



Learning from the field

Meet managers with experience in planning for climate change adaptation

Château de Valmy, 6 Octobre 2022



#01

Co-benefits for coastal protection and biodiversity restoration in dune ecosystems

The Netherlands and water are inseparably connected. Over time we have learned to build and live below sea level, to protect ourselves from river flooding and to use the abundance of fresh water for a lot of different functions. However due to climate change our relationship with water faces new challenges. Sea level rise threatens our coastal defense, an increase in average precipitation results in more frequent flooding and prolonged drought and lower river discharges during summer put our fresh water supply under pressure.

PWN is a nature conservation and drinking water company in the northwestern part of the Netherlands. Due to sea level rise and more intense rainfall we experience elevated ground water levels in the dune areas that we manage and in the adjacent rural settlements. This causes flooding of paths and campsites and a higher discharge of valuable fresh water. Fresh water that we highly need during hot and dry summers and that becomes more scarce in a large part of the Netherlands.

For over 100 years the dunes help us in the natural filtering of fresh water and they also play an important role in the coastal defense of a significant part of the province.



Noordhollandse Duinen - The Netherlands
#coastaldefence #dynamicmanagement

In order to make sure that our future is climate resilient, we believe that we have to continue to make use of the potential of nature. Three inspiring examples show how restoring, developing and embracing nature can help us to protect ourselves against sea level rise, flooding and fresh water shortage.

- 1. Dynamic dunes**
By restoring the natural process of blowing sand, the dunes are able to grow and adapt to rising sea levels in a natural way.
- 2. Development of new nature areas that prevent flooding in adjacent rural settlements**
By developing new wet natural areas at the inner dunes, nature can function as a sponge to absorb excessive rainfall.
- 3. Combining drinking water storage with nature development in lake IJsselmeer**
The water quality of lake IJsselmeer decreases due to lower fresh water discharge during summer. If we can combine the construction of deep water reservoirs with the development of a large wetland, both the drinking water supply and the ecology in the lake profit.



Myrthe Fonck, sr. Adviseur Natuur
Puur Natuur en Water (PWN) & Member of the EUROPARC Task Force on Climate Change

#02

Climate change adaptation in Mediterranean mountain landscapes

The Sierra de Santo Domingo is located in the Aragonese pre-Pyrenees, in the province of Huesca. The geomorphology, its position between the middle supra-Mediterranean and the upper mesomediterranean regions, together with the ancestral use of the territory, determine the landscape. In the highest area there are forests of *Quercus faginea* and some relict beech forests, along with pine forests of *Pinus nigra* and *P. sylvestris*. The lower zone is dominated by *Quercus ilex* and forests of *Pinus halepensis*.

Planning: The Sierra de Santo Domingo Protected Landscape was declared in 2015 by the Government of Aragon, at the proposal of the municipalities as an opportunity to preserve its natural values and boost the local economy. The management plan is currently in the drafting phase.

Climate trends and scenarios: The time series of data from the closest meteorological stations shows an increase in the average temperature since the 1970s, especially the minimum. Precipitation shows a less clear trend, with a slight decrease in annual precipitation. The regionalised climate models forecast an increase in the average annual temperature of around 2°C by 2050 in the least unfavourable scenario.



Sierra de Santo Domingo Protected Landscape - Spain

#culturallandscape #mediterranean

Impacts & vulnerability: The habitats most vulnerable will be those most closely linked to cool and humid conditions, such as beech forests and Scotts pine forests, followed by *Quercus faginea* and *Pinus nigra* forests. For species, the greatest vulnerability is attributed to those most directly linked to the presence of water (amphibians, autochthonous crayfish), along with some species of butterflies and threatened flora, since the smallness of their populations greatly limits their ability response to climate change. The new climate scenario, acting synergistically with the process of rural abandonment, is identified as an aggravating factor in fire risk.

