ECOSYSTEM SERVICES PROVIDED BY MOUNTAIN PASTURES

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Life

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Ecosystem services is a term largely used among scientists and policymakers that refers to the connection between the environment and human livelihoods[1]. Ecosystem services are identified in four main categories: provisioning, regulating, supporting and, cultural services

- Provisioning services refers to the tangible resources or goods that people obtain from ecosystems, such as biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling.
- Regulating services refers to the intangible benefit such as maintaining the quality of air and soil, providing flood and disease control, or pollinating crops.
- Supporting services refers to the provision of living spaces for plants or animals and maintaining a diversity of plants and animals.
- Lastly, cultural services are the non-material benefits people obtain from ecosystems, such as cultural identity, sense of home, or the spiritual experience related to the natural environment.

The role of pastoralism in grassland ecosystem services

Grasslands cover 15.9% of the area of the EU-28 and are its third most widespread habitat. In addition to being used for food production, grasslands deliver several other ecosystem services. They contribute to soil carbon sequestration, biodiversity, beauty of the landscape, maintaining populations in rural areas, conservation of soil quality and supply of feed protein at farm level. More specifically, pastoralism contributes to grassland biodiversity in the following ways:

- Opening the landscape through livestock foraging, treading and defoliation, hence fostering spatial diversity (a patchwork of different habitats) and the presence of herbaceous plant species in competition with woody ones.
- Supporting biodiversity by contributing to the spread of seeds of woody and herbaceous plant species and many animal species such as birds, amphibians etc.
- Enhancing natural fertilisation and transportation of nutrients through excreta from livestock.
- Recycling organic matter, promoting the acceleration of nutrient cycles, and fostering the diversity/activity of soil biota.
- Increasing the use of local livestock breeds and crop varieties which are better adapted to local environments and more resistant against diseases, drought, and other changes in climate.
- Gathering and inheriting knowledge on different species and their related management practices.
- Ensuring, through the longevity of pastoral systems, the ecological predictability and stability of grassland habitats and the temporal diversity of patchwork management to adapt with changes and trends.

1. la Notte, A., D'Amato, D., Mäkinen, H., Paracchini, M. L., Liquete, C., Egoh, B., Geneletti, D., & Crossman, N. D. (2017). Ecosystem services classification: A systems ecology perspective of the cascade framework. Ecological Indicators, 74, 392–402. https://doi.org/10.1016/j.ecolind.2016.11.030

However, over the last decades a trend towards less grazing has been visible throughout Europe[2]. Land abandonment, intensification, afforestation, and conversation to other land-use types have led to a 90% decrease in semi-grasslands in most European countries and the loss (or even extinction) of species inhabiting these ecosystems[3].

Another visible impact of the abandonment of grazing activities has been the increased risk of wildfires. Through grazing, animals help to control plants growth and reduces plant fuel cover, maintaining grasslands open and fire resilient. As an example, Corsica has seen an increased number of scrubland fires, especially in areas impacted by the abandonment of pastures, and studies showed how pastoralism provided an extensive and sustainable solution to these fire risks[4]. The validity of using livestock grazing as a fire prevention tool was further demonstrated in several Natural Parks of Andalusia[5].

Even though the benefits of pastoralism on the environment are significant, pastoralists are often blamed for grassland degradation[6]. However, according to the FAO[7], grasslands management practices inherent to pastoralism have in fact contributed to the enhancement of grassland biodiversity, as well as to the maintenance and conservation of important wildlife habitats. Unfortunately, several factors (e.g., unfavourable government policies, the loss of key grazing areas to competing land uses, an increasing population and climate change) have decreased traditional management practices and livestock mobility. This has vegetation, wildlife and land use, thus exposing grasslands to overgrazing or under grazing, often leading to degradation.

