

LIFE PASTORALP



LIFE16 CCA/IT/000060

Pastures vulnerability and adaptation strategies to climate change impacts in the Alps

E.4

Replication and transfer plan

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	<p>Ente Parco Nazionale Gran Paradiso - PNGP</p>

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1 Aim of the Plan

The aim of the Plan is to facilitate the replication and/or transfer of the project's methods and results to other areas, regions and countries. The objective is therefore to transcend the simple dissemination of the project results and knowledge sharing and propose a model that can be applied in other contexts.

2 About the PASTORALP project

PASTORALP is a project aiming to reduce the impacts of climate change on alpine pastures, increase their resilience and decrease their vulnerability.

The project relies on participative and scientific approach based on the analysis of the present conditions of alpine pastoral communities and on future projections of the impacts of climate changes on these communities and focuses on two national parks representing western Alps environments: the Parc National des Écrins (France) and the Parco Nazionale Gran Paradiso (Italy).

The project has organized these approaches in several actions:

Action A1: a Communication, Dissemination and Stakeholder Participation plan (CDSp) was developed. The CDSp formalizes the stakeholders' participation strategy, including stakeholders' analysis and engagement plan and platform.

Action A2: a comprehensive review and assessment of national and European policy framework on pastures was carried out. The analysis has focused on Common Agricultural Policy, mainly assessing the Rural Development Programs of the Regions involved in the project. Other European regulations and technical reports have also been analyzed. At the same time, a list of feasible adaptation strategies was finalized.

Action C1: pre-existing data on current pastures distribution, soil and climate characteristics has been collected and harmonized. A geo-database for six relevant sites (three in the Parc National des Écrins and three in the Parco Nazionale Gran Paradiso) has been created containing meteorological data, pasture management and soil parameters. Downscaling of future climate variables (precipitation, Tmin, Tmax and solar radiation) was carried out under two IPCC RCPs scenarios (4.5 and 8.5) and two future time slices (2011-2040 and 2041-2070) by using three Regional Circulation Models (CNRM-ALADIN, ICTP-RGCM4, and CMCC-CCLM4).

Action C2: mapping the distribution of pastures in the two study areas with harmonized legend. Presence and absence of pastoral resources, vegetation types and categories, and pasture yield levels were mapped, based on field surveys, remote sensing and modelling application. The cartography was used as a baseline for modelling activity (Action C.4 and C.5).

Action C3: a set of environmental and socio-economic indicators assessing the vulnerability of pastures located in the project areas, under current and future conditions, was defined through the analysis of literature, the classification of indicators and the contribution of local stakeholders.

Actions C.4 and C.5: the vulnerability (biophysical and socio-economic) of pastures in the western Alps was assessed with modelling approaches. Two biogeochemical models (DayCent, PaSim) were calibrated on data gathered from different areas in the two parks. The results allowed to project the main changes expected in these ecosystems also applying a set of technical adaptation measures identified in Action C.6. The modelling procedure was also addressed by exchanges with local stakeholders and confirmed the importance of considering direct and indirect interactions between adaptive capacity and sensitivity to changes. The socio-economic vulnerability was assessed through modelling based on outcomes from round tables, interviews, questionnaires and workshops with relevant stakeholders throughout the life of the project.

