

# **Research priorities for European mountain areas**



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*Although mountain areas vary across Europe, at a pan-European level they face a number of environmental, social, economic and migratory challenges that affect not only the communities living in these areas but also the rich natural environment that characterises mountains. However, mountains are also areas of opportunity, not only for the mountain regions themselves, but also for Europe, because of the many ecosystem services they provide. Mountains provide raw materials for circular and bio-based value chains and can play a key role in the energy transition. They produce healthy and nutritious food and are important reservoirs of biodiversity and carbon sinks.*

*More research and innovation are needed to fully exploit these opportunities, continue to provide valuable ecosystem services to all Europeans and address the challenges they face. In 2018, the "[Strategic Research Agenda: Mountains for Europe's Future](#)" was published, setting out recommendations for the Horizon 2020 programme. Since then, significant progress has been made in European research programmes, with better integration of rural and mountain areas in the Horizon work programmes. However, due to the unprecedented challenges facing Europe's mountains, their natural constraints and the many ecosystem services they provide to Europeans, more research and innovation support is needed in areas where broader rural development solutions are not sufficient.*

*This document, developed jointly by Euromontana (European Association of Mountain Areas) and NEMOR (Network for European Mountain Research), therefore, aims to provide an up-to-date list of research priorities considered critical to help mountain areas, which cover 29% of the EU, face the above challenges. This document should be seen as a complement to the 2018 Strategic Research Agenda, many of whose recommendations are still valid.*



## ***1. Priorities for rural areas, with particular relevance to mountains***

### ***1.1 New business models to unlock the potential of rural silver economy in rural areas***

With several rural areas facing ageing and declining populations, harnessing the benefits of the silver economy can both create economic opportunities and contribute to maintaining older populations in rural and mountain areas. Research is needed to understand the viability, real impact and best use cases of silver economy business models. Projects should aim to work with SMEs and rural communities to support entrepreneurship, including social entrepreneurship, and to increase knowledge of the economic and social potential of the silver economy. In addition, projects should assess the societal impact of silver economy business models, including on access to health services, and identify business models with both high societal and commercial value. In addition, projects should support the development of relevant policy recommendations and the dissemination of good practices. Finally, projects should pay particular attention to remote areas affected by insufficient availability of services of general interest. The projects should contribute to the development of relevant policy recommendations, focusing on business models that have both high societal and commercial value. Particular attention should be paid to remote areas where essential services are lacking. Projects should contribute to the creation of new employment opportunities outside traditional sectors, thereby contributing to the diversification and resilience of rural economies, and to measurably improving access to services for older people in rural areas.

### ***1.2 Improving access to services of general interest in areas in situation of demographic decline***

Rural and remote communities face unique challenges due to their geographical isolation and often declining populations. These areas are vital to our social fabric, cultural heritage and economic diversity. However, maintaining essential services - such as healthcare, telecommunications, housing, social support, clean energy and culture - remains a critical challenge. As the population ages and young people migrate to urban centres, ensuring the continuity and quality of these services becomes paramount. Projects should explore existing and new business models to enable the sustainable delivery of essential services in rural and remote areas. Projects should also develop innovative approaches to address specific gaps. Shared ownership and cooperative models should also be explored as potential solutions. In addition, projects should provide public authorities with practical tools and guidelines to help them assess long-term service needs, evaluate the real impact of service delivery and identify areas for improvement. Successful projects will make a significant contribution to the attractiveness of rural and remote areas. By providing essential services, these regions will become viable places of opportunity for entrepreneurs, families and individuals who recognise the potential for a high quality of life. Access to health care, education and cultural activities builds community resilience, so these projects are also expected to contribute to social cohesion and dynamic local economies.



### *1.3 Making rural communities more attractive and resilient*

Rural areas, especially those in remote regions, face a multitude of challenges, characterised by factors such as a lack of vocational and educational opportunities, limited access to basic services and widespread land abandonment, all of which have accelerated demographic decline. Heavily dependent on primary sector industries and tourism, these regions are uniquely vulnerable to a range of social, economic and environmental disruptions. While existing data has already identified specific factors influencing attractiveness and resilience, there is a lack of comprehensive understanding of the overarching framework conditions (including social, cultural, economic and environmental dimensions) that shape the attractiveness and resilience of rural areas. Projects should build on previous initiatives by developing and rigorously testing assessment tools tailored to rural areas, enabling them to accurately measure their resilience to socio-economic and environmental risks. Such tools should enable local authorities to strategically prioritise investments, recognising the heterogeneity of rural contexts and the need for tailored approaches. The expected impacts of the project go beyond building resilience but should enhance the overall attractiveness of rural communities and promote sustainable territorial development in the long term. The tools developed should make use of cutting-edge data visualisation techniques to ensure that they are easily accessible and usable by local and regional decision-makers. In addition, projects should explore opportunities for cooperation and integration with existing initiatives, such as the EU Rural Observatory, in order to maximise their reach and effectiveness.

