Integrated social-ecological and governance analysis of the water-energy-food-ecosystems Nexus in a mountain catchment in Northern Italy

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Summary

The Alps are the “water towers” of Northern Italy, contributing on average to 53% of the discharge in the River Po.[1] Changes to the total and seasonal availability of alpine water resources induced by climate change cause trade-offs between water dependent sectors, which became evident in recent water scarcity and drought conditions. The Water-Energy-Food-Ecosystems (WEFE) Nexus approach has proven useful to understand how these sectors are intrinsically interconnected at a biophysical and technological level. The governance implications of WEFE interdependencies and the institutional interlinkages between the sectors have received, so far, less attention. The objective of this study is to qualitatively assess water scarcity in terms of:

- Interlinkages between social-ecological processes across the WEFE sectors
- Interconnections between sectoral venues of decision making and policy formulation

Methodology

Action Situation: a venue of decision-making where social actors interact and produce an outcome.[2]

Data source

- Stakeholder Interviews
- Observation of stakeholder meetings
- Regional policies, plans
- News’ articles

Results: governance interconnections

- Unilateral influence
- Mutual influence
- Only active in drought
- Key Action Situation

Legend

AS 15: Renewal of large hydropower concessions
AS 4: New drinking water supply concession
AS 6: Irrigation at farm level
AS 8: E-flow experimentation by water users
As 9: Groundwater withdrawal concession
AS 10: Energy and Environmental Plan
AS 11: Sustainable Development Plan
AS 13: Water Protection Plan
AS 18: River Po Basin Water Balance Plan
AS 18: Energy and Environmental Policy
AS D1: Coordination dialogue energy-agriculture
AS D2: Water allocation plan between irrigation districts
AS D3: Guidelines for drought management

Results: social-ecological interlinkages

- Water scarcity
- Ecological degradation
- Drought

Legend

- Reinforcing loop
- Balancing loop
- Negative causal link
- Positive causal link
- Causal link in drought
- Water flow upstream downstream

Case study

Torrente Orco catchment, River Po Basin, Northern Italy

- Large storage capacity in upstream hydropower reservoirs
- Large downstream withdrawals for irrigation (corn, grassland, cereals, soya)
- Frequent water scarcity conditions (granted concession vs available water)
- Water resources partly allocated outside the catchment

Conclusions

- Droughts reinforce uptake of decision making at operational level into higher hierarchical levels (AS D1 + AS 1; AS D2 + AS 3)
- Multi-purpose use of hydropower reservoirs is enabled by informal agreements at the operational level (AS 4, AS 5, AS D1)
- Need to further support transformation of local agriculture to a more profitable and climate-resilient sector.
- Risk of over-reliance on existing hydropower reservoirs?

References


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Questions? Comments?

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