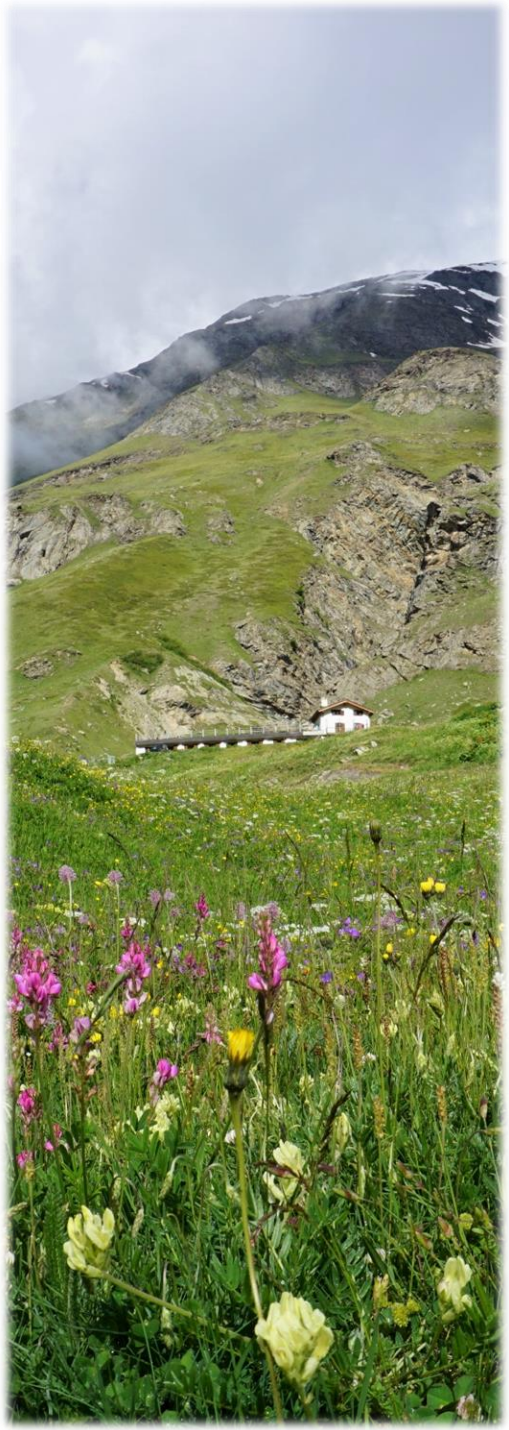


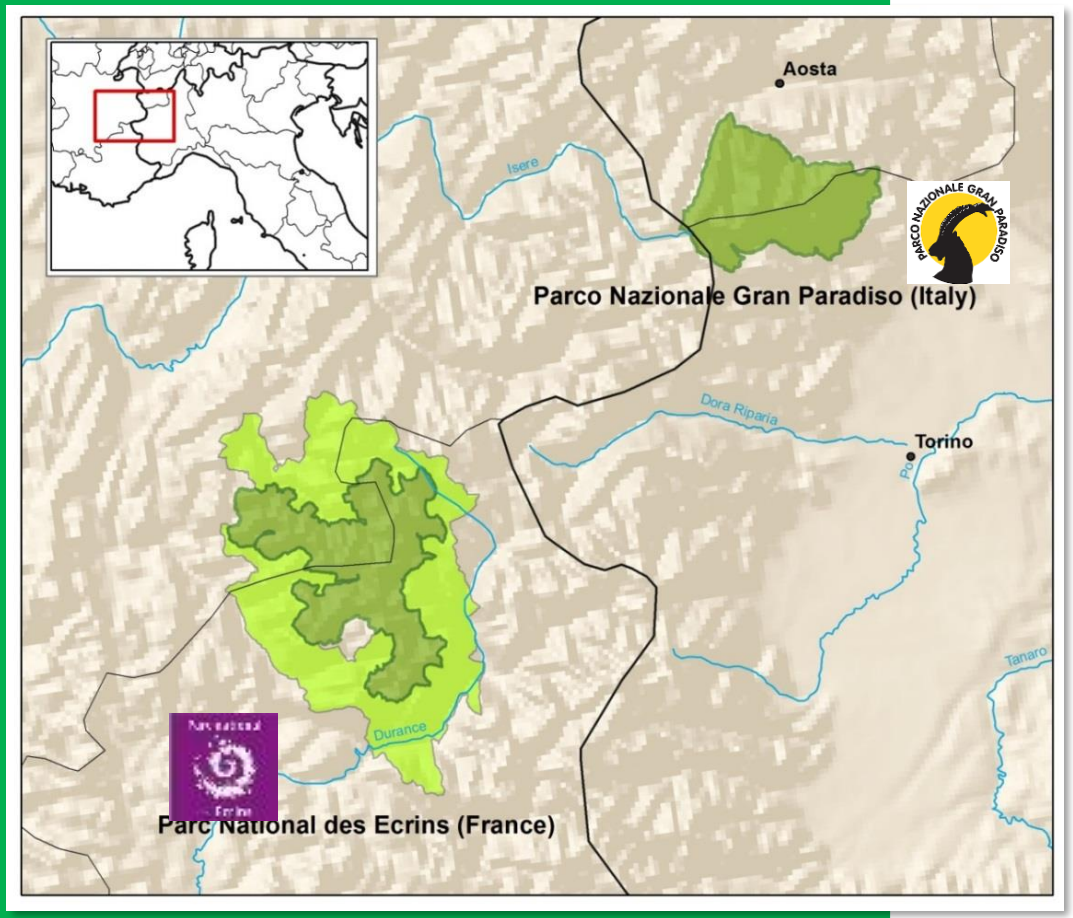
Adaptation policies and measures to cope with climate change in Alpine mountain farming