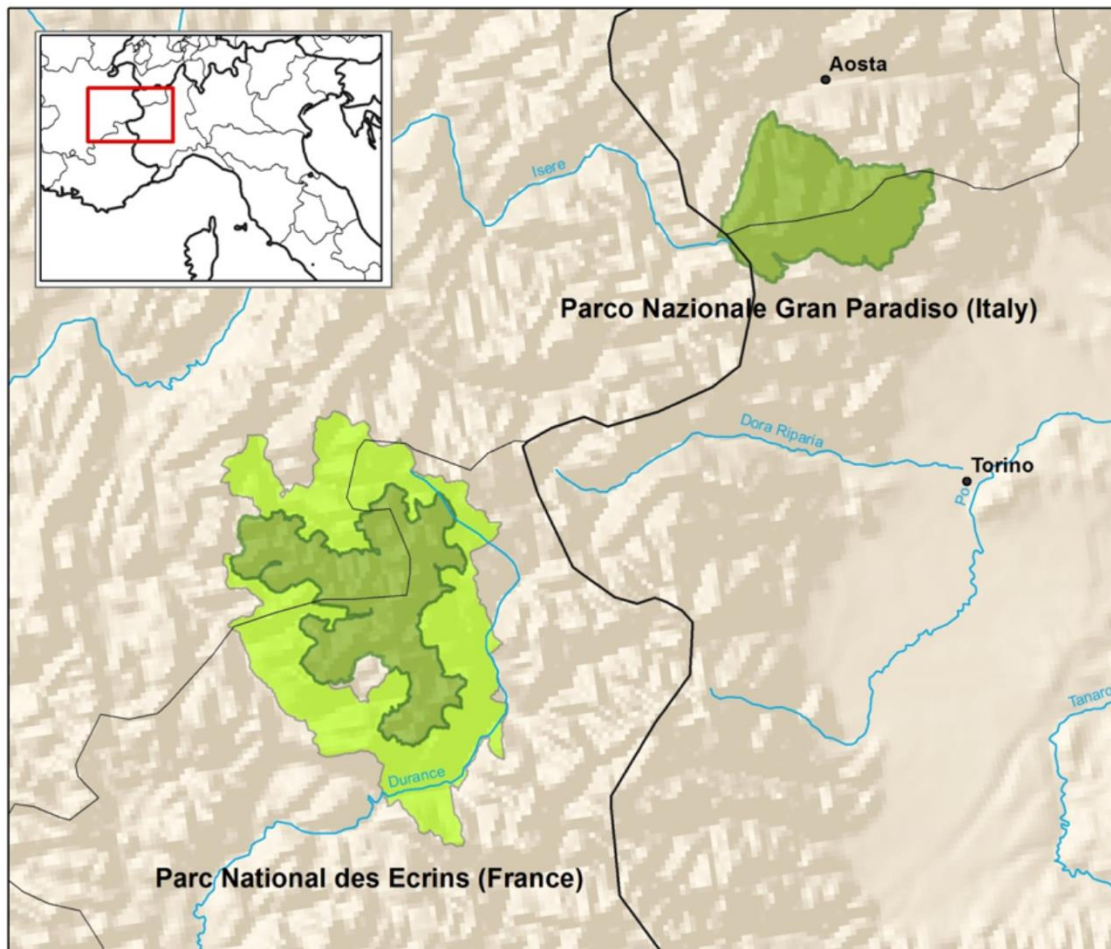
Action C6: adaptation strategies, based on data acquired by the bibliographic research previously described, were tested in a set of experimental sites located in the two parks, in order to prove their feasibility and/or improvements/reductions on productivity and biodiversity. Results have been gradually fine-tuned and integrated with those obtained in the modelling framework (Action C.5) and stakeholders' feedbacks (Actions E.2). Preliminary results of the abovementioned actions have been shared and discussed with relevant stakeholders by means of workshops, interviews, questionnaires, meetings and round tables. Socioeconomic factors affecting sensitivity to climate changes were obtained according to the stakeholders' opinion and were compared with the results of the analyses of the literature.

Action C7: a web-based platform was deployed serving as a decision-making support tool. It has a dynamic interface for wider dissemination of the achieved results (adaptation measures, policy recommendations, impacts of climate change, vulnerability analysis, etc.). There is also a WebGIS section with climate, pastoral and vegetation maps. Finally, it contains the pastoral and diagnostic plans specifically produced for the permanent demonstration areas created in the two national parks.

Action C8: integrated adaptation strategy plan and policy recommendations have been elaborated to preserve pastoral production, forage quality, socio-economic sustainability and biodiversity.

3 Geographic area covered by the project

The case study areas of the project were two National Parks located in the western Alps (Parco Nazionale Gran Paradiso, Italy, and Parc National des Écrins, France), conceived as open-air laboratories of sustainable management of mountain pastures in a context of climate and land use changes.



3.1 Parco Nazionale Gran Paradiso, Italy

The Parco Nazionale Gran Paradiso, created in 1922, is the first national park to be set up in Italy. The Park straddles the regions of Valle d'Aosta and Piemonte, around the Gran Paradiso massif and covers an area of approximately 71,000 hectares, on a predominantly mountainous terrain.

<https://www.pngp.it>

3.2 Parc National des Écrins, France

The Parc National des Écrins, created in 1973, is located in the southeastern part of France, south of Grenoble and north of Gap, in the departments of Isère and Hautes-Alpes.

<https://www.ecrins-parcnational.fr>

4 Features characterizing context and pastoral system in the two pilot areas

In order to verify the transferability of the project results and outcomes, it is necessary to assess in advance the similarities and differences of the reference contexts. The main elements characterizing the pilot territories from the point of view of the pastoral system and, more generally, of the socio-economic context are summarized below.

