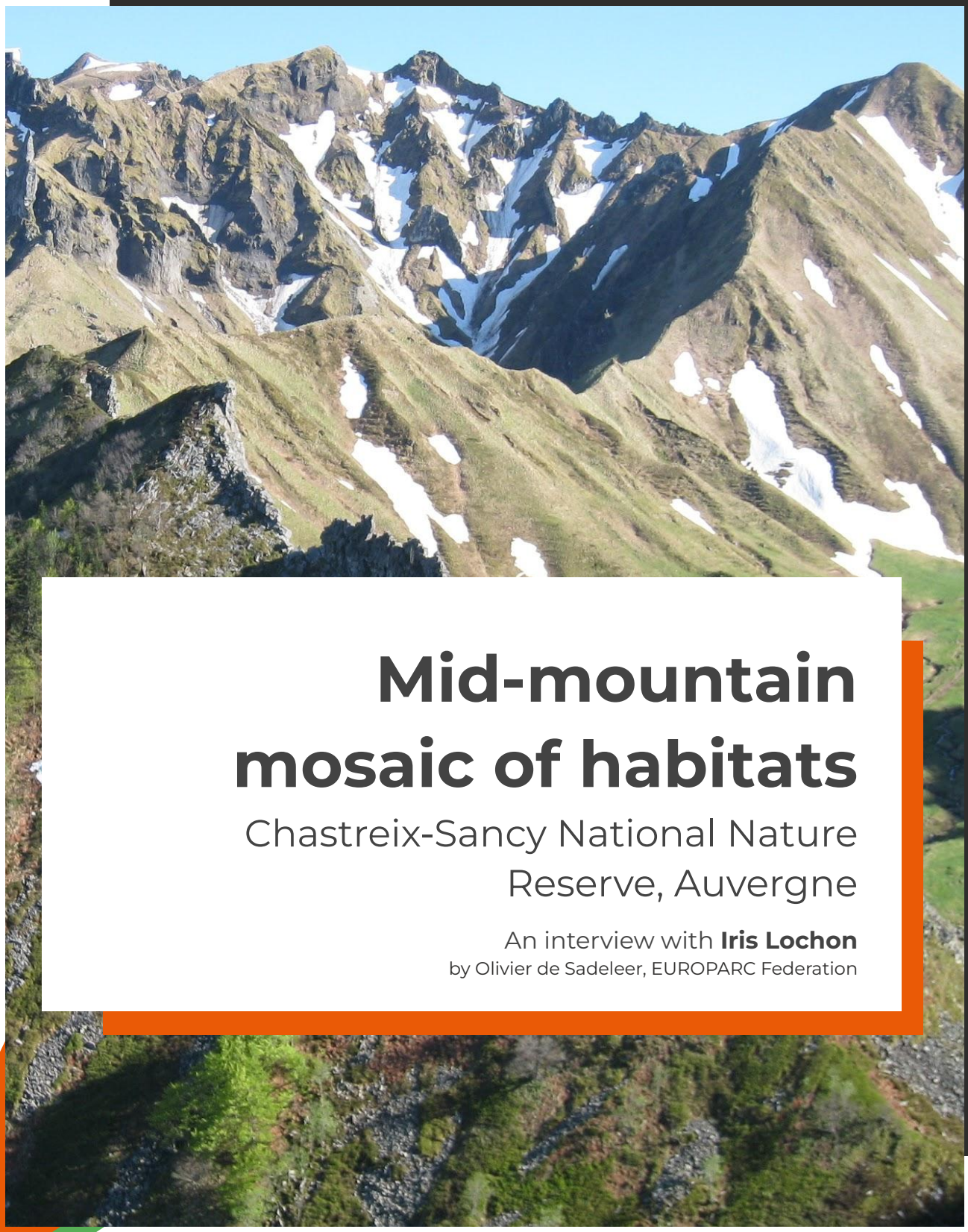
LIFE NATUR' ADAPT

Adapting to climate change in Protected Areas



Mid-mountain mosaic of habitats

Chastreix-Sancy National Nature Reserve, Auvergne

An interview with **Iris Lochon**
by Olivier de Sadeleer, EUROPARC Federation

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The alpine landscape of the Chastreix NNR

Chastreix Sancy, a mosaic of habitats and land uses

Chastreix-Sancy is a reserve covering 1,895 hectares. It is a bio-geological island, home to endemic species, between the Alps and the Pyrenees. It hosts a wide variety of habitats, including peat bogs, forests, grasslands and a sub-alpine level. The tension between the towns and countryside is increasingly tangible in the area.

