BIORESILMED

Proposal for a plan to promote the bioeconomy in the Ebro Delta



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Members of the Bioresilmed project's community of practice during the co-creation session held on 10 December 2024 at the Centre en Resiliència Climàtica d'Eurecat in Amposta.

Centre en
Resiliència Climàtica
by eurecat

Promoting organisations, mission, and vision

The Climate Resilience Centre, promoted by Eurecat, contributes to addressing the environmental, socio-economic, and governance challenges arising from climate change. We firmly believe in the holistic restoration of landscapes as a paradigm for the transformation and revitalisation of territories. To achieve this, we seek to build climate resilience through the promotion of the bioeconomy, improving people's quality of life, and the ecological integrity of ecosystems.

The plan contributes to the achievement of several Sustainable Development Goals (SDGs):

- **Promoting regenerative agriculture and tourism:** SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 15 (Life on Land).
- **Conserving and restoring ecosystems and biodiversity:** SDG 15 (Life on Land).
- **Mitigating and adapting to climate change:** SDG 13 (Climate Action).
- **Strengthening local communities:** SDG 1 (No Poverty), SDG 8 (Decent Work and Economic Growth), and SDG 11 (Sustainable Cities and Communities).

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Plan de Recuperación, Transformación y Resiliencia

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The 2050 vision is to transform the Delta into a regenerative territory where nature and the economy positively reinforce each other. The objective is for the Ebro Delta to be a globally recognised reference area by 2050 in ecological restoration and rural development, which contributes to territorial prosperity and socio-economic development.

0. Executive Summary

BIO RESIL MED

Plan for the promotion of the bioeconomy in the Ebro Delta: the 2050 roadmap

The purpose of the proposed Bioeconomy Promotion Plan for the Ebro Delta is to guide the future of the territory towards large-scale regeneration. To achieve this, the document is structured into key sections that provide a thorough understanding of the local context and its future outlook. These include a detailed description of the territory, the challenges and opportunities within a context of global change, and the achievements to date. It also defines the future vision, strategy, and roadmap to advance the bioeconomy and territorial regeneration. This plan, developed within the BIORESILMED project, has been prepared by Eurecat – Climate Resilience Centre (CRC), through the Living Lab Ebre Bioterritori, where co-creation activities have been carried out with local stakeholders who are pioneers in promoting ecotourism, organic rice cultivation, and nature conservation. This space brought together 15 pioneering individuals driving the bioeconomy in the territory, including representatives from public administration, the ecotourism sector, organic rice farming, and nature conservation.

The Ebro Delta is one of the most valuable yet vulnerable coastal territories in the Mediterranean. With an area of approximately 32,000 hectares, it faces the impacts of climate change and global change, including coastal regression and biodiversity loss, making it a ground zero for climate change. Through the collaboration of pioneering bioeconomy entities, the ambitious challenge of promoting a territorial initiative for large-scale regeneration has been addressed. This collective ambition is based on the development of a socio-economic model rooted in the bioeconomy and climate resilience.

The territory is characterised by its rice fields (21,000 ha), bays (6,800 ha), lagoons, dunes, and riparian forests protected by the Natural Park. It is an area of high value for biodiversity conservation (with more than 350 bird species recorded, representing 60% of Europe's bird species), local traditions, delta culture, and characteristic gastronomy. However, the territory is extremely vulnerable to sea level rise, as well as the lack of water and sediment supply from the Ebro River.

The plan identifies key opportunities to reverse this trend, including the transition towards regenerative-organic rice cultivation, biodiversity-positive and carbon-negative practices, as well as the consolidation of regenerative tourism as one of the main economic activities. These bioeconomy-based production models aim to combine ecosystem restoration and the conservation of key habitats to foster a local economy built on the restoration of natural capital, while ensuring the long-term prosperity of the territory.

The 2050 vision is to become a regenerative territory, where nature and the economy positively reinforce each other. The objective is for the Ebro Delta to become a global reference in ecological restoration and rural development by 2050, contributing to territorial prosperity and to socio-economic development that is positive for nature.