4.1 Permanent grasslands

Permanent grasslands are a key element for the agro-pastoral livestock systems in the territories of the two National Parks and in the Alps in general. Alpine mountain pastures are complex and multifunctional systems, preserved by traditional and sustainable pastoral practices. They constitute a habitat for flora and fauna of high biodiversity value and represent a landscape of great cultural value. The extensively managed alpine pasture system provides multiple ecosystem services of support, supply, regulation (in particular, carbon sequestration and prevention of flooding and soil erosion) and cultural value (recreational spaces for tourists and local population). Summer mountain pastures, or “*alpages*”, play an important economic and social role in the development of rural areas and in the production and commercialization of quality products linked to specific territories (e.g. dairy, meat, wool).

4.2 Vertical transhumance: the connection between the valley floor and the *alpages*

Cattle, sheep, and goat breeding represents the most important and widespread form of agriculture in these mountain environments. The typical organization of livestock farming systems involves the droving of herds or flocks, from the farm at the bottom of the valley to the *alpages*, sometimes moving through the *mayens*, the mid-mountain areas that are typically grazed in spring and autumn. This farm management, based on the practice of vertical transhumance, derives from the possibility of always being able to graze fresh grass, first at the bottom of the valley and then going up to the *mayen* and the *alpage*, as well as to mow the low-altitude meadows to provide the fodder supply for the winter. Because of the high elevation of the *alpages* (approx. 1500-2700 m above sea level) their pastures are grazed only during summer. Generally, an *alpage* includes several sub-units, at different elevations, in order to better use the seasonal growth of the grass. Some are equipped with buildings for housing staff and livestock, small dairies for milk processing and other facilities.

4.3 Family-run farms

Mountain animal husbandry is characterized by predominantly family-run farms from small to medium size in terms of both managed surfaces and number of animals. In the Parc National des Écrins pastures are typically grazed by flocks of sheep for meat production, while in the Parco Nazionale Gran Paradiso cattle breeding is the most widespread. In Valle d’Aosta, the management of alpine pastures with dairy cows is largely aimed at the production of Fontina PDO, a traditional cheese closely linked to the territory and the native cattle breeds, which are distinguished by their remarkable rusticity that allows them to adapt to the difficult mountain conditions and at the same time guarantees good productivity.

4.4 Demographic and socio-economic evolution of mountain context

Agricultural activity is strongly influenced by the difficult geomorphologic and climatic characteristics typical of the mountain environment and by socio-economic changes. The trend in recent years is a gradual but constant decrease in the rural population and agricultural activities, resulting in the abandonment of agricultural land. Other critical issues include the shortage of manpower in the agricultural sector, the low value of dairy and meat products and, finally, the return of the wolf, which heavily affects the management of animals by breeders and shepherds.

5 Main geographic areas for replication

Although project outcomes and tools are suitable for all mountainous territories, European and non-European, given the geographical and socio-economic characteristics listed above we can identify some main areas where the transferability and replicability of the PASTORALP experience are better applicable.

5.1 The Alps

Including the Alpine territories of France, Italy, Switzerland, Austria, Germany, Slovenia, this is the territory that resembles the most to the project context and therefore is most likely to be interested in the export of project tools and results.

5.2 The Pyrenees

Located on the border between Spain and France, the Pyrenees chain can relate in many respects to the western Alps from a geographical point of view, given its numerous peaks above 3000 m above sea level, and from a socio-economic point of view, due to its tourist attractiveness and the presence of national parks. The Pyrenees are also an area in which pastoralism and transhumance remain central to the identity and heritage of the territory as also demonstrated by the LIFE OREKA MENDIAN project (<http://www.lifeorekamendian.eu>).

5.3 The Apennines

Compared to the Alps, the Apennines have a different conformation and, overall, a much lower elevation and aspects that determine a climate very different from that of the Alps. However, the traditional activity in the highest areas of the Apennines, characterized by large areas of rough rangelands and mountain grasslands, is sheep and goat breeding, although in some areas cattle breeding is also practiced. In the highlands of the Apennines, as in the Alpine context, the pastoral-breeding connection is a main feature, and the practice of transhumance strongly characterizes not only agriculture but also the identity and culture of the area.

6 What and how to replicate

6.1 Results transferring

Integrated adaptation strategy plan

The integrated adaptation strategy plan (the main outcome of Action C.8) is the main tool developed by the project to support pastoral communities' adaptation to climate change.