Anaïs Piccot*, G. Argenti, G. Bellocchi, P. Brien, E. Cremonese, M. Della-Vedova, C. Dibari, M. Galvagno, S. Ghidotti, C. Napoléone, L. Stendardi, S. Targetti, G. Trombi, P. Varese, M. Bassignana

* *Institut Agricole Régional, Aosta, Italy*

The EU LIFE PASTORALP

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



DURATION: 01/10/2017 - 30/03/2023
(5.5 YEARS)

Overall aim

Reduce the vulnerability and increase the resilience of alpine pasture agriculture by **assessing impacts** and testing and promoting **adaptation measures.**

Study areas

Ecrins National Park (France) and Gran Paradiso National Park (Italy).

Partners

1. Coordinator Department of Agriculture, Food, Environment and Forestry Science (DAGRI), University of Florence (IT)
2. Agenzia Regionale Protezione Ambiente Valle d'Aosta - ARPA VDA (IT)
3. Institut Agricole Régional – IAR (IT)
4. Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement– INRAE (FR)
5. National Center for Scientific Research - CNRS (FR)
6. Parc National des Ecrins – PNE (FR)
7. Parco Nazionale Gran Paradiso – PNGP (IT)

Climate change (CC) in the Western Alps

	In the last century	**Expected in the future (RCP 8.5/end of century)**
TEMPERATURE	Increase by 2°C (about twice higher than the global average)	+2/3 °C
PRECIPITATIONS	➢ -30% summer precipitations ➢ Increases of extreme events ➢ Reduction in snow cover	➢ Increases in annual precipitations and intense rainfalls but… summer droughts ➢ Reduction in snow cover