### *1.4 Supporting energy communities in rural and remote areas*

There is a need to develop, test and prepare for up-scaling solutions for citizen-led energy actions that contribute to the clean energy transition and promote energy efficiency, resilience and social cohesion in rural and remote areas. Projects should address the dual challenge of deploying green energy solutions in remote areas while increasing public awareness and acceptance of renewable energy sources, taking into account territorial constraints and specificities. Particular attention should be paid to governance models for community-led energy production and distribution. Projects should also consider the potential benefits of using energy communities as drivers of social inclusion and social resilience in rural and remote areas, for example by reducing energy bills for low-income households. The expected impacts are expected to directly contribute to supporting the energy transition in rural areas and improving the overall energy resilience of remote areas.

### *1.5 Quantification and valuation of ecosystem services from agriculture and agro-pastoral activities*

The primary sector plays a crucial role in providing a wide range of ecosystem services to human society, including provisioning, regulating, cultural and supporting services. Unfortunately, these services are often overlooked, resulting in inadequate planning and policies. It is essential to recognise, quantify, map and value these services, as this process can contribute significantly to the analysis of the value of mountains. It can also highlight the importance of protecting these ecosystems and potentially diversifying farmers' incomes. Projects should seek to address key issues such as the types of services provided by each rural



area, their level of accessibility, their economic value and the potential societal damage if these services are compromised (including a reduction in fire resilience). Projects should explore the impact of quantifying and valuing ecosystem services on the economic sustainability of value chains, access to insurance and the adoption of new land management practices. Particular attention should be paid to mountain value chains and pastoral activities. The expected impacts of these projects aim to strengthen the long-term economic resilience of the primary sector by creating new income streams, while contributing to maintaining the provision of essential ecosystem services to society.

### ***1.6 Providing future oriented skills for rural areas***

Rural areas face a range of demographic, economic and environmental challenges that affect the long-term viability and resilience of rural economic sectors. Preparing and adapting to these challenges requires new skills for both new and existing workers. Projects should use multi-stakeholder approaches to identify territorial needs in the context of long-term territorial developments and long-term trends affecting local value chains. In addition, projects should identify good practices and business models for mapping territorial skills needs and providing future-oriented skills. In addition, projects should cover traditional education, but also vocational training to help active adults, including farmers, transition or diversify their economic activities. Through the implementation of these projects, projects should contribute to helping rural areas to adapt and, where necessary, transition to future-oriented sustainable development models.

### ***1.7 Exploring the contribution of the built cultural heritage to tackling global challenges***

The lack of understanding of the multidisciplinary potential of cultural heritage remains a challenge to making a difference, as does the lack of cooperation between different relevant disciplines (heritage, architects, ecologists, environmentalists, biodiversity specialists, archaeologists, historians, anthropologists, etc.). The lack of a systematic study and a holistic, justified approach to the use, adaptation and transformation of tangible and intangible heritage to meet the needs of rural communities hampers the process of increasing its instrumentalisation to address EU priorities (such as Nature Based Solutions, the Green Deal or the New European Bauhaus). Therefore, in order to respond to the contemporary needs of rural communities, in particular in remote and mountainous areas, research will focus on developing tools and methodologies to better integrate built heritage into modern life and to address challenges of social protection and inclusion, economic development and environmental protection. In particular, research will further explore how cultural heritage can be used to advance mitigation and adaptation strategies in support of the objectives of the European Green Deal. Projects should contribute to a better integration of the cultural dimension in the greening of rural communities and economies. They should also lead to a clear vision among a wide range of decision-makers, practitioners and academics of how heritage can effectively address the above challenges, as well as developing a range of cases where heritage has been used to meet the modern needs of communities and society.