Figure 1:
Location of the Ebro Delta.

Territory size:
38,850 ha

Annual precipitation:
528 mm

Population:
72,000 people in 2021

Productive activities:
Rice Cultivation
Tourism
Aquaculture
Salt Production
Hunting and Fishing

Key species:
500 vertebrate
340 bird (60% of European species)
101 fish
22 amphibian and reptile

To achieve this shared vision, the strategy is based on the Commonland 4 Returns Framework, establishing **three specific zones:**

Natural Zone

The main objective is the restoration of habitats and effective management of biodiversity.

Combined Zone

The main intention is the development of a replicable and scalable rice system and regenerative tourism.

Economic Zone

The aim is to promote the establishment of a strong collaborative leadership and governance mechanism to coordinate the bioeconomy throughout the territory.

1. Introduction

Global and peninsular context

Global change, which drives phenomena such as climate change and territorial degradation, is also causing a loss of biodiversity on a planetary scale, with severe consequences for ecosystems and human society.

In the **Iberian Peninsula**, these pressures are becoming increasingly alarming. Firstly, **climate change** is causing rising temperatures, reduced rainfall, and a higher frequency of extreme weather events such as droughts, storms, and coastal flooding. Desertification is advancing in many regions, with agriculture, livestock farming, tourism, and many other productive activities being affected by water scarcity and biodiversity loss. Gradually, this global situation is impacting the ecological **quality and integrity of territories, as well as the socio-economic livelihoods of local communities**.

This is **a key moment to drive territorial regeneration** and promote the bioeconomy as a mechanism to reverse this trend. Both approaches, strongly interconnected, represent a new way of acting based on restoring nature and fostering territorial prosperity through economic activities that benefit both people and ecosystems.

This **integrated vision** enables large-scale responses to social, economic, and ecological challenges through alternative, viable, and fair prosperity models that enhance people's quality of life and regenerate nature. To make this possible, it is essential to co-design a long-term vision with key territorial stakeholders and to use strategic planning tools, collaborative governance structures, and funding mechanisms that ensure the achievement of this vision over time, delivering real impact on ecosystem health and people's lives.

This interconnected framework between vision, strategy, and concrete actions must **enable the development of economic models** that ensure people's prosperity without compromising the health of the planet. Only in this way can a dignified and sustainable future be guaranteed for future generations and for the ecosystems we depend on.

In the **Ebro Delta**, this context is particularly intense. It is **one of the most vulnerable areas in the Mediterranean** to sea level rise and coastal regression, and has become a real ground zero for climate change. This situation reinforces the need for strategic planning and an urgent collective response, based on a territorial model that places regeneration and the bioeconomy at its core, generating real and lasting impact at territorial scale.

> Generating transformative change to achieve a fair and sustainable world is urgent, necessary, and challenging, but it is possible to halt biodiversity loss and safeguard life on Earth.
>
> *IPBES. Transformative Change and Options for Achieving the 2050 Vision for Biodiversity, 2024.*

Proposal for a plan to promote the bioeconomy

Given the context of global change, this is a key moment to advance the holistic restoration of territories, restoring their essential role in ensuring a healthier planet and a society that can live in balance with it. This transformation involves increasing biodiversity, improving soil fertility, and enhancing carbon sequestration, among other actions that contribute to the health of natural systems and the preservation of ecosystem services that are essential for our survival.

In this context, global initiatives such as the United Nations Decade on Ecosystem Restoration promote preventing, halting, and reversing environmental degradation across all continents and oceans. Restoring 350 million hectares before 2030 could generate a wide range of ecosystem services, significantly reduce greenhouse gas emissions, and deliver new economic and social returns, contributing directly to the achievement of the Sustainable Development Goals (SDG).

This global paradigm shift can only be consolidated if it is driven at a local level, with the direct involvement of communities. This document aims to promote the restoration of the Ebro Delta through the advancement of the bioeconomy. The Bioeconomy Promotion Plan for the Ebro Delta is therefore a strategic tool developed with the collaboration and commitment of local people and organisations that are pioneers in the development of the bioeconomy.