… and socio-economic changes

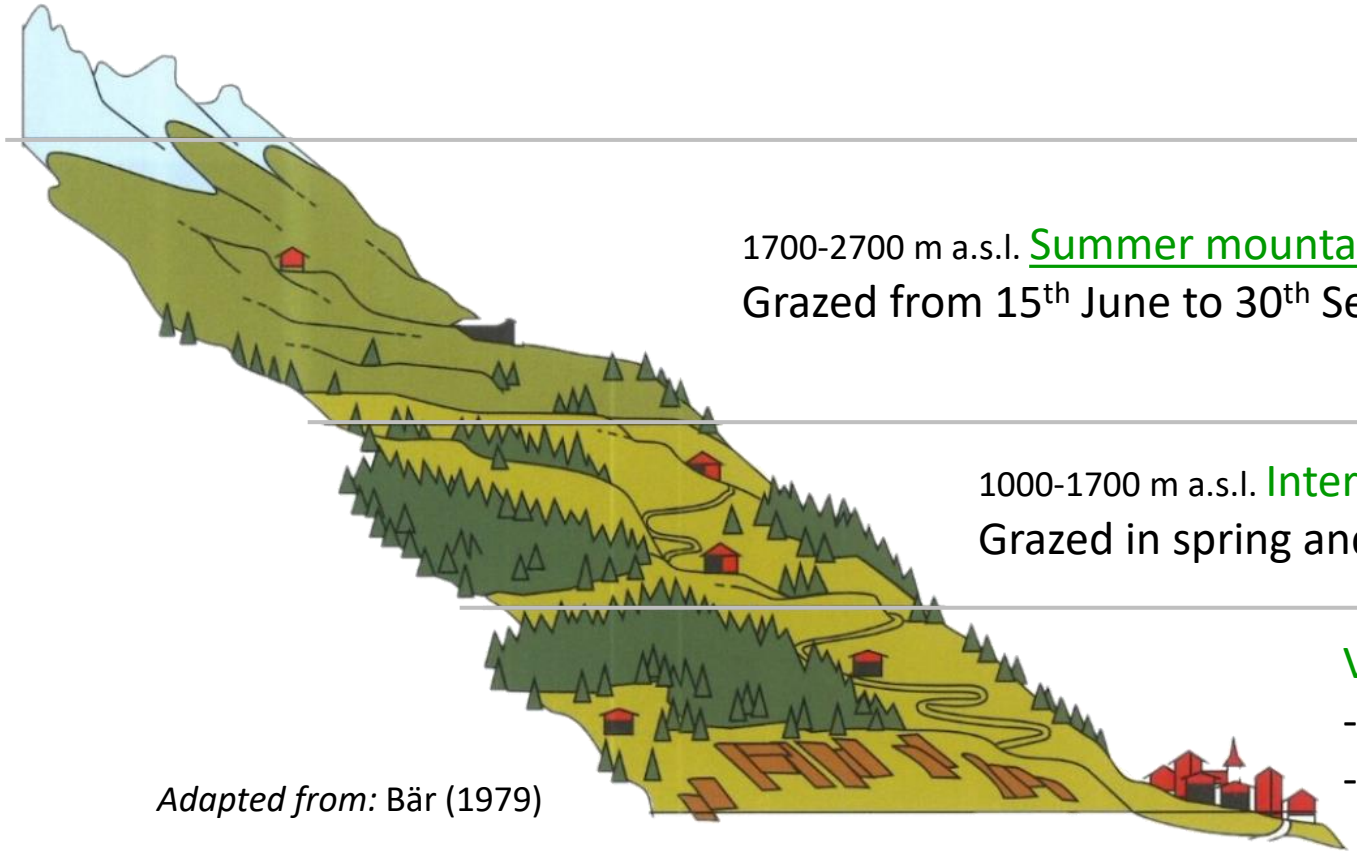
- Rural depopulation
- Land and rural activities abandonment
- Manpower shortage in the agricultural sector
- Lower value of dairy and meat products
- Return of the wolf

The summer mountain pastures or "*alpages*"

- Permanent grasslands in the montane, subalpine and alpine belts
- Grazed by cattle, sheep and goats during summer
- A central element for many agro-pastoral livestock systems in the Alps

Alpages, estives

Alpeggi, malghe



1700-2700 m a.s.l. Summer mountain pastures
Grazed from 15th June to 30th September

1000-1700 m a.s.l. Intermediate grasslands
Grazed in spring and autumn + cut in summer

Valley and low-altitude zones:
- livestock are stabled in winter
- grazing + haymaking

Adapted from: Bär (1979)

The summer mountain pastures:

a multifunctional and complex system preserved by traditional and sustainable pastoral practices

- Extremely rich biodiversity
- Regulating services: preventing flooding and soil erosion, purifying water
- Carbon sequestration

- Forage for livestock
- Dairy and meat products, wool

- Leisure for tourists and local population
- Open landscapes
- Great cultural value