Adaptation measures: The possible measures to improve the adaptation capacity of the most vulnerable conservation objects were obtained from the consultation with experts, and from a participation process with local agents. The proposed measures can be grouped into:

1. Increase the resilience of forests favouring greater heterogeneity. Reduce the density and continuity of pine plantations. Strict protection of mature or singular beech stands.
2. Improvement of the habitat of threatened species, such as water points, identification of refuge areas and corridors
3. Improved knowledge about the effects of climate change and the adaptive capacity of ecosystems and species
4. Development of a program for monitoring and evaluating the effectiveness of the adaptation actions carried out.



Jose Antonio Atauri Mezquida, Coordinator of LIFE RedBosques_Clima
Technical Office EUROPARC-Spain & Member of the EUROPARC Task Force on Climate Change

#03

How is climate change adaptation supporting community engagement?

The Portofino Marine Protected Area is a national Marine Protected Area, established in 1999. It is the third smallest in Italy with 346 hectares.

The main habitats of the Portofino Marine Protected Area are coralligenous, Posidonia meadows, rocky seabeds and it also happens that pelagic species come very close to the coast and can therefore be observed. The main economic and socio-economic activities we have in our area are diving, fishing and yachting, which naturally create an impact on habitats.

In October 2018, there was a very violent sea storm that caused a lot of damage and changed people's perception of climate change.

In the last 10 years, the temperature of the top 20 metres of water in the Ligurian Sea has risen by 1°C and is expected to rise by another 3°C by 2100, leading to conditions similar to those we have now in Greece and Lebanon.

The combined effects of sea storms together with rising temperatures can exacerbate mass mortalities. In addition, the rise in temperature also leads to the arrival of new species from the southern Mediterranean, the Red Sea and the Atlantic, which can cause damage to the ecosystem.



Area Marina Protetta de Portofino, Italy

#marine #community #cooperation

Our main objective now is to reduce the direct impact on habitats and thus restore their natural adaptive capacity. A healthy, unimpacted habitat is more resilient and less sensitive to the effects of climate change. This also applies to individual species. There is evidence that a Posidonia meadow impacted by anchorages is more sensitive to events such as extreme storm surges than a completely healthy one.

Practically, we are planning intensive fieldwork and monitoring and then through the active involvement of local communities. Then also through training and awareness-raising programmes for divers and fishermen. Over the years, mutual trust has been built up. Through concrete support or through conflict resolution with other users. Fishermen help us concretely in monitoring pelagic species and they collaborate to try to reduce their own impact on the seabed. With divers, there is a productive collaboration for reporting on the effects or the removal of lost fishing gear.



Dott. Lorenzo Merotto, Scientific officer, Consorzio di gestione dell'Area Marina Protetta del Promontorio de Portofino & Member of the EUROPARC Task Force on Climate Change

#04

Integrating climate action & biodiversity conservation at a regional level

The Basque Country is a country rich in biodiversity, despite its small size. The Basque Country is a hot spot for biodiversity in Europe. It hosts hundreds of species and 35% of the habitats of interest present at European level. There are 3 main types of biomes, Atlantic coastal habitats, and Mediterranean habitats and Mountain habitats.

Regional climate scenarios show that temperature will rise between +1.5 and +5°C and precipitation will decrease. Especially in frequency and numbers. It is predicted that sea level may rise between +51 cm and 100 cm in different coastal regions. In addition, extreme weather events will occur more frequently and their effects will be stronger compared to today.

Due to the rapid transformation that must take place now, the strategic priorities of the Basque Government are to make effective the objectives that the European Commission is setting. In this sense, not only does an immediate transformation have to take place, but adaptive planning must be carried out.



