Life_eCO adapt5O

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no. 1
Water: the main challenge in adapting to climate change

Life_eCO adapt50

Life eCOadapt50

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no. 1

Water: the main challenge in adapting to climate change

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Presentation

It is our pleasure to introduce this inaugural edition of our annual magazine – available also in both Catalan and Spanish – which aims to foster collective reflection on shared adaptation challenges within emerging climate realities; disseminate activities driven by the Life eCOadapt50 project; spotlight replicable best practices for reducing territorial vulnerability and cultivating environments more resilient and prepared for climate change.

Life eCOadapt50, spearheaded by Barcelona Provincial Council's Climate Action & Energy Transition Department, unites 25 public and private partners. The initiative focuses on co-creating strategic climate adaptation measures for over 60% of Catalonia's territory, by prioritising four climate-vulnerable economic sectors: agro-livestock, forestry, fisheries and tourism. The project actively supports and drives local climate adaptation action across Catalonia's municipalities.

We have decided to dedicate the first issue of the magazine to the topic of water. The long-awaited spring rains in Catalonia have eased the shortage and reduced pressure on the territories, returning things to an apparent state of normality. However, according to leading studies and experts in the field, the drought experienced over the past three years is not an isolated event.

We must prepare ourselves for water scarcity and increasingly frequent and intense droughts. Now that the emergency has passed, therefore, it is a good time to reflect collectively, learn from our mistakes and good practices, and implement structural changes.

At regional level, we face the dual challenge of managing water resources more efficiently; enhancing water retention through nature-based solutions; implementing adaptation strategies to strengthen ecosystem resilience against water stress and reducing flood risks. Disruptions to hydrological cycles and rainfall patterns, coupled with crop damage, vanishing sensitive ecosystems and other visible territorial impacts, generate consequences requiring both mitigation efforts and inevitable strategic adaptation through coordinated, planned measures.

Evidence-based understanding consequently emerges as critical for developing holistic perspectives on these challenges and formulating actionable response strategies. This inaugural edition gratefully acknowledges contributions from: the Catalan Meteorological Service's Climatology Department for their analytical insights, Albet i Noya Winery (pioneers in Spain's organic viticulture sector) for their innovative practices, as well as project partners implementing replicable adaptation measures.
Let's co-creating climate adaptation!

Marc Serra Solé
Executive Chairman for Climate Action and Energy Transition
Barcelona Provincial Council

The Analysis

Marc Prohom i Duran
Head of Climatology
Catalan Meteorological Service (SMC) Government of Catalonia

“The longer we delay implementing effective adaptation policies, the closer we edge towards systemic collapse. Crucially, there can be no adaptation without mitigation.”

Climate change is a global phenomenon manifesting uniquely across different planetary regions. When assessing its impact on rainfall patterns within a specific territory, a broad spectrum of factors must be considered.

As established, the Mediterranean climate is characterised by pronounced spatial and temporal variability. Consequently, developing an accurate diagnosis of climate change impacts in our region requires an effective monitoring system. This equates to two interdependent elements: maintaining robust historical climate datasets while simultaneously implementing adequate real-time monitoring mechanisms for current conditions.

This climate data series database must possess the most extensive temporal coverage feasible, span sufficient geographical range to capture national climatic variability and, crucially, integrate high-quality, continuous and homogeneous records. Such a resource forms the essential basis for both rigorous climate monitoring and the robust validation of predictive models that accurately simulate observed patterns – the fundamental prerequisite for reliable future projections.

The Catalan Strategy for Climate Change Adaptation (2030 Horizon) reaffirms, as previously outlined in the Catalan Strategy for Climate Change Adaptation 2020 (ESCACC20), that Catalonia’s water cycle constitutes its most vulnerable system, with rainfall patterns facing severe disruption.

Climate change projections from the Meteorological Service of Catalonia (SMC) indicate a future trajectory of diminished precipitation levels. Notably, under high-emission scenarios (RCP 8.5 and SSP8.5), annual rainfall is projected to decrease by 20-25% by the late 21st century, accompanied by greater climatic variability.

This translates to the coexistence of prolonged drought periods and extreme rainfall events. Consequently, a precipitation regime marked by heightened instability and increasing unpredictability. Empirical data confirms Catalonia has already experienced an average annual rainfall reduction of 100 mm since 1950, demonstrating measurable manifestations of global warming impacts.

These combined impacts on precipitation patterns and hydrological cycles will fundamentally alter natural system dynamics and, consequently, primary sector economic activities.

Concurrently with diminishing rainfall, temperatures are projected to rise progressively, reaching increases of 3-4°C above pre-industrial levels under worst-case scenarios. Such thermal escalation will drive heightened losses through evaporation and evapotranspiration processes, thereby intensifying vegetation's water demands. The evapotranspiration concept encapsulates dual moisture depletion mechanisms: direct soil evaporation coupled with plant transpiration water loss.

This environmental strain will push forests and crops beyond critical stress thresholds, rendering many ecologically or agriculturally non-viable. Paradoxically, elevated temperatures may increase atmospheric moisture retention capacity, favouring more extreme rainfall events – essentially enabling higher precipitation accumulation within short timeframes. This phenomenon has become increasingly apparent during autumn months, particularly within the Terres de l'Ebre region.

The vulnerability assessments within the Life eCOadapt50 project derive from climate zones delineated by ESCACC30, which align with those in ESCAT20's climate projections: coastal/pre-coastal, Pyrenean, and inland zones.

These zones were established based on geographical homogeneity and comparable thermo-pluviometric regimes. The Catalan Office for Climate Change (OCCC) mandated this zoning framework to develop tailored adaptation policies for these areas following climate projection modelling.

For ESCAT20, projections were generated using the Meteorological Service of Catalonia's (SMC) implementation of statistical regionalisation methodology. Statistical regionalisation constitutes a technical approach for downscaling global climate model (GCM) outputs to regional/local levels. This method establishes statistical relationships between global climate variables and local parameters using historical data, subsequently extrapolating these under emission scenarios to produce fine-scale projections critical for regional planning.