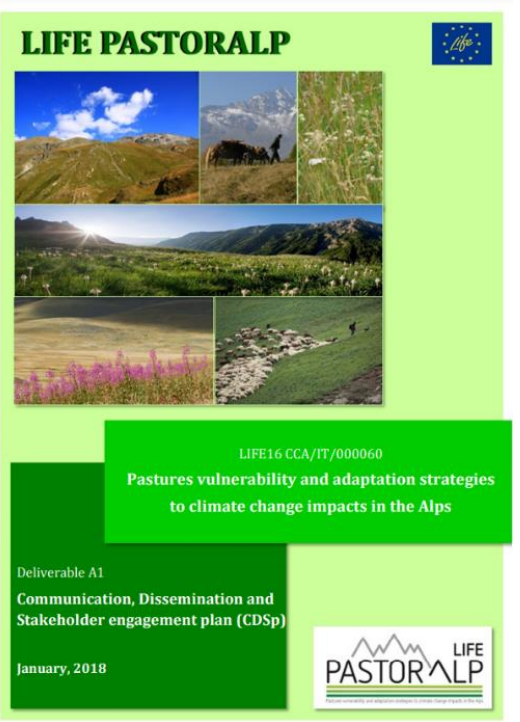
Which are the suitable **management practices**, **adaptation strategies** and **policies** to preserve mountain grasslands biodiversity, maintain ecosystem services and cope with climate change impacts while fostering the socio-economic sustainability of mountain farming?

METHODS: a multi-disciplinary approach

Literature research on CC adaptation actions

→ Analysis of current European, national and regional policies, scientific articles and technical reports;

→ Review and classification of >400 adaptation measures applicable to mountain pastoral activities.



A modelling approach (using DayCent and PaSim) to:

→ project CC impacts and estimate the biophysical pasture vulnerability;

→ assess adaptation options for pastoral management.

https://www.pastoralp.eu/deliverables/

Stakeholder involvement and consultation from the project early stages to the validation of results.

>150 livestock farmers, technicians, representatives of the parks and protected areas, agricultural players and local institutions officials, …

METHODS: a multi-disciplinary approach

Stakeholder involvement and consultation in Gran Paradiso National Park and Ecrins National Park

2018 Launching events

2019 Consultation workshops

Online questionnaires

Participatory analysis in all the PNGP summer mountain pastures:
45 farmers interviewed on the management and problems of mountain livestock farming, their perception of CC, effects on pastures and animals and adaptation suggestions