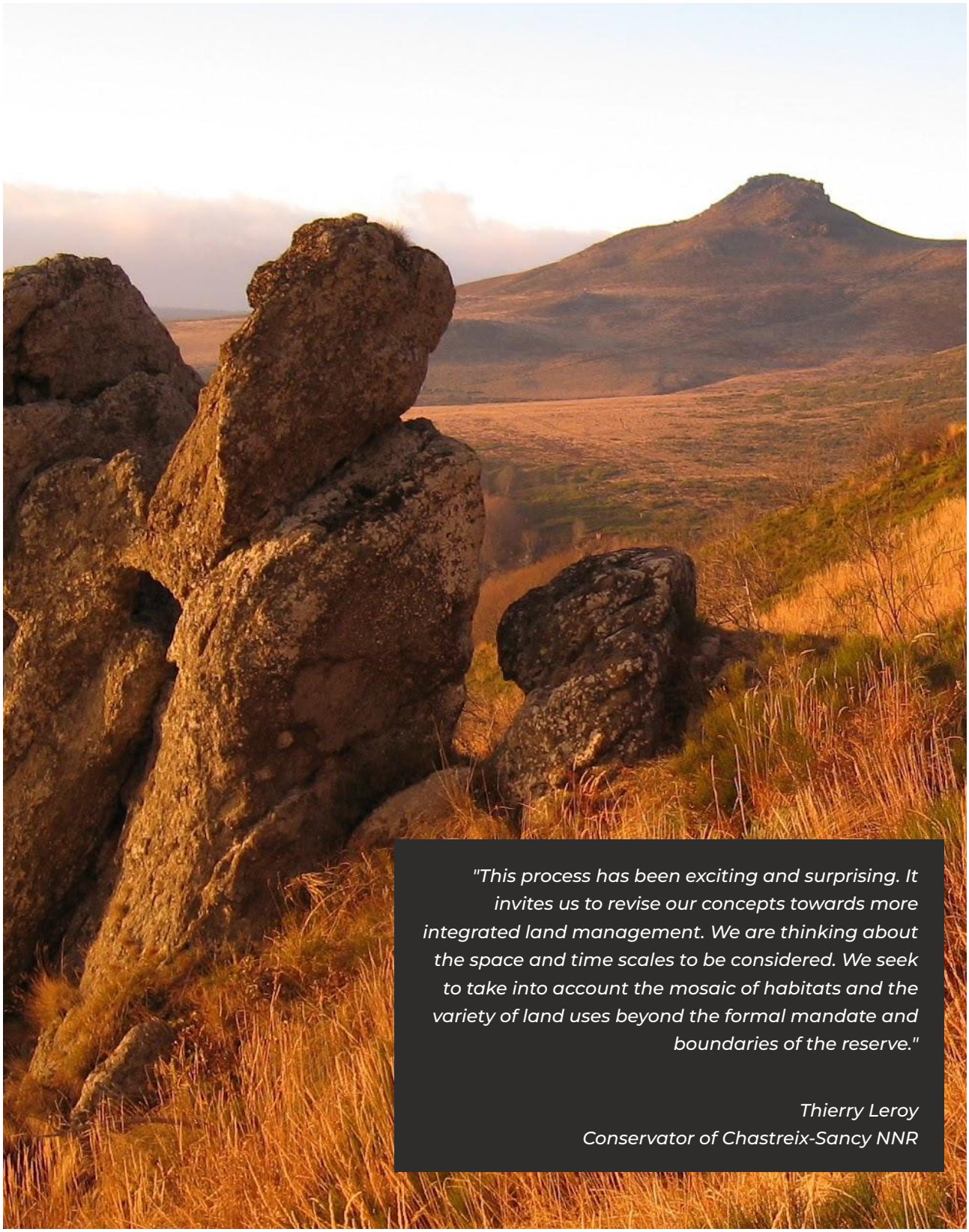
The Chastreix-Sancy National Nature Reserve (NNR) is located on the southern face of the Sancy mountain range. It is adjacent to the Vallée de Chaudefour NNR on the other side and the ski resorts of Super Besse and Mont-Dore. It covers an altitudinal gradient of almost 700 metres, between 1,200 and 1,885 metres. It was created in 2007 to protect fauna and flora (Apollon, Jasione, Biscutelle, etc.) as well as volcanic geology, *i.e.* two caldera collapses and the Mont-Dore volcano. The State has entrusted the management of the reserve to the mixed syndicate of the Volcans d'Auvergne Regional Natural Park.