[2] *Voituriez, T., et al (2017). Financing the 2030 agenda for sustainable development.*

How has the plan for promoting the bioeconomy been developed?

This document is the result of a co-creation process with fifteen key people from the Ebro Delta territory. Throughout 2024, a series of seven working sessions was carried out to mobilise collective intelligence and build a shared vision of the Delta for 2050, as well as the fundamental steps to implement it [2].

The workshops, facilitated at the **Living Lab Ebre Bioterritori** [3], have enabled the current plan to be developed through the creation of a solid community of practice. The foundations for collaboration to promote the bioeconomy have been laid with the participation of 15 committed people, with leadership roles and strong influence in the territory, who want to work together to promote the regeneration of the Ebro Delta. The **vision** of the community of practice is to become a collective that operates as a network to make this plan for the promotion of the Bioeconomy in the Ebro Delta a reality over the next 25 years. Its mission is to join forces and generate synergies to promote a prosperous, regenerative, and large-scale territorial model through the bioeconomy.

To create transformative change, a shared language among the stakeholders involved and a practical action-oriented framework are essential. With this purpose, the Bioeconomy Promotion Plan for the Ebro Delta has been inspired by the **Commonland** [5] **4 Returns** [4] **Framework**. This framework seeks to help people establish a common language and a consistent pathway to imagine, design, and plan the steps towards the regenerative future of the territory. Based on holistic landscape restoration, it aims to transform degraded ecosystems by focusing on restoring four key returns within a single generation, or 20 years.

These returns are:

1. **Natural return:**
   Healthy ecosystems that ensure the conservation of nature, while supporting resilient territories adapted to climate change.
2. **Social return:**
   The recovery of decent work, quality education, cooperation between people, and improved access to services, knowledge, and opportunities.
3. **Financial return:**
   The development of business models based on the bioeconomy and nature conservation, generating added value for the territory and restoring natural capital.
4. **Inspiration return:**
   People living in the territory regain hope, a sense of purpose in life, and a stronger sense of pride and belonging.

By adopting this framework, the plan not only aims to promote nature-based economic activities, but also to strengthen the resilience of the territory, improve people's quality of life, and preserve the natural and socio-cultural heritage through a holistic and financially sound approach. The co-creation process highlights the importance of shared governance and strategic planning focused on action to achieve this vision for the future of the territory. The plan is conceived not only as a technical tool, but as a living and collective process that requires the continued involvement of public authorities, local communities, businesses, environmental organisations, and citizens.

[3] *The Living Lab Ebre Bioterritori was established in response to the need to create and deploy a new governance model for the Ebro Delta territory, bringing socio-economic sectors closer to the regeneration of natural capital through the bioeconomy.* ***More information here.***

[4] *The Commonland 4 Returns Framework provides the methodological foundation for long-term landscape restoration, enabling people to interact with each other, form alliances and create a shared vision.* ***More information here.***

[5] *Commonland is a private foundation that seeks to bring people together to restore territories and regenerate the Earth with a holistic approach. The main tool is the 4 Returns Framework.* ***More information here.***

2. Description of the territory

The Ebro Delta is the largest wetland in Catalonia, located in the south of the autonomous community. With an area of 32,000 hectares of land and 6,850 hectares of bays, it is one of the most important areas of natural and cultural heritage in the Mediterranean. The Delta is characterised by an extensive plain of rice fields that change colour and function depending on the season. In spring, the territory becomes a large expanse of fresh water at the start of sowing. In summer, the Delta turns into a plain of intense green colour, evolving throughout the maturation cycle until reaching a golden colour. By autumn, the rice has already been harvested and the fields are partially covered with water again. In winter, the territory is coloured in earthy tones when the fields dry out to resume the production cycle.