In the SMC's application, projections featured 1km horizontal resolution grids – nodal points spaced one kilometre apart – for temperature and precipitation variables, accompanied by associated daily extreme indices.

The Pyrenean region will be among the areas most impacted by climate change due to rising temperatures, particularly at higher elevations.

One recognised effect of climate change is Elevation-Dependent Warming (EDW), through which areas above 2,000 metres experience accelerated warming rates compared to valley floors, chiefly due to reduced snow-cover duration. The Meteorological Service of Catalonia (SMC) is actively involved in the seven-year LIFE PYRenees4CLIMA project, which analyses this phenomenon in the Catalan Pyrenees.

In coastal and pre-coastal zones, increased precipitation variability is anticipated – featuring more frequent dry years interspersed with exceptionally wet ones, particularly during autumn. Inland areas (Central Depression) will similarly experience pronounced temperature rises, especially in summer, where maximum temperatures will regularly surpass 40°C. Winter warming will advance crop flowering periods, heightening vulnerability to late frosts.

Catalonia's pronounced geographical variability is mirrored at county level, with some regions exhibiting stark climatic diversity across short distances. The SMC's projections for ESCAT20 aim to deliver 1-kilometre horizontal resolution data, enabling identification of climatically homogeneous zones.

In this scenario, two factors will increasingly define our climate: declining precipitation levels coupled with heightened variability, alongside rising temperatures – particularly during summer.

Agriculture and public health will bear the brunt of climate impacts, as they are among the most exposed sectors. The agricultural sector has made significant strides in developing heat-resilient crop varieties and optimising water efficiency – initiatives pioneered in Catalonia by IRTA over decades.

In healthcare, efforts focus on enhancing early-warning systems for heatwaves – including night-time heat alerts which have been operational for two summers – alongside urban adaptations to create expanded shaded areas and climate shelter networks. Nevertheless, a holistic approach remains crucial that recognises that all activities, sectors and ecosystems face climate vulnerability. Delaying effective adaptation policies heightens risks of systemic collapse. We must also remember: meaningful adaptation cannot exist without parallel mitigation efforts.

Studies and data

Editorial Team

What do territorial risk assessments reveal about vulnerabilities?

Water scarcity – particularly given current demand levels – will increasingly constrain economic sectors most at risk: the primary sector and tourism. Understanding the specific climate risks and vulnerabilities of each territory, along with the future scenarios that may arise, enables stakeholders to proactively implement context-specific adaptation strategies.

This knowledge is fundamental for defining action plans and for identifying and planning the specific adaptation actions that must be prioritised. In the case of the Life eCOadapt50 project, the assessment of risks and vulnerabilities for each territory and sector involved has been conducted across three major territorial units that, reflecting Catalonia's climatic and biogeographical diversity, share common characteristics: the Pyrenean zone, inland regions, and coastal/pre-coastal areas. These vulnerability assessments are based on the climatic zones defined in the Catalan Climate Change Adaptation Strategy (ESCACC30).

Trends and Evidence

From a general perspective, Catalonia's outlook under a warming planet suggests changes in rainfall patterns that may lead to intense rainfall events, more severe and recurrent droughts and reduced available water resources – trends already being observed. Simulations also indicate greater interannual variability than historically recorded (wetter years alternating with extremely dry years).

However, detailed analyses reveal distinct characteristics for each of the three zones. In the coastal/pre-coastal area, spanning from Alt Empordà to the Ebro Delta, the region is projected to experience increased annual and seasonal variability, with increasingly extreme precipitation levels – both unusually high and low. This translates to significant increases in rainfall during some years and sharp reductions in others, potentially causing droughts of varying intensity.

A rise in maritime storms has also been observed in recent years, alongside a trend of increasing maximum wave heights. These impacts, combined with rising sea levels, may affect coastal promenades and infrastructure through stability and erosion issues.

Regarding temperatures, an increase in both the intensity and duration of heatwaves is anticipated, while cold spells and frost events will decrease. Nevertheless, the Mediterranean Sea's thermoregulatory effect must be considered, as it moderates temperature increases – particularly in mean, minimum, and maximum temperatures – across coastal areas.

Inland Catalonia exhibits rainfall pattern trends comparable to those in coastal and pre-coastal zones. Over the next thirty years, precipitation-free periods (dry spells) will become longer in these areas than in the rest of Catalonia, potentially expanding semi-arid land coverage.

Furthermore, inland regions are experiencing significant temperature rises, increased

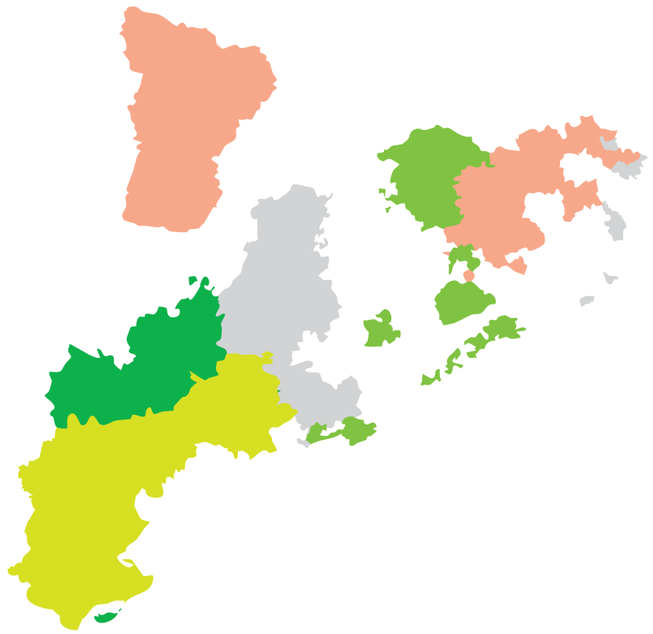
heatwaves – with peaks of up to 43 °C during prolonged multi-day periods – and fewer cold episodes.

