Overview of sustainable practices for the management of mountain grasslands in Europe

OREKA MENDIAN

Life

NATURA 2000

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A foreword by Herbert Dorfmann

In the past decades, as agriculture and animal husbandry have become increasingly intensive in Europe, we have forgotten how important pastoralism is on our continent.

There are many areas in Europe that can only be used for grazing animals. These include many extensive areas in alpine regions, in the Mediterranean or in the Arctic regions, or the dams of Europe major rivers. Grazing animals keep these areas open, fortify the dams and are part of our cultural landscape. Since we have become more aware of the limits and also the problems of ever more intensive production methods in agriculture, we start to realise again how important pastoralism is for our agriculture.

Sustainable animal husbandry is only possible with permanent grassland and extensive pastures. We need to control the stocking density in animal husbandry in Europe, restoring a clear relationship between animals and agricultural land, and decreasing our dependence on imported proteins. This is the only way to sustainably improve the carbon footprint of meat and dairy products. The general accusation that animal proteins are climate killers and should therefore be avoided is wrong. What should we do with permanent grasslands in Europe without animals? Converting it to arable land would be a real disaster for our climate.

I think we have managed to create important preconditions with the new CAP, which will apply from 2023. Member states can now use the new eco-schemes to promote pastures and permanent grassland and thus launch more sustainable animal husbandry in Europe. I hope they will make use of this opportunity.

Pasture farming is of course also an important contribution to animal welfare. As someone who grew up on a farm myself, I know how happy animals are when they are allowed to graze. For roughage eaters, there is no animal husbandry more appropriate to the species than pasture. However, pastoralism also faces difficult challenges in Europe. I am thinking in particular of the growing populations of large predators. In many regions of Europe, the traditional grazing of sheep and goats is no longer possible today because the attacks of wolves and bears are unmanageable. It is unacceptable that the protection of wild animals is all-encompassing and that of farm animals non-existent. A new balance is needed here.

That is why I believe that we need to put a bigger focus on pastoralism in our agricultural policy. We need an action plan where we address the challenges and opportunities of pastoralism and create new incentives for our farmers to graze animals. I am advocating in the EU Parliament to demand such a plan from the Commission.

Grasslands are active nature conservation, care for our cultural landscape, fight climate change, preserve centuries-old traditions and increase animal welfare. We should promote them more strongly.

Herbert Dorfmann, Member of the European Parliament
Member of the Agriculture and rural development committee
Member of the RUMRA & Smart Villages Intergroup on Rural, Mountainous and Remote Areas

Executive summary

This report, elaborated in the frame of EU-funded LIFE project OREKA MENDIAN (2016-2022), focuses on how human activities can support sustainable management of mountain grasslands in Europe.

Grasslands are one of the world's most widespread habitats and the third most dominant ecosystem in the EU-28 (15.9% of the total area). In mountain areas, grasslands are mainly semi-natural and characterized by their longevity ("permanent grasslands") due to the specific climatic, topographic and soil conditions which prevent them from being turned into arable or forest lands. Permanent grasslands support several ecosystem services and public goods such as water infiltration, C-storage in soil, feed and biomass provision. For centuries, mountain grasslands have persisted because of the presence of people and their activities to maintain an open and diverse landscape. Low-intensity agriculture and pastoralism are the primary activities which enable the preservation of grasslands. Due to the remoteness and steepness of mountain areas, pastoralism has had a prominent role in conserving permanent grasslands in mountains in several ways including opening the landscapes, creating a patchwork of different habitats, and supporting biodiversity.

Grasslands: a threatened yet fundamental habitat for delivering EU's climate ambitions

Today, more than 75% of the grassland area in the EU-28 is considered to have an unfavourable conservation status. The widely negative picture of the status of mountain grasslands is due to a rise in environmental pressures which accelerate the deterioration of this ecosystem, as well as changing socio-economic factors which lead to the decline of pastoral practices for the maintenance of this landscape. During the 20th century, land abandonment, intensification, afforestation, and conversation to other land-use types caused a 90% decrease of semi-grasslands in most European countries and the loss (or even extinction) of species inhabiting these ecosystems. Both undergrazing and overgrazing weaken grassland biodiversity and presence in mountain areas and cause an increased risk of natural disasters. In parallel, climate change – through rising temperatures, a decline in water availability, and more frequent and extreme climatic events – severely affects mountain grassland species, the quality and quantity of food for the animals, animal well-being, and the available space for pastoral activities. Yet, the world's grassland habitats have a storage capacity between 60.5 and 82.8 billion metric tonnes of CO2 (about three times more than ocean and coastal ecosystems). They are therefore key for EU's climate mitigation and should be better considered in the Union's climate ambitions and policies (EU Climate Pact, Climate Law, Green Deal).

An enabling policy framework that remains to be improved

A supportive policy framework is fundamental to design and implement measures which can adequately address the socio-economic and environmental causes behind the deterioration of mountain grasslands. Furthermore, policies can ensure the durability of pastoral systems, which too often would not be economically viable without external support or administrative facilitation. At the national level, this has been done by some countries through policy frameworks such as the "Loi Montagne" (France), "Montes de Utilidad Pública" (Spain), "Legea Muntelui" (Romania), "Strategia delle Aree Interne" (Italy), "Landbrukspolitikken" (Norway) and "Politique Agricole" (Switzerland). Meanwhile, at the European level, there is no shared policy framework referring exclusively to mountain development, and mountain areas have to comply with existing – often sectoral – frameworks such as laws and regulations on agriculture, water treatment, climate change, biodiversity protection, etc. The Common Agricultural Policy (CAP), and the Biodiversity Strategy (which includes the Habitats and Birds Directives) are the main European sectoral frameworks which have an impact on mountain grasslands and pastoral systems.

This report argues that, so far, neither national nor European political efforts have been able to completely prevent the drastic decline of pastoral practices. At the European scale, much still needs to be done in order to remove inconsistencies among policies and efficiently help farmers and shepherds to address socio-economic and environmental changes. Whereas the CAP seems to be somewhat effective in its socio-economic impact (e.g. supporting farmers' revenues, preserving pastoral lands, reducing market distortion, boosting local economies and jobs), it has mainly supported larger producers. More reliable indicators on the results and impacts of the CAP in relation to biodiversity would contribute to more adequately assessing the net-effects assessment of this policy on Europe's biodiversity, especially in widely deteriorating habitats such as grasslands. In line with the Green Deal, the CAP post 2023 should have a stronger positive impact on biodiversity and natural resources. Yet, its implementation will largely depend on how the Member States define and implement their CAP Strategic Plans.

31 good practices to overcome the environmental and socio-economic barriers

Beyond policies, the sustainable management of mountain grasslands strongly relates to the ability to implement practices on the ground which simultaneously address all three dimensions of sustainability. It is also important to renew and reinvent practices for managing mountain grasslands. This report identifies 31 good practices selected throughout Europe which have been piloted and implemented for the sustainable management of this habitat, clustered according to practices related to: ecological dimensions (biodiversity conservation; climate change adaptation and mitigation; prevention of natural disasters); economic aspects (valuing products and services; economic diversification; innovation through modern technology; coexistence with wildlife); and the social facet of grassland management (improving working conditions and access to land; transferring knowledge and skills; revaluing pastoral and rural life; rural – urban linkages). These good practices show that better management is possible.

Recommendations for the future

Based on these outcomes from documentary and desk research, a stakeholder survey, interviews with key experts, and analysis of best practices, this report calls for a more ambitious vision for rural and mountainous areas at all scales – European, national, regional and local. This new vision should be able to address the specificities of mountains by building on 2021-2027 European policies and strategies (e.g. Green Deal, Long-Term Vision for Rural Areas) as well as implementing concrete measures at national and local level, as follows:

To increase the environmental management of mountains grasslands, the report recommends:

- Member States should use eco-schemes as a key tool to improve the management of permanent grasslands.
- Regional authorities should establish multi-annual shared plans between land managers, farmers and local authorities.
- Member States should provide sufficient economic, scientific and technical support to trigger effective climate change adaptation and mitigation actions amongst farmers.

To maintain a stronger economic support for pastoralism, the report recommends:

- Regional authorities should enhance the visibility and commercialisation of pastoral services and products in a more systematic way.
- Member States should support the implementation the Optional Quality Term for Mountain Products in all mountainous countries.
- Member States should estimate the economic value of ecosystem services provided by pastoralism.
- National and regional authorities should support multi-sectorial collaborations.
- National and regional authorities should encourage the digitalisation and (social) innovation in mountain areas.
- National and regional authorities should increase awareness of the general public and multi-stakeholder dialogues on the implications of the return of large carnivores for livestock farmers and rural societies.
- Compensation costs linked to attacks by large carnivores should pertain not only economic damages linked to the loss of livestock, which represent the minority of costs, but also indirect costs.

To overcome the social barriers, the report recommends:

- EU institutions and Member States should ensure a better valorisation of pastoral jobs through a dedicated EU action plan for pastoralism.
- Member States should facilitate pastoral employers to find and hire paid collaborators.
- Regional and national authorities should maintain or implement regionally or locally funded measures to make pastoralism fit for 21st century's challenges and attractive for young people.
- The EU and Member States should use European funds (e.g. Horizon Europe) to finance collaborative research, coordination and innovation projects on pastoralism and related issues on the topics advanced by the Network for European Mountain Research (2018).
- Member States should formally recognise the intrinsic links between pastoralism, cultural and natural heritage in mountains.
- EU and national authorities should encourage scientific studies and data

gathering/analysis on large carnivores, in order to promote evidence-based derogations to the protection of species in EU Member States, as envisaged in the Habitats Directive and Bern Convention.

- Regional and local authorities should close the rural-urban divide and better integrate rural local economies in regional and national supply chains.

List of acronyms

AEC: Agri-environment-climate

ANC/LFA: Areas of Natural Constraint (formerly known as Less Favoured Areas)

CAP: Common Agricultural Policy

CAPV: Autonomous Community of the Basque Country

CO2: Carbon Dioxide

CoR: Committee of the Regions

EAFRD: European Agricultural Fund for Rural Development

EAGF: European Agricultural Guarantee Fund

EEA: European Environment Agency

EMFF: European Maritime and Fisheries Fund

ENRD: European Network for Rural Development

ERDF: European Regional Development Fund

ESBO: Environmental and Social Beneficial Outcomes

ESF: European Social Fund

ESPON: European Territorial Observatory Network

EC: European Commission

EU: European Union

FAO: Food and Agriculture Organization of the United Nations

GAEC: Good Agricultural and Environmental Conditions

HNV: High Nature Value

IUCN: International Union for Conservation of Nature

MS: Member State

OECD: Organisation for Economic Co-operation and Development

NGO: Non-governmental Organization

OPCC-CTP: Pyrenean climate change observatory

OQT: Optional Quality Term (for mountain products)

PDO: Protected Designation of Origin

PES: Payment for Ecosystem Services

PGI: Protected Geographical Indication

RHEA: Natural Resources, Human Environment and Agronomy

RUMRA: Rural, Mountainous and Remote

SME: Small and medium-sized enterprise

SMR: Statutory Management Requirements

SWOT: strengths, weaknesses, opportunities, and threats

TFEU: Treaty on the Functioning of the European Union

TSG: Traditional Speciality Guaranteed

UAA: Utilised Agricultural Area

UNEP: United Nations Environment Programme

UNESCO: United Nations Educational, Scientific and Cultural Organization

WWF: World Wildlife Fund

Glossary

Carbon sequestration: the process of increasing the carbon content of a reservoir other than the atmosphere (MEA, 2005).

Climate change adaptation: adaptation practices designed to allow agricultural systems to better adapt to a changing climate and conditions.

Climate change mitigation: mitigation practices designed with the aim of reducing emissions from agricultural practices and increasing carbon sequestration.

Commons: a natural resource – like land – which is owned, managed and /or used collectively by a community or group of people to sustain their livelihoods.

Drove road: a road or path along which livestock is driven from one place to another.

Ecosystem services: the aspects of ecosystems utilised (actively or passively) to produce human well-being (Fisher et al, 2009) in the form of environmentally and social beneficial outcomes. The most widespread classification systems include the UN Millennium Ecosystem Assessment (MEA, 2005) and the CICES classification (2013) which identify respectively four and three types of ecosystems: provisioning, regulating, supporting (regulation and maintenance in CICES) and cultural ecosystems. The concept of 'ecosystem goods and services' is synonymous with ecosystem services.

Environmental and Social Beneficial Outcomes: outcomes in the environmental and social spheres that are delivered by socio-ecological ecosystems and which benefit society, e.g. food security, water quality, soil functionality etc (Maréchal & Baldock, 2017).

Favourable Conservation Status: a legally established biodiversity term which, in layman's terms, can be described as a situation where a habitat type or species is prospering (in both quality and extent/population) and also has good prospects to do so in the future.

Fodder: food, mainly dried hay, for livestock.

Graminoids: grass-like plants.

Grazing: (of animals) to eat grass, or to cause animals to feed on grass.

Grazing season: The part of the year when pasture is available for grazing, due to natural precipitation or irrigation. Grazing season dates may vary because of mid-summer heat/humidity, significant precipitation events, floods, hurricanes, droughts or winter weather events.

High Nature Value farming: farming systems and practices which sustain a high level of biodiversity. They are often characterised by being extensive, diverse and low-input, and are associated with a high species and habitat diversity or the presence of species of European

conservation concern.

Legumes: nitrogen-fixing plants that have pods or nodules (e.g. peas and clover).

LIFE programme: EU's funding instrument for environment and climate action.

Livestock/animal farmers: people whose economic activity is based on raising livestock (also "stockbreeders" and "livestock breeders"). Specifically, in this report, the term refers to farmers who raise their animals in an extensive manner.

Mountain pastures: areas in mountains composed mainly of grasses and other herbaceous plants, with some shrubs and trees (also referred to as "grasslands", "pasturelands").

Natura 2000: network of nature protection areas in the European Union.

Pastoral systems: mountain pastures and the pastoral activities linked to them.

Pastoralism: branch of agriculture concerned with extensive grazing for livestock production.

Prescribed burning: the process of planning and applying fire to a predetermined area, under specific environmental conditions, to achieve a desired outcome.

Public goods: a good or service in which the benefit received by any one party does not diminish the availability of the benefits to others, and where access to the good cannot be restricted. The public goods concept focuses attention on the type and level of provision/supply of environmental and social goods and services needed to meet societal demand.

Resilience: capacity of a system to absorb disturbance and still retain its basic structure and viability.

Shepherd: a person who takes care of livestock and moves them from one place to another. This person is not necessarily the owner of the animals.

Soil Organic Carbon: carbon in the soil from decaying plants and animals. This is the basis for soil fertility, e.g. by releasing nutrients and promoting the soil structure.

Stocking rate: The relationship between the number of animals and the total area of the land in one or more units utilised over a specified time.

Sustainability: within the limits of available physical, natural and social resources, meeting the needs of present generations without compromising the ability of future generations to meet their own needs (Brundtland, 1987). The concept is based on three pillars: economy, environment, and society.

Transhumance: the practice of moving livestock from one grazing area to another according to the season.

Introduction

Grasslands cover 15.9% of the area of the EU-28 and are its third most widespread habitat (EC, 2016b), yet also one of the most degraded (75% of this habitat has an unfavourable conservation status)[1]. Grasslands are a typical habitat in mountain areas across all Europe. Scientific evidence shows that mountain grasslands are valuable for European society in both mountain and lowland areas as they deliver a number of public goods and ecosystem services of great added value (i.e. the "environmental and social beneficial outcomes") such as: *provisioning services* (e.g. forage, milk, meat, fibre); *supporting services* (e.g. nutrient cycling; water infiltration and retention in soil); *regulating services* (e.g. erosion and flooding control, wildfire control, C-storage in soil); and *cultural services* (e.g. aesthetic, educational, recreational) (Plantureux et al., 2016). Mountain grasslands have also important, yet under-recognised, roles to play in responding to the global challenges reflected in the UN Sustainable Development Goals 2015-2030 and the European Green Deal, as well as in contributing to numerous European priorities and strategies for the year 2030 (e.g. Biodiversity Strategy, Farm to Fork Strategy, Circular Economy Action Plan, EU Climate Pact).

Nonetheless, mountain grasslands are currently affected by many types of changes, such as environmental changes (climate change, biodiversity loss), unsustainable management practices (land abandonment or intensification), and general socio-economic changes (depopulation, globalisation of markets). The conservation of grasslands, especially in mountain areas, remains a challenge, and decades of policy measures and different approaches have not reverse negative trends. As this study shows, grasslands are a non-typical habitat and grazed pastures, in particular, suffer from biodiversity loss when abandoned (MacDonald et al., 2000). The absence of any human activity decreases the conservation status of mountains grasslands. Thus, these grasslands require human intervention, and particularly pastoralism, to reach a minimum conservation status and increase their quality (Galvánek & Leps, 2008; Metera et al., 2010; Russo, 2016).

For millennia, pastoralism has enabled the development of mountain territories which are characterised by low agronomic value and land which has restricted accessibility (altitude, marked topography) and where mechanisation is not possible, and contribute to the spatial diversity and biodiversity of these areas. 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 social and economic viability of pastoralism. Because of this, pastoralism is recognised by the International Union for the

[1] https://www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-17-national-summary-dashboards/conservation-status-and-trends

Conservation of Nature (IUCN) and the United Nations Environment Programme (UNEP) as being at the nexus of the three pillars of sustainability.

This report was elaborated within the framework of the European Union EU-funded LIFE project OREKA MENDIAN, with the aim of answering the following question: "How to achieve the sustainable management of mountain grasslands, by addressing its social, environmental and economic dimensions?" In this study, the sustainable management of mountain grasslands is defined as the capacity of local and supra-local actors to tackle the environmental degradation of this habitat and ensure the socio-economic viability of human activities linked to their management, for present and current generations.

OREKA MENDIAN in a nutshell

LIFE project (2016-2022)

Location: Basque country, Spain

Project Budget: 3,743,704.00 €

Coordinating partner: HAZI Fundazioa, Spain

Problem: Basque mountain pastures are threatened by the decline of grazing activities.

Aim: to create a sustainable balance between the preservation and socio-economic uses of Basque mountain pastures.

The structure of this report is as follows:

- PART I offers an overview of the current state of play in mountain grasslands throughout Europe, to have a precise picture of what mountain grasslands represent in 2021.
- PART II presents the most significant policies linked to the management of mountain grasslands at the European level (for the 2014-2020 period and the proposals of the 2021-2027 period) and at national levels in EU Member States (France, Italy, Romania, Spain) and beyond (Norway, Switzerland).
- PART III compiles a collection of good practices in European countries that deal with the environmental, social and economic challenges affecting mountain grasslands and the related human activities across 11 sub-topics.
- PART IV, based on the desk research, interviews and good practices, presents 17 policy recommendations for the attention of managing authorities, European institutions, national and regional policymakers, local stakeholders etc. in order to support the development and transfer of such good practices throughout Europe in the 2021-2027 programming period.

The target audience for this report includes all stakeholders working on, or are interested in, mountain grasslands, such as livestock farmers and shepherds; local, regional, and national authorities; socio-economic organisations or chambers; environmental, farming or development agencies; research institutes; schools and training centres; and all other actors passionate about sustainably managing mountain grasslands – including the EU institutions.

Methodological note

To elaborate the present report, the following mix of quantitative and qualitative data collection methods was used:

- Desk research for quantitative and qualitative information on mountain grasslands and good practices. The following sources were particularly relevant: ESPON Cooperation Programmes, European Commission, ENRD, EEA, IUCN, UNEP, Pastomed, Entretantos, Euromontana and European Grassland Federation.
- Survey conducted in the scope of the OREKA MENDIAN project in 2018. In total, 98 respondents from 14 countries and 16 mountain ranges participated in the quantitative survey. This covered the following topics: threats to, and functions of, mountain pastures; valorisation of mountain products; environmental conservation measures; transhumance; policies; and large carnivores.
- Interviews conducted during summer 2019, with the aim of receiving feedback from external experts on our preliminary results and to collect additional good practices. In total, 7 interviews took place with experts from the Soil Association; Natural Resources, Human Environment and Agronomy (RHEA); the Norwegian association of Pastoralism and Transhumance; Romontana; WWF Europe; the Spanish municipality Linás de Broto; and Pasture for Life. These external experts were selected based on the desk research previously mentioned and contacts made through Euromontana's network.

The above-mentioned data collection methods enabled, in the first place, the identification of the opportunities and challenges associated with mountain grasslands. As "sustainable management" is considered here from the social, environmental and economic angles of sustainability, the good practices are structured along those lines in the report.

Good practices were selected through desk/web research and a survey done at EU level in 2018, using the following main criteria:

- Integrate the definition of "sustainable development" as defined by the Brundtland report (1987) – i.e. the ability to meet the needs of present and future generations without overpassing planetary boundaries.
- Relate to at least one of the three pillars of sustainability: economy, society, or environment.
- Be relevant to the challenges and opportunities identified during data collection (desk research, interviews and survey).
- Occurred ideally under the current EU programming period (2014-2020), or in limited cases in the previous programming period (2007-2013), to facilitate comparison of data and the elaboration of policy recommendations for the next programming period (2021-2027).
- Be balanced between public and private funding.
- Have a balanced spatial distribution across Europe (east – west, north – south, EU – non-EU), to represent the diversity of European mountains.
- Potentially be transferable to other mountain areas.

There were several limitations to finding good practices:

- Geographic coverage: many research institutions are located within the Alps, while several other mountainous regions across Europe are not as well represented.
- Data quality: there are inherent limitations to desk research, such as the web availability of information and good practices, and the responsiveness of contacts when requesting additional information.
- Coverage of topics: for several specific topics, it was challenging to find good practices, such as bioeconomy, circular economy, improvement of working conditions, land access, generational renewal and payment for ecosystem services. While many good practices do in fact exist on these topics, these terms are currently not always used by local stakeholders, and they are rather limited to scientific literature and/or policy.
- Languages: the research team was speaking only English, French and Italian. This reduced the possibility to access information in other languages.

The complete set of good practices, including complementary examples to the ones presented in this study, is available in a separate booklet available in English, French or Spanish and on the project's website (www.lifeorekamendian.eu).

Part 1
Setting the scene: investigating mountain grasslands in Europe

1. Permanent grasslands: an endangered habitat that requires sustainable management

Grasslands are one of the world's most widespread habitats e. In the EU-28, they cover 15.9% of the overall area and represent the third most dominant ecosystem following woodland and forest (40%) and cropland (29%) (EC, 2016b). The distribution of grassland areas varies considerably across countries (Figure 1): natural grasslands are mostly present in the Nordic and Iberian mountains, while pastures are prominently concentrated in Central and South-eastern Europe (ESPON BRIDGES, 2019).

Grasslands can be naturally occurring, or man-made. In Western and Northern Europe, most grasslands (80%) result from millennia of human activities (cultivated or semi-natural), while only 20% of grasslands (mainly located in arctic-alpine and coastal zones) are entirely natural (Box 1.1) (Dengler & Tischew, 2018).