Euskadi / Pais Vasco, Spain

#regional #governance #co-benefits

The Basque Government is seriously trying to include the biodiversity axis as an important issue in all policies. It is important from the point of view of the territory's resilience to climate change. We know that less stressed systems are more capable of resisting or responding to the impacts that climate change is going to cause us. For the Natural Heritage, what we do is, at a sectoral level, we include all the necessary measures to promote the healthiest possible biodiversity. In 2021, the Basque Government published its new plan for the Energy Transition and Climate Change, which focused on promoting the resilience of Natura 2000 and its contribution to climate mitigation processes. The Basque Government is also promoting the use of biodiversity outside natural protected areas as natural solutions to promote climate resilience and adaptation, especially in cities and towns.



Ainhize Butrón Mota, Climate Action Department

Ihobe. The Basque Environmental Agency & Member of the EUROPARC Task Force on Climate Change

#05

Towards adaptive coastal management. Key learnings from LIFEAdapto

On 10 pilot sites owned by the Conservatoire du littoral, adapto experiments adaptive coastal management. It helps demonstrate the ecological and economic benefit of improving the resilience of coastal areas to protect human activities by opening more space for the coastline.

These 10 experimental sites, nine in metropolitan France and one in French Guiana, are typical of five different coastal environments: low and sandy Atlantic coasts, polderised low Atlantic coasts, Mediterranean barrier beaches, Mediterranean salt marshes, mangroves.

On each of the 10 sites, the adapto project helps local authorities, managers and users to build their territory project. To this purpose, adapto offers them an interdisciplinary approach (economic, sociological, biodiversity...).



10 Protected Areas - France

#coastal #adaptivemanagement #LIFE

The results of the project are:

1. a better understanding of the dynamic nature of the coastline and the need to adapt to it rather than to hold the line.
2. a methodological toolbox allowing to initiate, support and assess nature-based adaptation solutions for coastal areas (vulnerability assessment, environmental assessment, scenario implementation, awareness raising).
3. a network of ten sites where an effective land-sea interface in relation to adaptation to climate change has been carried out successfully (and the story on how it was made possible, even if sometimes it was also made difficult)



Adrien Privat, Land-Sea Interface officer
Conservatoire du littoral (French coastal protection agency)

#06

A forest in free evolution. Forêt de la Massane National Nature Reserve.

The “Forêt de la Massane” National Nature Reserve (NNR) covers 336 hectares, between 600 and 1,150 metres high. It is located in the Eastern part of Pyrenees, on the Albera massif, France. There has been no logging on site for more than 140 years and the Massane is considered as an old growth forest. It is a UNESCO component of the transnational property covering 18 countries “Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe”. The only human activities in the NNR used to consist in extensive cow grazing during summer and still in tourism.

Currently, La Massane is characterized by a meso Mediterranean climate consisting in intense summer heat and/or drought episodes, and irregular yearly precipitations, mostly in fall. The Massane is a southern edge beech population and faces conditions at the margin of the climatic envelope of the species. It is thus considered as an outpost of climate change.



Forêt de la Massane National Nature Reserve - France
#beechforest #freeevolution

For the last 20 years, beech forest dynamics (yearly dieback, and mortality) has been exhaustively monitored on 30 hectares in correlation with the climate obtained from the onsite meteorological station. We used climate projections as a basis for our prospective work. By 2100: the average annual temperature is likely to increase by 5°C; the average annual rainfall should decrease by 100 to 200 mm. In addition, a sharp increase in extreme weather events is expected. Changing climate conditions should reinforce the existing fragility of the ecosystems, and reduce their resilience.

The managing plan of the reserve consists in the free evolution of the forest, i.e. natural selection operates and we bet on naturality for a better resilience of this complex old growth forest ecosystem. In order to enhance beech regeneration success, cows are now excluded from the forest, and maintained only on the alpine grasslands. Hiking pressures are carefully controlled in collaboration with the City council in order to reduce erosion and quietness disruption risks.