The Sancy summit is the highest point of the Massif Central and the water reserve of the region. It is located at the head of the Dordogne and Loire watersheds, not far from the Clermont-Ferrand agglomeration (approx. 300,000 inhabitants). The massif faces numerous anthropic pressures. Tourist activities and nature sports have a significant presence in the area and in the reserve. There are three ski resorts adjacent to the reserve. In addition to tourism, there is sheep and cattle grazing in summer pastures and hay production.

Iris Lochon, tell us a little about yourself

I am a project manager in the Volcans d'Auvergne Regional Nature Park team. I am 28 years old and I have always lived in the mountains. I studied agronomy and ecology. I did a PhD at the Institut National de la Recherche Agronomique (INRA) on the effects of liming on grassland ecosystems and on greenhouse gas emissions in mountains. Besides nature protection, I love road cycling. Recently, I have been discovering the pleasures of cyclo-cross: water, mud and cold.

Iris Lochon, Project Manager,
Volcans d'Auvergne Regional Nature Park



"This process has been exciting and surprising. It invites us to revise our concepts towards more integrated land management. We are thinking about the space and time scales to be considered. We seek to take into account the mosaic of habitats and the variety of land uses beyond the formal mandate and boundaries of the reserve."

Thierry Leroy
Conservator of Chastreix-Sancy NNR

Autumn atmosphere on Roc de Courlande

Towards a warmer future and drier soils

Projections confirm the trends recorded over the last 70 years in the Monts Dore. And the phenomenon is accelerating. Temperatures are rising, while precipitation is remaining stable. A high level of evapotranspiration is expected in the summer, resulting in drier soils. Snow cover remains irregular, and there is too little data on the evolution of winds.

How will the climate change?

This part of the analysis was really interesting. The Mont-Dore ski resort has been recording temperatures, precipitation and snowfall since 1950. So we know what has happened over the last 70 years. A study by Frédéric Serre shows that temperatures are rising and that the phenomenon is accelerating. If we compare the periods 1950-1980 and 1980-2010, we see an increase in the average annual temperature of 0.9°C. However, if we compare the periods 1960-1990 and 1990-2019, we see an increase of 1.2°C. The increase is slightly faster in spring, summer and at higher altitudes. This phenomenon is particularly structuring. There is less snow stored and the snowpack is not as good, because there are frequent periods of thaw. The average annual precipitation volume is stable. On the other hand, summer evapotranspiration is higher and the soil dries out. There is also a feeling that the precipitation patterns vary a little. It seems that it rains less in summer and more in autumn, but the figures are not clear. Although we don't have snowfall data for different altitudes, we know that it has always been irregular from year to year. There will still be good years and bad years.

For the projections, all the scenarios show the same situation in 2050. It is when we look ahead to 2100 that the scenarios diverge sharply, depending on society's capacity to reduce greenhouse gas emissions.

Temperature change projections are consistent with what we are already seeing. The increase in average temperatures is expected to accelerate. This will be particularly the case in summer and spring, less so in winter and hardly at all in autumn. In terms of precipitation, little change in precipitation patterns is expected, except in the extreme and long-term scenario. No major increase in extreme weather events is expected either. On the other hand, recent events show that it is probably in managers' interest to monitor and take greater account of natural soil erosion. Wind is a structuring factor, because it contributes to the drying out of soils. Still, we have little data. At the Sancy summit, winds of 250 km/h are occasionally recorded. At lower altitudes, we see instantaneous frost events. It's very beautiful, but the recording equipment cannot withstand these almost Arctic conditions. The inhabitants have the impression that winds are getting stronger.

Local climate variability is important in the mountains.

In the heart of the Sancy mountain range, the average annual rainfall is between 1,800 and 2,200 mm. Ten kilometres away, as the crow flies, the figure is 700 mm. When using projection models, the resolution, the size of the pixels used, strongly influences the results. It is up to each manager to resolve this important methodological issue locally.

High vulnerability and increasing pressure

Projections foresee higher temperatures on average and the drying of soils. Under these conditions, subalpine species are very vulnerable. Existing problems are likely to be exacerbated. Tensions related to access to water and grass resources and to recreational use of the mountain area are likely to increase and affect the natural environment.