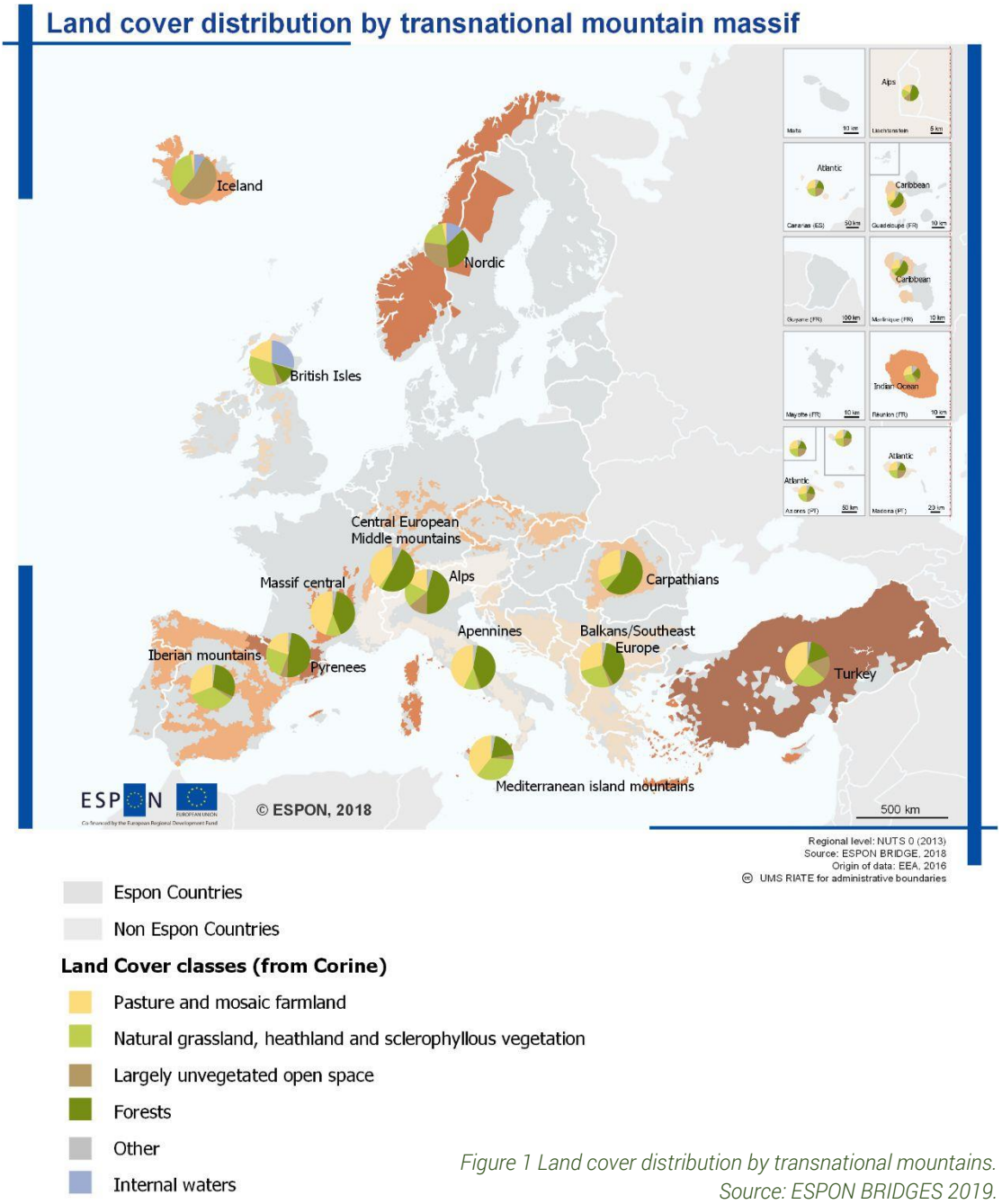


Figure 1 Land cover distribution by transnational mountains. Source: ESPON BRIDGES 2019.

Box 1.1 What are the main types of grasslands? (Peeters, 2008)

Cultivated grasslands (sown) can be located in both lowland and mountain areas, where they cover a limited surface area, such as plateaux or other mechanisable surfaces, producing valuable fodder for the winter period. Generally, they require inputs, such as artificial fertilisers and regular reseeding, to maximise their outputs.

Semi-natural grasslands are managed ecosystems formed by naturally occurring species (self-seeded) over a long period of time. Mountain grassland ecosystems are predominantly semi-natural and their maintenance requires management including grazing, cutting, mowing, herding, controlled burning and fertilising. While productivity is lower in these grasslands than in more intensively managed grasslands, they have exceptional environmental values.

Permanent grasslands are areas where the herbaceous vegetation covers at least 50% of the area and which have not been reseeded for at least 5 years. These areas require the least human intervention (e.g. not mowed, drained, irrigated, sown, fertilized), though human activities, such as maintenance mowing and shrub clearance cannot be completely discarded.

Mountain grasslands (Box 1.2) host more than half of Europe's High Nature Value (HNV) farmland and are associated with a high diversity of species (EEA, 2019, 2020). They provide feed for both wild and domesticated herbivores, deliver several environmental and social beneficial outcomes (ESBO) (Table 1.1) and, via grassland-based livestock, support a significant number of public goods such as rural viability, agricultural employment, water availability, soil functionality, local ecological knowledge, and spiritual and aesthetic value (Manzano-Baena & Salguero-Herrera, 2018; Maréchal & Baldock, 2017; Plantureux et al., 2016). A study by Dengler and Tischew (2018) estimates that, in Western and Northern Europe, the direct economic value of ESBO linked to grasslands (mainly linked to meat and dairy production) amounts to € 71 billion each year.

Box 1.2 Ecological definition of mountain grasslands (Velthof et al., 2014). Areas in the mountains dominated by graminoids and other herbaceous vegetation, which can also include legumes and woody species to some extent.

Table 1.1. Ecosystem services and ESBO originating from grasslands

Provisioning services	Food production (forage, milk, meat, fibre) • Medicinal and ornamental resources • Biomass production • Clean water • Wildflower germplasm for restoration and/or breeding
Supporting services	Buffering, accelerating, slowing down of and nutrient cycling • Water infiltration and retention in soil
Regulating services	Erosion and flooding control • Wildfire control • Carbon storage in soil • Greenhouse gas mitigation • Water purification • Preserving biodiversity
Cultural services	Cultural heritage • Educational • Recreational • Eco-tourism

Despite all above-mentioned beneficial implications of grasslands for socio-economic and environmental settings, less than one sixth of this habitat is protected by Natura 2000 designation (EC, 2016b).

Moreover, over the last decades, several trends such as land abandonment, intensification, afforestation or conversion to other land-use types have led to substantial losses of this habitat (EC, 2016b; Peeters, 2008; Vrahnakis et al., 2013). In the 20th century, approximately 90% of semi-natural grasslands disappeared due to intensification or abandonment, and populations of many of their species decreased or became extinct in most European countries (EC, 2016b).

Today, more than 75% of the grassland area in the EU-28 is considered to have an unfavourable conservation status[2] (Figure 2), with varying trends across biogeographical regions. Grasslands, together with forests, coastal habitats and dunes are the habitats with the worst conservation status (EEA, 2020). The conservation trends are particularly negative for Atlantic, Boreal and Continental biogeographical regions (EEA, 2020).

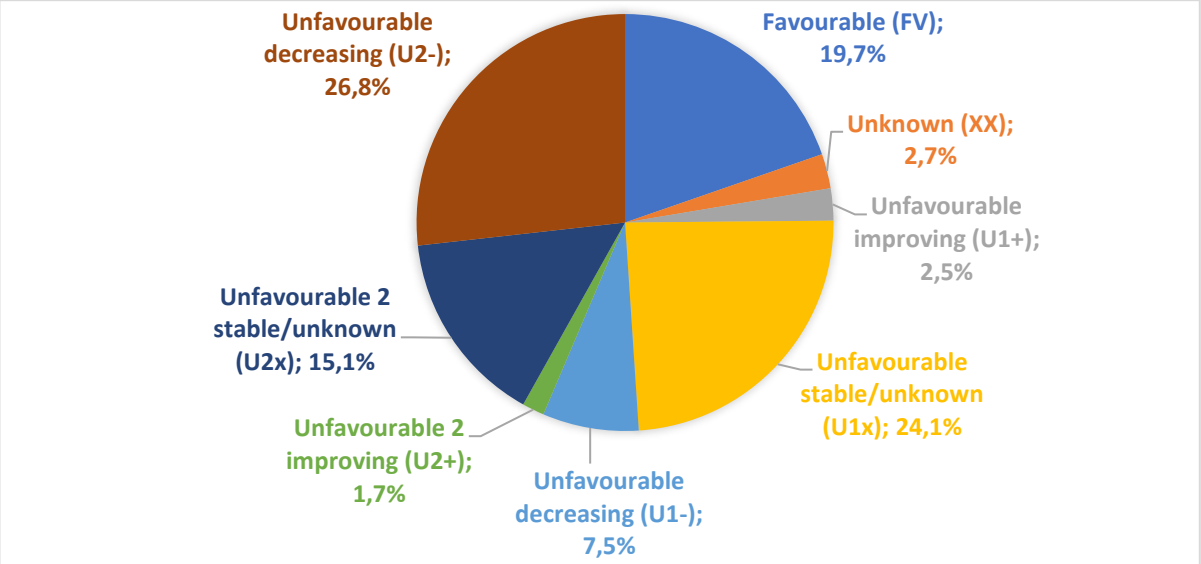


Figure 2 Conservation status and trends by habitat category of EU-28 in 2013-2018. Adapted from EEA, "Conservation status and trends of habitats and species"(2020)[ii].

Box 1.3 Do you know the botanical names of mountain grasslands? According to the EU Habitats Directive, there are multiple types of mountain grasslands, including:

- Siliceous alpine and subalpine boreal grasslands (6150)
- Oro-Iberian Festuca indigesta grasslands (6160)
- Alpine and subalpine calcareous grasslands (6170)
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (6210)
- Species-rich Nardus grassland habitat. on siliceous substrates (6230)
- Mountain hay meadows (6520)

[2] https://www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-17-national-summary-dashboards/conservation-status-and-trends. Retrieved 26/06/2020.

Table 1.2 presents the conservation status and trends for the mountain grasslands (see Box 1.3) of the most relevant biogeographical regions. Though mountain areas withstood a fast decline, they remain species-rich if compared to grassland habitats in valleys and low mountain areas (MacDonald et al., 2000; Van den Pol-van Dasselaar et al., 2019).

Table 1.2 Conservation status and trends of grasslands across regions (EEA, 2020; period: 2013-2018)[3]

	Regions						
Habitat	Alpine	Atlantic	Black Sea	Boreal	Continental	Mediterranean	Pannonian
6150	FV	U2		FV	U1	U1	
6160		U1				U1	
6170	U2	U1			U1	XX	
6210	U2	U2	U1	U2	U2	U2	U1
6230	U1	U2		U2	U2	U2	U2
6520	U2	U2		U2	U2	U2	U1

The specific conditions of mountain areas – such as topography, climate, remote location and specific soil composition – prevent grasslands from being turned into arable or forested land, hence contributing to their longevity. For this reason, this report considers so-called permanent mountain grasslands[5] (Box 1.4).

Box 1.4 Eurostat definition of permanent grassland. According to Eurostat, permanent grasslands denote plots of land used for at least 5 consecutive years *"to grow herbaceous fodder, forage or energy purpose crops, through cultivation (sown) or naturally (self-seeded), and which is not included in the crop rotation on the holding"*[4].

Several measures have been introduced for the sustainable management of this habitat (Box 1.5), ranging across water management and balanced vegetation composition to livestock management, controlled burning and many more. The selection of sustainable management practices depends on territorial factors such as the land and soil conditions (e.g. soil fertility, quantity and quality of pastures, species selection), climate conditions, availability of natural resources (e.g. water), livestock and vegetation species. Above all, low intensity agriculture and pastoralism are the primary activities which enable the management and preservation of grasslands (EC, 2018a; Russo, 2016). In mountainous areas, pastoralism has had a prominent role in preserving permanent grasslands for centuries, due to the structural difficulty of undertaking agricultural activities. Without pastoral practices, levels of biodiversity and

[3] *Ibid.* FV – favourable, XX – unknown, U1 – Unfavourable inadequate, U2 – unfavourable bad.
[4] https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Permanent_grassland
[5] From now on, also referred to as "mountain grasslands" or just "permanent grasslands".

richness in mountain grasslands would significantly decrease, leading to a loss of some of the ESBOs they provide (CoR, 2019a; Plantureux et al., 2016; Peyraud & MacLeod, 2020; Russo, 2016, Seid et al., 2016). The next section will explore how pastoralism contributes to the conservation of mountain grasslands.

Box 1.5 Sustainable management of grasslands. According to the FAO, this refers to "*activities on land that meets the definition for grassland under the Verified Carbon Standard rules and that reduce net GHG emissions by increasing carbon stocks and/or reducing non-CO2 GHG emissions*" (FAO, 2014). More holistically, the term entails the selection of the best management practice(s) which ensures the provision of environmental and social beneficial outcomes (e.g. food provision, soil quality, carbon storage, biodiversity level, nutrient cycling, rural well-being) from pastureland for present and future generations.

2. What is the role of pastoralism in maintaining mountain grasslands?

The appropriate preservation of mountain grasslands requires human intervention (Galvánek & Leps, 2008; Metera et al., 2010; Russo, 2016). Low intensity agriculture, clearing shrubs to prevent forest fires, conservation actions to support the survival of certain species, and maintaining paths for recreational activities such as hiking are some of interventions that meet these objectives. However, to date, the key activity for managing and supporting mountain grasslands is pastoralism.

Pastoralism is a livestock farming system strongly adapted to specific territorial social, environmental, and economic contexts (Figure 3). Today, 21% of UAA[6] in the EU-27 is devoted to pastoralism (EC, 2016b) and approximately 4 million ha of agricultural lands depend on transhumance (2005) (Santini et al., 2013).

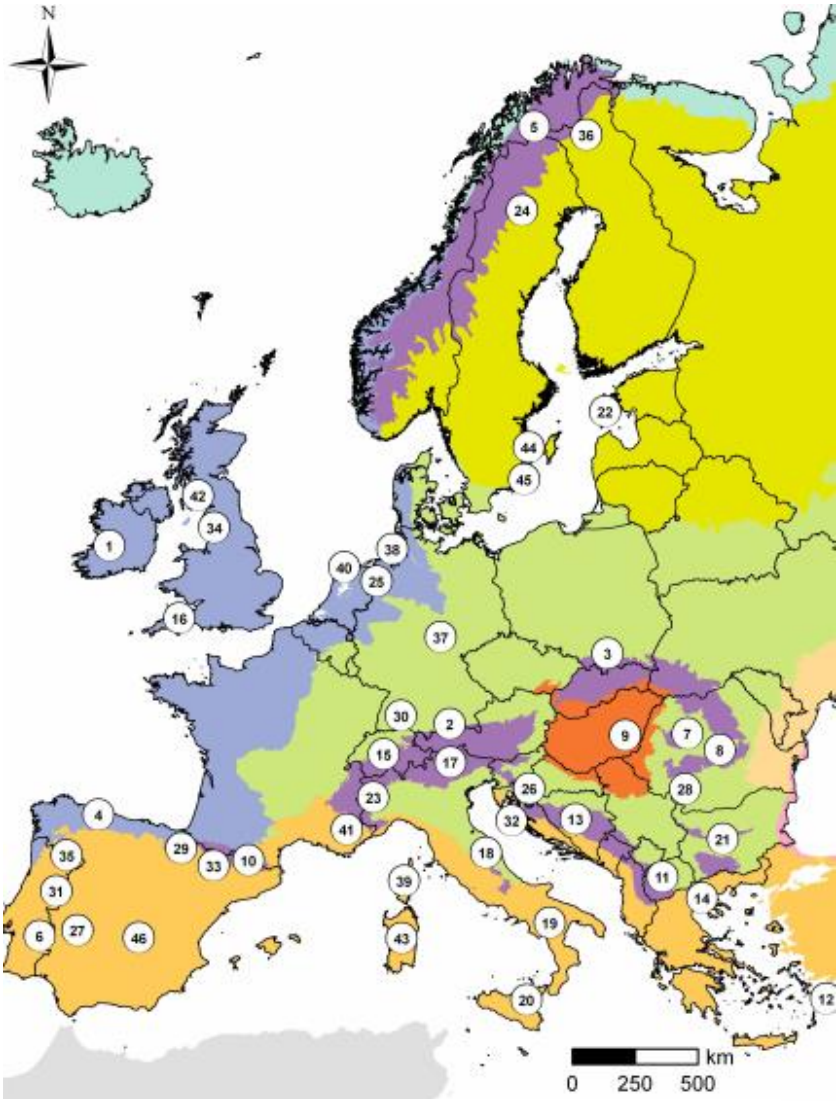
Pastoralism in Europe has the following key characteristics (Caballero, 2015; Farinella et al., 2017; Liechti & Biber, 2016; Nori, 2019; Secretariat of the Convention on Biological Diversity, 2010; Seid et al., 2016):

- A 'low-input low-output' economic activity located on land with which is less suitable for intensive agriculture, inaccessible, or on which machinery cannot be used.
- Based on extensive livestock breeding of different species (cattle, sheep, goats, etc), sometimes combined with agricultural (agro-pastoralism) or forestry (silvo-pastoralism) activities.
- The origin of multiple ESBOs (Table 1.1).

Pastoralism mainly occurs through extensive livestock grazing, a practice found widely across Southern European countries. Herds either graze the grass directly from mountain grasslands or eat the fodder after it has been mowed and dried. Extensive livestock grazing depends on the movement of livestock to optimally use pasture availability and adapt to the climatic conditions (Box 2.1).

[6] Percentage of UAA where the stocking density is below or equal to 1 livestock unit per hectare.

Figure 3 A sample of European extensive systems of grassland management. Source: Caballero (2015).



A sample of European extensive systems of grasslands management

1 Burren, W, Ireland, cattle
2 Vavarian Alps, S, Germany, cattle
3 Tatra, S, Poland, Sheep
4 Asturias, NW, Spain, mixed
5 N, Fennoscandia, reindeer
6 Montados, SE, Portugal, mixed
7 SE, Transylvania, Romania, sheep
8 S, Carpathians, Romania, sheep
9 Hungarian Plain, SE Hungary, mixed
10 E, Pyrenees, Andorra, cattle
11 W, Republic of Macedonia, sheep
12 Island of Rhodes, Greece, goats
13 Central Bosnia and Herzegovina, sheep
14 Central Macedonia, Greece, goats
15 Swiss Alps, Switzerland, cattle
16 Dartmoor, SW England, mixed
17 E, Alps, S, Tyrol, Italy, cattle
18 Central Apennine, Italy, sheep
19 S, Apennine, Italy, mixed
20 Nebrodi, NE, Sicily, Italy, mixed
21 Central Balkans, Bulgaria, sheep
22 Össel Island, Saaremaa, Estonia, mixed
23 Wn Alps, Italy, cattle
24 N, Sweden, reindeer
25 Drenthe, The Netherlands, sheep
26 Dinaric Alps, Croatia, sheep
27 Dehesa, SW, Spain, mixed
28 Wallachia, W, Romania, sheep
29 W, Pyrenees, Navarra, Spain, mixed
30 Black Forest, SW, Germany, cattle
31 Serra da Estrela, Portugal, sheep
32 Island of Pag, Croatia, sheep
33 Central Pyrenees, Aragon, Spain, mixed
34 Cumbria uplands, NW, England, sheep
35 Tras-os-Montes, NE, Portugal, sheep
36 Upper Lapland, N, Finland, reindeer
37 Thuringia, Germany, mixed
38 Wadden Sea, N, Germany, sheep
39 Island of Corsica, France, mixed
40 Atlantic dunes, The Netherlands, cattle
41 Provence, Alpes du Sud, France, sheep
42 Uplands of SW, Scotland, UK, sheep
43 Island of Sardinia, Italy, sheep
44 Island of Öland, Sweden, wooded meadows, mixed
45 Island of Öland, Sweden, alvars, mixed
46 Castile-La Mancha, SC, Spain, sheep

Box 2.1 Types of pastoral mobility

Nomadism: largely disappeared in Europe, it refers to the continuous migration of herders with their flocks to find the best pastures.

Small/local transhumance: short distances in summer, such as vertical migration up to mountain pastures.

Large transhumance: long distances in summer, such as horizontal migration from lowlands to mountain pastures.

Through these movements and foraging, livestock create gaps in forest ecosystems, woodlands and shrublands, opening new space for other plant communities (especially herbaceous plant communities) and increasing the heterogeneity and biological diversity of grassland habitats.

In mountains, the grazing of herds often depends on vertical mobility because of the seasonal and climatic stratification of resources (Box 2.2). Mountain pastures or pastureland are the result of the different pastoral practices (mainly grazing, but also mowing, controlled burning, or fertilising) carried out on mountain grasslands.

Box 2.2 Vertical mobility in pastoralism to access mountain grasslands

In mountains, various topographic and climatic conditions have created diverse habitats and – in consequence – several food sources throughout the year for the animals. Through pastoral mobility, the herders can use drove roads or transhumant roads to steer flocks towards the best grasslands, moving usually from lowland (in the cool season) to highland (in the warm season) pastures. In this way, grasslands are used in each season without overexploiting the - often vulnerable or scarce - natural resources. According to the altitude, season and use, the following classification of mountainous grazing areas can be applied:

High and medium altitude grasslands: despite the harsh climate, rugged terrain, and short growing season of plants, these are used in summer because that is when the best pastures can be found. There may be huts or secondary farms is these areas, as they are distant from valley settlements. These areas go by names such as seter or summer farms (Norway), uplands (Scotland), alpages and estives (French), alpeggi (Italian), and pastos de puerto (Spanish).

Intermediate grasslands: used as an intermediary zone in spring (before ascending to the higher areas in summer) or in autumn (before descending to the valleys in winter). These intermediate zones have names like Maiensäss (German), maggenghi (Italian), montagnettes or parcours (French), and aborrales (Spanish).

Figure 4 Majada de Redes, Spain © Isabeau Ottolini

Valleys and low-altitude zones: the location of permanent settlements and farms, where livestock stay during winter as climatic conditions are less harsh and winter forage is available. These areas are referred as Niederalm (German), pastos de valle (Spanish), fondovalle (Italian).

Pastoralism contributes to grassland biodiversity in the following ways (Bunce et al., 2004; Lehikoinen et al., 2018; McCraken, 2004; Metera et al., 2010; Plantureaux et al., 2005; Van den Pol-van Dasselaar et al., 2019; Secretariat of the Convention on Biological Diversity, 2010):

- 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 (Box 2.3), the ecological predictability and stability of grassland habitats and the temporal diversity of patchwork management to adapt with changes and trends.

Box 2.3 Definition of pastoral system.
The combination of livestock units, grasslands and shepherds is often referred to as a pastoral system.

Consequently, the natural diversity of mountain grasslands strongly depends on the presence of livestock herds and the continuity of pastoral practices.

Most pastoral systems in Europe such as the Scandinavian Saami Reindeer, the Mediterranean Milk Sheep Transhumance, La Crau Meat Sheep, the Portuguese Lameiros Beef Cattle and many more – are classified as "HNV pastoral systems" in light of their high ecological importance (McCracken, 2004). Any factor – endogenous or exogenous – which has an influence in social, economic, or environmental viability of pastoral systems also has an impact on the stability of the entire system (Khurshid et al., 2019; Moreira & Coelho, 2010; Schermer et al., 2016). The next section will review these trends which have a direct or indirect repercussion on pastoral systems.

3. What are the trends having impacts on mountain grasslands?

Environmental pressures on mountain grasslands, as well as socio-economic changes impacting pastoral systems in these areas, are responsible for the deterioration of mountain grasslands. Understanding how these trends interrelate with the mountain grasslands and are intertwined between each other is a fundamental step for deriving long-term solutions and reverse the decline of grasslands.

3.1 How do socio-economic trends affect the management of mountain grasslands?

Approximately 17% of Europe's population lives in mountains (EEA, 2010), with varying trends in population levels. Population levels in the Alps, French Massif Central, Pyrenees, the Nordic and the Iberian mountains have remained stable or have been on the rise, while there have been significant declines in the Carpathians, Balkans/Southeast Europe and the British Isles mountains, characterised by ageing populations and lower birth rates (CoR, 2016). The tertiary sector in Europe's mountains accounts for most employment, and remote working is regarded as an emerging trend that could further support the development of the tertiary sectors in mountains (Gløersen et al., 2016). The agricultural sector is still important in Cyprus, Greece, Portugal, Romania, and Slovenia, however it is undergoing a steady structural change, in parallel with the changing employment structure (EEA, 210; ESPON & University of Geneva, 2012; Flury et al., 2013; Gløersen et al., 2016). For instance, in the Alps, the population employed in agriculture decreased from 70%, at the beginning of the 20th century, to less than 10 % in the 1970s (Flury et al., 2013).