Elodie Magnanou, Ingénieur de Recherche CNRS 1ère classe
Observatoire Océanologique de Banyuls sur Mer, Laboratoire Arago



#07 Low Carbon Lake District

The English Lake District National Park is a self-contained mountain area whose narrow, radiating glaciated valleys, steep fells and slender lakes exhibit an extraordinary beauty and harmony. This landscape reflects an outstanding fusion between a distinctive communal farming system that has persisted for at least a millennium with improvements of 18 and 19 Century villas, picturesque planting and gardens. The landscape manifests the success of the conservation movement based on the idea of landscape as a human response to our environment. Its landscape diversity is the key to its beauty and significance; including coast, lakes, distinctive farmland, fell, woodland, industrial activity and settlement.

With climate change, it is expected to have more unpredictable and unseasonable weather patterns as well as significantly hotter, drier summers, and warmer, wetter winters. Environmental responses triggered by weather patterns will impact upon what is special in the National Park and what it provides to society.

Since 2005 the Lake District has experienced several storm and flooding events creating significant damage.



Lake District National Park, United Kingdom

#mitigation #carbonbudget #netzero

Our assessment shows that climate change will impact the special qualities and outstanding universal value of the Lake District, and our experiences of living, working and visiting the area:

- Sea level will rise affecting our coastal areas.
- Many of our current species, some of which are iconic and already rare on a UK scale, will not survive in the National Park as their habitats become inhospitable to them. Agriculture in the Lake District will change. Cultural heritage and historic environment will be under threat from changing weather patterns.

Adaptation measures aim at reducing the contributions from farming and land management make to greenhouse gas emissions net zero as well as support farmers and land managers on adaptation by:

- Supporting farm carbon budget assessments
- Co-creating and delivering farming led carbon reduction or carbon storage
- Co-creating and supporting farmers and land managers make adaptation part of their plans and deliver schemes for public benefit reducing risks from climate change



Tim Duckmanton, Team Leader Environment Strategy
Lake District National Park Authority & Chair of Europarc Atlantic Isles Section

#08

How to adapt an ancient Atlantic beech forest to climate change?

The Sonian Forest in its entirety covers an area of more than 4400 hectares. It is located in Brussels at the border of the three regions of Belgium. It is de facto a peri-urban forest. The Sonian Forest is largely dominated by beech trees, with a cover of about 65%. Then there are oak-alder forest habitats, about 15%. And then there are habitats that are related to wetlands, tall herb fringe communities and water bodies. The main pressures is the urban context. It is a peri-urban forest with 1 200 000 inhabitants living next door. So obviously, there is a pressure from recreational uses, real estate, and mobility as there are two motorways that cut the Sonian Forest into four pieces.

Climate change is very clearly observed in the Sonian Forest, especially with regard to the beech tree. The thinning of the tops, the fall of branches and the descent of the tops are very recurrent phenomena. A recent study shows that by 2100, an annual temperature to rise by +2.5 degrees can be expected if active measures to reduce climate change are taken. The intensity of heat waves is already high today. The scenarios for 2100 predict a decrease in precipitation of around 4% per year. The most important changes is in the regime of precipitation throughout the year. During the summer months, we will have much less rainfall, in the order of -15 to -20%.



Sonian Forest, Belgium

#forest #periurban #heterogeneity

The Sonian Forest is vulnerable due to the fact that it is mainly composed of a single species, the beech tree. The beech tree is very sensitive

to heat waves and drought. It is a species that appreciates a regular supply of water. As precipitation decreases, the water table tends to decrease too, the beech tree is not adapted anymore. Wetlands also face difficulties as water levels tend to drop. Water bodies sometimes dry completely. Consequences on species such as amphibians, which are dependent on wetness are easy to imagine.

So, in certain places, we want to gradually transform the woodland into something different than a beech forest. The aim is to reduce the proportion of beech trees by 10% by 2043 in favour of other species to create a more heterogeneous forest.