Based on the expected future impacts of climate change and the vulnerability analysis, effective adaptation measures were developed to cope with socio-economic and climate changes in the two study areas.

For each climate hazard, suitable adaptation measures were identified, taking into account their potential impacts on the natural environment and the pastoral system. Particular attention was paid to technical difficulties, factors of failure or success, management aspects on the side of the farmers and the shepherds, and finally the conservation of floristic and faunal biodiversity.

Based on the temporal and spatial scale of application, technical adaptation measures were grouped in short- and long-term adaptations.

This tool can be a useful starting point to define adaptation strategies and measures in other mountain grassland contexts.

Policy recommendations

The project addressed recommendations to apply adaptation measures of the pastoral system to face climate change. These recommendations aim at supporting decision-makers and evidence-based policies at all levels – local, regional, national and transnational. They were structured in different areas of intervention: *alpage* management; water management; biodiversity preservation; multifunctionality and pastoralism/tourism coexistence; cooperation and training.

After verifying the starting conditions of the examined territorial contexts, the recommendations can define strategies and implement policy instruments in other mountain territories, both at local, regional, national and transnational level. The policy recommendations of PASTORALP can be easily fine-tuned to the local contexts.

6.2 Methods transferring

In addition to the transferability of the project outcomes, it is important to emphasize the replicability of the methods and approaches developed and applied to achieve PASTORALP results and outcomes. Following the same line of reasoning, it is useful to highlight the possibility for other territories to follow a similar path to the one defined by the project, which was based on a detailed study of the scientific knowledge of starting contexts (CARTOGRAPHY, MONITORING) and possible future projections (IMPACTS, VULNERABILITY through modelling) as well as on a constant involvement of the stakeholders in all the project development phases since the beginning (i.e. it is important to highlight stakeholders' needs under a specific framework and address the activities according to them).

During the project development, the methodology to map pasture vegetation was adopted by the Autonomous Region of Valle d'Aosta, which is extending its application to the entire regional territory.

The project methods and outcomes have been collected in the online PASTORALP PLATFORM. This platform is supposed to support pastoral communities in their adaptation to climate change

and to raise awareness in stakeholders, target groups and general public about the issues related to high mountain climate change vulnerability, impacts and adaptation. It is therefore the primary tool not only for the results dissemination but also for the replicability and transferability of project methods and results.

7 Target audience and stakeholders

The above-mentioned methods/results can be directed to a variety of possible audiences and stakeholders:

- Shepherds, farmers and their associations;
- Agronomists, technicians and professionals offering advice and technical assistance to farmers;
- Scientists, research centers, universities, environmental protection agencies;
- Nature parks, managers of protected areas and their networks;
- Local and regional administrations;
- Environmental protection associations;
- Local communities and civil society.

Based on the project experience, the dialogue with these different parties enabled to satisfy the knowledge requirements connected not only to the scientific component, but also to land use and practices, ensuring the return of a complex framework in which to assess the concrete feasibility of the proposed measures.

8 Key elements for replicability in other mountain contexts

8.1 The Parks

As mentioned in the previous paragraphs, the project was developed in pilot areas within national parks. This choice strongly characterized the project development in several aspects:

- availability of data and important territorial knowledge, linked to monitoring, studies and research that are more thoroughly and consistently developed over time in protected areas than in areas outside parks;
- increased attention to habitat protection, landscape maintenance and biodiversity conservation in accordance with the national parks mission; it is important to take into account that these interests are often underrepresented outside the protected areas;
- greater binding nature of the measures protecting environment and biodiversity;
- availability of dedicated human resources.

8.2 CAP and judicial-administrative frameworks

The project involved territories with different judicial systems: more centralized for France, regionalized for the Italian part, involving two territories with different autonomy (Piedmont, ordinary region; Valle d'Aosta, special autonomy region). Despite these differences, the shared frame of reference - the Common Agricultural Policy (CAP) - has facilitated dialogue and exchanges between the different territories. CAP objectives and measures have been the common ground for comparison, the shared language that has facilitated joint work.

Transferability to non-European contexts may be more complex due to the absence of the Common Agricultural Policy framework.
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8.3 Local fine-tuning

In the project experience, comparison at the local level was crucial, mainly to assess the feasibility of the proposed adaptation measures. It is therefore an important step to ensure the effectiveness and comprehensiveness of the technical adaptation measures.