At EU-27 average, mountain farms represent 18% of agricultural enterprises, using 15% of the utilised agricultural land and employing 18% of the agricultural workforce; higher proportions are found in Slovenia and Austria where more than 50% of farms and UAA are in mountains (EC, 2009). Livestock production – in particular meat and dairy – is the dominant output, accounting for 54% of the turnover of mountain farms at global level (Fabien et al., 2013). Wool production was a driving sector for mountain farms until 1980, when prices began to fall (Kramm et al., 2010). Some regions like Scotland show a strong decrease in livestock numbers – i.e. a 27% reduction in sheep numbers, and 11% in cattle (2000-2010) (Silcock & Pring, 2012). Two main reasons which can explain this trend are the continuous decline of agricultural revenues and the constant income gap with respect to non-disadvantaged areas (28%), which are two of the main reasons behind the scarcity of successors in mountain farming (EC, 2009).

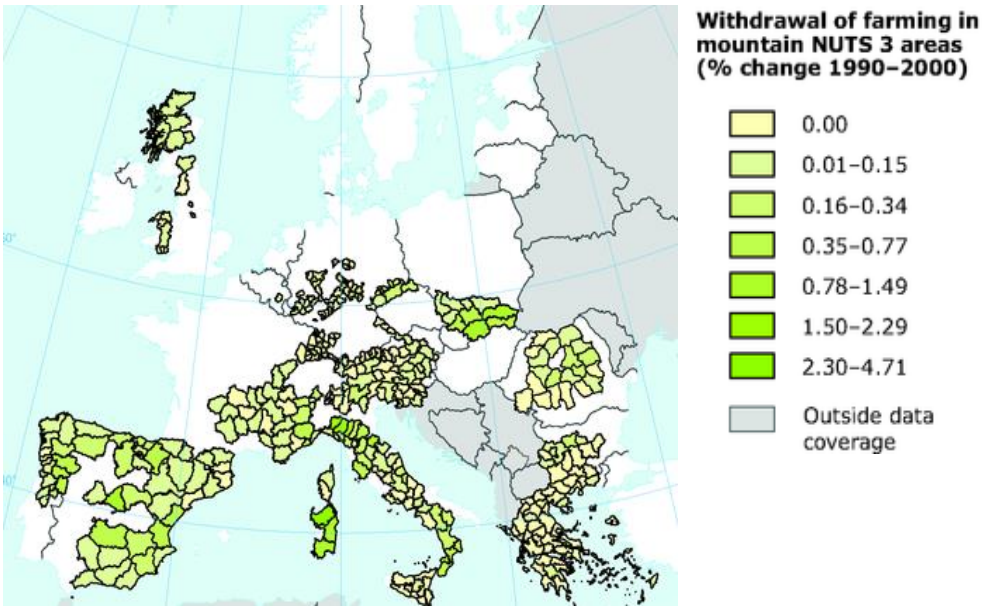


Figure 5 Withdrawal of farming in mountain NUTS3 areas (% change 1990-2000)

"Many summer farms [in Norway] are disappearing. One driver is the building of holiday houses: it is very lucrative to sell your summer farm so holiday houses are built there. So that's a conflict between tourism and summer farming, although on the other hand, tourism is also beneficial because people buy products from the summer farms." Katharina Sparstad – Norwegian association for pastoralism and transhumance

Overall, these changes in population density and type, employment sector (towards tertiarization) and mountain farms (decrease of number of farms and increase of farm size), converge into two progressive trends with major impacts on mountain grasslands: changes of land use and in management practices.

Land use conversion and higher pressure on UAA especially occur in areas close to farms and accessible by machinery, such as low mountain areas or areas closer to urban centres. From 2008 to 2018, natural grasslands and pasture decreased by around 260 km^2/year in the EU-28[7]. Conversely, the abandonment of less productive and labour-intensive lands, especially land parcels located far from the farm and not easily accessible has led to the deterioration of mountain grasslands and an increased risk of natural disasters. In the French mountains, between 2000 and 2010, about 25,106 farms were lost, while the average area of farms increased in parallel (from 38.4 ha in 2000 to 48 ha in 2010) (AGRESTE, 2015). Today, the risk of land abandonment is particularly prominent in Southern European countries (Portugal, Spain, Italy, Greece, Romania), though it also represents an issue for the Baltic Region and north-western Ireland, and is 30% higher on farms depending on livestock grazing[8].

"A large reduction in ruminant populations would induce land use change that could have some unexpected negative effects: abandonment of grasslands that would cease to be grazed and that are species-rich could lead to methane production by decomposition of the vegetation and shrubs/forests development will decrease biodiversity and could increase the risk of fire in the long term. Forest needs to be maintained by creating open spaces through pastoralism in a natural and non-binding way." (Peyraud & MacLeod, 2020, p. 63).

Abandonment of less productive and labour-intensive lands, and therefore the lack of pasturing (undergrazing), often causes shrub encroachment and biodiversity loss (Camacho et al., 2008; Peyraud & MacLeod, 2020; Vrahnakis et al., 2013). Since World War II, land abandonment also allowed forest cover to increase all across Europe through natural expansion or reforestation (+30% in Western Europe, + 20% in Central and Eastern Europe, +16% in Southern Europe) (EEA, 2018). Even though this symbolic victory of the natural world over the human landscapes has been widely acclaimed, the repercussions on the loss of grassland area and of all associated ecosystem services have been downplayed and not properly addressed (Camacho et al., 2008; Conti & Fagarazzi, 2015).

Whereas abandonment is the most discussed land use change in mountain areas, other studies[9] show that excessive pasturing (overgrazing) is also a threat to mountain grasslands (Figure 6). This reduces species-richness and stress-tolerant species in favour of invasive species with a rosette structure, early flowering, and seed dispersal. Overgrazing is associated with biodiversity loss, soil degradation, lower soil C stocks, and associated decreased

[7] https://www.eea.europa.eu/data-and-maps/indicators/land-take-3/assessment
[8] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Agri-environmental_indicator_-_risk_of_land_abandonment&direction=next&oldid=327077
[9] https://www.sierraforestlegacy.org/FC_FireForestEcology/TFH_ExcessiveLivestockGrazing.php

"*Changes in mountain grasslands and pastoralism require people to adapt to such changes and redesign the pastoral systems.*" – Alain Peeters (RHEA)

regulation of the water cycle as the soil becomes compacted – and even desertification. A study in the North-Western Italian Alps shows how excessive grazing increases the vulnerability of the landscape to erosion and climate hazards, such as landslides and floods (Torresani et al., 2019).

In parallel, since the second half of last century, European farms experienced a shift in management practices from traditional farming systems towards more specialised systems, characterized by increases in mowing frequency, livestock units, fertilisation intensity, and groundwater extraction (Camacho et al., 2008; Gillet et al., 2016; Marini et al., 2001; Schermer et al., 2016). Technological progress and a strong emphasis focus on land productivity by the Common Agriculture Policy (CAP) reinforced this shift and thus the intensification of agricultural activities (Secretariat of the Convention on Biological Diversity, 2010). Today, agriculture remains by far the main source of pressure on Natura 2000 protected grassland areas (46% of all pressures) (EEA, 2020) with undeniable effects on soil fertility, plant and insect biodiversity. The European Grassland Butterfly Index reveals that in the period 1990-2017, the grassland butterfly abundance declined by 39% due to farming intensification in North-Western Europe and grassland abandonment in other parts of Europe (Van Swaay et al., 2019). Similarly, the Common Farmland Birds Index recorded a 49% decline of bird species in agricultural areas in the EU over the period 1980-2018[10].

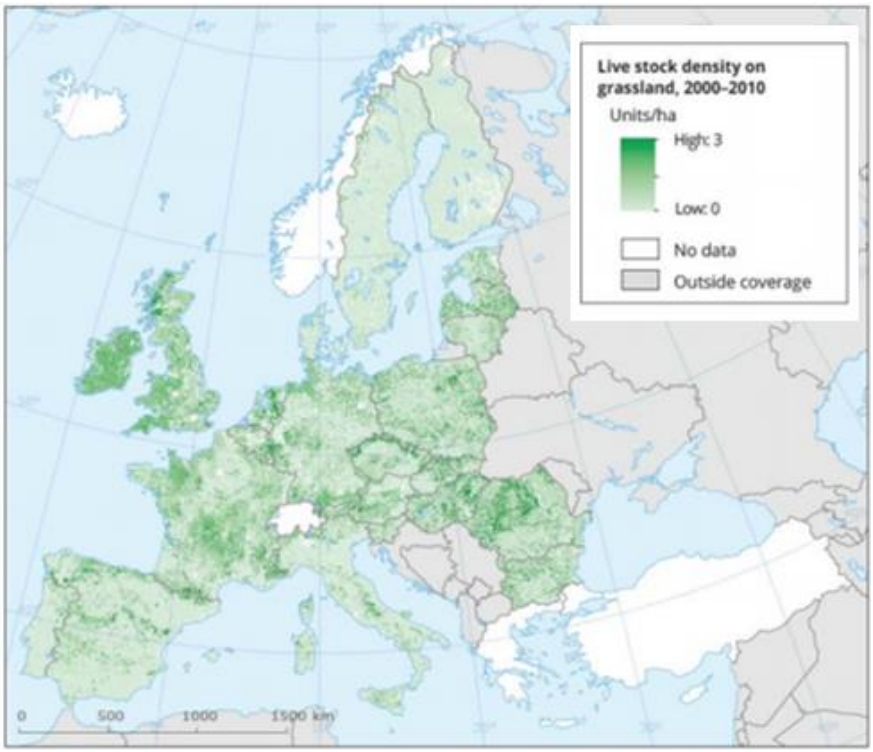


Figure 6 Livestock density on grassland (2000-2010). Source: ETC/SIA, 2014.

Other agents of changes in land management that can also be mentioned include: wildlife predation, which obliges shepherds to gather flocks in containment areas overnight, thereby causing overgrazing; climate change, which reduces the availability of natural resources during dry periods, high altitude mining, which destroys entire ecosystems and all related ecosystem

[10] PanEuropean Common Bird Monitoring Scheme: https://pecbms.info/

services; and ageing and declining rural populations, which leads to the partial or total disappearance of local knowledge on traditional management practices.

3.2 How do the current trends in biodiversity loss and climate change affect the conservation status of mountain grasslands?

Climate change, together with the above-mentioned socio-economic changes, is one main cause of biodiversity decline in mountain grasslands. Mountain grasslands are particularly rich in biodiversity and 33% of EU's mountain areas are considered High Nature Value farmland (Figure 7, EEA 2010) but, like all mountain ecosystems, they are extremely sensitive to climate change: snow and ice turn to water with small changes in temperature, and the steep slopes harbour many – often isolated – climatic zones with associated habitats and endemic species surviving under very specific conditions. Indeed, the impact of climate change in mountains has been much more prominent than in other regions.

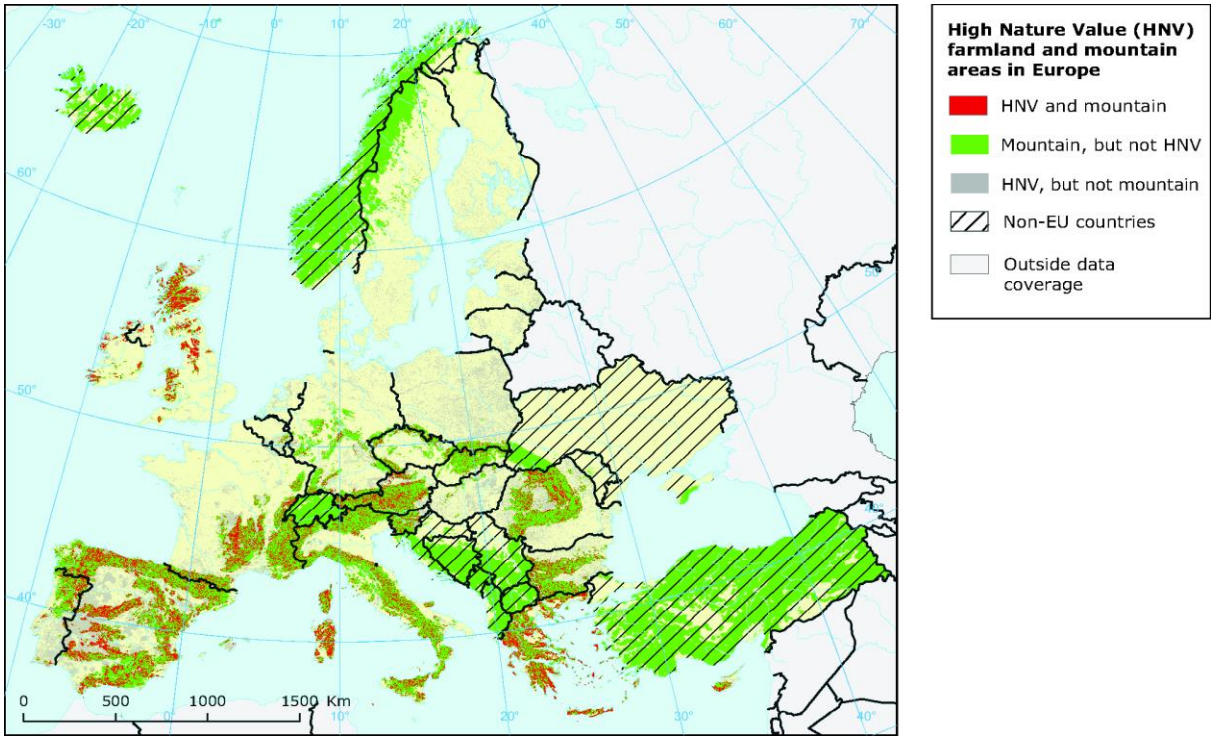


Figure 7 Distribution of High Nature Value (HNV) farmland and mountain areas in Europe in 2008. Source: EEA, 2010

Here are the main impacts of climate change on mountain grasslands:

- Rising temperatures. Since 1950, the temperature in the Alps has risen by 2ºC, which is twice the global average (Chaix et al., 2017). Likewise, in the Pyrenees over half of the glaciers have disappeared over just 35 years (OPCC-CTP, 2018). While higher temperatures will prolong the period of plant growth and benefit certain plant species, many plant species might become extinct when failing to adapt or move towards higher altitudes. For example, higher tree lines invade ecosystems previously dominated by herbaceous vegetation, as a study in the Valle d'Aosta region (Italy) shows, with the treeline shifting upwards by 115 meters between 1901 and 2000 (Leonelli et al., 2011). General impacts on pastoralism include alterations in the quality and quantity of food

for the animals, animal well-being, and the available space for pastoral activities (Di Bari et al., 2013; 2015).

- Decreased water availability. Less precipitation, especially snow, and increased evapotranspiration – due to increased plant growth and higher temperatures – will lead to more droughts (Marty, 2013). In fact, climate change mainly impacts grasslands through reduced precipitation, and less through temperature rise (Menegalija, 2017). The overall consequences are the disappearance of species unable to cope with drought, and changes in plant productivity, thereby affecting food sources for animals on the pastures. In addition, it can lead to water scarcity on the mountain pastures, impacting animal health and welfare, thus creating new challenges for sustainable pastoral activity.
- Extreme climatic events. Climatic changes have high spatial and temporal variability and do not just lead to temperature increases and precipitation decreases. In general, there are increases in extreme climatic events, including heat waves, frost episodes, intense precipitation, storms, hailstorms, and droughts. All this greatly impacts pastoralism, for instance an increased danger to the well-being of both animals and shepherds on the pastures, or scarcity of food sources for livestock.

Beyond climate change directly impacting grasslands, there are also other associated effects, such as changes in livestock feeding habits during warmer periods. The animals will tend to graze on higher and cooler pastures as lower altitude grasslands become less suitable due to heat and drought. An indirect impact on mountain pastures which are able to maintain their fodder production in periods of drought, compared to the increased shortages in the valleys, is the increasing land pressure linked to urbanisation and PDO specifications (specifically for the Alps). Moreover, new diseases may appear and affect livestock, the working conditions of shepherds might deteriorate and become harder due to the changing climate, and increases of alien species may threaten grassland vegetation.

In this context, mountain grasslands can play a very significant role in achieving the climate objectives set by the new EU Climate Pact, Climate Law and the Green Deal. Research shows that mountain grassland ecosystems are key for mitigating climate change, as they cover 33% of the UAA in the EU-28 and their soil organic matter has the capacity to sequester carbon. Overall, grasslands store between 60.5 and 82.8 billion metric tonnes of CO2 globally (98% of which in the top metre of soil), which is approximately three times the capacity of ocean and coastal ecosystems (Ward et al., 2014). The European Commission confirmed that "mitigation can mainly be achieved by extensive livestock grazing systems and protecting existing carbon stocks, thanks to the maintenance of permanent grasslands" (EC, 2021b). This means they are not only in need of actions to counter climate change but also enable carbon reduction.

Policies at the regional, national and EU levels are key for supporting and designing adequate measures which can simultaneously address the socio-economic and climate causes behind the deterioration of mountain grasslands.

Part II

The role of European and national policies in preserving mountain

At present, there is no common European policy framework dedicated to mountain areas and their development. Human activities occurring in mountain areas need to comply with existing – often sectoral – frameworks such as laws and regulations on agricultural activities, water treatment, land property rights, biodiversity protection, food safety, animal health and so forth. However, mountains are unique territories, and these regulations do not always consider the specificities of mountain areas adequately. Some European countries have decided to address the constraints faced by mountain people by either introducing derogations for mountain areas in mainstream regulations or adopting mountain regulatory frameworks which amend and add to the mainstream ones. This section presents the European Union policy framework relating to mountain grasslands and pastoralism *in sensu stricto*, and then legislative frameworks adopted in some countries in Europe.

4. How do European policies support mountain grasslands?

At the European level, the main policies that set the basis for rural development and nature conservation - and hence impact mountain grasslands and pastoralism - are:

- The Common Agricultural Policy (CAP) – the only European funding programme offering some dedicated measures to mountain areas.
- The EU Biodiversity Strategy – defining the European long-term plan for protecting nature and restoring biodiversity, which includes the Birds Directive and Habitats Directive – regulating the conservation of biodiversity in the EU.

These policy frameworks, which cover agriculture and nature conservation, are closely linked to mountain grasslands, as explained further below.

4.1. Which measures does the Common Agricultural Policy plan to support the preservation of mountain grasslands?

The CAP provides a unified agricultural policy in the EU. As defined by the European Commission[11], the 2014-2020 CAP's main goal is to "*strengthen the competitiveness of the [agricultural] sector, promote sustainable farming and innovation, to support jobs and growth in rural areas and to move financial assistance towards the productive use of land*". The 2014-2020 CAP is based on:

- Pillar I supports farm revenues through direct payments, to face unsteady market trends and changing weather conditions; and market measures, to address specific market situations and enhance trade promotion.
- Pillar II of Rural Development supports rural areas in the application of 6 thematic priorities[12].

[11] https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en

[12] These are: 1) fostering knowledge transfer in agriculture, forestry and rural areas; 2) enhancing the competitiveness of all types of agriculture and enhancing farm viability; 3) promoting food chain organisation and risk management in agriculture; 4) restoring, preserving and enhancing ecosystems dependent on agriculture and forestry; 5) promoting resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors; 6) promoting social inclusion, poverty reduction and economic development in rural areas.

Box 4.1.1 Most relevant CAP measures for mountain grasslands (CAP 2014-2020) (Euromontana, 2014)

PILLAR I

- Basic payments: are the precondition for benefiting from the other schemes and are subject to cross-compliance, including the Water Framework and the Sustainable Use of Pesticides Directives. The definition of permanent grasslands and the recognition of their productivity is important here to access these basic payments and, therefore, all the other schemes. In addition, collective grazing areas can be counted in some cases on a pro rata temporis basis (according to the number of animals involved in the transhumance and the length of the transhumance period).
- Greening payments: were introduced in the 2014-2020 period to encourage farmers to adopt or maintain farming practices that help meet environmental and climate goals and reward them for the provision of public goods. To benefit from these greening payments, farmers have notably to maintain permanent grasslands. MS have to target 30% of their direct payments towards greening and have some flexibility to ban the ploughing of environmentally sensitive permanent grassland inside and outside Natura 2000 areas.
- Areas with Natural Constraints (ANC): MS may choose to grant an additional payment for ANC such as mountain areas, as defined under the Rural Development rules. ANC Payments are allocated as a flat annual payment per hectare, although MS may decide to set a maximum number of hectares per holding for which this payment can be granted. The ANC Payment scheme may amount up to 5% of the national budget for the first pillar. This scheme is optional and does not affect the ANC options available under Pillar II.
- Coupled support: MS may use part of their direct payments budget to provide coupled payments for potentially vulnerable farming sectors, which are most typically used to offer additional support per unit of livestock. While coupled support does not target mountain areas in particular, it is a paramount source of income in these areas, given the predominance of animal farming in them.

> *"Make more money available for mountain pastures, either by putting ANC payments into Pillar I and/or ensuring the Rural Development budget stays big enough. But in the end, this really depends on the political will of member states".* Jabier Ruiz – WWF EPO

Additional measures (voluntary for MS): redistributive payments – farmers may receive additional support for the first 30 hectares of farmland; a simplified system for 'small farmers', offering subsidies of up to EUR 1 250, less stringent cross-compliance rules and no need to match the greening requirements.

PILLAR II

At least 30 % of the national rural development budget must be spent on 'greening' (ANC payments, agri-environment-climate measures, environment and climate investments, forestry measures, organic farming and Natura 2000). The most relevant measures for mountains are:

- Support in ANC: a voluntary scheme for each MS. It considers the added cost of farming in places where farming conditions are especially difficult, such as in mountain areas and farmland above 62º North. Aid amounts can reach up to 450€/ha. In March 2020, the European Commission published two reports addressing the impact of CAP payments on water and biodiversity, with a specific attention to ANCs. According to the European Commission, even if ANC Payments do not explicitly target biodiversity, they can have a limited positive impact on protecting biodiversity (Alliance Environment, 2019a, 2019b).
- Agri-environment-climate (AEC) payments. They are granted to farmers who voluntarily commit their farming activities to include one or more specific agri-environment-climate practices, thereby positively contributing to the environment and climate, for instance, conserving grasslands and HNV farming systems. Therefore, this measure targets grasslands directly but through a voluntary approach, and so with less territorial impact.
- Quality schemes for agri-food products. This is aimed at supporting promotion and information actions related to official quality schemes (e.g. protected designations of origin, PDO) and optional quality terms like "mountain product", which support the local economy and heritage and contribute to the maintenance of cultural landscapes. The technical specifications of PDOs may contain criteria for pastoral practices such as the number of days on the pastures for examples.

> *"The CAP already has a sort of PES scheme: agro-environmental payments covering, for instance, cutting mountain grasslands rich in biodiversity. Whilst it doesn't fully cover the ES benefitting society and is not enough to stop the decrease of grassland biodiversity, it has at least decreased the speed of the biodiversity loss".* Alain Peeters – RHEA

Additional measures: Natura 2000 payments; Young farmer payment; Investments in physical asset; organic farming; and Basic services and village renewal in rural areas.