2020

https://www.pastoralp.eu/other-products/

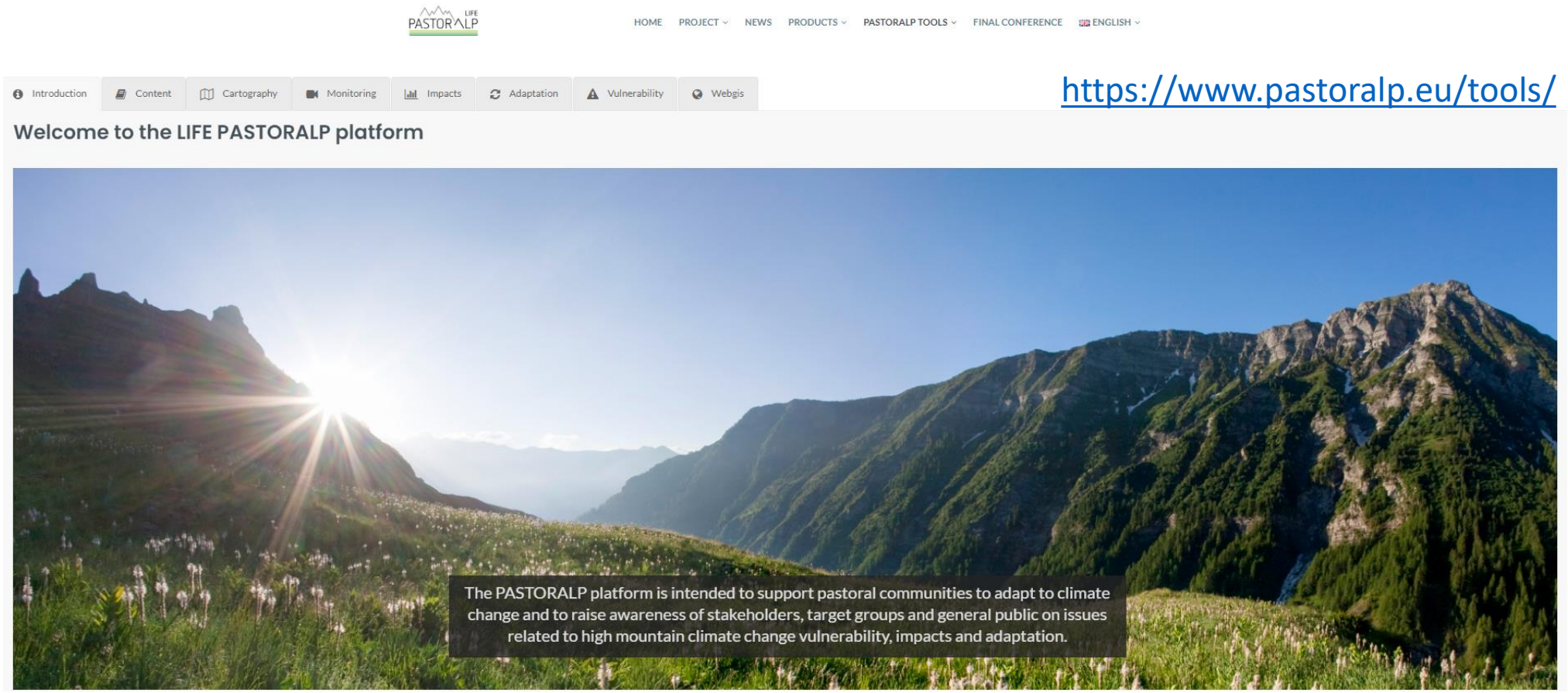
2022 Validation workshops to:
→ evaluate the feasibility and effectiveness of the measures identified
→ gather suggestions and further potential adaptations

+ ongoing collaboration with farmers at pilot sites (2019-2022)

RESULTS

Identification of technical measures and policy guidelines to overcome climate and socio-economic issues for summer mountain pastures in PNGP and PNE

Promotion of the strategies in the LIFE PASTORALP project web platform



https://www.pastoralp.eu/tools/

RESULTS: 37 technical measures identified

Climatic hazards

I. Very dry winter, late or cold spring

II. Early spring

III. Shallow snowpack

IV. Spring drought

V. Heatwave and wind in June

VI. Very hot and dry summer, heatwave and drought

VII. Rainy summer

Consequences on the natural environment and on animals

Consequences on the pastoral system

Possible adaptations

Short-term adaptations

Adjustments to extreme weather events at the *alpage* scale

Long-term adaptations

Structural actions and strategies implemented at the *alpage* scale in the medium and long term

Farm system

Adaptations affecting not only the *alpage* but the whole farm organisation

RESULTS: 37 technical measures identified

Climatic hazards	Consequences on the natural environment	Possible consequences on the pastoral system	Possible adaptations
…	…	…	…
Very hot and dry summer, heatwave and drought	Source dry out	Watering and irrigation problems	…
			Search for long-lasting supply solutions (catchments, reservoirs, etc.)
			…
	Decrease in the amount of grass	Low fodder resource	…
			Search for additional grazing areas (e.g. wooded or shrubby ones)
			…
	Degradation of vegetation composition in the medium and long term	Worsening of the forage resource	
			Improving grazing efficiency (rotational grazing) and pasture management (*e.g.* manuring, weeding)
	No regrowth on lower grasslands	• Low resource at the end of the season • Adverse effects of heat stress on animals	…
			Exceptional early ending the summer grazing season and descent of animals from mountain pastures
			…
…	…	…	