The Ebro Delta rises only 5 metres above sea level at its highest point. However, the average elevation of the entire territory is less than 0.87 m above sea level. Large coastal lagoons, wetlands, brackish water areas and long beaches are preserved, with areas very little altered by human activity such as Punta del Fangar and Punta de la Banya. These landforms define the Fangar and Alfacs Bays.



Territory size
38,850 ha (32,000 ha of land, 6,850 ha of bays)

Annual precipitation [6]
528 mm per year. Rainfall is highest in autumn and lowest in summer.

Geology and soil [7]
The Delta is a combination of environments characterised by different types of **sediments and alluvial materials**, such as sands of different sizes and silts, which are distributed by marine dynamics, including waves and storms.

Population [8]
72,000 people in 2021.

Productive activities
Rice cultivation, tourism, aquaculture, and salt production are the main activities. Hunting and fishing are also productive activities.

Main habitats [9]
Ebro River and the riverside forest, rice fields, river islands, coastal lagoons and wetlands, bays, freshwater springs, beaches, dunes, and salt flats. **23 habitats** included in Directive 92/43/EEC, of which 2 are of priority conservation.

Key species [10]
500 species of vertebrates. Some 340 species of birds, representing 60% of the species in Europe. 101 species of fish, 22 species of amphibians and reptiles (all with some level of protection), and 21 species of mammals. In total, 23 vertebrate species in the Delta have a recognised conservation status.

764 taxa of flora. Species of national and/or international importance, such as flower soda (*Zygophyllum album*), trencadalles (*Kostelezkya pentacarpos*) and limonium (*Limonium vigoi*), endemic to the Delta.

6 *Climatología e hidrología. Ministerio de Fomento, Gobierno de España.*

7, 9 & 10 *Natural Parks of the Generalitat de Catalunya.*

2.1 Geology and geomorphology

The Delta is an area with unique geological and geomorphological characteristics. Its origins date back to the moment when the Ebro River opened its way to the Mediterranean, approximately 5.3 million years ago. The Delta is a changing and constantly evolving system since its shape depends on the sediments provided by the Ebro River and the interaction with the sea.

The Delta that we know today has a geological history of eight millennia. It is built up of different layers of silt, sand, and gravel. Three main geological areas stand out: the deltaic plain, the coast or coastal environments, and the marine areas.

- **Deltaic plain:**
  It corresponds to a large part of the emerged surface area, composed of medium sands and silts from the fluvial activity of the Ebro. A large part of the surface is dedicated to the cultivation of rice.
- **Coastal front:**
  It comprises of coastal ecosystems and the diversity of habitats that characterise them. It is the flooded and emerged space composed of coastal lagoons and sandy beaches.
- **Marine environment:**
  It is the submerged part outside the land limits of the delta. It includes the Fangar and Alfacs Bays.

The Delta's natural geological processes have effectively come **to a halt** over the past century. Because of the 200 dams built across the Ebro River Basin during the last century, the Ebro River can no longer carry out its ecological role. In fact, **99.9% of the sediments** that once sustained the Delta's coastline are now trapped behind these dams. On top of this, the ecological flow has been significantly reduced, limiting the river's ability to transport what little sediment remains. As a result, this lack of water and sediment has led to a pronounced process of **coastal regression** in the Ebro Delta, driven by rising sea levels and increasingly severe marine storms. This is causing **serious problems** across the whole area, with the continuous loss of land in the delta plain and growing vulnerability along the coastline. Recent events, such as Storm Gloria in 2020, clearly exposed just how fragile the delta system has become.



Figure 3:
Map of the Delta in two recent timeframes, showing how its shape has changed. On the left, a 1945 aerial image (in white, the current perimeter of the Ebro Delta), where the Delta has a wide coastal front. On the right, a 2025 aerial image, where the coastal front is much narrower, increasing its vulnerability to climate change.

2.2 Soil, hydrogeology, and river network

The deltaic surface, being land reclaimed from the sea, has naturally saline and highly permeable soils. However, **human intervention in the territory** has led to a substantial change in natural conditions, particularly since the 1860s[11], when rice cultivation began. In order to enable production, the Delta has undergone a series of major hydrological modifications that have made it possible to supply freshwater to the deltaic alluvial plain and facilitate agricultural production through soil desalination. To reduce high soil salinity, a complex network of canals and drainage systems was built, and this change has led to a significant transformation of the territory over the past 150 years.