It will done by avoiding clear-cutting, paying a lot of attention to forest microclimate and as much as possible with natural rejuvenation and also by bringing in species that should be more resistant to the effects of climate change



Etienne Aulotte, Head of department nature and agriculture development and Member of the EUROPARC Task Force on Climate Change & **Frederic Vaes**, Head of the Forest Department - Brussels Environment

#09

Climate change adaptation in Gorges de Daluis Regional Nature Reserve

The Gorges de Daluis Regional Nature Reserve is the first official nature reserve in Alpes-Maritimes. It covers more than 1,000 hectares of territory of the villages of Guillaumes and Daluis. The Gorges de Daluis were formed in the red pelite of the Permian period. They offer an unusual and spectacular canyon-like landscape and have earned the nickname of « Colorado of Nice ». The gorges boast sheer drops of up to 300 metres above the River Var. Their narrowness transforms the river into a gushing torrent and the current is fierce at times. In the Gorges de Daluis, species that are typically alpine, like the chamois, the black grouse or the royal eagle, mingle with Mediterranean species such as the ocellated lizard and the short-toed snake-eagle. This unusual coexistence is also shared with several endemic species, including the symbols of the Reserve, two snails (*solatopupa cianensis* and *macularia niciensis saintivesi*), as well as a small amphibian, the French cave salamander (*speleomantes strinatii*)



Gorges de Daluis RNR- France

#canyon #outdoorssports #mediteranean

Using the LIFE Natur'Adapt methodology, the Reserve's position on climate change was clarified. The reserve has decided to keep its options open. We will resist, let go or accompany change depending on available management resources and the feature concerned.

Altogether, 46 measures have been defined based on the vulnerability assessment. They can be clustered into the following strategic actions: extending the Reserve's perimeter to ensure ecological coherence, adopting a scientific strategy geared towards climate change, implementing management actions aimed at experimentation and supporting stakeholders in making changes, raising public awareness by mobilising the Reserve's actions and the data collected, and adapting the internal organisation.



Iris Silveira, Animatrice Natura 2000 site des 4 cantons et chargée de Mission LIFE Natur'Adapt, Communauté de communes Alpes d'Azur

#10

La Brière: An anthropised wetland facing climate change

This Natura2000 site of 20,000ha has an international importance for the wintering and migration of avifauna. This managed retro-littoral wetland offers a mosaic of habitats (salt meadows, oligotrophic habitats, fens, bogs...) favourable to a rich biological diversity. These landscapes have been shaped by man for decades leading to a strong cultural appropriation of the site. Human activities present are agriculture (cattle breeding), leisure (hunting, fishing, hiking, cycling and horse riding in summer, kayaking) and tourism (traditional boat trip).

Concerning biodiversity conservation, the site is already subject to various pressures: peripheral urbanisation, proliferation of invasive exotic species (being at the gateway to an industrial port), overexploitation of resources, etc... The LIFE Natur'adapt helped us to envisage the future of the site by identifying major trends and questioning our management practices through a socio-ecosystemic approach.

Three main climatic indicators influencing the site have been identified: rising temperatures, changing rainfall patterns and rising sea levels. By modifying water flows and quality as well as habitats, climate change could have a strong impact on the species that depend on these environments. In brief, the main changes expected at the sites are: *Water quality and quantity; Migratory species are vulnerable; Fish fauna is vulnerable; Arrival of newcomers; Development of wooded marshes; Risk of CO2 Emissions; Human activities with strong adaptive capacity; Recomposition of the agricultural landscape*



Natura 2000 site « Grande Brière, marais de Donges et du Brive - France

#wetland #culturallandscape #N2000

The conservation objectives of the habitats and species may be redefined for a certain number of them. In this case, accompanying measures will be required when possible. Also, ecological continuity for the migration of local populations to more suitable areas must be integrated into the management of the site. At the same time, the reception of new species from the south is one of the new challenges that emerge in the light of climate change and which must therefore be included in the future management plan.