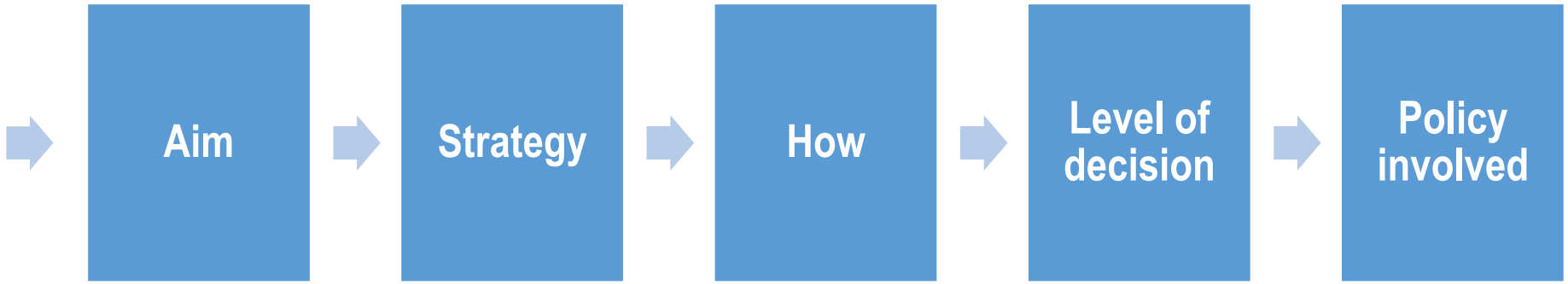
An example from https://www.pastoralp.eu/tools/#piattaforma_adattamento_en

RESULTS: 22 adaptation policies identified

EU, national and regional policies are key to develop measures that can help farmers to cope with climate and socio-economic changes, while preserving mountain grasslands ecosystems and their rich biodiversity.

We propose 22 **climate-proof guidelines** for effective decision-making at all policy levels.

Scope
I. Alpage management
II. Water management
III. Multi-functionality and pastoralism / tourism cohabitation
IV. Cooperation and training
V. Biodiversity



RESULTS: 22 adaptation policies identified

Scope	Aim	Strategy	How	Level of decision and implementation	Policy involved
…	…	…	…		
Water management	Reduction of conflicts for water use	Promotion of watershed management including all stakeholders	• Technical support to define users' priorities • Stakeholder arrangements	• State • Region • Local	• National, • Regional, • Local measures
	Increase grassland production capacity	• Restoration of the historical irrigation network • Creation of a sprinkler irrigation system	• Financial tools • Preliminary studies	• Region • Territories (parks, municipalities, etc)	• CAP: rural development • Regional measures
	…	…	…	…	…
…	…	…	…		

An example from https://www.pastoralp.eu/tools/#piattaforma_adattamento_en

LIFE PASTORALP: next steps…

- Dissemination events (training seminars, demonstration event, final scientific conference)
- Launching of PASTORALP PLATFORM (currently in a beta version at https://www.pastoralp.eu/tools/)
- Publication of the “Integrated adaptation strategy plan and policy recommendations of alpine pastures to climate change impacts”

Drought and high temperatures of 2022 confirm the need of working on adaptation to climate change!

AOSTA & REGIONE

MONTAGNA E SICCITÀ

Problemi di salute per le bovine in alpeggio

Occhi e zampe a rischio

Il forte irraggiamento in quota e la polvere stanno favorendo la diffusione di casi di cheratocongiuntivite e i terreni secchi causano traumi alle articolazioni: “Sui pendii più aridi si scivola come sul ghiaccio”

Abbiamo dovuto intervenire dando farmaci antinfiammatori e antibiotici

DOPO 15 ORE E SOLO CON L'ELICOTTERO

Due polacchi recuperati sul Cervino “Sbagliato dare per scontati i soccorsi”

AOSTA & REGIONE

PRIMO PIANO

Evapora anche il latte

La siccità ha fatto crollare la produzione nelle stalle “I caseifici avranno meno formaggi da poter vendere e i pagamenti ai soci subiranno un drastico taglio”

Al Col di Joux

Le “reines” riprendono i combat

L'EVENTO

AOSTA & REGIONE

PRIMO PIANO

Désarpa anticipata

Troppa siccità negli alpeggi più alti e gli allevatori hanno cominciato a far scendere le proprie mandrie prima dei cento giorni stabiliti per poter ricevere i contributi

la produzione di Fontina amo nell'aiuto del governo”

Thank you for your attention!

LIFE PASTORALP

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

www.pastoralp.eu