The new CAP was expected to begin on 1st January 2021. However, as the negotiations between the European Parliament and the Council had some delays, the new CAP was postponed to 1st January 2023. Until then, a regulation on transitional provisions has been adopted for the years 2021 and 2022[13]. The transition regulation will ensure uninterrupted payments to farmers and other beneficiaries based on the 2014-2020 CAP rules yet using the budget allocation for 2021-2022. A few novelties will be applied including support measures to

[13] Regulation (EU) 2020/2220 Of The European Parliament And Of The Council of 23 December 2020.

tackle the impacts of the COVID-19 pandemic and for a digital and sustainable recovery, and increased support to environmental and climate measures including a "no backsliding" principle: Member States cannot lower their environmental and climate ambition in comparison with what was funded during 2014-2020 period.

The post-2022 CAP will contribute to delivering the EU Green Deal as well as the new Biodiversity and Farm to Fork Strategies, through its nine specific objectives (Figure 8) (EC, 2020b). The overall 2021-2027 CAP budget (€386.6 billion) is lower than the 2014-2020 allocations (€408.31 billion), yet it remains the first budget expenditure in the 2021-2027 Multi-Annual Financial Programme. To this budget, an additional € 7.5 billion will be channelled for rural development with the Next Generation EU package.

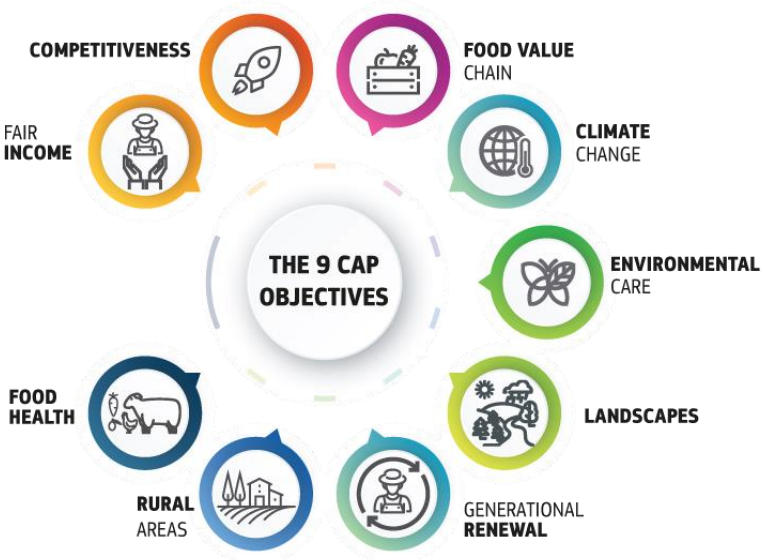


Figure 8. The new CAP's objectives

The post-2022 CAP will introduce six important changes:

- A new delivery model: while the EU establishes the basic policy parameters and types of interventions, each Member State will be responsible for elaborating its own CAP Strategic Plan (for both Pillars I and II) with more flexibility than before based on its SWOT analysis. These plans will be financed by the EAGF and EAFRD[14]. All interventions covered by the 2014-2020 CAP, especially from Pillar II, may be financed even if the categories have been renamed.
- Enhanced conditionality to receive basic payments: to ensure that farmers comply with higher minimum environmental and climate standards. Mandatory standards will include (among others) crop rotation; soil protection; maintaining permanent grasslands, wetlands and peatlands; and protecting existing landscape features or devoting an area on each farm to "non-productive" features. Member States will be required to define, at national or regional level, minimum standards for beneficiaries to access basic payments. These standards shall consider the specific characteristics of the areas concerned, including soil and climatic condition, existing farming systems, land use, crop rotation, farming practices, and farm structures.
- Introduction of Eco-schemes: they will offer annual support for practices favouring climate and the environment, financed from at least 25% of the Member State's budget for direct payments in Pillar I. They will replace the current greening payments and for the first time since, it will be mandatory for MS to define them in their CAP Strategic Plans, but they will be voluntary for farmers. Hence, they have to be attractive enough

[14] This analysis is based on the 2018 proposal for the CAP Regulation, COM/2018/392 final - 2018/0216 (COD) (EC, 2018c). The negotiation phase for the final regulation is still ongoing and hence, our suggestions exclusively refer to the above-mentioned proposal.

for farmers so that they wish to apply for this measure. Payments could be based on an annual payment per eligible hectare, or could be offered as "top-up" to farmers' direct payments or as stand-alone schemes or as compensation payments based on income losses and extra costs incurred by farmers (Box 4.1.2)[15].

Box 4.1.2 Possible eco-schemes for permanent grasslands

Eco-schemes shall be established by the Member States and have not been defined yet. The European Commission published an indicative list of potential eco-schemes to inspire Member States. The following suggestions could be interesting to encourage better management of permanent grasslands:

Agroecology: low intensity grass-based livestock system, mixed species/diverse sward of permanent grassland.

Husbandry and animal welfare plans: promoting genetic diversity and resilience, access to pastures and increasing grazing period for grazing animals.

Agro-forestry: establishment and maintenance of landscape features above conditionality, and of high-biodiversity silvo-pastoral systems.

HNV farming: shepherding on open spaces and between permanent crops, transhumance and common grazing, semi-natural habitat creation and enhancement.

Carbon farming: establishment and maintenance of permanent grassland, extensive use of permanent grassland.

- More emphasis on the result-based approach: schemes and payments will progressively rely more on the achievement of expected results rather than the compliance with a specific delivery method. Throughout this approach, farmers and landowners will have more freedom to select the approach they believe is the most suited for their territory, including more conventional and traditional methods.
- Threshold for environmental and climate action: at least 35% of the rural development funds will be allocated to support agri-environment climate measures (AECM). These AECM measures are also aimed at the conservation of biodiversity in highly fragile ecosystems such as mountain grasslands.
- More emphasis on the Agricultural Knowledge and Innovation Systems and farm advisory support services: in the CAP Strategic Plans to encourage sustainable

[15] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/factsheet-agri-practices-under-ecoscheme_en.pdf

management in farming via the support of the European Innovation Partnership for agriculture (EIP-AGRI).

Additionally, in the 2023-2027 period, Member States may grant support to farmers in areas facing natural and other area-specific constraints, such as mountain areas, and the rules on ANC payments will continue to apply as in the2014-2020 CAP (Council of the European Union, 2021).

Box 4.1.2 Green architecture for grasslands in the post-2022 CAP (Lütteken, 2021)

Figure 9 shows an example of how specific combinations of CAP measures can be used for enhancing eco-system services of grasslands in the 2023-2027 period.

Eco-schemes	CAP Pillar II	Conditionality
• Conversion of arable crops to grasslands • Temporary grasslands in crop rotations • Mangement commitments for extensive livestock rearing • Appropriate grasslands management (no plughing, no cut before end of breeding season)	• Result-based schemes for mixed species grasslands • Cooperation • Conversion of arable crops to grasslands • Support for mixed species grassland establishment • Establishment of tree-pastures (silvo-pastoralism) eco-systems	• GAEC1: Maintenance of permanent grassland based on a ratio • GAEC8: crop rotation, definition of minimum rotation patterns • GAEC10: ban on converting or ploughing permanent grasslands in Natura 2000 sites • SMR3: Conservation of wild birds • SMR4: Natural habitats

Figure 9 Example of green architecture for grasslands

Over the 2021-2027 period, other programmes such as the EU Green Deal, LIFE, Horizon Europe and European partnerships will offer some funding opportunities dedicated to food, agriculture, rural development, and the bioeconomy.

4.2. How does the Biodiversity Strategy protect and support mountain grasslands?

The EU Biodiversity Strategy sets the long-term plan of the Union for protecting nature and reversing the degradation of ecosystems. The EU Biodiversity Strategy for 2030 will enhance its action against biodiversity loss by establishing at least 30% protected land areas in the EU, restoring degraded ecosystems, unlocking € 20 billion/year for biodiversity and (EC, 2020a). According to this strategy, at least 30% of the land area of the EU shall be protected, and 10% of the land area shall be strictly protected. To date, the Commission have not defined yet the definition for "strict protection" and hence whether this provision will have an impact on fundamental practices for grassland management such as pastoralism.

Particularly important to achieve the goals of the Biodiversity Strategy are the Habitats and Birds Directives (EC, 2014a, 2014b). Since 1992, these Directives provide the legal framework for the protection of habitats and species within the EU. Both directives identify which species and habitats are of community interest, and these are protected in designated Natura 2000 sites. Grassland habitats hold a significant part of Europe's biodiversity and are the origin of many public goods and services. As such, the Habitats and Birds Directives are among the main policies for the protection of grasslands and activities associated to their maintenance.

The scope is to ensure a favourable conservation status of these habitats and species across all EU Member States. Therefore, traditional activities such as pastoralism are allowed, or even fostered, in the Natura 2000 sites if they do not negatively affect the species or habitats for which the site has been created. Every six years, each Member States has to present a progress report to the European Commission, which then aggregates the information to provide a unified picture of the conservation status and trends in Europe.

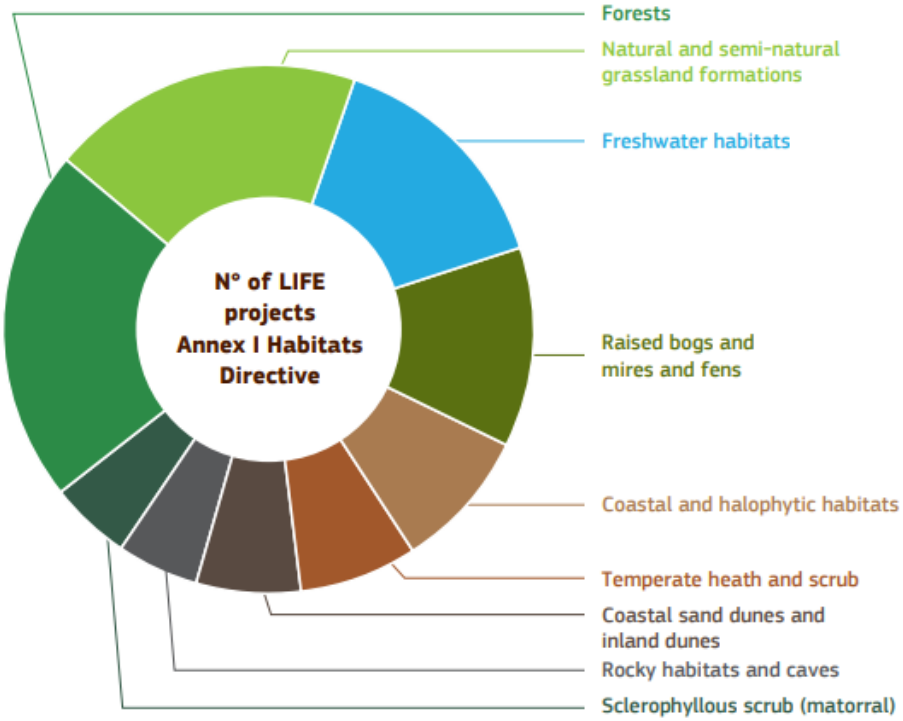


Figure 10 LIFE's contribution to the Natura 2000 sites. Source: European Commission (2018) LIFE improves nature.

To implement the Habitats and Birds Directives, the European Commission provides local and regional actors with funds, capacity building activities and international cooperation through the LIFE programme (€3.4 billion in 2014-2020). This has been fundamental to help EU MS is developing policies and structures to manage Natura 2000 sites across different habitats, including grasslands (Figure 10) (EC, 2018b).

In the next programming period 2021-2027, the EU agreed to allocate, through the LIFE funding instrument, € 5.4 billion for projects at current prices supporting the environment and climate action (+60% compared to 2014-2020). In the upcoming seven-year period, new Strategic

Nature Projects will be designed and funded to support the implementation of EU nature rules, and biodiversity policy objectives through mainstreaming under the Nature and Biodiversity sub-programme, and can be used as a tool to improve grasslands in mountains.

The Birds and Habitats Directives are linked to the CAP. Firstly, through cross-compliance, which ensures all CAP beneficiaries respect certain obligations related to the Birds and Habitats Directives. Secondly, through the limited funding that Natura 2000 sites receive under diverse CAP schemes (EC, 2014c). For instance, the menu of measures under CAP Pillar II includes Natura 2000 payments for forest-environmental and climate services and forest conservation. AEC schemes can also be specifically targeted to Natura 2000 sites (EC, 2016a).

4.3. Are European policies fit for purpose?

The role of the European policy frameworks in preserving mountain grasslands, especially in the 2014-2020 CAP, remains contradictory and unsatisfactory. On one side, the direct payments and Pillar II measures have been effective in delivering funds and incentives to support farmers' revenues, reduce market distortion, and boost local economies and jobs (Pe'er et al., 2017; EC, 2021a). On the other side, the latest evaluation on the impacts of the CAP impacts in rural areas shows that this policy has favoured big farmers over small ones, in order to increase the competitiveness and higher yields in the agricultural sector (EC, 2021a). This led towards biodiversity decline in agricultural lands as well as to the deterioration of the socio-economic conditions for smaller farmers (Calvi et al., 2018). Moreover, the lack of reliable indicators for assessing the results and impacts of the CAP in relation to biodiversity hinders the net-effects assessment of this policy on Europe's biodiversity, especially in widely deteriorating habitats such as grasslands (European Court of Auditors, 2020; Pe'er et al., 2020) (see Box 4.3.1).

Box 4.3.1 Farmland Bird Index in mountain pastures. Birds are optimal ecological indicators and their conservation status is often monitored to assess the level of biodiversity. In the framework of a joint project endorsed by the Italian Ministry for Agricultural policies, Food and Forestry, the Rete Rurale Nazionale and Lega Italiana Protezione Uccelli created the Farmland Bird Index for mountain pastures (FBIpm), which complements the Farmland Bird Index (FBI). This indicator offers a synthetic instrument to monitor and communicate the conservation trends of these species and the habitat that they inhabit at both national and regional level.

In the 2014-2020 period, greening payments were introduced in order to have a significant impact on permanent grasslands. However, due to their important exceptions (e.g. not applicable for small farmers) and the limited ambition of the MS, they have only led to small changes in farming practices, with limited impact on the ground. They were more used to maintain the income support status quo for farmers rather than to address environmental and climate issues more effectively (Meredith & Hart, 2019). In the 2021-2027 programming period, greening payments will be replaced by new eco-schemes (Box 4.1.2). Yet, the content of these

new eco-schemes remains unclear. How to ensure that these eco-schemes are going to green the future CAP? How to avoid duplication and maximize synergies between the eco-schemes and AECM? How to ensure that farmers will be interested enough to implement them? Also, the success rate of these eco-schemes depends on the ability to set well-defined and measurable targets, and involve actively farmers (European Court of Auditors, 2020), which hence will strongly depend on the CAP Strategic Plans of each MS.

On the other side, the evaluation of the Habitats and Birds Directives (2016) shows better results than the CAP legislative framework with respect to mountain grasslands (EC, 2016c). Overall, the core benefits of the Directives exceed the cost of implementation as they favour the preservation of habitats and species preservation. Still, given that "*a very high proportion of species and habitat types protected under the Directive are still in an unfavourable conservation status, some of which are continuing to decline or remain endangered",* these Directives did not fully accomplish their general objectives. The main issues include an underestimation of the time needed to meet the objectives, and a failure to expand relevant actions to habitats and species beyond the Natura 2000 site that reduces the overall ecological coherence of the network. Furthermore, other shortcomings are the persistence of illegal activities and conflicts with wildlife, a limited availability of funding and the need to improve coherence with other EU policies and programmes (EC, 2016c).

As for extensive livestock practices, CAP support has been fundamental in keeping pastoral lands populated and productive. Today, for instance, CAP subsidies represent about half of pastoral revenues in the EU Mediterranean region, and as much as 80% in France with the Prime Herbagère Agro-Environnementale (Fréve, 2015). Europe's policy frameworks acknowledge the positive impacts of pastoral activities in maintaining biodiversity and landscape management in less favoured areas (EC, 2014b; CoR, 2019a, 2019c). Notably, in the 2014-2020 period, CAP support shifted towards a more multi-functional conceptualisation of farmlands, considering pastoral farmers not just as livestock producers but as 'guardians of nature' or suppliers of multifunctional goods and socio-ecosystem services (Nori, 2019). This new vision steers a transition of pastoral economies from production-based to more service-based economies, therefore supporting the diversification of pastoral revenues and a more holistic view of ecosystem services linked to pastoral activities.

Nevertheless, over the past decades these political efforts have been unable to prevent the drastic decline of pastoral practices and overcome several shortcomings (Beaufoy & Poux, 2014; Nori & Farinella, 2020; Nori, 2019) such as :

- Growing bureaucratization of pastoral duties (e.g. sanitary regulations of pastoral products and product processing)
- Balancing the legislation on biodiversity and wildlife protection – at both European and MS levels – with important impacts such as overgrazing, undergrazing and conflicts with large carnivores

- Supporting pastoral farmers in meeting non-environmental challenges such as changing societal demands (e.g. dietary trends, environmental concerns)
- Engaging local actors in policy design, implementation and monitoring
- Lacking separate criteria and indicators for extensive and intensive farming systems
- Adopting a restrictive definition for the permanent grasslands which forbids the grazing of low vegetation areas such as shrubs and small trees (Box 4.3.2).

Box 4.3.2 What is at stake behind the official definition of permanent grasslands?

For farmers[16], the definition of permanent (mountain) grasslands is crucial as the amount of European subsidies they receive for their activity is partly linked to the recognition of the pastures they use for breeding. This definition has gone through the following changes:

Regulation[17] (Validity Period)	Definition
2013 CAP Regulation (2014-2017)	Land used to grow grasses or other herbaceous forage naturally (self-seeded) or through cultivation (sown) and that has not been included in the crop rotation of the holding for five years or more, as well as, where Member States so decide, that has not been ploughed up for five years or more; it may include other species such as shrubs and/or trees which can be grazed and, where Member States so decide, other species such as shrubs and/or trees which produce animal feed, provided that the grasses and other herbaceous forage remain predominant.
Omnibus Regulation (2017-2022)	Following the adoption of this Omnibus regulation, Member States may also decide to consider as permanent grassland: a) land which can be grazed and which forms part of established local practices where grasses and other herbaceous forage are traditionally not predominant in grazing areas; and/or b) land which can be grazed where grasses and other herbaceous forage are not predominant or are absent in grazing areas".
Post-2022 CAP (2023-2027)	Permanent grassland and permanent pasture' (together referred to as 'permanent grassland') shall be land used to grow grasses or other herbaceous forage naturally (self-seeded) or through cultivation (sown) and that has not been included in the crop rotation of the holding for five years or more as well as, where Member States so decide, that has not been ploughed up, or not tilled, or not reseeded with different types of grasses, for five years or more. It may include other species such as

[16] In this report, the terms "farmers", "livestock/animal breeders" and "stockbreeders" are considered synonyms and refer to the people whose economic activity is based on extensive livestock breeding.

[17] Respectively the relevant regulations are: a) for the 2013 CAP Regulation: EU Regulation No 1307/2013 of article 3, paragraph 1); b) Omnibus Regulation: Regulation No 2017/2393; c) post- 2022 CAP: Proposal for a Regulation of the European Parliament and of the Council 11102/21.

	shrubs or trees, which can be grazed and, where Member States so decide, other species such as shrubs or trees which produce animal feed, provided that the grasses and other herbaceous forage remain predominant. Member States may also decide to consider as permanent grassland: ▪ land covered by any of the species as described in this point and which forms part of established local practices, where grasses and other herbaceous forage are traditionally not predominant or absent in grazing areas; ▪ land covered by any of the species as described in this point, where grasses and other herbaceous forage are not predominant or are absent in grazing areas.

Including shrubs and trees in the definition of permanent grasslands, as introduced via the Omnibus Regulation in 2017, is central to supporting pastoral practices in the Mediterranean countries, where these elements are part of the grassland ecosystem and livestock grazing is indispensable to reduce fuel loads and wildfire risk. So far, the proposed definition for "permanent grasslands" in the post-2022 CAP include shrub and tree cover, as defined in the Omnibus regulation.

The abovementioned criticism demonstrates that significant changes are needed to properly preserve and maintain mountain grasslands and pastoral practices at European level. Member States should reinforce the implementation of EU policies and measures to support livestock farming systems, as well as developing a supportive regulative system at national level. The next section will present the political framework of some countries in Europe which are frontrunners in regulating livestock farming systems, and all related elements, in mountain regions.

5. Learning from supportive policies in European countries

In Europe, some countries have developed specific national legislation in favour of mountain grasslands. Member States such as France, Italy, Spain and Romania provide empirical examples on how national policies can support areas with specific characteristics, like mountains and inner areas. Whilst Switzerland and Norway are not part of the EU, their policies and measures have both similarities to the Common Agricultural Policy, like the use of direct payments in both countries, and also differences, such as the annual Farm Agreement negotiation process in Norway. The following sections introduce the prominent policies and measures for mountain territories in these countries.

"It is needed to make policies more flexible, accommodating for the specificities of mountain areas (e.g. policies on animal health, human health, food safety…)". Jabier Ruiz – WWF EPO

5.1. France: A decentralised governance model

In France, the *Loi Montagne* was adopted in January 1985, and then updated in 2016 by the *Loi Montagne II*, to frame the development and protection of mountains in an integrated and transversal way. Both laws challenged the strongly centralised governance model in France by offering mountain regions the opportunity to intervene in the legislative process through "adaptative measures" across all sectors related to mountain development such as urbanism, tourism, agriculture, risk prevention, the organisation of public services, tax incentives among others. The *Loi Montagne II* foresees specific support to mountain agricultural and pastoral activities, such as financial support for maintaining activities in areas with natural constraints, combating shrub invasion in pasturelands, and reducing conflicts with large carnivores.

Furthermore, the law sets up the current governance model of mountain areas in France, with a National Mountain Council and distinct coordinating agencies for the different massifs. These agencies undertake managerial and consultation activities which have the merit of going beyond administrative boundaries to address strategies within a naturally defined perimeter (a mountain range). In the massif, working groups have been set up on seasonal employment in summer/alpine pastures, land clearing, and the promotion of mountain products. These groups contribute to the exchange of good practices within a territory and the dialogue between civil society and policymakers.

The Loi Montagne of 1985 and 2016 builds on the foundations of the Loi Pastorale (72/12 January 1972) (Lorenzi, 2013), which is still in force, and much earlier officialised the recognition of the French State of three institutions for the collective management of mountain pasturelands: associations foncières pastorales (pastureland associations), gathering landowners of the grazing areas with the aim of ensuring the single and consistent management of these areas; groupements pastoraux (pastoral groups), to encourage the collective development of mountain pastures via renewed grazing and livestock management practices; and conventions pluriannuelles de pâturage (multi-annual grazing agreements), contracts between farmers and landowners that establish the rights and duties of each party in the use of grazing land. Also, the Pastoral Law established compensation for farmers who contribute to land management in critical areas within defined mountain areas.

5.2. Spain: Montes de Utilidad Pública

The Spanish State's main legal framework for the conservation, sustainable use, improvement and restoration of natural heritage and biodiversity, including mountain grasslands, is Law 42/2007. Its guiding principles are: a) the maintenance of essential ecological processes and basic vital systems; b) preservation of biological, genetic, population and species diversity; c) variety, uniqueness and beauty of natural ecosystems; d) geological and landscape diversity. Law 42/2007 establishes instruments such as an Inventory and a Strategic Plan for Natural Heritage and Biodiversity, as well as Management Plans for Natura 2000 Network sites

"(…) A priority role will be given to the waterways, livestock routes, mountain areas and other elements of the territory, linear and continuous, or that act as connecting points, regardless of whether they have the status of protected natural spaces." Law 42/2007

Of paramount importance is the emphasis on ecological corridors in mountain areas and their contribution to:

- The role of livestock routes in mountain areas.
- Improving the ecological coherence, functionality and connectivity of the Natura2000 Network.
- The establishment of the European and Community network of biological corridors defined by the Pan-European Ecological and Landscape Diversity Strategy and the European Territorial Strategy.