Consequently, a particularly negative impact on crops is projected, alongside reduced agricultural land due to farming abandonment. This will drive gradual conversion of these areas into scrubland and forests, potential loss of open spaces and adverse effects on biodiversity and landscape integrity.

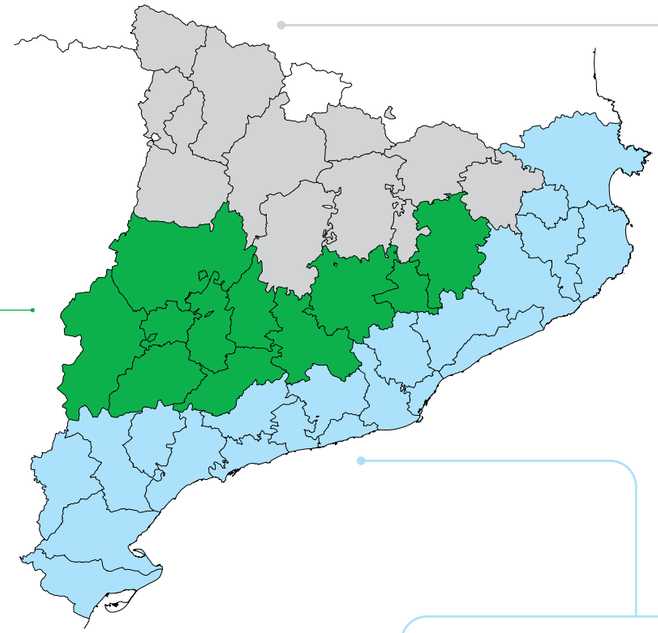
Lastly, in the Pyrenean zone, temperature increases exceeding those in other territories are being detected, with the highest projected rises expected in the Western Pyrenean summits. Regarding precipitation, the Pyrenean zone exhibits lower interannual variability than coastal/pre-coastal and inland areas, both at annual and seasonal scales.

Consequently, sensitive ecosystems and iconic landscape features are disappearing, the life cycles of numerous plant and animal species are being disrupted and hydrological cycles are undergoing modifications. Both the primary sector and tourism are being affected, while pre-existing challenges in the Pyrenean zone – such as depopulation, land-use changes and lack of generational succession in agriculture and livestock farming – are intensifying.

In any case, across all three major analysed zones and at every territorial level, it is evident that further research into precipitation trends remains imperative. This approach aims to achieve greater robustness in projecting rainfall regime trajectories. While consensus exists, that temperatures will continue rising over coming decades, the impact on precipitation remains less clear, with no statistically significant trend yet observed towards reduced mean annual precipitation in recent years.



How is precipitation expected to evolve by region?



Pyrenean area

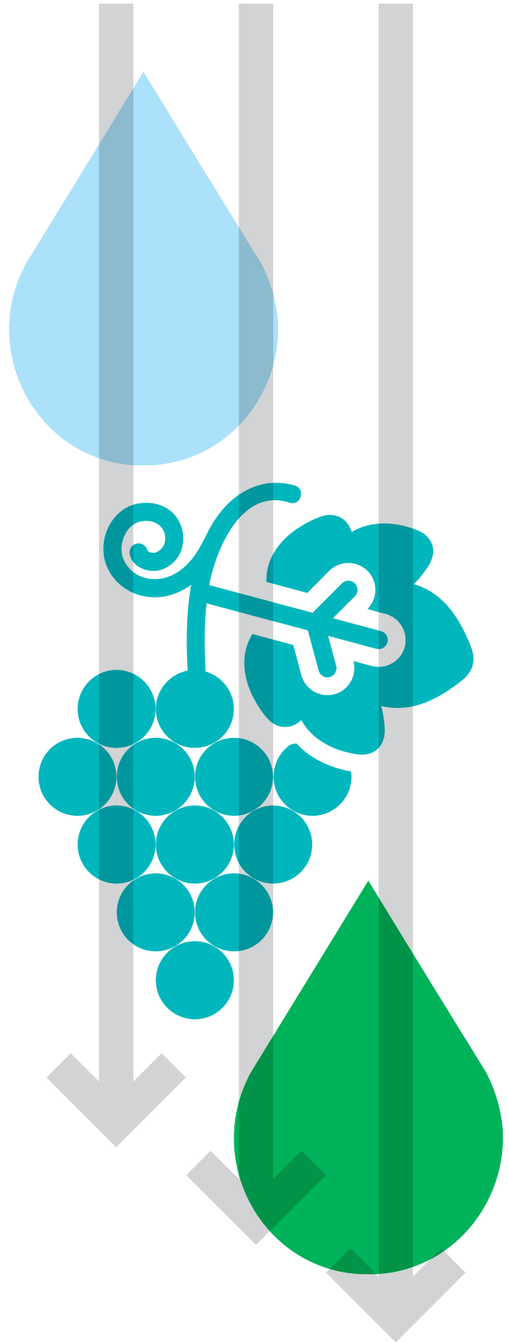
Lower interannual variability than coastal/pre-coastal and inland areas – both annually and seasonally.

Inland Catalonia

Trends mirroring those in coastal/pre-coastal zones regarding rainfall patterns. More intense precipitation-free periods (dry spells) than across Catalonia overall over the next 30 years.

Coastal and precostal area

More extreme precipitation values within annual and seasonal variability – both positive and negative, i.e. significant increases in some years and major reductions in others, including intense droughts.



From the field

Interview with Josep Maria Albet
Owner of Albet i Noya Winery

“The three-year drought has sharpened agricultural awareness of the need for new water management strategies.”

Josep Maria Albet – a pioneer of organic vineyards and wines in Spain – has compiled 40 years of pluviometric data from the region, granting him granular insight into climatic evolution and its effects on water cycles. This expertise has driven him to implement measures reducing consumption, optimising usage and promoting sustainable resource management.