## ***2. Specific priorities for mountain areas***

### ***2.1 Strengthening the resilience of mountain value chains most affected by climate change***

With temperatures in mountain areas rising much faster than the global average, mountain value chains are particularly exposed and sensitive to climate change. As these value chains, in the agriculture, agroforestry and tourism sectors, are often the backbones of mountain economies and deliver essential ecosystem services to society, it is essential to support adaptation and transition in the most impacted sectors. Building on the results of projects such as MOVING and MOUNTRESILIENCE, projects should select specific mountain value chains whose sustainability is particularly threatened by climate change, which have a high cultural or socio-economic value for the territories to which they belong, and that exist in several mountain areas across Europe. Transitions to new, better adapted value chains could also be considered. The sectors to be considered are agriculture, agroforestry, tourism as well as cross-sectoral value chains. Projects should be multi-stakeholder and aim to develop replicable methodologies for the development of local adaptation action plans and a set of practical tools and policy recommendations. Other transitions affecting value chains, such as (but not limited to) regional demographic decline and lack of generational renewal, should be considered. Intended impacts of the projects should contribute to enhancing the overall resilience of mountain value chains in the face of climate change.

### ***2.2 Thematic network to compile knowledge ready for practice on pastoralism***

Pastoral activities have long contributed to shaping and maintaining rural landscapes, provide a wide range of other ecosystem services to citizens and are an integral part of the cultural and natural heritage of rural areas. However, Europe's pastoralists face several socio-economic and environmental challenges, including access to land, generational renewal and land-use conflicts with large carnivores and other economic activities. In the run-up to the International Year of Rangelands and Pastoralists in 2026, the creation of a thematic network to gather practical knowledge on pastoralism would be an opportunity to pool and disseminate relevant knowledge, e.g. on the provision and remuneration of ecosystem services, wildlife management, the content of training programmes, and how to overcome market and regulatory barriers. Projects should contribute to maintaining pastoral activities and enhancing the value of the ecosystem services provided by these activities through better training and exchange of good practices.

### ***2.3 Supporting winter tourism transition in European mountain areas***

Stakeholders in mountain resorts face a common challenge in coping with the effects of climate change on the socio-economic fabric, while often feeling isolated and poorly supported by public authorities due to the lack of a reference framework for action. There is a need for transnational projects to assess these problems and find common solutions through the development of a physical and digital network of resorts in transition. Promoting the exchange of knowledge and experience and reducing the isolation of resort managers and local stakeholders, while implementing possible nature-based solutions (NbS) on the ground,



is key for the European mountain tourism sector. Projects should focus on identifying and clearly understanding the transition between traditional and modern occupations in the tourism sector. In addition, they should focus on identifying the strategies needed to enable tourism operators and tourists to build partnerships with local populations and administrations based on environmental principles. In addition, projects should prioritise the development of physical and digital networks of destinations in transition to facilitate the exchange of knowledge and experience between stakeholders. In addition, the implementation of nature-based solutions to socio-economic and environmental challenges in mountain resorts should be a key objective. Finally, projects should aim to develop different approaches to tourism development. Based on analyses of the economy, biodiversity and social behaviour, these scenarios will aim to meet the needs of the general interest and sustainable development. The analysis of pilot sites in European mountains could provide a better understanding of the strengths and vulnerabilities of mountain resorts, will help to develop tools and methodologies, and reproducible transition schemes for other mountain regions.

### *2.4 Understanding the long-term impacts of climate change on migration trends and their consequences for mountain areas*

Environmental factors often intersect with economic, political, cultural and social considerations when examining the reasons for migration. However, the worsening impact of climate change on livelihoods is expected to contribute to an increase in the number of people migrating, both latitudinally and altitudinally. Mountain regions around the world are highly vulnerable to the effects of climate change, but in some regions, such as the Mediterranean, they can act as climate refugees, so migration may become a long-standing livelihood strategy in these areas. Projects should focus on developing a comprehensive conceptual and methodological framework for assessing climate migration in European mountain areas. They should also examine climate migration in different countries and at different time scales, including both long-term and short-term migration patterns. In addition, projects should explore the opportunities that climate migration can offer for the settlement of populations in European mountain areas. Through a comprehensive understanding of the dynamics between climate change and migration in mountain areas, the projects aim to inform policies and strategies that promote sustainable livelihoods. It is expected that the knowledge gained will contribute to global efforts on climate change adaptation and human mobility, with a positive impact on the resilience and well-being of communities in remote regions.