The Autonomous Communities have the competence and responsibility to manage the Natura 2000 Network. They are responsible for drafting and reaching agreements on the Management Plans and carrying them out. In the Autonomous Community of the Basque Country (CAPV), the Provincial Councils, responsible for the management of the Protected Natural Areas, are also involved as responsible for implementing these plans. In the case of the CAPV, each Special Area of Conservation has its own Management Plan, which gives special attention to mountain pastures such as a specific conservation status and a set of standards and measures for its conservation or restoration.

The sites currently constituting the Natura 2000 Network have been designated largely in areas previously declared as Mountains of Public Utility ("Montes de Utilidad Pública").

This mention recognises the ancestral way of working in the communal areas of these mountains, where the neighbours shared uses, exploitations and customs. These included the use of communal mountain pastures during the summer months, a use that has contributed to the conservation of the Basque landscape and its consideration as habitats of community interest. For these reasons, the Guidelines for Territorial Planning of the Autonomous Community of the Basque Country affirm that mountain pastures *"constitute extremely valuable environments from an environmental, landscape and cultural perspective"*[18].

[18] https://www.euskadi.eus/directrices-de-ordenacion-territorial-dot/web01-a3lurral/es/

"The Mountain Law recognises that mountains, due to their particularities, must be treated differently, acknowledging their importance." Adrian Radu Rey - Romontana

5.3. Romania: A special consideration of mountain areas

Since 2018, the Law of the Mountain nº 197/2 (Parliament of Romania, 2018) – Legea Muntelui – regulates the inclusive and sustainable development and conservation of mountain areas in Romania. This law is directly inspired by the Mountain Law in France. The Legea Muntelui recognises disadvantages of mountain areas due to:

"*the limited possibilities of using the agricultural land, because of the altitude and climatic conditions, the slopes, the geological substratum and the high costs of working with it, the living conditions, the infrastructure, the business environment, the access to education and medical services*" (Parliament of Romania, 2018)

The Legea Muntelui allocated € 1 billion over the 2018-2028 period to encourage activities in the mountain areas. This money comes from the State budget, through the Ministry of Agriculture and Rural Development, and covers aspects such as:

- Financial compensation to landowners located in Natura 2000 sites, natural parks, national/biosphere reserves and other protected natural areas in mountain areas.
- Support to the cultural heritage of the mountain area.
- Financial support to livestock farmers in the mountain area depending on the severity of natural handicaps and altitude, in addition to the CAP payments.
- Protection and development of mountain biodiversity, including HNV farming.

The Romanian National Mountain Area Agency will manage investment programmes, covering investments on, for example, modernising the summer grazing areas for sheep, and improving the collection and processing of wool.

5.4. Italy: A territorial cohesion approach

During the 2014-2020 programming period, Italy has put in place the National Strategy for Inner Areas (Strategia nazionale per le aree interne) (Lucatelli, 2016) These inner areas are characterised by their distance to services, low population density and richness in natural and cultural resources. Overall, these areas cover 60% of the country and 23% of its population. 85% of the inner areas are mountain municipalities. Hence, the Strategy seeks to *"contribute to define both the intensive and the extensive development and demographic recovery in Inner Areas"* by empowering the territories and people of inner areas across Italy.

In particular, the Strategy has five mid-term objectives: i) increase the well-being of local population, ii) foster local labour demand and employment opportunities, iii) enhance the use of territorial capital, iv) lower the social cost related to human abandonment, v) bolster local development factors.

This is done by creating the preconditions for territorial development (i.e. ensuring the availability of adequate goods/essential services), on one side, and promoting local development projects across the five spheres of interventions mentioned above. An innovative aspect of this Strategy is the multi-fund approach based on EU Funds (EAFRD, ERDF, ESF, EMFF) and the National Stability Fund.

Rural Development initiatives are focussed on topics such as land access and management, diversification of the rural economy, local food products, and young farmers. For instance, funding has been used to set up the *scuole itineranti della pastorizia* (itinerant pastoralist schools), contribute to the sharing of knowledge and innovations, and facilitate access to and the preservation of mountain pasturelands (Forum Disuguaglianze Diversità, 2018).

5.5. Norway: Involving farmers through the annual Farm Agreement

The Norwegian agriculture policy – *Landbrukspolitikken* (Daugstad, 2015; Hemmings, 2016; Mittenzwei et al., 2018) in Norwegian – is aimed at keeping an active and sustainable agriculture throughout the entire country, as well as contributing to the development of rural areas. A large part of farm income in Norway is based on coupled payments, which are differentiated according to criteria such as farm size, location, and herd size. Here, the payments are negatively related, meaning that payments per animals are higher for the first animals in the herd, after which the rate flattens as herd size increases (the same applies for farm size).

Moreover, there is also differentiation based on the natural (dis)advantages, meaning products from the less productive areas receive higher prices than the more productive areas. For instance, in mountain areas, milk production receives the highest price.

The OECD (2016) estimated that regional annual payments for a 30-cow dairy farm were zero but could reach around 180,000 NOK per farm in the mountains and valleys of Southern Norway (roughly 20,000 EUR at the time). These differentiated payments - combined with legal regulations - are aimed at encouraging small-scale farming in remote areas.

On the national level, there are measures supporting Norwegian grasslands, for grazing, supporting old livestock breeds, preventing carnivore damage, and for selected cultural landscapes linked to agriculture. In addition, on a regional scale there is support for activities such as the mowing of steep areas, herding, and transhumance.

An important aspect to the transparency and inclusiveness of Norwegian agricultural policy is the Farm Agreement (Jordbruksavtalen): annual agreements between the State and two farmer organizations: the Norges Bondelag and the Norsk Bonde- og Småbrukarlag. The Norsk Setterkultur is also involved in the Norsk Bonde- og Småbrukarlag, as a voice for the traditional

summer farming. During the meetings to discuss the annual agreements, the different stakeholders review on the issues for agriculture and establish framework conditions on aspects such as the market prices for agricultural products and the differentiated support levels.

5.6. Switzerland: Recognising the multifunctionality of agriculture

The Swiss agricultural policy – the Politique Agricole (Conseil fédéral Suisse, 2019; OECD, 2017; Swiss Federal Office for Agriculture, 2019) – considers the multifunctionality of agriculture, namely in producing "non-commodity outputs" (e.g. contributing to rural development, environmental quality and landscape management). As there is no market for such public goods, *"they may be produced in suboptimal amounts in the absence of agricultural production" (OECD, 2017)*.

To ensure that agriculture meets both sustainable development and market requirements, government intervention is justified through agricultural policy instruments such as direct payments to farmers. Under the Politique Agricole, direct payments are linked to reaching specific policy goals and providing public goods. For instance, there are specific payments for contributing to the cultivated landscape through farming practices (Contributions au paysage cultivé). These include, for instance, farming activities on steep surfaces, maintaining an open landscape, and summer farming. Furthermore, there are direct payments for contributions to biodiversity (Contributions à la biodiversité) at the so-called biodiversity promotion surfaces, which include extensive mountain pastures. Moreover, the stocking rate (charge en bétail) is limited, depending on factors such as the altitude and pasture quality; subsidies are decreased if the producer exceeds the limit.

The commercialisation of agricultural products is promoted through measures of support for promotion (Absatzförderung / promotion des ventes). Official Logos for Mountain- and Pasture- products were introduced in 2014 and their use is free of charge. They are based on a federal ordinance[19], which protects the terms 'mountain' and 'pasture' for products produced and transformed in these respective regions. Also important for mountain regions are the measures to improve the structural situation of farms (Strukturverbesserungsmassnahmen / Améliorations structurelles). These measures allow also the funding of "projects for regional development", e.g. accessibility to farms, irrigation, land reform, renovation of farm housing and, from 2020, improving digital access to remote farms. Though the farming sector must be predominant, these projects may involve other sectors such as tourism or forestry. This is an interesting tool to improve cross-sectoral cooperation and has found widespread use all over the Swiss rural areas.

The Swiss agricultural policy is reformed every four years. The agricultural policy 2014 –2017 was an important shift with a stronger accent on direct payments. This derived from a political imperative for mountain regions to get more direct payments in order to compensate their natural handicaps. This goal was achieved. In 2018, this direction was re-confirmed, and no

[19] https://www.blw.admin.ch/blw/fr/home/instrumente/kennzeichnung/berg-und-alp.html

major changes were introduced. The next step in the agricultural policy is currently under discussion. In this post-2022 period, agricultural policy is once again confirmed, and mountain agriculture shall get higher compensation rates than lowland farmers. However, the Swiss federal agricultural policy neglects the important role of part-time farms in mountain areas. In some mountain areas, such as the Canton of Valais, part-time farms constitute up to 80% of all farms. With the industrialization and the development of tourism at the end of the 19th century, farmers started to combine their activities. This model is prevalent till today. These part-time farmers play important roles to ensure agricultural production and maintain the landscape. However, the agricultural policy 2022 envisages more professionalisation of the farming sector, which would significantly hamper the attractiveness of part-time farming and thus endanger the exploitation of large areas in the Alps.

6. Why do legislative frameworks matter for grasslands?

Too often pastoral systems are not economically viable without external support or easing administrative burdens. This chapter has proven that an enabling policy framework – at country and EU level – is fundamental to address these shortcomings and hence to ensure the preservation of mountain grasslands.

At European level, much still needs to be done in order to remove inconsistencies among policies and efficiently help farmers and breeders to address the socio-economic and environmental changes of this century.

The analysis of national legislation offers some inspirational models – in terms of governance structures, use of funds and specific payments, valorisation of mountain products – that foster the sustainable management of mountain grasslands. They could contribute to ameliorating the European policies and measures which affect grasslands and pastoralism, for instance through increased subsidiarity or the uptake of specific regulations on a wider EU level. Additionally, the diversity of the national frameworks demonstrates that there is not a one-size-fits-all approach, but that multiple measures can exist, and the choice should depend on the specificities of the territory and its inhabitants.

As new challenges for mountain grasslands arise, not only policies but also management practices for this habitat need to be renewed and reinvented. The latter should be embedded and valorised by the legislative framework of each country and the European Union. The next chapters provide an overview of good practices which support the sustainable management of mountain grasslands (PART III) and how they can be used to derive a list of recommendations (PART IV).

Part III
Good practices to sustainably manage mountain grasslands and make the best of existing opportunities

7. Why is a collection of good practices on the sustainable management of mountain grasslands needed?

For thousands of years, mountain grasslands have existed thanks to the presence of human inhabitants and their activities. Today, the long-term sustainability of this habitat strongly depends on the ability to decrease environmental pressures and ensure the continuation of the same human practices which have a beneficial effect on territorial management, such as pastoralism. Yet, pastoral activities will exist only if they continue to be economically viable and socially acceptable. For this reason, this chapter compiles good practices which address the environmental, economic and social pillars of sustainability (see Methodological Note). Thanks to these good practices, stakeholders will be able to be inspired and learn from others' solutions and then take full advantage of what these areas have to offer to their territory and professional work.

The map below (figure 11) shows the geographical distribution of the 31 good practices selected throughout Europe. The territorial dimension influences many aspects, such as site-specific challenges and opportunities, as well as policies underlying good practices, so the authors have paid a special attention to the transferability of each good practice presented in this report. In green are the good practices related to the ecological dimension, in blue to the economic aspect, and in orange to the social aspects of the sustainable management of mountain grasslands[20].

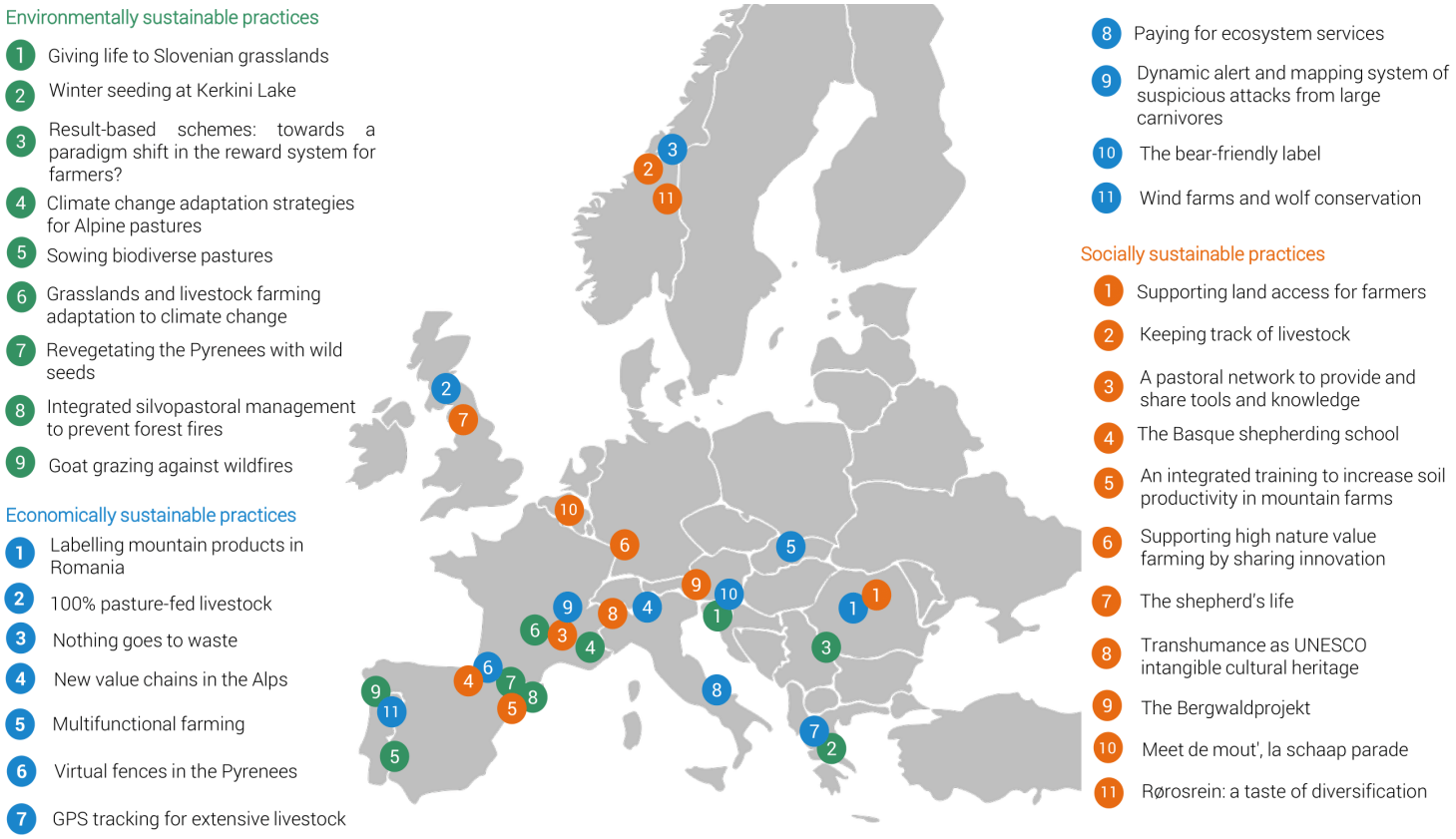


Figure 11 Geographical distribution of OREKA MENDIAN good practices

[20] Only summaries of some good practices are included in this report. A complete factsheet for each good practice is available in a separate booklet in OREKA MENDIAN Website: http://www.lifeorekamendian.eu/

8. How to ensure the environmental sustainability of mountain grasslands?

Compared to intensive systems, extensive livestock practices better consider the characteristics of the local ecosystems and their natural cycles; plan and manage for the long term; and use biological and local inputs instead of chemical inputs. This section describes some good practices across Europe which, if expanded and replicated, can contribute to conserving mountain grassland biodiversity, supporting climate change mitigation and adaptation, and decreasing the risk of natural disasters.

"It is necessary that people recognise and value the work done by extensive livestock owners for the local economy, biodiversity, landscape. The disappearance of extensive livestock farming does not hold immediate consequences, it is only after several decades that the full extent of the consequences becomes clear." **Enrique Ramón** – Mayor of Linás de Broto

8.1. Biodiversity conservation

There is a close link between **traditional farming practices** and **biodiversity** (Bunce et al., 2004). In mountains, environmental factors such as geology, climate, isolated location, and topography set the bases upon which farming practices (such as pastoralism and low intensity agriculture) have evolved. These practices, combined with environmental processes, have resulted in unique **"cultural landscapes"**, which are dependent on both human interventions and natural cycles. Research shows that grazed pastures often suffer from biodiversity loss when they are abandoned (MacDonald et al., 2000). Many **designations**, such as UNESCO's Cultural and/or Natural World Heritage Sites and Biosphere Reserves, have recognized the role of these farming practices and pledged to conserve the cultural landscapes derived from human-nature interactions.

This means that, to preserve biodiversity, traditional management practices which led to the creation and maintenance of mountain grasslands and ecosystems need to be sustained. These practices include the grazing of animals; seeding with local species; mowing and cutting; extensive grazing (preferably using local breeds); fertilising with manure from the grazing animals; mechanical crushing; and carrying out controlled burns (Figure 12).

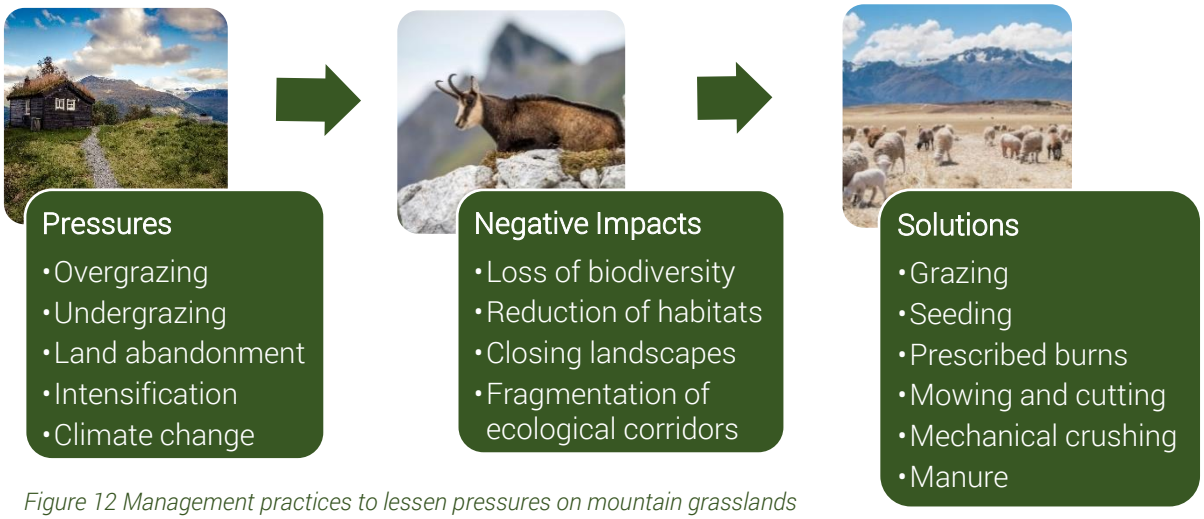


Figure 12 Management practices to lessen pressures on mountain grasslands

For instance, seeding can be used to tackle overgrazing – and thereby conserve grassland biodiversity – as in the example of winter seeding at Kerkini Lake, in Greece (Box 8.1.1).

Box 8.1.1 Winter seeding at Kerkini Lake - Greece

The grasslands surrounding Kerkini Lake are the primary grazing land for water buffaloes – kept as livestock – and birds, many of which are endangered. However, food availability for domestic and wild herbivores is very limited during winter. Consequently, overgrazing and grassland degradation are major threats, as these herbivores graze the grasslands all year. Moreover, there is competition for scarce grassland resources between livestock raising and biodiversity conservation.

Name: 'Research & Technology Development Innovation Projects'- AgroETAK, MIS 453350

Context: Greece (2014)

Coordinator: Hellenic Agricultural Organization – DEMETER

Key result: increase plant cover through winter seeding to prevent overgrazing

To tackle these issues, the Hellenic Agricultural Organisation DEMETER investigated and assessed the effectiveness of seeding Winter wheat (*Triticum aestivum*) to increase available winter forage. The innovative seeding practices, aimed at causing minimal effects to existing natural vegetation, increased the total plant cover by 30%.

This supplied enough grass during the wintering period, which is especially important for the survival of endangered bird species. In addition, the extra forage lowered costs for farmers who otherwise needed to buy supplementary food in the winter season for their livestock.

Mowing and grazing activities are also efficient measures to counter biodiversity loss resulting from intensification and abandonment of grasslands (Box 8.1.2).

Box 8.1.2 Giving life to Slovenian grasslands

Slovenian grasslands are in a very poor state, due to the threats of intensification and abandonment. Hence the project LIFE to Grasslands has been set up to improve the conservation status of the grasslands in four project sites across the country. In short, the aim is to "give life to grasslands" and show that providing food security and conserving nature is not only possible but also compatible.

Name: LIFE to Grasslands

Context: Slovenia (2015-2020)

Coordinator: Institute of the Republic of Slovenia for Nature Conservation

Key result: improvement of the unfavourable status of grasslands and ensuring their long-term conservation

During the project, the status of two Natura 2000 priority habitat types of grassland in unfavourable condition has been improved. Activities included:

- Structural and technical interventions for the sustainable management of grasslands (e.g. rental and purchase of abandoned grasslands);
- Mapping of overgrown areas and removal of the overgrowth;
- Provision of grazing equipment and free rental of lawnmowers, and the restoration and establishment of traditional orchards;
- Planning activities for the medium- to long-term management of grasslands (e.g. preparation of farm management plans for selected farms);
- Training and actions for stakeholder involvement (e.g. creation of an agri-environmental programme in the field of sustainable management of grasslands), communication and networking of landowners and farmers, and promotional and educational activities.

Lessons learnt:

- Linking biodiversity conservation to cultural activities and programmes carried out by NGOs and environmental conservation agencies enhances the stakeholders' awareness on the benefits of sustainable grassland management and their multiple ESBOs – and hence promotes actions for habitat protection.
- For livestock farmers and herders, it is necessary to increase knowledge on the appropriate management practices and how to use them (right equipment, time of year, frequency…) to avoid causing damage to grassland habitats.
- Promoting and fostering the use of locally suitable adaptation and management practices – such as planting use of wintering forage, innovative seeding practices etc. – can mitigate the effects of climatic seasons/changes on grassland growth.
- Regulating the number and types of livestock – including autochthonous breeds which are more adapted to the local characteristics of vegetation and topography – can a) valorise genetic biodiversity, b) maximise the resilience of the pastoral system to climate change and biodiversity loss, c) prevent land abandonment.
- Results-based payments provide more flexibility to local farmers and valorise local knowledge and expertise when shaping measures to tackle biodiversity loss.
- Raising awareness of landowners about biodiversity loss – and its causes –and supporting their active involvement in improving the situation can accelerate the transition towards grassland biodiversity conservation. This can be achieved through communication campaigns and capacity-building at the local level (which implies both funding and territorial animation by local authorities).

8.2. Climate change mitigation and adaptation

As described in chapter 3.2, climate change has threatened the existence of many plant and animal species in mountain grasslands. However, grasslands – particularly the upper soil layer

– are not just impacted by climate change but can also widely contribute to reversing this trend as they are important repositories of CO2 (Seid et al., 2016). Jones (2010) showed that the potential for carbon sequestration in temperate grassland soils across Europe ranged from 4.5 g C/m^2/year (a C source) to 40 g C/m^2/year (C sink) (Van den Pol-van Dasselaar, 2017). In contrast, grassland degradation leads to the release of carbon into the atmosphere. Thus, efforts must be made to – at least – halt grassland degradation, and ideally increase the capacity of grasslands to store carbon. Several practices have been tested and proven successful and fit to this aim (Calado et al., 2018; MediNet, n.d.; SheeptoShip, 2019). The following project is an example of how to finance carbon sequestration in pastures through a Carbon Fund – created to comply with the Kyoto Protocol (Box 8.2.1).