Is the Chastreix-Sancy reserve vulnerable?

In a context of increasing temperatures and the drying of the soil, particularly in the warm seasons, we assess the vulnerability of the reserve, the habitats and the diversity of species it protects today, as fairly high. Subalpine species are sensitive to warming and droughts, and their capacity to adapt is low. The other environments are less vulnerable, but are likely to suffer as a result of an increase in pressures related to the adaptation and changes in agricultural and tourism practices.

High vulnerability of subalpine species

The subalpine species are rare heritage species established on ridges (>1,500 m) and are part of the reserve's responsibilities. Today, they are already very sensitive to erosion from trampling by visitors. Our analysis indicates that they are very vulnerable to climate change. By 2050, it is indeed likely that we will see the disappearance of these species, because they are dependent on cold and snowy conditions. Their capacity to adapt appears to be low. Their migration to a colder altitude is impossible because they are located on the summits. We don't know how well they will hold up under these new conditions.

Tense relationship over access to surface water and grazing pastures

Soils are drying up. Water and grass resources should logically decrease. Vegetation, wildlife and livestock need more water. The farmers active in and around the reserve are highly vulnerable in this drying up context. However, they feel that they can adapt their practices by changing the location of their summer pastures, increasing the duration or decreasing the load. We are already seeing farmers taking their herds down in the valley later because there is not enough water and grass there. These adaptations will potentially affect the reserve. The reserve is seeking to reduce grazing surfaces to develop no-go areas. For example, peatlands are being exclosed. We therefore assess its vulnerability as medium in this respect. The reserve is at the heart of a rural community, and its relationship with farmers is important.

As conflicts are likely to increase, we also assessed the vulnerability of **our creation decree** to see if it would be strong enough to protect the reserve against increasing pressure from grass and water demand. So far, it is strong enough, but this rigidity could also hinder the introduction of new positive agricultural practices.

Increased pressure from tourism

Issues related to pressure from tourism and the development of nature sports (hiking, trail running, electric bikes, downhill cycling, skiing, snowshoeing, etc.) are already present in the reserve and are likely to increase. Through our analysis, we have been able to formalise our intuition. We are witnessing a democratisation of mountain sports and leisure activities, and consequently an increase in the number of people doing them. The expected climate changes will reinforce this phenomenon by lengthening the season. This can be particularly problematic because we know that in autumn and winter, when soils are wet, they are even more susceptible to erosion. At the same time, people's desire for nature or the outdoors is also increasing. The period of confinement linked to the Covid-19 pandemic has very clearly highlighted this phenomenon.

It is important to clarify this point. We note that tourist practices are contrasted and heterogeneous. More and more visitors are interested in ecology and nature conservation. They are generally looking for calm, and wonder at the beauty of the "wilderness". Others tend to consume the mountains as a theme park or a backdrop for doing sports.

We have also found out that the ski economy is very vulnerable. The adaptation of this sector is particularly complicated because snow forecasts are pessimistic. Snowfall has always been erratic and the economic balance of the region's resorts is based on the fact that one good year of snow can compensate for three bad ones. This, combined with the scale of investment by private and public players, makes the transition to other models difficult.

Tourism is likely to increase with climate change © RNNCS-PNRVA

Integrating, communicating and accepting

In Chastreix-Sancy, the projections call for us to accept the disappearance of subalpine species, and to develop integrated management for habitats' species and land uses. To improve the robustness of ecosystems, our management will be adapted to support the ecological continuity and the mosaic of landscapes, while encouraging dialogue with stakeholders in the area.

The Natur'Adapt approach is the starting point for managing the reserve in light of climate change. Based on climate projections and the vulnerability assessment, we have defined the principles of adaptation and reviewed or affirmed various aspects of our conservation philosophy. For us, the adaptation plan must be fully integrated into the management plan at different levels. It is within this framework that actions will be detailed.

What are the pillars of your adaptation process?

To sum up, our adaptation approach will be based on four pillars:

Towards a holistic management of habitats and species

Our thinking on climate change has led us to step back and consider integrated or holistic management of habitats and species. Our current planning method tends to compartmentalise issues. Within this framework, it is difficult to think transversally when the biotopes are varied and related and climate change is all-encompassing. In the future, we want our thinking to encompass multiple criteria, taking into account vulnerability, adaptability, connectivity and functionality.