Our estates lie in the Ordal Mountains, straddling the transition between coastal ranges and plains, with terraced cultivation. The clay-rich soil has a one-metre-deep fertile layer, underlain by bedrock that restricts root growth. While groundwater is good and remains abundant, we now drill 400-metre boreholes to access it – unlike in prior decades. The water cycle has demonstrably shifted in recent years.

You’ve collected 40 years of climate data in Penedès and tracked rainfall patterns. How did this begin, and what conclusions are you drawing about the region’s climatic evolution?

Our winery pioneered organic farming in Spain 40 years ago, driven by collaboration with a Swiss firm that required practices like six-month green manure cover crops before cultivation. This heightened our focus on water availability and management – the period when I began recording rainfall data.

We operate in a territory of erratic rainfall, with annual variations from 900 mm to 250 mm.

Until the recent three-year drought and this year’s exceptional rains, precipitation hadn’t shifted markedly. What’s evident is rising temperatures and more intense, concentrated downpours – creating prolonged dry spells that induce water stress in vineyards and vegetation.

Three consecutive drought years are unprecedented in my records. Soil moisture depletion reached five metres deep. Fortunately, recent rains have replenished these losses and we’re now in a strong position.

In any case, you've implemented water efficiency measures for several years now...
Indeed. If we abandon viticulture due to water scarcity, the only viable crops become drought-resistant species like carob, almond, or cacti.

Thus, driven by both product integrity and water stewardship, we introduced practices years ago – such as drip irrigation using estate well water. These systems are now highly sophisticated, they use self-compensating drippers powered solely by water pressure, thus eliminating energy inputs. On sloped vineyards, this ensures uniform water distribution across all drippers.

How much water do vineyards consume?

We use approximately one million litres annually per hectare – well below typical consumption in other crops – we only irrigate to offset rainfall deficits. Others vineyards use up to three million litres, but microclimates and soil types dictate needs: gravel-rich soils, for instance, accelerate water percolation.

Recent IRTA projections suggest future irrigation allowances may halve to 500,000 litres – the minimum to prevent vine mortality and maintain production consistency. Within the Penedès Do's four-district irrigation community we're developing, we propose allocating 500,000 to 1.5 million litres per hectare for supplementary irrigation, which aligns with EU frameworks.

Monitoring accumulated soil moisture levels to determine the land's hydration status remains equally critical for managing available water resources.

What other practices have you adopted?
With limited water availability and projections indicating increasingly irregular supply, we must prioritise storage through all viable means: soil infiltration, reservoirs or large-scale dams.

Our approach focuses on enhancing soil water retention and constructing local reservoirs. Relatively straightforward practical techniques exist, such as creating small channels between vine rows to prevent rainwater from surface runoff and channel it into the subsoil – particularly on sloped land – constructing compact infiltration basins among vines to enable gradual soil absorption of stored water, or pruning longer woody roots to promote the proliferation of absorbent root hairs and enhance water uptake efficiency. These methods, long employed in drier southern regions, are now being integrated here.

Our clay-rich soils exhibit exceptional absorption capacity (1 cubic meter of clay retains 1 cubic meter of water), but require extended saturation periods.

Such practices would prove ineffective in regions like Alella or Priorat, where soil composition differs fundamentally.

What benefits do the reservoirs provide?
Since wells cannot supply the required flow during irrigation months – approximately four to five annually, in spring and early summer – we've constructed multiple reservoirs to gradually accumulate water extracted from wells. We currently operate one seven-million-litre reservoir and two four-million-litre counterparts. Irrigation occurs through gravity-fed systems or pumps powered by photovoltaic energy.

The reservoirs host fish that feed on naturally occurring organic matter, serving as bioindicators of water quality. They also attract birds, thus creating small ecosystems.

What does the green manure you mentioned earlier involve?
It involves a legume base sown around September and maintained until February or March. The roots can fix atmospheric nitrogen and transfer it to the soil, reducing the need for additional organic fertiliser. Furthermore, this nitrogen type isn't leached by rainfall. When soil moisture decreases, we cut these plants to prevent water absorption from the vineyard.

In this scenario, two aspects will increasingly define our climate: the decrease in precipitation and its increased variability, and the rise in temperature, especially in summer.

Photos ©Jordi Inglès

©Jordi Inglès

You mentioned rising average temperatures also affect crops...
Yes, to counteract this increase we're implementing measures like raising trellis heights – since higher-trained vines are less affected by ground-radiated heat. We're also deploying adjustable photovoltaic panels for shading – known as agrivoltaics, which we aim to trial here – which serve a dual purpose: energy generation and protecting vines from excessive heat, hailstorms and torrential rain. Ultimately, it's a combination of techniques.