Box 8.2.1 Sown Biodiverse Pastures Project - Portugal

In Southern Portugal's 'Montado' area, decades of harmful agricultural practices degraded the permanent pastures, leading to decreased carbon sequestration, soil degradation and biodiversity loss. To deal with these issues, the Sown Biodiverse Pastures project was implemented between 2009 and 2012.

Name: Sown Biodiverse Pastures

Context: Portugal (2009-2012)

Coordinator: Terraprima

Key result: 1000 farmers contributed to the sequestration of 1 million tons of CO_2 by sowing biodiverse seed.

During this period, 1,000 farmers sowed biodiverse seed mixtures – adapted to each specific area and soil type – across 50,000 hectares as part of the project, which was managed by the business group Terraprima. Simultaneously, grazing was used to avoid shrub invasion and reduce fire risk.

The project contributed to the sequestration of one million tons of CO_2[21]. Additional environmental benefits were improved soil organic matter, improved soil fertility, increased water retention, reduced erosion, and conservation of grassland biodiversity. Moreover, it also positively impacted livestock farmers, as animal production increased.

© Terra Prima

As farmers contributed to the ecosystem service of carbon sequestration, they were remunerated by the Portuguese Carbon Fund.

The effects of climate change on mountains are faster than in lowland areas (Pepin et al., 2015). Consequently, pastoral systems need to go beyond mitigation and start adapting to the changing climate. Such adaptations may include using autochthonous animal breeds, applying

[21] This is the equivalent of almost 200,000 passenger vehicles driving for one year

integrated natural resource management, diversifying livelihoods, and conserving traditional multifunctional landscapes (Climate ADAPT, 2016) (Box 8.2.3).

Box 8.2.3 Climate change adaptation strategies for Alpine pastures

Even though Alpine permanent grasslands are extremely sensitive to climate change, the number of measures to manage these areas in the face of this challenge is limited. The LIFE project PastorAlp combines biophysical and socio-economic approaches to reduce the vulnerability and increase the resilience of Alpine pastures towards climate change.

Name: LIFE PASTORALP

Context: France and Italy (2017- 2022)

Coordinator: University of Florence

Key result: research climate change vulnerability of alpine pastures, creating and testing adaptation strategies.

PastorAlp began by researching the vulnerability of Alpine pastures under the changing climate. Though scientific knowledge and feedback from stakeholder workshops, the next step consists of proposing viable adaptation measures for the Alpine pastures. The effectiveness of the measures will be tested in two national parks: Parc National Des Ecrins (France) and the Parco Nazionale del Gran Paradiso (Italy). This will provide real-life examples to be shared and adopted by mountain areas across the Alps and other European mountains, ensuring replicability and transferability of the proposed methodology. The final output will be an online tool platform to support and promote the improved adaptation strategies.

Lessons Learnt

- Sowing adapted seeds not only preserves mountain biodiversity but can also help to mitigate climate change through carbon sequestration. Other measures such as organic farming, use of autochthonous and traditional techniques can also have beneficial effects.
- Development of adaptation and mitigation practices must go in parallel with local climatic models and early warning systems, and the use of agro-climatic indicators.
- The many different micro-climates of mountain areas, as well as differences in population density, governance and socio-economic composition of these areas, make it complicated to apply national climate change mitigation and adaptation strategies at the local level. For this reason, farmers, breeders, local authorities need to tailor national approaches to the specific characteristics of their territories, such as the structure of grasslands (i.e. distribution of species and soil types), populations of pests and disease-causing organisms etc.
- It is fundamental to consider the socio-economic dimensions – such as diversification, sense of place, social network, environmental awareness, conflict etc. – in order to

foster stakeholder acceptance of mitigation/adaptation practices, foster their uptake at the local level, and avoid conflicts between tourism, agriculture, and local communities.

- Facilitating impact assessment/foresight analysis of grassland evolution can increase knowledge – and thus lead towards good management – of mountain grasslands as new species migrate to higher altitudes in the mountains.

8.3. Prevention of natural disasters

Natural disasters regularly occur in mountain areas, but they are further triggered by unsustainable human activities and climate change affecting mountain grasslands (ESPON, 2013). For example, in the French Alps, 52% of the glacier area disappeared between 1970 and 2009, causing an acceleration of the shrinkage of permafrost areas and endangering 1,769 mountain infrastructures (Duvillard, 2015). Pastoral activities play an active role in the prevention of natural disasters, such as erosion, landslides, fires, and avalanches, by maintaining and opening up mountain landscapes, thereby limiting the colonization of pastures by shrubs and forests (Bunce et al., 2004).

In the context of higher temperatures, more droughts, and higher plant growth rates, forest fires are becoming more frequent and intense, entailing additional negative effects for pastoral systems, such as soil erosion and decreased water availability (Lasanta, 2010). For instance, forest megafires in Portugal destroyed 4,400km^2 of forest in 2017. In addition to climate change, forest fires are intensified by increased biomass supply because of grassland abandonment, shrub invasion and afforestation, which are major trends in mountain areas (Navarro & Perreira, 2015). There are diverse ways to prevent forest fires, such as public awareness campaigns or mechanical clearing of shrublands. Extensive grazing and silvopastoral practices can also be used efficiently, as proven through diverse projects in Spain (Junta de Andalucia, n.d.; Ramats de Foc, 2019) (Box 8.3.1).

Box 8.3.1 Using silvopastoralism to prevent forest fires

A major issue for the Natura 2000 sites of Montserrat Mountain in Spain is the abandonment of silvopastoral practices. As traditionally open landscapes have turned into shrubland and dense forests, fire risk increased, and biodiversity decreased. To tackle this, several ecosystem-based measures have been developed under LIFE Montserrat.

Name: LIFE Montserrat

Context: Spain (2014- 2018)

Coordinator: Diputación de Barcelona

Key result: creation of a silvopastoral management plan to prevent forest fires and halt biodiversity loss

Amongst the diverse measures is the silvopastoral management plan, based on previous experiences of the *Guardabosc* initiative (2010-2014). Traditional livestock activities have been enhanced, by first

considering the socio-economic viability of extensive grazing, and then investing in infrastructure, livestock and management plans.

There are now 10 livestock farms which manage 3,890 ha through grazing, thereby keeping a more open and fire resilient landscape.

Additionally, unsustainable management of steep mountain grasslands leads to increased risk of landslides and avalanches (Bunce et al., 2004). Avalanche risk can be decreased by keeping the grass on mountain slopes short, as this retains the snow cover.

Moreover, restoring the vegetation cover and soil helps to decrease the risk of landslides due to eroded and degraded slopes (Box 8.3.2)

Box 8.3.2 Revegetating the Pyrenees with wild seeds

Ski tourism, road construction and overgrazing cause the degradation and erosion of mountain slopes, which results in less attractive landscapes, landslide risk, and decreased water quality. Since 2003, the Pyrenean Botanical Conservatory has been developing eco-friendly revegetation practices in the Pyrenees through the Ecovars project to protect the mountainous terrain from erosion and improve the local environment. Stakeholders from ski resorts, local authorities and mountain farms are trained and provided with autochthonous seeds for ecological restoration activities.

Name: Ecovars

Context: France (2003-present)

Coordinator: Pyrenean Botanical Conservatory

Key result: Ecological restoration through local seeds and creation of the collective seed brand *Pyrégraine de nèou*

Pyrégraine de nèou

The choice of local seeds is based on aspects such as their reduced need for fertilisers, higher climate change resilience, and value for biodiversity conservation. There has been an increasing demand for the local seeds. However, their harvesting can create environmental impacts, so Ecovars came up with a sustainable alternative: the development of the collective brand Pyrégraine de nèou. This brand guarantees the local origin and quality of wild seeds, and supports seed producers who sell their products under the brand.

Lessons learnt:

- Disaster prevention requires a diffused and multi-stakeholder approach. Establishing a multi-actor project can be used as starting point to develop a long-lasting network of partners and involve different stakeholders, who can later transfer good practices to other sites.
- Stakeholders are often not aware of the adverse effects related to the uncontrolled expansion of shrubs and trees. Balancing natural expansion with forest control and

management measures, as well as revegetating grasslands, reduces forest fires and promotes biodiversity.

- Clearing shrubs and trees is the first step to decrease the amount of available fuel for forest fires and create a mosaic landscape. However, in the mid and long term, these landscapes require livestock grazing to stay open.
- Prescribed burns can be necessary, but must be complemented by a) more training for farmers to reduce risk related to fire escape, b) legislation allowing this management practice, and c) partnerships between foresters and farmers.
- Considering and assessing the economic viability of livestock practices allows us to understand the reasons why certain areas were abandoned and how this trend could be reverted.

9. How to enhance sustainable and competitive economic activities in mountain grasslands?

Mountain agricultural systems – which are low input-low output on small-scale farms – have to deal with challenges linked to a shorter growing season; lower livestock density; difficulty to adopt intensive production models; and the need for specialised machinery, as well as with the presence of wildlife and competition for natural resources with non-agricultural uses (e.g. tourism, hunting, major development projects, second homes etc.) (EC, 2009; European Grassland Federation, 2011). To overcome this disadvantaged position compared to lowland agriculture, various opportunities can be developed. These opportunities include, for example, valuing the products and services derived from pastoral activities, farm diversification, and technological innovation.

9.1 Valuing products and services

In an increasingly competitive market, farmers tend to abandon the less productive or energy-intensive land and intensify their farming practices in more productive areas (sometimes at the expense of the environment) or completely abandon their farming activity. In mountains, the challenge of farming systems is therefore to increase their competitiveness through high-quality well-differentiated products and creating an added value that consumers will appreciate.

Already, due to environmental characteristics, the quality of natural resources, traditional techniques and know-how used to produce them, mountain products are characterized by a higher quality in terms of taste, aromas, colour, texture, etc. Mountain products are perceived by consumers as environmentally-friendly products which support the local economy and culture and contribute to the maintenance of landscapes that are dear to them. 86% of consumers questioned during the EuroMARC project declared themselves favourable to a specific labelling of mountain products[22].

[22] https://www.euromontana.org/en/project/euromarc/

"While there are so many benefits to upland farming, these are simply not valued economically and culturally. It is hard to celebrate the added value of upland farming (like animals living in a natural environment and less intensive practices), and culturally, people no longer want to go up to the higher parts and stay there for a long time with their livestock" Mark Borthwick - Soil Association

One way to provide a comparative advantage for mountain agri-food supply chain actors is though labelling mountain products. Labels can stand for a) a product's quality (in terms of organoleptic characteristics and higher nutritional values), b) the contribution of the product to the conservation of traditions and ecosystem services linked to its production, c) the maintenance of cultural landscapes and the provision of employment opportunities.

At a European level, there are many choices for labelling through quality logos, such as the Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), and Traditional Speciality Guaranteed (TSG), as well many private labelling options at national and regional levels. Among the latter, for instance, some valorise the product's contribution to forest fire prevention, coexistence with wolves, or supporting transhumance (De Pastos Naturales, 2019). However, the certification processes of quality schemes are often complex and expensive for mountain farmers. Since 2012, there is a dedicated Optional Quality Term (OQT) for mountain areas: "mountain product" (EU Regulation Nº 1151/2012; Delegated Act Nº 665/2014). Some EU Member States are adapting this legislation to the national level, such as Romania, (Box 8.1.1) in this market segment, which shows great potential to expand.

Box 8.1.1 Labelling mountain products in Romania

29.9% of Romania is mountainous and 19.7% of Romanian UAA is in mountain areas. 9.15% of Romanian agricultural production occurs in mountain areas (Euromontana, 2020). Therefore, Romania's mountain regions have important economic, social, cultural and environmental potential. Romania has adopted the OQT for "mountain products" at the national level. The National Mountain Area Agency, which is a part of the Ministry of Agriculture and Rural Development, oversees its implementation.

Name: Romanian implementation of the Optional Quality Term "mountain products"

Context: Romania (2016-present)

Coordinator: National Mountain Area Agency, part of the Ministry of Agriculture and Rural Development

Key result: 2090 products using the OQT for mountain products (2021)

The farmers ask the agency for a pre-authorisation before they can use the OQT and the agency uses this record to keep track of all the users in their National Registry of Mountain Products.

"In Romania, to legally produce and label cheese as mountain product, it needs to be produced at the mountain pastures, in buildings which require a building permit from the local authority. However, it is not allowed to build on land qualified as pastures. So, people then just sell products on the local market without paying taxes or using the label." Adrian Radu – Romontana

Another approach to commercialising mountain products and positioning them in the market is via collective supply chains (sectoral, territorialized or a mix of both), short supply chains and direct sales. As the price premium paid by consumers cannot be too excessive, production or delivery costs can be reduced as a result of a shortened supply chain or more direct contact with final customers. Collective supply chains allow the cost of reaching out the customers to be lowered, by sharing the fixed expenses with other farmers. These methods can be used to establish emotional contacts with buyers and to encourage mountain farmers/herders to adopt sustainable practices (Box 8.1.2).

Box 8.1.2 100% pasture-fed livestock

Many UK upland farms are not profitable and depend heavily on subsidies. To make business models operating in the uplands economically viable and environmentally sustainable, the Pasture-Fed Livestock Association brings together farmers committed to producing high quality food through 100% pasture-fed livestock.

Name: Pasture for Life

Context: United Kingdom (2011-present)

Coordinator: Pasture-Fed Livestock Association - PFLA

Key result: 67 certified producers with 6,240 cattle and 10,035 sheep grazing on 9,256 Ha (2018)

The Pasture for Life certification mark promotes the unique quality of produce raised exclusively on pastures, and the associated wider environmental, health and animal welfare benefits. Direct sales are facilitated through the online website and are considered as a key element, as many people nowadays are unfamiliar with where food comes from and the stories behind it. By letting people experience farmers' stories, they become aware of, and learn to value, the benefits from purchasing (local) products from pasture-fed livestock.

Moreover, Pasture for Life supports farmers in switching from conventional grain-feeding to pasture-feeding, by bringing together farmers to exchange knowledge and know-how. The most important tool for this is the online forum with currently over 500 farmer users, complemented by additional activities such as farm visits.

Outputs from mountain pastures are not always as tangible as foods and drinks. Thus, economic instruments such as Payment for Ecosystem Services (PES) can incentivize land users to continue supplying ecosystem services that benefit society. These commonly refer to the non-provisioning ecosystem services – typically less quantifiable and economically remunerated – such as the regulation of air, soil and water quality, and the prevention of natural disasters (Box 8.1.3).

> *"Research has demonstrated the quality of mountain products such as cheese, which have a better taste and nutritious value (especially fatty acids like omega3 and omega6). It is demonstrated that there is a real difference with lowland cheese."* Alain Peeters – RHEA

Box 8.1.3 Paying for ecosystem services

Scarce financial resources often limit nature conservation. To recognise the monetary value of ecosystem services and create innovative financing models to support conservation measures for protected areas, the LIFE project Making Good Natura took place from 2012 to 2016. A comprehensive overview of the ecosystem services provided by 21 Italian Natura 2000 sites was elaborated. Key ecosystem services at each site were identified, assessed and valuated, allowing the creation of diverse PES schemes.

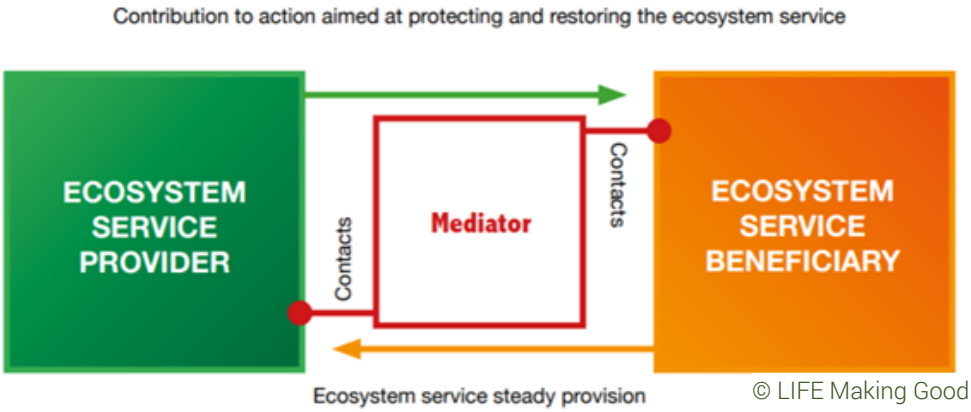
Name: LIFE Making public good provision the core business of Natura 2000 / Making Good Natura

Context: Italy (2012- 2016)

Coordinator: Consorzio universitario per la ricerca socioeconomica e per l'ambiente

Key result: valuation of key ecosystem services; creation of site-specific PES Schemes.

For example, on the Natura 2000 site Parco regionale Orobie Valtellinesi, the estimated ES value of pastures is 1,575,176 €/year for 22,815ha. By committing to good conservation practices on the alpine pastures, farmers obtain the certification of the Park for their produce. As the brand attests to the product's added value, farmers can raise their prices and compensate for the effort in adopting good practices that support the conservation of priority habitats.



© LIFE Making Good Natura

Lessons learnt:

- Valorising mountain products through the OQT "mountain product", and also through more traditional tools like PDO and PGI, allows producers to increase the price of their products and is positively perceived by consumers.
- Raising awareness amongst consumers on mountain quality labels and associated benefits (e.g. to health, environment, animal welfare, local economies) can contribute to consumers valuing mountain products more, in terms of both price and loyalty.
- The uptake of quality labelling, such as the OQT "mountain product", depends on the capacity of national and regional authorities to reduce the administrative procedures linked to them and promote the scheme amongst farmers and consumers.
- As also substantiated during the COVID-19 crisis, the use of online platforms and new methods to connect producers with consumers is useful in supporting a) the livelihoods

of small producers, b) direct sales to environmentally sensitive and other niche consumers, and c) knowledge and experience exchange.

- Payments for Ecosystem Services (PES) allow farmers to be rewarded for pastoral and low intensity practices and their ESBO beyond food production.

9.2 Economic diversification

As shown previously, giving additional value to mountain products and services can counter lower productivity and higher production costs, thus ensuring the economic sustainability of mountain grasslands. In addition, by diversifying their activities and products, mountain societies can increase their resilience to environmental and global changes (EC, 2009; FAO, 2011). Diversification can be done by improving existing products/services through innovation (e.g. change to organic farming, direct sales, labelling); adding new products/services (e.g. care farms, by-products, recreational activities) to existing ones; or completely substituting traditional or conventional products (e.g. cultural and educational activities) (EC, 2009; PADIMA, 2012). For instance, development of the use of by-products makes innovative use of existing resources in the farming system which otherwise would go wasted (Box 9.2.1).

> *"While policies might be important issues, and these might change, the most important is changing farmer's mindset and showing them that it is possible to pasture feed their animals and be profitable."* Russ Carrington – Pasture for Life

Box 9.2.1 Nothing goes to waste

Often, only meat and dairy products are valued outputs from mountain farms. Nonetheless, by-products generated in producing meat and dairy products can be transformed into high-quality products, thereby creating additional income for farms.

Name & Coordinator: Norilia

Context: Norway, 2000-present

Key result: annually transforms 150,000 tons of by-products, and handles around 3200 tons of wool.

norilia
Pure nature refined

The Norwegian company Norilia focusses on ensuring that the whole animal is used, thereby contributing to a more profitable and sustainable agriculture. By annually transforming around 150,000 tons of by-products – mainly from small Norwegian farms – into products such as pet food, hides and wool, added value is created to what would otherwise be considered waste.

For example, Norilia handles nearly 80% of the annual Norwegian wool volume by working together with the Norwegian Association of Sheep and Goat Farmers. This wool comes from sheep that often graze on uncultivated semi-natural mountain grasslands. To accredit the sustainability and traceability of Norilia wool, it has been granted the Nordic Swan Ecolabel, guaranteeing a transparent value chain and the low use of chemicals on the pastures on which the sheep graze.

Another recent trend enabling the economic diversification of mountain grasslands is linked to bioeconomy, which uses renewable natural resources for new and alternative products. By combining technology, ecology and sustainability, new opportunities and prospects for economic activities are created (Box 9.2.2) (AlpBioEco, 2019).

Box 9.2.2 New value chains in the Alps

Alpine hay is a raw material cultivated on steep mountain meadows, contributing to the typical cultural landscapes of the Alps and their rich biodiversity. However, the labour-intensive cultivation of these less mechanisable and less productive areas are an economic challenge for farmers. To support the cultivation of Alpine hay, it needs additional value. Recognising this, AlpBioEco is developing new bioeconomy products and business models based on resources such as Alpine hay, apples and walnuts.

Name: Interreg Alpine Space AlpBioEco

Context: Italy, Austria, Germany, Slovenia & France (2018- 2022)

Coordinator: City of Sigmaringen, Germany

Key result: Roadmap for analysing bioeconomic value chains, eco-innovation business models, policy recommendations

Starting off with a market analysis for Alpine hay, potential uses have been identified, including human food source and naturopathic products. Future steps are to conduct pilot studies to validate the eco-innovative business models; and to elaborate policy guidelines supporting the bioeconomy of mountain products such as Alpine hay.

© AlpBioECo

In the last decade, multifunctional farms are becoming increasingly popular amongst farmers and end-users (e.g. tourists, consumers, families, companies). These are farms where additional activities – often touristic – complement the traditional farming activities of livestock rearing and fodder production (Box 9.2.3).

Box 9.2.3 Multifunctional farming

The core aim of this project is to guarantee the socio-economic viability of farms through multifunctional farming, while also maintaining and promoting European agricultural landscapes. Conducting case studies to show best practices of multifunctional farming, serving as an inspiration for farms across Europe, is one way that the project's aims are being achieved.

Name: Erasmus + FEAL- multifunctional Farming for the sustainability of European Agricultural Landscapes

Context: Spain, Italy, Germany, Belgium, Slovenia and Slovakia (2016-2019)

Coordinator: Technicka Univerzita Zvolene

Key result: 3 full time workers, farming 30ha since 1990

One example is the AFRA Odorica farm in Slovakia. Based on family tradition, the main focus of this multifunctional farm is on medicinal plants, sold both at the farm and through an online shop

© Zuzana Homolová. Picture of Odorica farm

Moreover, organic food is produced here, with animals grazing naturally and fed exclusively with natural fodder, and activities are organised such as children summer eco-camps and WWOOFing. As the area is close to the medieval town of Levoča, a UNESCO World Heritage Site and the High Tatras National Park and Biosphere Reserve, many tourists use the multiple services and products offered by this farm.

"Tourism is a big opportunity for mountain areas. There has been research on the 'ideal landscapes for tourism', and open landscapes like those created through pastoralism are one of them. In addition, people like to see animals graze, with flowers in the fields" Alain Peeters – RHEA

Lessons learnt:

- Livelihood diversification can occur in multiple ways ranging from small adjustments of the core business/activity (e.g. adding products and services) to medium/high variation (e.g. innovation, new products and services). Depending on the magnitude of change, there can be different risk levels and needs to learn new skills.
- Mapping the resource sinks and flows of a territory can help in thinking beyond traditional activities, and create innovative products and services, which can then be offered by SMEs and big companies, and lead to joint initiatives between territorial actors.
- The two emerging concepts of circular economy and bioeconomy offer new opportunities to valorise traditional knowledge and exploit mountain value chains (e.g. linked hay, nuts, herbs).

- Mountain farmers and businesses often lack the knowledge and skills on how to set up new/non-traditional forms of business and make them viable for the long term. For instance, multifunctional farmers need to have holistic knowledge on the entire farming system, including its agroecological and business aspects, and training is key for people to gain this multidisciplinary knowledge.
- Valorising the cultural component and the tourism opportunities linked to pastoralism reflect the most recent consumer preferences in cultural, natural and gastronomic tourism.