This historical modification of the hydrology, through the network of canals and drains, has also had an impact on the state of the bays and their ecological conditions. Previously, the only supply of fresh water was provided by the natural flow. Currently, the water distributed throughout the delta plain for rice cultivation is pumped into the bays and the open sea. This situation makes the physicochemical conditions variable and complex, changing throughout the year depending on the supply of fresh water to the rice fields.

The three main layers of the Ebro Delta aquifer are the shallow, intermediate, and lower aquifers. The shallow aquifer is a layer 5 to 10 m deep where salinity is highly variable. Freshwater predominates in spring environments and near the river, but the rest is naturally saline. The intermediate and lower aquifers correspond to depths of 10 to 50 m and 70 to 500 m respectively. These are composed of clays, silts, and gravels. Saline intrusion is a growing phenomenon that already affects water quality and the productivity of rice fields, especially during periods of drought or low river flows.

2.3 Habitats and biodiversity

Despite the transformations it has undergone throughout history, the Ebro Delta remains a wetland of great international importance. It hosts **a total of 26 Habitats and 14 Species of Community Interest**[12], a unique combination in the Mediterranean. It is included under several protection designations, including the Natura 2000 Network (SAC and SPA sites), the Plan for Areas of Natural Interest (PEIN), the Ebro Delta Natural Park, the Ramsar Convention, and the Terres de l'Ebre Biosphere Reserve.

The Delta's biodiversity is unique for several groups. Birds are the group that stands out the most: **more than 350 species** have been observed out of the almost 600 existing in Europe. The Delta is a wintering and migratory stopover site, generating large concentrations of wading birds, anatidae, herons and other families in search of food, shelter and space to reproduce. The flamingo (*Phoenicopterus roseus*), the collared pratincole (*Glareola pratincola*), the Kentish plover (*Charadrius alexandrinus*), the slender-billed gull (*Larus genei*), the Sandwich tern (*Thalasseus sandvicensis*), and the shelduck (*Tadorna tadorna*) are among many species that are listed as vulnerable by the International Union for Conservation of Nature (IUCN).



[11] ***DeltaPolet***

[12] *Departament de Territori i Sostenibilitat. ES0000020 Ebro Delta*

The following environments stand out:

1.

The Ebro River:
It is the central axis of the territory, providing freshwater and sediments that flow into the sea. Riparian forest and fluvial habitats stand out species such as river honeysuckle (*Lonicera biflora*) and fish adapted to strong salinity gradients such as the European eel (*Anguilla anguilla*), which is critically endangered [13].

2.

The Bays of Fangar and Alfacs:
They are made up of shallow, nutrient-rich waters that host a high diversity of marine life. Within them, seagrass meadows of marine phanerogams such as Cymodocea nodosa and Zostera noltii thrive, which create an essential habitat for numerous species. Among the most emblematic is the fan mussel (*Pinna nobilis*), an endemic Mediterranean mollusc currently critically endangered [14], as well as a wide variety of molluscs and other aquatic invertebrates that find shelter and food in these ecosystems.

3.

Beaches and dunes:
Wide beaches and dunes form a dynamic territory with the presence of habitats conditioned by the sea and the winds. The Delta has the largest dune complex in Catalonia, and is a breeding ground for species such as the loggerhead turtle (*Caretta caretta*).

4.

Salt marshes and salt pans:
Areas of high salinity that host plant communities that are among the most threatened in Europe. They represent a key refuge for many species, especially waterfowl and waders. The diversity of microenvironments and trophic complexity is significant. This environment gives life to species of national and/or international importance, such as the flower soda (*Zygophyllum album*), trencadalles (*Kostelezkya pentacarpos*) and *Limonium vigoi*, an endemic species of the Ebro Delta.

