Readily Available
Integrated Drought Management Programme (IDMP)	0.68	
Water metering	0.68	
Irrigation management	0.68	
Temporary use Bans/ Non-essential use restriction	0.56	Intermediate stage
Drought permits	0.56	
Scarcity charge/tariffs alignment	0.5	
Rain water harvesting (cisterns)	0.44	
Cooperation and collective management	0.44	
Collaboration with local authorities and housing developers to ensure water and energy saving	0.26	Adjustment needed
Water Community Fund (i.e. Water Saving Community Fund)	0.26	
Civic innovation approach	0.26	
Aquifer storage and recovery	0.26	
Share water	0.24	
Improve/maintain soil water holding capacity	0.24	Major reforms
Government farm subsidies	0.24	
Water rights	0.18	
Water markets	0.18	
Better integrated network	0	
Grey water reuse by third parties/ (Re)use grey water	0	Major reforms
Diversifying urban supplies	0	
Agricultural Insurance	0	
Integrate scarcity into planning	0	
Water efficiency initiatives/Nudge	0	

Policy options by threshold, Regione Piemonte

Summary

- RSPI analysis mirrors the "suitability" and readiness of a region in large policy terms to adopt drought management policies
- Diverse cases can be identified and different features emerge in different areas which may deserve more investigation
- Issues concerning excludability and conflicts are prominent
- WSPSI show significant differences in their potential efficacy (absolute terms)
- Policy indices can be integrated with quantitative data and results of other regional analysis (e.g. sectors, impacts)

Challenges and future developments

- All the policy components analysed play a role in shaping the policy, however co-benefits do not seem to have been fully recognised so far
- Conflicts are quite evenly distributed across the sample
- Data availability appears to be a need for applying several policy options of the sample
- Notwithstanding the limited significance of average values, the matching exercise shows that the easiest policy options to adopt across the Alps could include water sharing, soil management, and network improvements
- The situation is more nuanced when single regions are studied. However, all regions have some options at hand, but may need some reform to introduce significantly innovative options