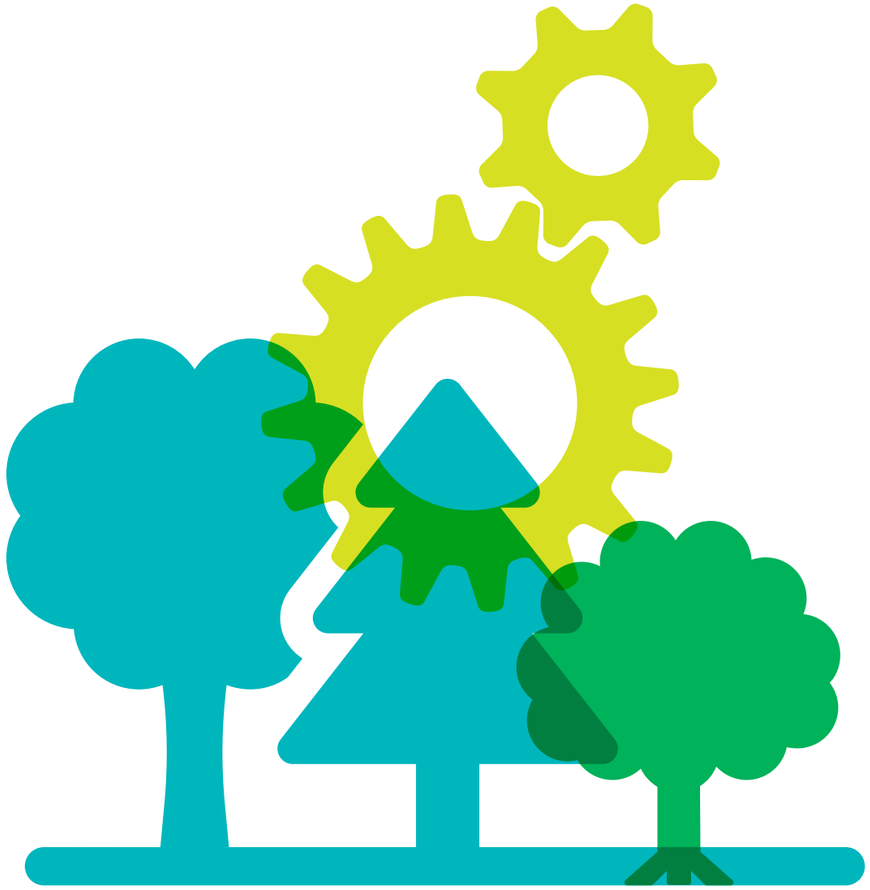
Beyond climatic shifts, how do biogeographical and ecological factors influence the territory?
In Penedès, most rivers and streams remain dry for most of the year, only carrying flow during rainfall. Ecological flow is typically absent, with existing supply sourced from the Ter-Llobregat system and wastewater treatment plants. Understanding these dynamics is critical to grasping the natural water cycle in this arid region. Consequently, alternative water sources must be rigorously evaluated.

Treated wastewater offers one option but is restricted to woody crops without direct fruit contact or requiring tertiary treatment.

Desalinated water should also be considered. Upscaling planned infrastructure to increase reserves could provide supplementary supply, enabling diversification into other fruit trees beyond vineyard monoculture.

Clearly, no single solution addresses both climatic variability and irregular water availability. The drought has, if anything, catalysed awareness of the urgent need for innovative water management strategies and holistic solutions.

Josep Maria Albet, a winemaker and viticultural specialist, is co-owner of Albet i Noya – a fifth-generation family winery cultivating and producing wine in Penedès. Forty-six years ago, he pioneered organic viticulture across the Iberian Peninsula. Today, he manages over 90 hectares in the Ordal Mountains, employing exclusively organic and regenerative practices.
He currently leads the development of disease-resistant grape varieties using native Catalan rootstocks. Together with his son Martí, he oversees Albet i Noya Winery, producing one million bottles annually – 75% exported to 25 countries worldwide.



[eCO]Actions

The Drought Observatory of Terra Alta

Pere Quintana
Ebro Observatory

The Drought Observatory of Terra Alta is a pilot project to adapt traditional dryland crops – specifically vineyards – to climate change. It was initiated under the earlier Life Clinomics project and has continued under Life eCOadapt50, with the aim of extending the initiative to the rest of the Terres de l'Ebre region. The challenge is to establish a monitoring network and a drought-tracking system, alongside support irrigation guidelines.

Rising temperatures and shifting precipitation patterns due to climate change – marked by more frequent heatwaves and prolonged droughts – are increasing plant evapotranspiration and aridity. As a result, soil moisture levels are increasingly falling below those required to meet the water demands of crops, which have historically been rainfed. This issue is particularly critical in regions where agriculture is a key economic sector, such as Terra Alta in the Terres de l'Ebre.

Support Irrigation Criteria

In this context of reduced water availability for irrigation, the agricultural sector must implement measures to use water resources more efficiently. This is essential to ensure the continuity of farming activities while preventing the depopulation of rural areas. Support irrigation is one such adaptation tool, enabling crop survival amid increasing aridity. However, it must be applied with utmost caution.

Support irrigation is defined as the minimum watering required to counteract the impacts of severe drought periods and safeguard plant health, i.e., to prevent damage or unsustainably low yields during exceptionally dry spells. The proposal is to irrigate only the bare minimum necessary to avoid plant stress.

The Terra Alta Drought Observatory was established to provide technical support and tools to the region's farming community, thus enabling measures to ensure the survival of dryland crops – particularly vineyards – by delivering objective data on soil water status.

In addition to supplying meteorological data and soil moisture measurements (for both rainfed and irrigated land), the Observatory offers irrigation guidelines. However, farmers ultimately adapt these recommendations to their specific needs. In any case, no irrigation is applied when soil moisture is sufficient. Watering is kept sporadic to prevent plants from losing their natural capacity to absorb rainwater. During the limited weeks when irrigation is advised, daily watering is proposed to simplify scheduling within designated irrigation windows.

Photos ©Pere Quintana

Soil Moisture Sensor Network

In the specific case of vineyards, it is important to note that vines begin to experience water stress when the available water deficit reaches approximately 70%. For this reason, support irrigation is triggered when the deficit reaches 60% and continues until the deficit decreases to 50% or until weekly irrigation reaches 30 mm. No irrigation is applied as the harvest date approaches.

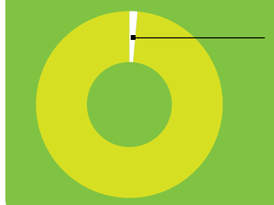
The soil moisture sensor network is deployed across representative farms in the region – both irrigated and rainfed – due to the prohibitive cost of installing sensors in all plots. These data are used to monitor moisture levels and calibrate a weekly water balance model, which accurately simulates irrigation patterns to generate recommendations; they are also used to project historical soil moisture trends retrospectively in order to create datasets of sufficient length to calculate drought indices. These drought indices are highly useful for contextualising the situation at a specific moment and comparing it with past episodes. It is essential to carry out weekly monitoring of soil moisture, as periods of heatwaves or sudden droughts require swift responses.