5.

Coastal lagoons:
The eight main lagoons of the Delta are: Bassa de les Olles, Canal Vell, Garxal, els calaixos de Buda, l'Alfacada, la Platjola, la Tancada and l'Encanyissada. All of them are characterised by shallow bodies of water (up to 1 m), with fluctuations in salinity. They are surrounded by extensive reed beds (*Phragmites australis and the subspecies chrysanthus*), rushes (*Juncus sp.*) and glasswort (*Salicornia sp.*), habitats where a complex trophic network develops that supports high biodiversity.

6.

Freshwater springs:
They are freshwater springs in peatland areas, refuges for unique and endangered species such as water lilies (*Nymphaea alba*), reptiles such as the Mediterranean pond turtle (*Mauremys leprosa*) and the European pond turtle (*Emys orbicularis*), as well as fish such as the samaruc (*Valencia hispanica*), the fartet (*Aphanius iberus*) and the river blenny (*Salaria fluviatilis*), the latter endemic to the Iberian Peninsula.

7.

Rice fields:
Extensive crops that, due to their water management, function as artificial wetlands. These are areas flooded with freshwater for much of the year. The 21,000 hectares of cultivated land change colour throughout the seasons thanks to the phenological development of rice, a distinctive feature of this territory. This allows thousands of organisms to find refuge, food, and breeding grounds. In particular, birds such as herons (*ardeids*), gulls (*larids*), and ducks (*anatids*), but also mammals such as bats and invertebrates such as dragonflies (*Sympetrum sanguineum*) and damselflies (*Libellula sp.*).

[13] *Pike, C., Crook, V., & Gollock, M. (2020). Anguilla anguilla (European eel).*

[14] *Mar Balear. (2021). Nacra (Pinna nobilis)*

The Delta is also a key node on the Euro-African migratory route (*Atlantic Flyway*), which gives it international importance and makes it a strategic point for global bird conservation.



Figure 4: *Aerial image of an experimental area in the Ebro Delta, where the effects of climate change on wetland habitats are being studied as part of the European Rest-Coast project.*

2.4 Climate and weather patterns

The climate of the Ebro Delta is a determining factor in the configuration of the territory. It has a marked **coastal Mediterranean** character, with dry summers, mild winters and a strong marine influence, which moderates temperature variations and maintains very high humidity [15] [16].

Temperatures are mild throughout the year, with an annual average of between 15 and 17 °C. The monthly average ranges between 10 °C in winter and 25 °C in summer. The average annual **rainfall** is **between 500 and 600 mm**, concentrated mainly in autumn. Summers are dry, and interannual variability is very high: in the last 30 years, annual records have varied between 251 mm and 1054 mm.

The Delta is a very windy area. Northwesterly winds (the Mistral) prevail, especially strong between November and April, often exceeding 100 km/h. Sea breezes are also common, generated by land heating. In autumn, easterly winds dominate, bringing humid air from the sea and potentially causing episodes of strong instability.

2.5 People and culture, land use, and patterns of development

The socio-cultural history of the Delta is marked by two key moments: firstly, the construction of irrigation canals (in 1860 in the right hemidelta and in 1912 in the left hemidelta [17]) and secondly, the mechanisation and industrialisation of rice cultivation in the mid-20th century.

Currently, the Delta is made up of seven municipalities with a total population of around 70,000 [18], a figure that has remained relatively stable in recent decades. The main economic activities are agriculture, aquaculture, salt production and ecotourism, as well as the services sector. Activities such as hunting are also practised.

[15] *Anejo nº3: Climatología e hidrología. Ministerio de Fomento (2009).* ***More information here.***

[16] ***Meteocat Website***

Before the construction of irrigation canals, life in the Delta was based on the use of available natural resources, hunting in marshes and lagoons, grazing, traditional salt production, the collection of glasswort and liquorice, fishing, and the export of leeches. It was a wild and harsh territory, with small scattered human settlements and a low level of environmental transformation.