Climate change is likely to accentuate territorial conflicts. Social dimension is a fundamental aspect of the future management of the site. Result of a fragile compromise, this diagnosis questions hydraulic management. Acceptance of change by local actors seems to be a key issue: How can we work on perceptions to make people accept evolutions and avoid short-term technical solutions?

Regarding the Natura 2000 framework, this work questions the integration of climate issue into the management of the site: the monospecific vision and the past reference state freeze the protected area and do not allow the construction of a management plan based on the site's functionalities and its ecosystem services such as carbon sequestration.

In view of these findings and with a forthcoming revision of the management plan, we have proposed a strategy based on integrated and adaptive management as well as a toolbox of adaptation measures.



Elisa Tuillon, chargée d'adaptation au changement climatique
Parc naturel régional de Brière

#11

How is global warming affecting communities and park management?

Roughly 11% of Iceland is covered by glaciers that in recent decades have been retreating at an alarming rate.

In Southeast Iceland, glaciers are a major source for economic activity and employment. Without glaciers, local communities face many challenges. Rising temperature and changes in seasonal patterns bring unprecedented uncertainties and increase the risk for outdoor activities.

Besides, retreating glaciers are affecting the local geology increasing the risk of landslides, which are directly or indirectly threatening human settlements.



Hrafnhildur Ævarsdóttir, park manager
Vatnajökull National Park, Iceland



Vatnajökull National Park, Iceland

#glaciers #climaterisk #tourism

These vulnerabilities lead to difficult or unpopular decisions such as closing the access to glaciers or forbidding the development of a settlement or changes to current buildings.

As an adaptation measure, the National Park team has developed specific monitoring and risk assessment to inform decision making. Communication about the challenges posed by disappearing glaciers with communities and outdoor agencies can be very complex and even conflictual. It is nevertheless unavoidable and really questions the role of the national park and/or local authorities in these matters.

Community engagement programmes on the topic are being developed and the role of the national park as the south region will face further challenges in the future with continuous glacier retreat.

#12

Addressing climate change through habitat restoration

Back in 2011, the Forest of Bowland AONB Partnership published its first Climate Change Adaptation Plan, as part of a project initiated by Natural England, the national government agency responsible for nature conservation. The plan assesses the vulnerability of priority habitats, species and key ecosystem services and also suggests adaptation actions to improve the climate resilience of these.

6 steps

1. Identify landscapes character, ecosystem services and biodiversity
2. Identify assets that contribute to landscape character, ecosystem services and biodiversity
3. Assess the vulnerability of assets
4. Summarise the implications of vulnerability assessments for landscape character, ecosystem services and biodiversity
5. Identify possible adaptation options
6. Screen options for multiple benefits or negative side effects



Forest of Bowland Area of Outstanding Natural Beauty - United Kingdom

#landscapescale #blanketbogs #grassland #AONB

Guided by this plan over the last decade, the AONB Partnership has focused much of its habitat conservation efforts on conserving and restoring two habitats, characteristic of the Protected Area and which were identified as more vulnerable to the predicted impacts of climate change, namely: blanket bog and species-rich grasslands. It has also guided the development of a prioritisation strategy for management and maintenance of public access and visitor infrastructure (e.g. footpaths, bridleways and access land) within the area.

The session will offer the opportunity to explore how the climate change adaptation planning process was undertaken and how the AONB Partnership has applied the plan to guide its delivery of climate change adaptation and mitigation actions through habitat restoration and asset management.



Elliott Lorimer, Forest of Bowland AONB Partnership Manager
Forest of Bowland Area of Outstanding Natural Beauty (AONB)

#13

Climate change adaptation in Mas-d'Azil cave habitats in Parc Naturel Régional des Pyrénées Ariègeoises

The Mas-d'Azil cave is a prehistoric cave in the commune of Mas-d'Azil, in the centre of the French Pyrenees. This region is home to a phenomenal number of different cavernous contexts, including large volumes favourable to colonies of bats, which find their shelter in a context favourable to their prey, the invertebrates. The caves offer humans many cultural interests linked to history through archaeological remains but also the practice of sports and the study of underground environments as a whole via speleology.