### *2.5 European Roadless mountains: identifying and preserving ecosystems of high ecological integrity*

Europe is the most road fragmented continent in the world (1). Mountain ecosystems remain among the least fragmented areas in the EU (2,3), but are increasingly vulnerable to new infrastructure development (4-6). The challenge is to prevent land degradation and fragmentation in the most valuable mountain ecosystems in order to continue to conserve European biodiversity and provide multiple benefits to people within the current global and European policy framework. Projects should aim to (i) delineate the least fragmented ecosystems in Europe's mountain zone and provide the European Map of Roadless Mountain Areas, (ii) assess the level of their ecological integrity based on wilderness criteria (7), (iii) identify and map



their primary old-growth forests, (iv) assess their biodiversity and ecosystem services, (v) identify and map their biodiversity and (iv) assess their value for biodiversity and ecosystem services, (v) integrate a social component to support local economies, (vi) synthesise research results into policy recommendations to enhance their capacity to deliver benefits to people, taking into account management issues in the Natura 2000 network and sustainable spatial planning of projects and activities in this zone. In this way, projects should help to identify and protect the most intact and valuable mountain ecosystems in Europe and ensure their supporting role for biodiversity and people, including local mountain communities. Projects are expected to support our progress towards many legal and policy commitments under the SDGs (Goals 12-16 and in particular Target 15.4) (8), the Kunming-Montreal Global Biodiversity Framework (Goals A-B) (9), the European Biodiversity Strategy (10) and the forthcoming Soil Monitoring Law (11).

## *2.6 Conservation, characterization, and promotion of mountain agrobiodiversity*

The conservation, study and promotion of agrobiodiversity is a major global concern. Approximately 75% of the world's living organisms used for food and agriculture have been lost over the last century, with food production relying on a small number of plant and animal species. Europe's mountain areas are rich in agrobiodiversity, particularly in landraces. However, most of these landraces have not been scientifically characterised and are at risk of extinction due to the abandonment of mountain areas and the effects of climate change. In the mountains, particularly due to climate change, the original agrobiodiversity is changing (less participation, high temperatures, etc.) and more species and varieties characteristic of the lowlands are appearing in the mountains. The challenge is to conserve/maintain the original mountain varieties under climate change and invasion of lowland varieties and species, using agro-ecological practices. Projects should aim to: i) characterise mountain landraces to understand their genetic, morphological and agronomic traits; ii) valorise mountain landraces by exploring their potential in crop improvement programmes and the development of new agri-food chains and unique products; iii) investigate the suitability of mountain landraces for increasing agricultural productivity, nutritional value and marketability, thereby contributing to the sustainable development of mountain areas; iv) promote the cultivation of landraces in mountain areas using agro-ecological practices to support sustainable farming systems. These actions should promote the conservation of the biological resources of mountain areas and favour the development of the different landrace populations and their adaptation to environmental changes. Greater knowledge of their characteristics (agronomic, genetic, nutritional, etc.) should encourage their use in crop improvement programmes and in projects aimed at enhancing the unique agri-food production of mountain areas.

## *2.7 The role of culture in the adaptation of communities in mountain ecosystems*

The study of mountain cultures is an important area of research. However, no theoretical or conceptual research approach has explicitly or systematically discussed the role of culture in the adaptation of communities to their mountain habitat. The thematic focus can be on the commonalities and specificities of social, political and intellectual developments in different mountain regions, as well as in a comparative



perspective. Questions of how history, everyday life and traditions, political and social structures and their study can contribute to understanding resilient communities between civilisations, empires and states (lowlands). Projects should focus on exploring the specificities of mountain cultures, while assessing their development under various influences from the lowlands, neighbouring regions and civilisations. In addition, projects should aim at analysing cases of rejection and resistance, especially considering the potential rivalry between different cultural scripts. Finally, projects should focus on analysing how these cultural characteristics could be used to revitalise mountain communities after experiencing the devastating effects of migration and climate change. Expected impacts would include a better understanding of how resilient mountain communities have managed to adapt to their specific environment and cope with unexpected challenges; and would also highlight lessons on how community culture(s) can help contemporary communities to adapt to the impacts of climate change in their current environment.

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