> *"Most summer farms send milk to the big milk factory, but about 10% do other activities to generate more income such as making cheese, having open door days at which people can participate with farming activities, storytelling, education and information."* Katharina Sparstad – Norwegian association pastoralism and transhumance

9.3 Innovation through modern technology

Innovative businesses are often frontrunners in their domain, and have fewer competitors and can establish higher prices. Since the last century, technology has been at the origin of most innovations at all levels. In mountains, the deployment of new technologies based on systems like GPS, Internet and satellites, can be used to develop tools such as GPS monitoring, drones, 3D mapping or virtual fences. Technological tools can be used for multiple tasks: to gain information on the state of the pastoral system (e.g. the state of vegetation, or the herd's geographical position); to develop grazing plans; to apply management decisions; to inform and train livestock farmers and raise their awareness; to guarantee extensive livestock practices to consumers; and to mitigate land use conflicts (HVN-LINK, n.d.; Jouven et al., 2010). All of these approaches can strongly facilitate pastoralism and grassland management while promoting their economic development.

In particular, GPS tracking systems are becoming increasingly popular, and the following good practice from Greece explains how farmers use such as system to guarantee consumers of their sustainable herding practices in HNV areas (Box 9.3.1).

Box 9.3.1 GPS tracking for extensive livestock

A challenge to selling mountain products is strengthening the consumer's trust in the added value of such products (e.g. environmental sustainability of livestock raising). In cooperation with the European programme LACTIMED, Terra Thessalia developed a GPS tracking system in Thessaly, Greece.

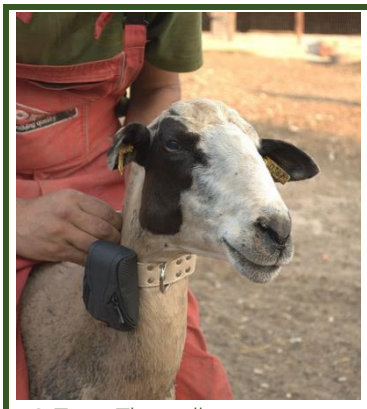
Name: Terra Thessalia

Context: Greece (2012-present)

Coordinator: Terra Thessalia

Key result: Use GPS-tracking on livestock to record their movement in real time at 15 farms.

This innovation, which is part of the Participatory Guarantee System, is used to guarantee extensive pastoral practices. It reinforces the confidence of consumers interested in supporting the multiple benefits linked to HNV systems, such as the sustainable use of natural resources, biodiversity conservation, and landscape quality.



© Terra Thessalia

Sheep get GPS tracking collars, which record their daily position in the mountains. This facilitates herd management; data collection for pasture quality control; prevention of conflicts between farmers and forestry services; active participation in the management of HNV areas; and, above all, the certification of farms with sustainable practices so that they can add value to their products. GPS-tracking therefore serves as a certification tool and contributes to increasing the products' added value.

Another good practice using innovative technological tools comes from Spain, where virtual fences are being tested to improve the management of livestock and pasture resources (Box 9.3.2).

Box 9.3.2 Virtual fences in the Pyrenees

Fences in mountain pastures are often used to avoid livestock wandering off and to avoid under/overgrazing of pastures. However, the maintenance and use of fences (either fixed or mobile) is resource- and labour-intensive. To increase the productivity of mountain farmers through technological innovation, the E-Barana project is developing an intelligent system for livestock management.

Name: E-Barana

Context: Pyrenees, Spain (2018-2020)

Coordinator: Ordesa – Viñamala Biosphere Reserve

Key result: Virtual fencing technology, Animal behaviour in response to virtual fencing

The system consists of a GPS collar and an application on which farmers can establish virtual fences. When an animal approaches this virtual fence, its collar warns the animal – through sound, vibration or small electric shock – not to go further. The virtual fence can be moved at any time, and the farmer can use the GPS collar to check on each animal's whereabouts and identify possible issues when it is not moving. Moreover, these fences can keep animals away from dangerous areas, thereby avoiding unnecessary animal suffering and loss. Lastly, by integrating data on the quality and quantity of the grasslands, pasture can be managed more sustainably.

Lessons learnt:

- In the future, technological deployment could potentially help to minimise human intervention in grazing management and make pastoral practices more resource- and labour-efficient, thereby tackling the lack of a labour force; reducing costs associated with raising livestock or monitoring grassland growth and development; and supporting more sustainable grazing practices.

- Technology can help make livestock management easier, decrease animal suffering, decrease costs, increase productivity, and support more sustainable management of pastures.
- Using innovation can help to save on other costs (e.g. maintenance, logistics), which can in turn be used to invest in the farm or revalorise the employees' salaries.
- Technological innovations can be employed to increase the farmer's quality of life by avoiding stress and time spent on the mountain pastures.
- Seeking out more sustainable alternatives in the functional/collaborative/sharing economy can decrease costs linked to the uptake and use of (costly) technological innovations. In this context, social innovation – reconfiguring social practices – can become a complement of technological innovation.
- There is a need to train farmers to use technology to ration grasslands and monitor their grassland resource, more closely, leading to better preserved habitats and optimised herd distribution. Another solution could be to develop counselling services to help farmers in these activities.

9.4 Coexistence with wildlife

Mountain areas across Europe have undergone many changes that allow the return of wildlife. This is particularly visible with the proliferation of wild boars and many wild herbivores, but also with large carnivores, such as wolves (17,000 individuals across Europe), Eurasian lynx (8,000-9,000 individuals), brown bears (15,000-16,000 individuals), and wolverines (1,000-1,250 individuals) (2012-2016)[23]. Increased protection, reforestation, recovery of wild prey populations, and reduced human presence due to rural depopulation and land abandonment facilitate the large-scale recovery of these species (Linnell & Cretois, 2018).

Large carnivores have consolidated their presence in regions where their numbers had declined and have returned to places after decades or even centuries of absence. Hence, conflicts linked to large carnivores have (re)emerged (Linnell & Cretois, 2018). One third of Europe's area (1.5 million km^2) is now populated by at least one of these species (EC, 2015). The EU has adopted two main legal instruments for the protection and conservation of wildlife: the Convention on the Conservation of European Wildlife and Natural Habitats 19.IX.1979 and the Habitats Directive 92/43/EEC. Large carnivores are currently under varying degrees of legal protection throughout Europe depending on the Member State, making practices such as hunting or poisoning them mostly illegal. The focus has shifted from eradication towards coexistence or cohabitation, and breeders, farmers and producers have to (re)learn how to deal with the presence of large carnivores.

The direct and indirect damage caused by large carnivores on the herds can have serious economic impacts for livestock breeders. On 5th December 2019, during a hearing organised by the European Parliament, Jacques Blanc, rapporteur of the pastoralism opinion adopted by

[23] https://ec.europa.eu/environment/nature/conservation/species/carnivores/conservation_status.htm
Last access on 03/06/2021.

the European Committee of the Regions, recalled that, in France, the annual cost of herd protection and compensation has been estimated by the National Institute of Agronomic Research at 80,000 euros per wolf; and in Spain, the cost of compensation increased from 40,000 euros in 2014 to 300,000 euros in 2019 (CoR, 2019b). The socio-economic and psychological dimensions of these conflicts also have to be taken into account – such as damage to the herds of livestock, indirect losses in productivity, psychological stress of shepherds, increased costs for more labour-intensive husbandry methods, changes in lifestyle, conflicts with tourists, etc.

The MapLoup alert and mapping system in France is an example of how to support the protection of livestock in mountain pastures with real-time and publicly available data on suspected attacks by wolves (Box 9.4.1).

Box 9.4.1 Dynamic alert and mapping system of suspicious attacks from large carnivores

MapLoup is an alerting portal which helps breeders and officials of the Auvergne-Rhone Alpes Region of France to detect and analyse predation risk in their territory. The MapLoup portal is based on two online tools: a dynamic map of points corresponding to suspected wolf attacks which generates an automatic alert SMS for all registered users in a 10 km radius from the point of attack; and an ATLAS screening which provides an interactive and long-term overview of predation at different administrative scales, from the Region to the Municipality.

Name: MapLoup

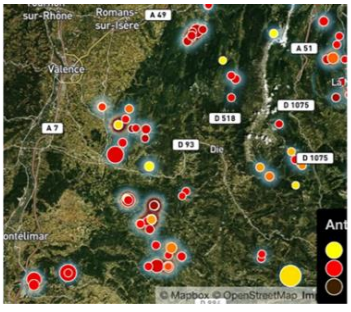
Context: France (2014-present)

Coordinator: Pastoral network, Auvergne-Rhône-Alpes; Federation of Pastures of Isère; Departmental Association of mountain economy of Drôme; Society of alpine economy of Savoie

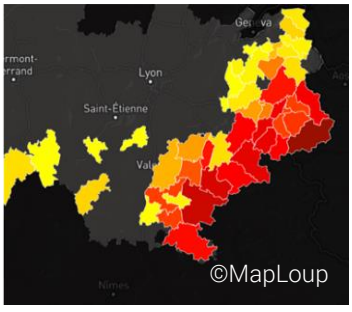
Key result 361 subscribed users; 1,113 attacks detected in 2019

These tools integrate data from public sources with real-time data, which are provided to end users through visual interfaces. MapLoup goes beyond providing alerts. The analyses of data on predation events and their integration with other public datasets provides decision-makers and other stakeholders with elements of reflection which aim to: facilitate the common analysis of predation questions; contribute to initiatives and support processes for breeders and shepherds; and resolve this problem in the mid and long term.

MAP



ATLAS



To reduce the economic losses associated with attacks by large carnivores, farmers usually receive compensation payments (Bautista et al., 2019). The following good practice presents an innovative initiative in Portugal which fosters wolf conservation and livestock damage prevention by using private funds from renewable energy companies (Box 9.4.2).

Box 9.4.2 Wind farms and wolf conservation – Portugal

Most wind farms in Portugal are located in remote mountain areas, which are also the main habitat for the Iberian Wolf. To balance the environmental impacts on wolf population and habitat, in 2006 several renewable energy companies created the non-profit association ACHLI.

Name & Coordinator: Iberian Wolf Habitat Conservation Association - ACHLI

Context: Portugal (2006-present)

Key result: 47 livestock guard dogs, 2300 ha restricted hunting zones, 16 windfarm companies

ACHLI manages the Iberian Wolf Habitat Conservation Fund, with financial contributions coming from the members who must conduct compensatory measures under the Portuguese Environmental Impact Assessment. The Fund, based purely on private funding, has as sole purpose to support projects related to the conservation and management of the Iberian Wolf and its habitat.

ACHLI
Associação de Conservação do Habitat do Lobo Ibérico

Between 2017 and 2019, ACHLI has worked on several projects, including specific actions aimed at decreasing the impact of wolves on livestock, through the Cão de Gado programme with the provision of 47 livestock guard dogs; the reintroduction of 102 Roe deer to provide a lasting food source for the wolf; and the creation of restricted hunting zones covering 2300 hectares to provide refuges for prey species. Moreover, awareness raising activities have been carried out to involve local communities in the coexistence with wolves.

One solution to increase the profitability of mountain products in areas of cohabitation between livestock and predators is to use a private scheme to identify good coexistence practices. This solution answers the needs of some niche market segments, such as tourists or more urban populations, who can very often be interested in wildlife (Box 9.4.3)

Box 9.4.3 The bear-friendly label

The northern Dinaric mountains have one of the highest bear densities in Europe. Both the increasing fragmentation of the bears' natural habitat as a result of expanding traffic infrastructure and urbanisation, and food bring bears closer to human settlements, where they can cause damage to crops, property, beehives and livestock. These events generate an inflated estimation of the risk of bear attacks, leading to a lower tolerance by the local population.

©LIFE Dinalp Bear

To support coexistence between people and bears, the "bear-friendly" label was designed during the project. This label promotes bear-friendly practices such as using bear-proof garbage bins; developing responsible tourism programmes; and protecting livestock, beehives and orchards.

Name: LIFE DINALP BEAR/ Population level management and conservation of brown bears in northern Dinaric Mountains and the Alps

Context: Slovenia, Croatia, Austria & Italy (2014-2019)

Key result: creation of good practices to support coexistence with bears, creation of a "Bear-friendly" label

The label is currently used for over 70 products and services in Slovenia and Croatia, awarded to food products such as honey, meat and milk; tourist accommodation; and souvenirs. In addition, a bear-friendly map and educational souvenirs promote a new type of bear-watching ecotourism and valorise local products with the bear-friendly label among tourists, helping to build a positive image of bears amongst local stakeholders and producers, as an opportunity of territorial rebranding and local development.

Lessons learnt:

- Legal obligations, such as the Portuguese Environmental Impact Assessment compensatory measures, can be used to create private funds and innovative financing schemes to enhance the protection measures for herds while monetizing new forms of species conservation and coexistence.
- Real-time mapping and alerting systems are used to decrease economic loss due to livestock damage, while also favouring constructive debates across citizens and the collection of public opinion on large carnivores.
- More public political acknowledgement of the social conflicts around large carnivores (e.g. conflicts with tourists and local groups, psychological stress of shepherds, changes in lifestyles) is required to ensure the continuity of pastoral professions.
- Implementing an adequate support system at the local level, managed by both agricultural and environmental authorities, with an emphasis on prevention measures, can bridge the conflictual relations between pastoral interests and wildlife protection.
- The lack of coordinated and cross-border management of large carnivores, particularly in mountain areas, still generates inconsistencies between different national approaches and unharmonized effects at EU level.

10. How to improve the quality of life of mountain communities?

Whilst it is important to generate sufficient economic profit through activities linked to pastoralism, as described in the section above, it is key to focus on the social sustainability of such practices and traditional societies. In the last years, demographic changes have become an increasingly visible and debated topic in Europe (Huyghe et al., 2014). To address this issue,

the Commission has published a "Green Paper on Ageing" in 2021 and the "Long-term vision for rural areas".

More and more projects are funded to fight depopulation and improve the quality of life for the remaining and ageing population in mountain areas. A focus on improving people's quality of life also includes: improving the working conditions; ensuring that good infrastructure is in place; valuing the pastoral sector; countering land access issues; supporting the transfer of knowledge and skills; strengthening rural-urban linkages; and enhancing the attractiveness of pastoral jobs (Liechti & Biber, 2016).

10.1. Improving working conditions and access to land

There are diverse reasons why people abandon the shepherding profession, including harsh living and working conditions linked to *"limited access to public services, scarce connectivity and few opportunities for leisure and alternative activities. The growing presence of predators and climatic vagaries add further hardening factors*" (Farinella et al., 2017, p. 4). Additional aspects making work conditions unattractive are the job's seasonality – with the high season in summer when livestock are in the mountain pastures; insufficient or inexistent infrastructure linked to housing, transport, communication and sanitation; and low income – especially for hired shepherds (Euromontana, 2008; Farinella et al., 2017; Mettler & Honnet, 2017). Actions aimed to improve these aspects are key to make the shepherding profession more attractive and increase the quality of life of shepherds (Box 10.1.1).

Box 10.1.1 Keeping track of livestock

When animals go missing in the mountains, this badly affects the working conditions of livestock farmers. It can mean hours of searching for the animals, or even losing animals if they are not found or have died. In addition, there is the psychological burden of looking for animals, without knowing if, and in which state, you will find them.

Name & Coordinator: FindMy

Context: Norway (2009-present)

Key result: 3 employees, 30,000 electronic bells sold (each weighing around 300grams)

While monitoring devices for livestock exist, these often rely on mobile coverage, which makes such technology unusable in remote mountain pastures.

To improve working conditions for farmers, the Norwegian company FindMy has developed innovative livestock monitoring options using satellite technology. The system works with electronic bells that send signals via satellites. The data is then available on software accessible for farmers on their computer and phone, so that they can easily locate their (missing) animals. In addition, farmers can receive different types of notifications, for instance when an animal is not moving or shows abnormal activity, indicating possible illness, danger, or death.

Another way to improve the quality of life and working conditions for shepherds and livestock breeders is by fostering cooperation between pastoral stakeholders and sharing tools which support the everyday life of shepherds (box 10.1.2).

Box 10.1.2 A pastoral network to provide and share tools and knowledge

Since 2015, French Alpine pastoral services and other stakeholders linked to this lifestyle have joined forces to create an Alpine pastoral network. Through this network, they aim to "contribute to maintaining robust and dynamic pastoral activities and attractive pastoral landscapes" by developing and disseminating a wide range of tools to support pastoralists in their everyday life.

Name & Coordinator: Alpine Pastoral Network Auvergne-Rhône-Alpes

Context: France (2015-present)

Key result: a wide range of supportive tools for shepherds and livestock breeders

Examples of tools developed include:

- An alpine pasture market and a job fair to find an alpine pasture, or a shepherd.
- A Guide for Employers in Pastoral Situations to provide information on all the steps to take as an employer: such as the type of contract, etc.
- A guide to legal responsibilities in mountain pastures, providing information on who is responsible in the event of an accident with a heifer, guard dog or other animal in a pastoral environment.
- A Facebook page to share resources, tips, information, contract and legal advice, job offers, classified ads, etc.

Next to improving work conditions through good practices, such as the innovative use of technology or the creation of pastoral networks, people also need to access grazing land for their livestock.

"Communal management is very typical in mountain areas, where land tenure is shared (under names like alpage, estive, pastos de Puerto…). However, this type of land governance is difficult to operate well under the current CAP, especially due to the great variety of commons in types, sizes, levels of formality (are mostly informal structures), legal status etc." Jabier Ruiz – WWF EPO

A traditional form of pastoral land tenure and resource use is a commons, in which land and resources are owned, managed and /or used collectively by a group of people. This type of land governance is the logical response to the low biological productivity of pastures and the high variability of mountain topography and climate, which requires the use of vast areas of land and therefore makes private landownership unpractical (Davies et al., 2016).

Today, commons are challenged by an increase in privatization of pastoral land, linked to increased land prices (both for buying and renting) and land grabbing, so that land becomes concentrated in hands of just a few. Under these conditions, accessing grazing land can involve significant costs for livestock farmers, or make it impossible for newcomers who have no land to enter the pastoralism profession (Bartz et al., 2019). Across Europe, initiatives exist on equitable land access, such as the ALPA organisation in Romania (Box 10.1.3).

"Common land management in Scotland was true in the past, but nowadays most land is owned by landlords and people have to rent the land. It's concentrated in hands of a few, so there's not much common land left." Mark Borthwick - Soil Association

Box 10.1.3 Supporting land access for farmers

Name & Coordinator: Acces La Pamant Agroecologic - ALPA

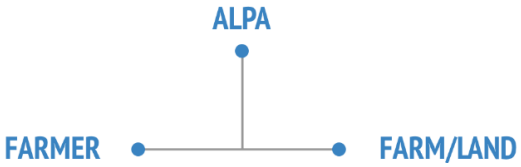
Context: Romania, 2019-present

Key result: New land governance model, agroecology training for farmers

In Romania, 2% of the farms cover over 60% of farmland, and land prices have increased more than 1600% during the last 15 years. As such, there are very few opportunities available for newcomers into small-scale agriculture. ALPA secures equitable land access for those wishing to enter the agroecological farming profession, aiming for: higher numbers of young agroecological farmers; the protection of the socio-ecological landscapes; the production of healthy and nutritious food; and the creation of local circular economies.

To support land access, ALPA either buys land and farms with the donated money or accepts donated lands and farms. These are owned by ALPA and stewarded by the farmer, with a contract between both to describe their relationship and commitments.

The farmer agrees to manage the land according to agroecological principles and to pay rent to ALPA, which provides the farmer with access to education and professional advice to make the enterprise successful.



© ALPA

Lessons learnt:

- Technological innovations can enhance the working conditions of livestock farmers in the following ways: a) decreasing psychological stress linked to missing animals through livestock monitoring options (e.g. electronic bells, remote livestock monitoring); b) sharing practical information on pastoral jobs and tools (e.g. through websites and phone messaging); c) countering loneliness experienced by shepherds (e.g. permanent phone service).
- Cooperative platforms can support cooperation between pastoral stakeholders (e.g. livestock farmers, landowners, consumers, job seekers).
- Land stewardship agreements facilitate land access for breeders, preventing land abandonment and favouring sustainable grassland management as well as generational turnover (via the inclusion of young herders) through the continuity of pastoral jobs.
- The legal status for seasonal pastoral jobs needs to be adapted in order to ensure basic social rights (covering unemployment support, minimum wage, social security, paid maternity/paternity leave, contracts, retirement, life-long training, etc.).

10.2. Transferring knowledge and skills

Even if working conditions are attractive, and access to grazing land and farms is possible, having the necessary knowledge and skills is essential to successfully managing pastoral systems. This is especially key for young people whose capacity to innovate can support the continuation of pastoral practices.

"Most farmers are not businessmen, they would need help with making their work profitable and improve their marketing. It's essential to link these people up with marketing and branding skills."
Mark Borthwick - Soil Association

Most European countries are gradually losing their pastoral knowledge due to the ageing of farming population, outmigration from mountain areas, and the shift of pastoralism to a part-time activity, given that it is less labour intensive than in the past. This loss leads to the unsustainable use of resources needed for livestock; conflicts between pastoralists and other land users; increased attacks from large carnivores; and the loss of natural biodiversity and local livestock breeds (Oteros-Rozas et al., 2013). Therefore, shepherding schools, research projects, and the sharing of innovations across Europe are essential to avoid losing pastoral knowledge and know-how, while also supporting the integration of novel knowledge acquired through research.

In several European countries such as Spain, Switzerland and France, shepherding schools have started to develop to professionalise the shepherding job (Box 10.2.1).

Box 10.2.1 The Basque shepherding school

Name & Coordinator: Artzain Eskola

Context: Spain (1997-present)

Key result: 278 people trained

In 1997, the Artzain Eskola was created to revitalise and maintain grazing in the Basque Country, increase the professional level of shepherds, and conserve the latxa sheep breed. With help of the Basque government and HAZI (Department of Agriculture of the Basque Country), this shepherding school has trained 278 people during the past 22 years. While the majority are men, one-fifth of the students are women, and 9% come from abroad.

© Artzain Eskola

The annual courses have a duration of 900 hours, spread over 5 months. Two thirds consist of theoretical knowledge building on topics such as: feeding, reproduction, health and management of the herd; the process of milk transformation; and marketing the final product. The remaining third is practice-orientated, involving a 16-week stay on collaborating sheep farms and elaborating an entrepreneurial project.

Likewise, there are more and more projects aiming at sharing innovations, knowledge and best practices across Europe. One example of this is the HNV-link project, focussed specifically on HNV farmland in the EU (Box 10.2.2).

"While it is more common to give money to farmers for more tangible things (working in the field, physical investments…), it is essential to encourage and help farmers to be part of knowledge and best practice exchange platforms." Russ Carrington - Pasture for Life

Box 10.2.2 Supporting HNV farming by sharing innovation

HNV farmland is a vital component of European agricultural landscapes for their natural values, cultural heritage, quality products and rural employment. However, farmland abandonment and intensification and socio-economic decline threaten these extensive and nature-friendly farming systems.

Name: HNV-Link

Context: Bulgaria, Croatia, France, Greece, Ireland, Portugal, Romania, Spain, Sweden, United Kingdom (2016-2019)

Key result: inventory of innovations linked to HNV farming. Atlas of Innovations

The HNV-Link network aims to increase the socio-economic viability of HNV farming while maintaining HNV farmland. Based on the 10 learning areas throughout the EU, innovative solutions of technical, commercial, social, institutional, and policy nature were collected. These include mobile abattoirs (Spain), agro-environment measures (Romania), and flexible governance (Greece). At the same time, relevant innovation gaps were identified, together with which innovations could be transferable to other HNV areas.