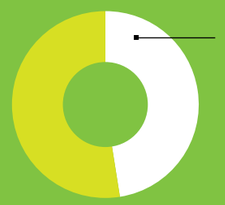
The adopted strategy is not exclusive to vineyards and can be applied to other crops and even forest areas, with the necessary adaptations. Looking ahead, we aim to enhance the geographical representativeness of irrigation recommendations by leveraging data provided by spatial remote sensing. However, this remains a field subject to ongoing research, and we are not yet in a position to offer it operationally, despite actively working towards this goal.

Therefore, the Drought Observatory is an initiative designed to provide reliable and objective information on the hydrological status of vineyards and, where irrigation is applied, to deliver trustworthy recommendations that help farmers overcome drought conditions and achieve greater stability. Nevertheless, we are acutely aware that, amid ongoing climate change, water is a scarce resource that must be used with the utmost prudence.

Territorial Scope of Terra Alta

An inland district forming part of Terres de l'Ebre. The total area spans 743 km², with 42% under cultivation. The climate is typically Mediterranean, with continental influences in the north. Rainfall is higher in the south (approximately 650 mm) and lower in the north (around 400 mm), precisely where the project's irrigation system has been implemented. Irrigated cropping has expanded since the 1990s, particularly in the northern area, though it covers no more than 1.5% of the land area.





Portable desalination units on Costa Brava fishing vessels

The Fishermen's Local Action Group of the Costa Brava (GALP)

The fishing sector of the Costa Brava has launched a pilot scheme to equip vessels with portable desalination units, enabling access to drinking water during extended voyages. This initiative forms part of broader efforts involving multiple fishermen's guilds to encourage more efficient water usage.

Under the Life eCOadapt50 project, two fishing vessels from Palamós and Roses have been fitted with seawater desalination systems. These provide crews with a practical and efficient solution for obtaining potable water during trips.

Spearheaded by the Palamós Fishermen's Guild, this innovation removes reliance on plastic bottles aboard vessels. By doing so, it reduces waste generation, prevents plastic from entering the marine environment, and mitigates impacts on ecosystems, marine species and human health – particularly from microplastics released into the sea.

In the facilities and services available to fishermen on land, water is used for multiple purposes, including personal hygiene, cleaning equipment or fish, crate washing and ice production, among other uses. In some guilds, such as Palamós, this consumption reaches approximately 10,000 m^3/year and 7.5 m^3/kg of fish.

While these desalination units also generate brine as a byproduct – water with an extremely high salt concentration – it is important to note that, unlike large-scale desalination plants, this does not pose a threat to the marine environment. The small volume produced is rapidly diluted by the surrounding seawater when discharged.

As part of the pilot scheme, and in collaboration with Empordà Aigua acabada de fer®, a 1-litre thermal bottle has been designed to facilitate water consumption during fishing trips. Its ergonomic design caters specifically to crew needs. The pilot phase, whic hran from September to December 2024, results will be analysed to assess scalability and the potential to roll out the initiative across additional vessels.

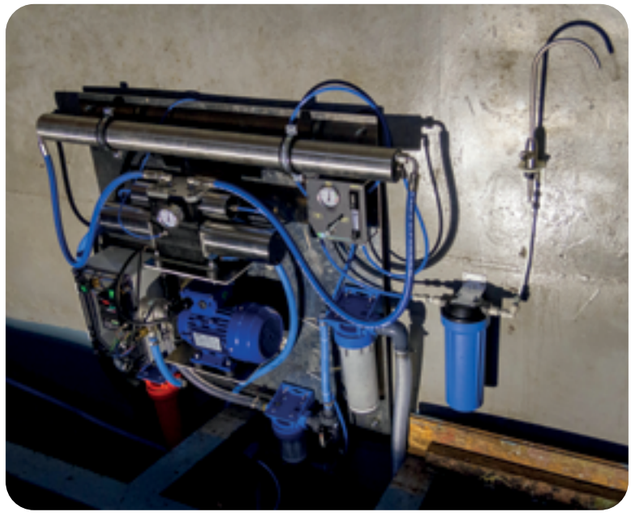
A spectrum of measures and best practices

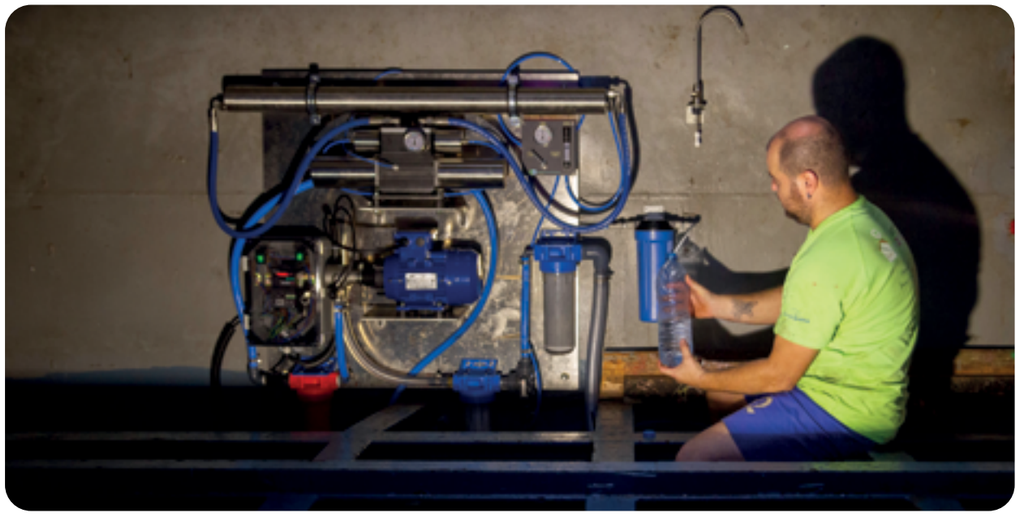
The fishing sector – which, like tourism, faces direct impacts from climate change on water cycles and current/future natural resource availability – has actively engaged in initiatives to reduce consumption and optimise water efficiency. These measures have been spearheaded by the Girona Territorial Federation of Fishermen's Guilds across municipalities within the Costa Brava Local Fisheries Action Group (Port de la Selva, Llançà, Cadaqués, Roses, l'Escala, l'Estartit, Palamós and Sant Feliu de Guíxols).