> "Rather than abandoning pastoralism, the revitalisation of traditional practices and indigenous knowledge is vital to secure sustainable livelihoods for millions of pastoralists, to maintain rangeland biodiversity and to preserve ecosystem services"
>
> FAO study

2. Van den Pol-van Dasselaar, A., Hennessy, D., & Isselstein, J. (2020). Grazing of dairy cows in europe-an in-depth analysis based on the perception of grassland experts. Sustainability (Switzerland), 12(3). https://doi.org/10.3390/su12031098
3. Waldén, E. (2018). Restoration of semi-natural grasslands: Impacts on biodiversity, ecosystem services and stakeholder perceptions Restoration of grassland biodiversity and ecosystem functioning in fragmented landscapes. https://www.researchgate.net/publication/327592845
4. Dubost Michel. (1991). Pastoralisme et feux en Corse. In G. Richez & J. Richez-Battesti (Eds.), Méditerranée, tome 72, 1-1991. Les grandes îles de la Méditerranée occidentale (pp. 33–38).
5. Mirazo, R.-, Robles Cruz, J., & Belén González Rebollar, A. (2009). Title Pastoralism in Natural Parks of Andalusia (Spain): a tool for fire prevention and the naturalization of ecosystems. http://hdl.handle.net/10261/42929
6. Grassland degradation refers to a biotic disturbance (e.g., overgrazing) in which botanical species struggle to grow (Bardgett et al., 2021)
7. FAO. (2021). Pastoralism - Making variability work. In Pastoralism - Making variability work. FAO. https://doi.org/10.4060/cb5855en

Ecosystem services in the Basque Country

Because mountain pastures are rich reservoirs of biodiversity, they need to be managed in order to guarantee the preservation of the ecosystem services that they can provide. The disappearance of pastoral practices would undeniably lead to the deterioration of mountain grasslands and hence all beneficial goods and services linked to these. This means it is not possible to address the environmental preservation of mountain grasslands without tackling the management of pastoralism. Over the last decades, the Basque mountains, which had been devoted to pastoral activities for centuries, have seen an increase in diversity and intensity of land uses, ranging from production, management and preservation of biodiversity to tourism and leisure activities. Competition between different land uses of mountain grasslands has sometimes led to conflicts. In this context, the LIFE project Oreka Mendian aimed to develop a common strategy for the conservation and the management of mountain pastures located in Natura 2000 areas in the region.

Oreka Mendian implemented several preservation measures based on monitoring, evaluation and stakeholder participatory activities in 15 Natura 2000 sites in the regions of Euskadi (Spain) and Iparralde (France). Many of those areas were characterised by the abandonment of their original pastoral use, or on the contrary an evolution towards more intensive production processes. As a result, several habitats are now considered to be in unfavourable state of conservation: many were colonized by scrub, suffered a loss of native species while invasive one developed, and saw an increase in combustible biomass.

A key objective of the project was thus to seek a balance between the interests of habitat conservation and the interest of mountain "users" (e.g., livestock farmers who make use of pasture). The project

involved landowners, technicians, farmers, experts and public authorities to assess their perception towards the ecological, hydrological, and social (cultural well-being and recreation) services of those habitats. The results indicated that landscapes and ecosystems are perceived valuable not only as places where biodiversity can be preserved but also because of the non-material benefits that people can obtain from them. As an outcome of this work, Oreka Mendian helped define strategies for the sustainable management of grazing practices as a tool to limit the deterioration of Basque grassland environments.

As an example, the project established several criteria for the management of habitat and species through a livestock management plan. The plan describes the actions necessary to achieve balance between the forage supplied by the grasslands and the demand for livestock use, as well as between livestock and forestry use. Thanks to the plan, grazing was limited to areas where the risk of forest regeneration or soil erosion was high. This allowed damaged habitats to recover.

Actions have also been implemented to rehabilitate abandoned pastures. This included targeted mechanised clearing actions allowing the use of grasslands for grazing, or efforts to clear invasive ferns and thistles. These actions have been coupled with the installation of salt blocks and water points in strategic locations, which helps guide livestock to under grazed areas, mainly in the lower mountain slopes as livestock have a natural tendency to graze higher up. Finally, the Oreka Mendian project has promoted the protection of wetlands and peatlands in the grazing areas, through the installation of permeable barriers to prevent their trampling by large livestock.

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