Cave-dwelling species choose caves for the conditions they offer in terms of tranquillity or microclimate, and this is already changing rapidly. We can therefore expect the occupation of caves by animal species to change, either positively or negatively.



Mas d'Azil, Parc naturel régional Ariègeois - France

#cave #chiropterans

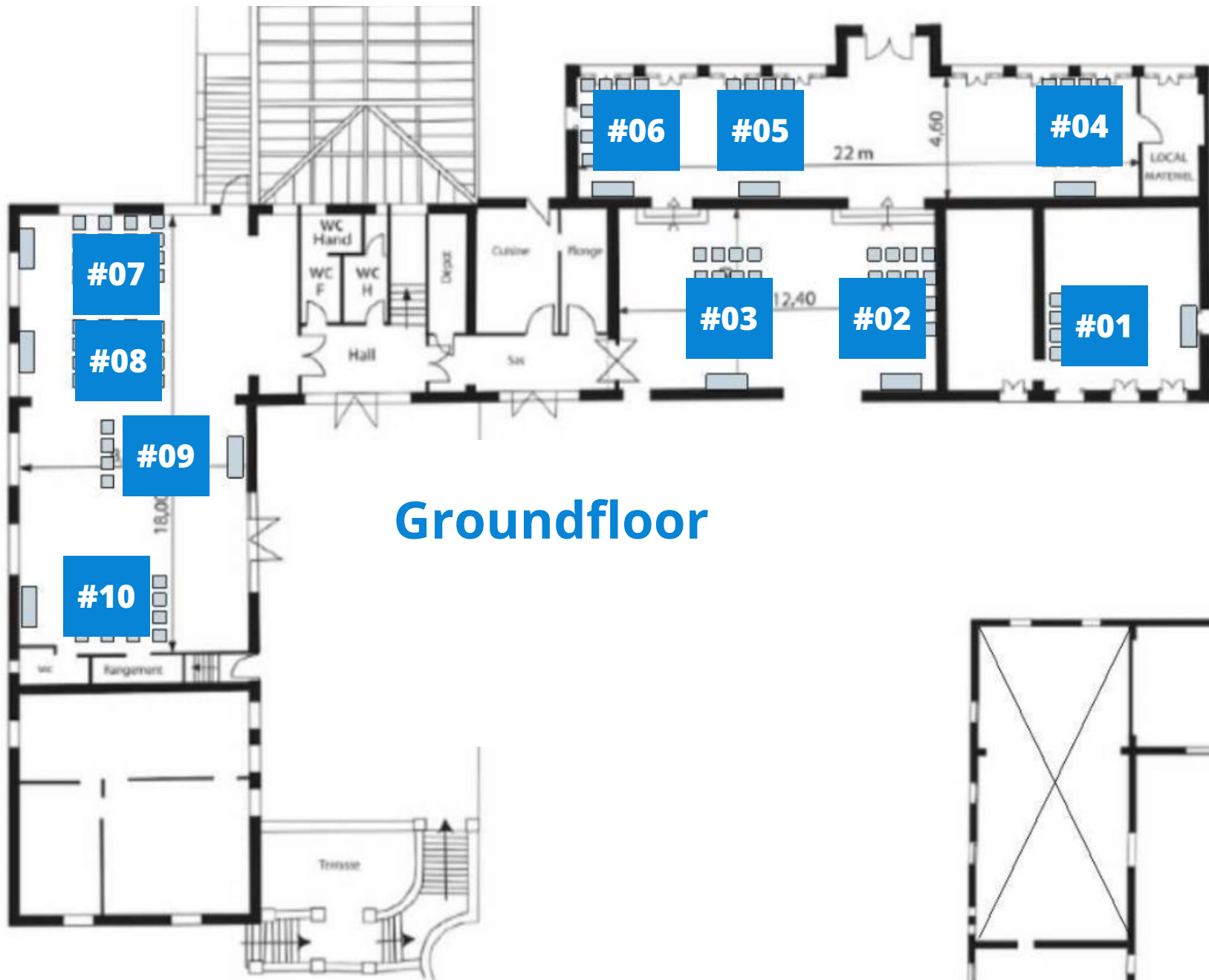
These microclimatic conditions are also crucial for the conservation of archaeological and cave heritage in particular. Drying out or a rise in temperature can modify the processes in place that have protected these remains for thousands of years.