We believe it is a good idea to promote better ecological continuity at Regional Nature Park level and to work on the "Green and Blue Infrastructure". In cooperation with the scientific council, we are thinking about how to take the mosaic of habitats into account beyond our formal conservation objectives. We are trying to identify the best scale to consider. In concrete terms, we are working to support the quality of abiotic factors and to reduce non-climatic pressures. We also believe it is a good idea to promote free evolution and islands of senescence, to conserve ungrazed open environments and to promote trees in open environments at low altitudes by allowing the regeneration of copses in agricultural grazing areas. We are also thinking about enhancing the value of edges and transition areas from one environment to another (ecotones). It is a question of nuance.

Dialogue as a tool for integration

In order to integrate management and land uses, it seems crucial to take the needs of each party into account, and to define balanced action plans for the common interest. It will be essential to continue the dialogue with stakeholders, in particular farmers and tourism players, to encourage the development of positive practices.

In order to initiate a global reflection throughout the territory, we plan to invest in community outreach to work on climate change and resource uses. We plan to organise meetings and workshops to share our discoveries with the Directions Régionales de l'Environnement, de l'Aménagement et du Logement (DREAL), the Communauté de communes, the Office du Tourisme, ski resorts, hiking guides, etc.

Accepting change

Unfortunately, one of the expected effects of climate change is the disappearance of subalpine species and habitats. We will have to accept this whether we like it or not. We can work to slow down the process by preserving the best conditions on the ridge for as long as possible. But in the long term, projections tell us that the conditions for the existence of such an environment will no longer exist at this altitude. As the species are already living in the highest area of the region, they will not be able to migrate upwards or northwards.

Improving knowledge

In carrying out this study, we identified knowledge gaps such as the responses of species and habitats to a changing climate. We have decided to extend the research work with the Conservatoire Botanique National du Massif Central to analyse late snow patches, the associated vegetation and the microclimate. Among other things, we will seek to monitor snow cover using satellite images.

How will you measure the effects of these adaptation measures?

Monitoring is part of the reserve's mission. It will be integrated into the management plan, with a particular focus on climate data.

Who did you work with on carrying out this adaptation process?

I worked a lot with Thierry Leroy, who is the conservator, the reserve team and the LIFE Natur'Adapt team. In parallel, we created a steering committee with representatives from the Volcanoes Regional Park, the DREAL and four scientists, including a climatologist. From the outset, it was important to develop a collaborative approach and to work with local stakeholders. We presented our results and collaborated with the technicians in charge of tourism and water resources within the Park. We organised conferences and workshops with the inhabitants. We conducted interviews with farmers and two online questionnaires, one on outdoor activities and the other for researchers and naturalists. The idea was to understand perceptions, prepare the dialogue and create a common culture.

The Auvergne biscutelle, a rare subalpine plant threatened with extinction by climate change © RNNCS-PNRVA)

A little advice for the road?

I think it is important to be well accompanied at each stage, *i.e.* the climate analysis, the vulnerability assessment, etc. As project leaders or managers, we do not have all the answers. As policy officers or managers, we are not the ones to provide the answers. In my experience, our role is to stimulate reflection, to bring together the knowledge, insights and perceptions of various stakeholders. Climate change will affect everyone in the community. We need to anticipate future conflicts with our neighbours and to identify what brings us together. In this sense, climate change offers an opportunity to change the relationship between the reserve and its neighbours and to foster dialogue and cooperation. In a context of climate change, protected natural areas have more to offer than ever.

Despite climate change, winters remain harsh © RNNCS-PNRVA

Further reading:

1. [English] Summary - Vulnerability assessment and adaptation plan
2. [French] Website of Parc Naturel Régional des Volcans and of Chastreix-Sancy NNR >>
3. [French] Facebook page of Chastreix Sancy NNR >>
4. [French] Vulnerability Assessment Chastreix Sancy NNR. LOCHON I., 2021. LIFE Natur'Adapt – Report PNRVA. 130p >>
5. [French] Adaptation plan of Chastreix Sancy NNR. LOCHON I., 2021. LIFE Natur'Adapt – Report PNRVA. 31p. >>

LIFE NATUR'ADAPT

A collective learning process on climate change adaptation in Protected Areas.

In Europe, Réserves Naturelles de France, EUROPARC and eight partners have come together in this LIFE Climate Action project to transform this challenge into an opportunity to innovate. Natur'Adapt aims at triggering a transition towards the adaptive management of protected areas while laying the foundations of a dynamic collective learning process.

www.naturadapt.com

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