

## **REGARDS – REsilience of marginal GrAsslands and biodiveRsity management Decision Support**

European marginal grasslands are biodiversity hot spots owing to ecological constraints, biophysical heterogeneity, and centuries of agriculture. Currently it is not clear whether they are vulnerable to ongoing environmental, socio-economic and political changes, or if they have developed a high resilience over their history of co-evolution between humans and ecosystems. If so, the limits to this resilience are unknown, and their prediction hazardous. This uncertainty lies largely in the poor knowledge of resilience mechanisms of the ecological and human sub-systems, and of the role of land management decisions and ecosystem services to foster robustness or vulnerability.

REGARDS aims to unravel the mechanisms underpinning resilience of marginal grassland systems to environmental and social changes in order to enhance socio-ecological resilience from farm to regional level. The project asks the following questions:

- 1) Can we identify dangerous thresholds in the combined effects of changing climate, including extremes, and management on grassland ecosystems?
- 2) How does coupled plant-soil biodiversity determine such responses?
- 3) How do landscape structures affect the resilience of ecosystem services?
- 4) Can multi-level governance facilitate fast adaptation to socioeconomic changes that affect biodiversity and the related ecosystem services?
- 5) Do regional integration and globalization modify resilience through their effects on flows of goods and ecosystem services, people and information?
- 6) How do ecological and human processes combine to determine resilience of ecosystem services?

REGARDS will address these questions for mountain grassland sites (Austria, France, Norway) with contrasted biophysical and human situations. Questions (1) and (2) will be addressed using field experiments. Historical analysis over the last 60 years will be used to quantify landscape functional structure and its effects on ecosystem services (question 3). Question (4) will be addressed by an assessment of how local, regional, national and EU programs affect farmers responses and resilience. Question (5) will be addressed by reconstructing exchanges with other regions of each site. A participative scenario-based approach will evaluate likely thresholds in terms of biodiversity, ecosystem services, material well-being (question 6). Outcomes will be used to foster knowledge building about resilience at farm and local/regional levels.



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