Caves, however little studied, reveal the galloping advance of climate change better than any where else. Due to the small variations in climatic conditions within the cave, climate change can be observed more clearly than outside. The influence of climate change on temperature, humidity and CO2 concentrations can be observed.

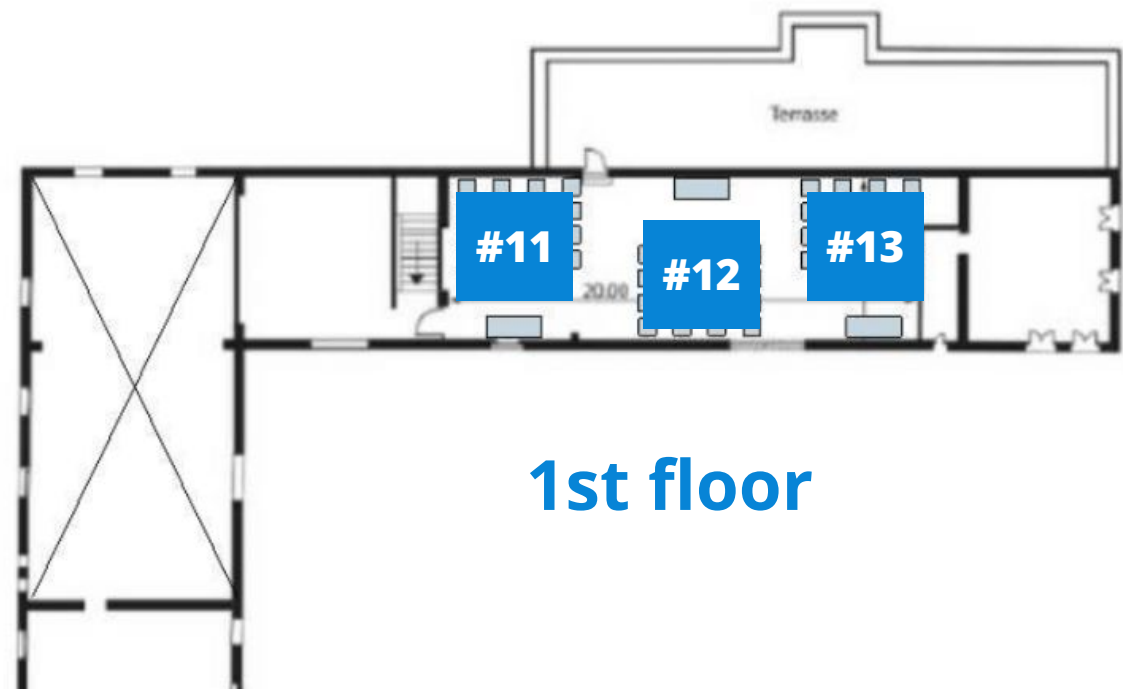
The main conclusion of our study highlights the vulnerability of the underground environments of Ariège, but also the opportunity that we have to learn more about them in the context of climate change.



Thomas Cuypers, Chargé de projets naturalistes,
ANA-Conservatoires d'Espaces Naturels Ariège



Groundfloor



1st floor



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5-7 October, Argelès-sur-Mer, France 

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