Examples of best practices already implemented under the Punt Blau project – also funded by the Life eCOadapt50 scheme – include the recycling of wastewater from reverse osmosis systems for floor washing and toilet cisterns, the elimination of single-use mineral water bottles, the reduction of chemical usage and water consumption in hygiene and disinfection processes in fish markets/auction halls and the installation of motion-sensor taps.

This initiative not only enables vessels to carry freshwater supplies independently of other potable water sources – particularly valuable during extended voyages – but also enhances onboard safety, as this resource can prove critical in emergency situations. Both systems also incorporate technological upgrades to desalination equipment to optimise their performance and energy efficiency. Furthermore, a reliable freshwater supply improves onboard working conditions and consequently boosts productivity.

In summary, installing desalination systems on fishing vessels delivers multiple operational advantages by holistically addressing technical, economic, and environmental considerations.





Photos ©Costa Brava Local Fishing Action Group

Thanks to the Life eCOadapt50 project, two fishing boats from Palamós and Roses have been equipped with seawater desalination machines.

Creating network

Antoni Domènech
Rovira i Virgili University

Connecting territories to collectively tackle climate adaptation: common challenges

The interterritorial meetings of the Life eCOadapt50 project constitute a key element in establishing a cooperation network that transcends local boundaries and allows for addressing the challenges of climate change. These dialogue spaces facilitate the exchange of experiences, good practices, and learnings derived from the work carried out in local Living Labs, governance spaces where challenges are identified and tailored solutions are co-created for each geographical area and economic sector.

Each territory and each of the economic sectors involved in the Life eCOadapt50 project present different climatic characteristics, risks and vulnerabilities. However, they share numerous challenges related to environmental factors such as water, temperature, biodiversity and soil. In fact, the viability of productive activities in agriculture, livestock farming, forestry management, fishing, aquaculture or tourism can be affected by the impact of climate change on these vectors.

Moreover, developing climate adaptation action plans not only constitutes a tool promoted by the project but also becomes an opportunity to strengthen the resilience of territories and economic activity in the medium and long term. These plans, therefore, must highlight the measures that can mitigate the vulnerabilities of each sector and improve the adaptive capacity of the territories. But how can we ensure their effectiveness?

The answer lies in collaboration and the ability to share experiences. In this scenario of common challenges, meetings should serve to share efforts and resources that are already being implemented at the local level to develop innovative and scalable solutions. Through the Living Labs, local knowledge regarding the environmental issues impacting the territory is valued, and consensus measures validated by an advisory committee composed of experts in areas. During the first two and half years of the project, 87 actions have been proposed and evaluated by the advisory committee: 18 are underway, 9 are about to start and 4 has already been completed.

At an interterritorial level, the Living Labs for Climate Change network (LL4CC) should facilitate the creation of synergies, the exchange of knowledge and experiences and the optimisation of resources to implement adaptation actions. Collaborative learning. In this way, interterritorial meetings should serve as a knowledge-sharing platform, through the application of co-creation methodologies, strategic pillars and replicable or adaptable actions for other territories.

This mutual learning ensures that adaptation strategies are not isolated initiatives, but part of a collective and coordinated process. Collectively, this will help strengthen the project's robustness and overall coherence. A project that plans to implement 76 pilot actions over its 8-year duration.

Actions reviewed by the advisory committee according to their progress status

Proposed	52
Selected	9
In progress	18
Completed	4
Discarted	7
Total	91

Actions reviewed by the advisory committee, classified by target sectors and progress status

	Agro-livestock	Agro-livestock and Forestry	Forestry	Fisheires
Proposed	18	13	3	1
Selected	2	3		2
In progress	3	8	2	
Completed				1
Discarted	3	2		2

	Tourism	Tourism and Fishing	Others
Proposed	4	2	9
Selected	2		
In progress	2	2	
Completed		1	
Discarted			

The inter-territorial meetings of the Life eCOadapt50 project are key to establishing a cooperation network that transcends local borders to address the challenges of climate change.

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Synergies with the ResAlliance Project

Mariona Borràs
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The ResAlliance and Life eCOadapt50 projects share a common vision: to strength territorial resilience against climate change through coordinated actions and sustainable strategies. While each has specific objectives and approaches, their areas of convergence (agricultural, forestry and livestock sectors) create synergies that amplify positive impacts on communities and ecosystems.

The Landscape Resilience Knowledge Alliance for Agriculture and Forestry in the Mediterranean Basin (known as ResAlliance) is established as a knowledge network with two key objectives: improving information flow in agricultural and forestry sectors and providing tools to identify innovative landscape resilience solutions.

Strategic Collaboration with Life eCOadapt50

ResAlliance operates in Mediterranean countries, driving initiatives in two key areas:

- LandNet: A pan-European network promoting participation, training and interaction among farmers, forest managers and other key stakeholders in the Mediterranean region, alongside disseminating validated best practices. Any interested party can register with LandNet free of charge and access its benefits (https://www.resalliance.eu/join/).
- LandLabs: A platform to advance knowledge transfer and foster regional/local landscape resilience solutions in five Mediterranean countries: Portugal, Spain, Italy, Greece and Cyprus. In Spain, the LandLab is based in Catalonia, specifically in the Baix Llobregat, Alt Penedès and Anoia districts – an agroforestry landscape threatened by droughts and wildfires.