The major outputs of HNV-Link include creating an inventory of grassroots innovations in each learning area; organising an "Innovation Fair" to foster peer learning; and making an interactive Atlas of Innovations of HNV farming areas.

Lessons learnt:

- Upgrading the pastoral profession through shepherding schools, by combining theoretical and practical learning with a broadening of the curriculum, helps to make the profession fit for current challenges such as competing in the globalised market and climate change.
- Sharing innovations – social and digital – amongst different regions and identifying which factors could enable or limit their transferability can provide a further trigger to the improvement and continuation of pastoralism.
- Considering innovation not just from a technical/scientific perspective, but also from social, organisational and regulatory angles, helps to address the complexity of socio-economic issues which also cause a decline of the pastoral profession.
- Traditional and modern knowledge are complementary, and can be further valued through inter-generational exchange and social recognition.

"We are not interested in expanding our project to other countries but rather the hope is that other countries will set up similar projects […] as it is essential to discuss and learn from each other." Russ Carrington – Pasture for Life

10.3. Revaluing pastoral and rural life

The sections above have shown good examples on how to improve the quality of life of mountain farmers, share innovations and learn how to become a shepherd. Still, a major challenge to the continuation of pastoralism is the "disaffection related to the folkloric perception" of pastoral and rural life, with shepherds being seen as poor, solitary people who work without a minimum of comfort.

There are many people and collectives who do recognise the cultural and natural values of rural and pastoral life, and creatively use storytelling in all its forms to improve the image of shepherding life. Documentaries, blogs, songs, and photos are all examples of how to convey a more positive image to the general public, while also raising awareness on the challenges and need to conserve rural and pastoral life (Box 10.3.1).

> *"It is a value choice for young people to live and work at the summer farms, because it is more work and less income. But it also has benefits: a life with meaning. It is also about cultural values, how summer farming is valued and what people think of this type of life. Nowadays parents wish the best for their kids, and that includes the kids leaving and getting a university degree and better jobs."* Katharina Sparstad- Norwegian Association Pastoralism and Transhumance.

Box 10.3.1 The shepherd's life

England's Lake District is a World Heritage Site that attracts millions of tourists each year. However, the number of families sustaining the farming culture is decreasing, while more and more tourists visit the area – often with little idea or interest for the stories behind the iconic cultural landscapes they seek to admire.

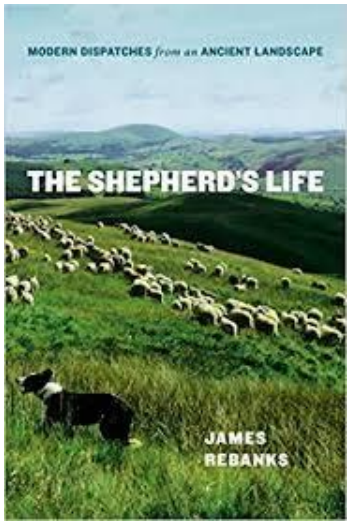
Name: The Shepherd's Life: A Tale of the Lake District

Context: United Kingdom (2015)

Author: James Rebanks

Key result: 3 literary prizes

James Rebanks wrote the book "The Shepherd's life", in which he describes life as a shepherd, and why this life has value in today's world. The book calls for action in protecting ancient ways of life that are slowly disappearing due to gentrification, globalization and urbanization, and for valuing the 'nobodies' who have created and sustained the iconic cultural landscapes that attract so many tourists. In Rebanks' words, "it is not about subsidizing a tiny number of farmers for nostalgic reasons. It is a very contemporary argument about defending older ways of being and not letting everything get swept away by an industrial, cheap food model". This bestseller book, together with Rebanks' activity on social media, is now raising much awareness and igniting necessary discussions on the key role of farming in today's society.



Top-down awards and recognition can be used to reaffirm the value of pastoralism and mountain communities on a supra-national level. For example, transhumance is one of the most important pastoral activities but is also significantly declining due to the intensification of pastures – leading to a loss of pastures and increased land prices; the crisis of shepherding; and the disappearance of traditional routes and other infrastructure linked to the drove roads. In search of tools to halt the loss of this cultural heritage, several European countries have succeeded in getting transhumance included in the UNESCO list of intangible cultural heritage (Box 10.3.2).

Box 10.3.2 Transhumance as UNESCO intangible cultural heritage

Transhumance is an ancient way of life in danger of extinction. To avoid the loss of its cultural elements – such as practices, know-how, skills, ethnographic elements, toponyms, festivals, gastronomy, and events – transhumance was presented as a candidate for the UNESCO's Intangible Cultural Heritage list and accepted in December 2019. The nomination process is a collaborative demand started by Italy, Austria and Greece in 2018, and later joined by France and Spain.

Name: UNESCO Intangible Cultural Heritage

Involved countries: Italy, Austria, Greece, France and Spain

Key result: Transhumance recognised as UNESCO intangible cultural heritage in December 2019

During the 14th Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage, held from 9 to 14 December 2019 in Colombia, the representatives of various delegations (Romania, Croatia, Albania, Luxembourg and Switzerland) expressed their wish to join the multinational candidature project, led by France alongside Spain, which will make it possible to broaden the basis of the "Transhumance" file already proclaimed for the three leading countries. More countries can join, if pastoralism is already acknowledged and protected at the national level.

The inclusion of such heritage in the UNESCO list is seen as a tool to a) raise public and political awareness, and b) receive financial assistance and expert advice from the World Heritage Committee for the preservation of this heritage. Moreover, it is a step forward to recognising that transhumance is more sustainable than intensive livestock farming.

United Nations Educational, Scientific and Cultural Organization

Intangible Cultural Heritage

Lessons learnt:

- Young people risk being less connected to the cultural dimensions of pastoral activities, and the vital link between natural and cultural heritage, and so are those who need to be most urgently targeted.
- Using art in all its forms – books, documentaries, blogs, songs, photography – together with social media, has a strong emotional impact of individuals and allows the

important role of pastoral and rural life in society to be pointed out and to raise awareness on the challenges faced by these ways of living.

- Giving voice to mountain communities through storytelling is fundamental to avoid fuelling an idyllic vision of mountain areas and, instead, to valorise traditional knowledge with all opportunities, strengths, gaps and weaknesses.
- As for the UNESCO designation of transhumance as intangible cultural heritage, top-down recognition and collaboration within and across countries can accelerate the legal recognition and protection of pastoral practices.

> *"It is important to improve the public opinion about us – society often looks down on us because we depend on subsidies – and make the governments see the importance of our contribution to the local economy, biodiversity, landscape, etc."* Enrique Ramón – Mayor of Linás de Broto (Spain)

10.4. Rural – urban linkages

By revaluing pastoral and, more generally, rural life – as done through the good practices above – rural-urban linkages can be strengthened. Although most people now live in urbanised areas (in 2015 this was 72% within the EU) (Eurostat, 2017), rural areas are not isolated. Rather, they are closely linked to urban areas in many ways: they are where food products come from; many people have their roots there; essential public goods are produced; and people from urban areas go back to them, either for holidays, or to settle permanently (Euromontana, 2017). Strengthening the linkages can improve territorial cohesion or, as the Cork 2.0. Declaration says: *"improved interrelations and partnerships among them [urban centres and rural areas] are important preconditions for economic viability, environmental performance and social cohesion of the Union as a whole"* (p.4) (EU, 2016).

Several of the good practices presented in this report support linkages between rural and urban areas, such as the volunteer programmes for guarding livestock in France, or the multifunctional farm in Slovakia. Another good practice, the Bergwald Project, involves people – largely from urban areas – in mountain pasture management through volunteering work (Box 10.4.1).

Box 10.4.1 Volunteering with the Bergwald Project

Nature conservation is often the work of NGOs or national organisations and requires financing that is not always available. As an alternative to conducting major conservation work at low cost, the Bergwaldprojekt (literally "mountain forest project") Foundation is based on the volunteering work of citizens to conserve, care and protect the mountain forests and cultural landscapes. This foundation was created in Switzerland in 1987, and is now also active in Austria, Germany and Spain.

Ecological restoration work is made possible through the volunteer camps organised in all four countries. Groups of volunteers work for a week to make the forest and the cultural landscape fit for the future. For instance, their activities involve clearing bushes on pastures; planting trees; building erosion barriers; and equipping hiking trails.

Name: Bergwaldprojekt

Context: Switzerland, Austria, Germany, Spain (1987-present)

Coordinator: Bergwaldprojekt Foundation

Key result: 5000 volunteers/year contributing to the conservation of mountain forests and cultural landscapes

Working together with experts, volunteers learn about the conditions and interrelationships of the fascinating mountain ecosystems. Through their work, the volunteers experience the mountains up close and actively contribute to preserving mountain forests and cultural landscapes.

The last good practice in this chapter is an example from the capital of Belgium: transhumance in the streets of Brussels, depicting as a way of bringing the mountain to the city (Box 10.4.2).

Box 10.4.2 Transhumance in the city – Belgium

Many people from urbanised areas are unfamiliar with rural life and where the food they consume comes from. As part of a participative urban agriculture project in Brussels, the "meet the sheep parade" (*Meet de mout', la schaap parade*) is organised in the heart of the Belgian capital by the farm Ferme du Chant des Cailles.

Name: Meet de mout'

Context: Belgium (2018)

Coordinator: Ferme du Chant des Cailles

Key result: 10 sheep and 2 lambs participated, 150 people accompanying the animals

This small-scale transhumance aims at stimulating debates on what kind of city people want to live in – including more sustainable mobility and living together with both people and animals, while also promoting local food production and consumption.

© Meet the mout – La Ferme du Chant des Cailles

For example, in 2018, ten sheep and two lambs participated, with some 150 people accompanying the animals. Upon arriving at the Royal Park of Brussels, there were activities for children, people could buy cheese, meet the sheep, and participate in discussions. The farm involved in organising the transhumance event also promotes using sheep to graze the green spaces of the city in a way that is both ecological and connects people more to nature.

Lessons learnt:

- Volunteering can be a physical force for undertaking major conservation activities, as well as an informal approach to move individuals closer to pastoral and rural life.
- The increase in urbanisation increases the gap between new generations of urban citizens and mountain rural life. Hence, educating children, youth and citizens on the origin of quality food and water, and ways of life linked to traditional practices in mountain areas, is needed to preserve their continuity.
- Volunteering camps can bring together rural experts and urban volunteers and raise awareness on conservation issues.
- Daring to switch things around: supporting pastoral systems does not have to be limited to the rural areas but can also be done in the city.
- Making use of the increased trend in urban areas for environmental-friendly production systems to support the conservation of grasslands.

> *"The labels are not known amongst consumers. In Romania there are no events dedicated to this; no debates on the topic; no mass media coverage; no facilitation of producers to organise themselves and create a national campaign to raise awareness and make people buy the products; no representation on national level."* Adrian Radu – Romontana

Part IV
Policy recommendations

This report was drafted between 2018 and 2021, in parallel with the discussions and negotiations on the new CAP. Documentary and qualitative research, as well as lessons learnt from the analysis of the good practices reveal that, in order to support mountain grasslands and communities that depend on them, there is a need for a more ambitious vision for rural and mountainous areas at all scales – European, national, regional and local. This new vision should be able to address the specificities of mountains (as recognised by the Art 174 of the TFEU) by building on 2021-2027 European policies and strategies (e.g. Green Deal, Long-Term Vision for Rural Areas) as well as implementing concrete measures at national and local levels.

We recommend:

1. Use eco-schemes as a key tool to improve the management of permanent grasslands: when designing eco-schemes for grassland management in their CAP Strategic Plans, Member States should a) adopt a result-oriented approach to foster farmers' traditional knowledge and locally-adapted interventions; b) make the payment attractive enough for farmers to compensate the costs of additional measures c) prioritize collective approaches and multi-stakeholder collaboration; d) include adequate advisory support for farmers and breeders; e) allow sufficient flexible eligibility criteria to allow the participation of different types of farmers and land managers; f) prioritize the eco-schemes suggested by the European Commission on grassland and livestock management; g) establish measurable actions and indicators to halt mountain biodiversity loss. By doing this, Member States will increase the attractiveness of eco-schemes amongst grassland farmers and land managers, and also address grassland deterioration.

2. To guarantee a coherent approach to grassland sustainable management, regional authorities are encouraged to establish multi-annual shared plans between land managers, farmers and local authorities. These plans should address appropriate issues such as land access, stocking rates, rational grazing management for the animals, buffer zones to reduce natural risk and wildfires and provide forage for the herds, usage of water sources, and potential/existing conflictual situations.

3. Member States should provide sufficient economic, scientific and technical support to trigger effective climate change adaptation and mitigation actions amongst farmers, such as a) providing economic incentives to farmers to enhance the usage of autochthonous fodder varieties and livestock breeds which are more resistant to climate variations or are more adapted to the new climatic conditions, b) better assessing and measuring the impact of climate change on grasslands and support farmers address these changes with the support of the Farm Advisory Services, c) developing local climatic models and early warning systems, as regional and national climate models may be inadequate for mountains where conditions can vary greatly from one valley to another.

4. To enhance the visibility and commercialisation of pastoral services and products, regional authorities with farmers should systematically: a) include the marketing of pastoral products/services into regional territorial marketing programmes and activities, b) identify and promote innovative modes to reconnect customers, such as short supply chains, urban-rural distribution channels, e-commerce, c) raise awareness on pastoral by-products (e.g. wool, biomass products) amongst the general public by informing them of the associated benefits (not only associated to the environment or rural society, but also in terms of health, economy etc.), d) encourage external agencies/business networks/advisory services (e.g. chambers of commerce) to design and offer marketing services to support farmers in the commercialisation of the products/services.

5. Member States should support the implementation the Optional Quality Term 'Mountain products' in all mountainous countries. By 2020, only half of the mountainous countries had adapted the EU Regulation 665/2014 in their countries. Member States should define the conditions of application in their countries, such as adequate controls, and inform farmers about this interesting tool to better valorise their products.

6. Member States should estimate the economic value of ecosystem services provided by pastoralism to encourage a more appropriate estimate of the price of pastoral products and services and incentivise the sector. As there is some caution regarding the ethical debate about valuing Nature, an option would be to use this approach more at the scale of local economies, in the context of rural-urban formal partnerships, cross-border programmes, or mapping or using the new European eco-schemes.

7. National and regional authorities should support multi-sectoral collaborations, in particular between livestock farmers and with other supply chains operating in the same territory. The pastoral profession is still poorly linked to other economic sectors (e.g. tourism, forestry), to which it could contribute economically and benefit from. For instance, this could be done by creating physical places/opportunities of involvement (e.g. national and regional fairs, meetings, events and seminars) and/or virtual one-stop exchange platforms where all stakeholders with diverse and competing interests on mountain grasslands

(e.g. livestock breeders, mountain farmers, hunters, environmental organizations, natural park rangers, etc.) can share or have access to knowledge, best practices, individual/community experiences, ideas etc.

8. National and regional authorities should encourage digitalisation and (social) innovation in mountain areas. To this end, national and regional governments should strive to a) increase fast Internet broadband and mobile coverage in mountain areas by installing digital infrastructure, as there is still a digital gap in mountain areas (Measure on Smart Villages – use of ERDF and EAFRD funds); b) accelerate the acquisition, including collectively through social innovation, of ICT tools (e.g. Internet of Things, remote sensors, Unmanned Aerial Vehicles, precision farming) to better monitor grassland and flocks and thus decrease the arduousness of human work. The results of many Horizon 2020 projects should be used better in order to accelerate this ICT transition on the ground; c) better train farmers to learn and use these tools. The work of Operational Groups and EIP-AGRI should be extended in order to widen the number of beneficiaries.

9. National and regional authorities should increase the awareness of the general public and organise multi-stakeholder dialogues on the implications of the return of large carnivores for livestock farmers and rural societies. These implications include both direct (e.g. low survival of domestic breeds, economic losses, stress, etc.) and indirect damage (e.g. loss of economic attractiveness of mountain landscapes, increased risk of avalanches and fire, inability to keep up with consumers' demand). Structuring dialogue between farmers and the general public, leading the discussion towards a shared agenda to set the prevention measures and compensate additional incurred costs (direct and indirect), and the development of management plans that effectively reduce conflicts between humans and large carnivores, should be encouraged to avoid misunderstanding, disputes and discrepancies in how different actors deal with large carnivores.

10. Compensation costs linked to attacks by large carnivores should recognise not only economic losses linked to the loss of livestock, which represent the minority of costs, but also indirect costs such as prevention costs, labour costs to search for missing animals, veterinary costs, purchase of dogs to protect livestock from large predators etc. Compensation costs should be linked to the programmes concerned with the conservation of species (e.g. LIFE) and not be funded directly by rural development programmes (which are already decreasing). A multi-fund approach, based on the Italian model of Strategy for Inner Areas, combining different financing sources (e.g. EAFRD, ERDF, ESF, LIFE funds) should be preferred to the currently singly-used EARDF.

11. EU and national authorities should encourage scientific studies and data gathering/analysis on large carnivores in order to promote evidence-based derogations to the protection of species in Member States, as already envisaged in the Habitats Directive and Bern Convention.

The current population dynamics of large carnivores in some European countries are by no means those of endangered populations. Hence, this study calls for amendments of the Habitats Directive and Bern Convention at shorter intervals to review the status of large carnivores in the light of technical and scientific progress and to consider modifying the protection status when this is justified by the evolution, positive or negative, of the status of protected populations. To this end, EU institutions should collaborate with national authorities to: a) work towards the homogenisation of wildlife census techniques, so that they have comparable and solid foundations and can support political decisions, b) foster quality information on pastoralism through (not dogmatic) scientific studies, c) analyse case studies on pastoralism and large carnivores in order to understand local conditions and see the extent to which good examples are effective and replicable, or not, to other territories.

12. A better valorisation of pastoral jobs through a dedicated EU action plan for pastoralism. EU institutions and Member States should make better use of the work done by shepherds and improve the visibility of this profession within and outside the agricultural sector. Incentive measures to be developed more widely include: better training for shepherds (in particular on breeding, the management of guard dogs and herd protection measures), for instance through the creation of pastoralism schools; the improvement of their living and working conditions in mountain pastures, especially securing and fixing road connections and basic infrastructure (such as shepherds' accommodation, containment areas, fences, water supply stations); and the establishment of employment agencies to find seasonal workers and facilitate hiring administrative procedures.

13. Member States should facilitate pastoral employers to find and hire paid collaborators, for example by a) easing the administrative procedures for hiring seasonal shepherds and transferring these online when possible, b) developing online platforms to match job seekers and job offers, c) creating an Hitchhiking Guide for pastoral employers, d) sharing useful resources on responsibility and obligations of both sides (e.g. unemployment support, minimum wage, social security, retirement, life-long training opportunities, loss of livestock, attack of predators, rights/duties for non-national workers etc.).

14. Regional and national authorities should maintain or implement regionally or locally funded measures to make the pastoral profession fit for 21st century challenges and attractive for young people**.** In particular, they should finance pastoralism schools. The teaching modules should combine theoretical teaching with practical/on-site lessons, mainly on sustainable grassland management techniques (to avoid damages to grassland habitats), climate mitigation/adaptation strategies and techniques for biodiversity conservation (e.g. local animal breeds, grassland varieties), and the use of the Optional Quality Term "Mountain Product" as well as methods of managing herds, animal husbandry, production, habitat and biodiversity conservation, business management and management, health and safety regulations, etc.

15. Use European funds (e.g. Horizon Europe) to finance collaborative research, coordination and innovation projects on pastoralism and related issues on the topics proposed by the Network for European Mountain Research[24]. These include topics closely interlinked with pastoralism and relate to climate change dynamics in mountain areas, landscape management, fire ecology in mountains, humans and their coexistence with large carnivores, etc. These suggestions could contribute to advancing understanding and practical solutions on the benefits and future development of pastoral activities across EU countries.

16. EU Member States should formally recognise the intrinsic links between pastoralism, cultural and natural heritage in mountains through acknowledgement and effective use of UNESCO designations such as Biosphere Reserves and transhumance's Intangible Cultural Heritage. The return of some mountains to a state of wilderness, for instance due to land abandonment and the loss of pastoral practices, would lead to the disappearance of this heritage and to significant changes in landscapes.

17. Regional and local authorities should close the rural-urban divide and better integrate rural local economies in regional and national supply chains by a) raising awareness about mountain products (their quality, their origin and what is needed to produce them); b) supporting bio- and circular economy value chains, c) encouraging cultural programmes and volunteering to support /sponsor pastoral practices.

[24] http://nemor.creaf.cat/wp-content/uploads/2018/11/Mountains_for_Europes_Future_2016.pdf and http://nemor.creaf.cat/wp-content/uploads/2018/05/NEMOR_Dream_BAIXA_DEF.pdf

Conclusion

The scope of this report was to understand how to enhance the sustainable management of mountain grasslands. This refers to the capacity of different stakeholders to simultaneously address, in their management plans and practices, all social, economic and environmental factors which affect grassland ecosystems. As this report shows, mountain grasslands can have an immense added value for today's society. Grasslands provide a wide set of ecosystem services and public goods, and have a high natural value for carbon storage (three times more than ocean and coastal ecosystems), and are therefore central in fighting against climate change and biodiversity loss, ensuring resilient food systems, and sustainable living for both mountain and lowland communities. However, the sustainable management of mountain grasslands is hindered by long-lasting socio-economic and environmental trends. Many socio-economic and environmental forces interact to ensure the optimal conditions for the growth of grasslands as well as the maintenance of this habitat which, in contrast to other ecosystems, requires human intervention to keep a favourable conservation status.

Our research reveals that good methods for the sustainable management of mountain grasslands exist, both in policy and practice, and are ready to be further strengthened or replicated.

At European and national scales, ad-hoc supporting policy frameworks have been designed to sustain the preservation of mountain grasslands. Undoubtedly these interventions have been crucial to support the economic viability of pastoral systems (at the core of the preservation of mountain grasslands) over time. National approaches are strongly place-based and show different ways to achieve this goal. In parallel, European policies (e.g. Habitat and Birds Directives, Biodiversity Strategy, the CAP, Green Deal) set the Union's priorities in biodiversity conservation more broadly and support the local stakeholders which have similar objectives. There is much room for improvement and greater level of ambition of both national and European policies. Yet, climate and environmental objectives must not outweigh the socio-economic quality of life which is fundamental for the sustainability of pastures and related jobs.

Looking at existing practices developed for the sustainable management of mountain grasslands, this report highlights 31 examples from across Europe. From environmental to social and economic good practices, these actions have proved successful at the local scale and many of them also at the international level, thanks to cross-national collaboration. Yet, the key question to address is: how can these practices further replicated and scaled up across all Europe? How can this process accelerated to prevent grassland deterioration and biodiversity loss?

This study identifies three possible pathways. First, it established 17 recommendations for local, national and European actors. These recommendations should be used to deliver a more ambitious vision for rural and mountainous areas at all scales. This new vision should be able

to address the specificities of mountains (Art 174 TFEU) by building on 2021-2027 European policies and strategies (e.g. Green Deal, Long-Term Vision for Rural Areas) as well as implementing concrete measures at all levels.

Second, a strong EU Action Plan for pastoralism is required, as already requested by the Committee of the Regions. This plan should serve to strengthen the replicability and scalability of such good practices in a coordinated manner at the EU level, as well as to create a holistic approach tackling grassland degradation through multi-stakeholder and trans-disciplinary collaboration.

Third, the role of pastoralism to preserve grassland habitats and all related ecosystem services should be further acknowledged by the public at the global level. The ongoing petition submitted to the United Nations to declare an International Year of Rangelands and Pastoralists in 2026 goes in this direction. This proposal, initiated by the Mongolian Government and endorsed by the FAO Committee on Agriculture, should be considered by the United Nations' General Assembly by the end of 2021.

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