The Catalonia LandLab has maintained close collaboration with Life eCOadapt50 since its inception: Active involvement in the workshop "Resilient Territory in Baix Llobregat, Alt Penedès and Anoia" (October 2023), which identified gaps, barriers and best practices for achieving resilient landscapes in the LandLab area. Discussions focused on climate change adaptation measures, particularly wildfire and drought mitigation.

Common Objectives and Transformative Outcomes

The collaboration has also co-organised the technical sessions "Exploring Solutions to Address Climate Challenges in Baix Llobregat, Penedès and Anoia" (May 2024), where experts from Portugal, Italy and local organisations presented solutions addressing the region's needs identified in the initial workshop.

Finally, by co-organizing "Territory and Resilience: The Fair of Best Agricultural and Forestry Practices" on 16 and 17 May 2025, with the aim of showcase and promote solutions that are being —or could be- implemented in the territory, especially in the agricultural, livestock, and forestry sectors, to address climate change. The event connected those responsible for these solutions with potential stakeholders and funding entities that can support them.

This collaboration between ResAlliance and Life eCOadapt50 holds significant potential to maximise impact in terms of sustainability and climate adaptation. Through knowledge exchange, resource optimisation and strategic coordination, these projects can drive meaningful progress towards a more resilient society better equipped to address environmental challenges. The synergy between ResAlliance and Life eCOadapt50 exemplifies how collaboration between initiatives with shared goals can deliver transformative impacts in tackling climate change.

Photos ©Susanna Ginesta

The eCOadapt50 Project

Co-creating strategic action to adapt territories and the local economy to climate change

The evident effects of climate change present a major collective challenge: to implement measures to adapt to emerging realities while anticipating projected impacts. This underpins Life eCOadapt50 – an action-oriented project fostering co-created, participatory solutions to develop more sustainable economic activities within evolving bioclimatic conditions.

Operating within an eight-year timeframe (2023-2030), Life eCOadapt50 assesses the adaptation potential of Catalonia's diverse territories to implement measures reducing vulnerability and strengthening resilience across four socioeconomic sectors: agricultural-livestock, forestry, fisheries, and tourism.

Led by the Barcelona Provincial Council, Life eCOadapt50 unites 25 public and private partners: local and supramunicipal authorities; general, local, and sector-specific socioeconomic stakeholders; local action groups and knowledge centres The initiative also engages over 350 identified territorial stakeholders, with 100+ actively involved since its launch.

Diversity of Biogeographical Contexts and Economic Sectors

The project delivers localised responses to adaptation agreements and policies established by the EU, Spain, and Catalonia. It actively addresses emerging challenges while developing practical solutions. A core objective involves implementing the Local Climate Change Adaptation Strategy (ELACC) – originally developed under the preceding Life Clinomics project – which integrates adaptation measures across all governance levels.

Risk and vulnerability assessments are structured around geographical zones defined by the Meteorological Service of Catalonia, methodological frameworks from the Catalan Climate Change Adaptation Strategy 2030 (ESCACC30), and the strategic framework for the 2030 horizon outlined in Catalan Climate Change Law (Law 16/2017).

Life eCOadapt50 operates across 19 territorial units representing Catalonia's full spectrum of biogeographical landscapes, climatic conditions and economic activities. These collectively span 60% of the region's territory (≈19,400 km²). The project targets the agricultural-livestock, forestry, fisheries and tourism sectors.

Climate Vulnerability Assessment

To identify key climate change risks across territories and sectors, a vulnerability assessment has established baselines and identified constraints on adaptive capacity.

Life_eCOadapt50 is a transformative project with a commitment to establish itself in the territory, expand, and become replicable. It is driven by governance and oriented towards action, aiming to generate participatory dynamics and solutions for climate change adaptation; even beyond the timeframe and space defined by the project.

The analysis considers three geographical zones – Pyrenean, inland, and coastal/pre-coastal areas – which encompass the project's 19 target territories.

This evidence base informs tailored action plans to enhance resilience scenarios and secure sustainable economic activity under evolving bioclimatic conditions. The project also includes a training programme to strengthen awareness of climate impacts and the urgency of implementing adaptation measures.

A core output is an updatable methodology with indicator frameworks to track adaptive capacity improvements and exposure reduction, aligned with policy implementation progress in each territory.

Living Labs for Climate Change (LL4CC)

The convergence of stakeholder engagement forms a central pillar of Life_eCOadapt50. Active participation by institutions, organisations, and socio-economic stakeholders in each territory enables the prioritisation of context-specific adaptation strategies, while making this knowledge available for future replication.

This approach establishes dedicated spaces in each territory for debate, reflection, and participatory decision-making among stakeholders. These governance hubs – termed Living Labs for Climate Change (LL4CC) – identify place-specific challenges and co-design context-appropriate solutions for geographical and sectoral contexts.

At inter-territorial level, the LL4CC network facilitates synergies, knowledge exchange and resource optimisation for implementing adaptation measures, fostering cross-learning between territories.

Sectoral Adaptation Actions

This diagnostic, participatory and collective strategic process will enable implementation of at least 76 sector-specific adaptation measures, to be progressively defined as the project advances. Initial framework measures provide directional guidance, with each territory tailoring interventions to local characteristics, identified vulnerabilities, and climate risk profiles.

Several actions build on outcomes from the preceding Life Clinomics project, including the Drought Observatory as a water management tool in agriculture, the analysis of forest vulnerability or the proposal to use livestock in forest management.

Implementation is supported by an €18.6 million budget – 60% co-funded by the EU Life Programme and 40% through public/private project partners. The eight-year timeline allows progressive securing of additional funding to expand intervention scope. In this regard, it is expected to mobilise over €73 million in complementary funds, such as European, state, regional, and provincial funds, the climate fund, private credit, and self-financing.

With this additional investment, the territorial scope can be expanded to 75% of Catalonia, replicating actions already implemented in the initial geographical areas and promoting new ones in coastal spaces, high mountain forests, and agricultural plains.