Following the construction of the canals, the territory changed radically: from brackish environments and pristine lagoons it shifted to an agricultural system in the process of intensification, alongside demographic growth and socio economic transformation. Although initially most land was concentrated in the hands of a few landowners, over time many families acquired small plots for rice cultivation and the construction of traditional houses. This process, marked by effort and the struggle against malaria, gave rise to small scattered villages inhabited by people who came from various regions of the Iberian Peninsula.



Figure 5: *Image of a rice field characteristic of the pre-harvest period in the Ebro Delta.*

The relationship between people and the deltaic ecosystems has historically been based on subsistence and the sustainable use of natural resources, including pastoralism, fishing, hunting, and the gathering of native vegetation. For this reason, a distinctive cultural and intangible heritage is still preserved today, giving a strong identity to the territory in its various dimensions. Some **traditional knowledge and practices** linked to agriculture and the sustainable use of natural resources are still present. Examples include traditional fishing techniques such as the rall, as well as a unique linguistic heritage with its own terminology that includes **more than 250 local names for birds**[19]. Although more recent, customs such as rice planting, harvesting[20] and the construction of traditional dwellings such as "barraques" [21 & 22] are still celebrated.

From the 1950s onwards, the industrialisation of rice cultivation brought about a significant change, as traditional agriculture gave way to chemical and mechanical methods, and today **90% of the Delta's land area** is dedicated to rice production. This has led to the loss of **more than 70% of the area of natural wetlands and lagoons** since the mid-20th century[23].

Currently, large farms coexist with a network of small farms, with more than 65%[24] of farms having less than five hectares. Many of these farms face viability challenges. Industrialised agriculture is increasingly becoming the dominant model as a way to reduce production costs and maximise profits.

Rice production, however, has played **an important role for certain species and biological communities**. Despite being a source of pressure on the territory, pollution, and changes in water regimes, it has been the only agricultural option compatible with economic development and the conservation of natural resources.

The Ebro Delta has also established itself in recent decades as **one of the main ecotourism centres in the Iberian Peninsula**, particularly in birdwatching and active nature-based tourism. Its rich cultural and landscape heritage has turned the territory into an increasingly recognised international destination. This growing interest translates into **more than one million annual visits**, generating an estimated economic impact of over 30 million euros. Ecotourism is an emerging niche and a socio-economic driver with significant growth potential. Beyond generating income, it offers a way to diversify the local economy, reduce dependence on intensive agriculture, and create stable, quality employment. At the same time, it contributes to ecosystem conservation, strengthens the cultural identity of the Delta, and positions the territory as an international benchmark in sustainable tourism and regenerative bioeconomy.



Figure 6: *Image showing some of the characteristic elements of the Ebro Delta, including rice, reeds and soil in different states, traditional fishing gear, cookbooks, and materials for species identification.*

17 ***Website of the Generalitat de Catalunya.***

18 ***IDESCAT***

19 ***Website of DeltaPolet.***

20 ***Website of the Reserva de la Bioesfera de Terres de l'Ebre.***

21 *Queralt Tomàs, M. Carme. "Les barraques del delta de l'Ebre, un dels habitatges populars més antics i singulars de Catalunya". Revista d'etnologia de Catalunya, 2006, núm. 28, p. 96-108.*

22 *Barraques 2100 - Passat, present i futur d'una arquitectura popular.*

23 *Ibáñez, C., Prat, N., Canicio, A., & Curcó, A. (1999). El delta del Ebro, un sistema amenazado (Vol. 6). Fundación Nueva Cultura del Agua*

24 *Requena Mora, M. (2015) Entre natros i mosatros: representacions socials, discursos agraris i discursos mediambientals al delta de l'Ebre i l'Albufera de València. Universitat de València.*

3. Challenges of the territory

Like many other territories on the Iberian Peninsula, the Ebro Delta faces challenges of great magnitude, shared with numerous coastal and rural areas.

The main challenge is to rethink the way we organise and relate to the territory, seeking **socio-economic development models based on nature** that ensure prosperity, restore hope and regenerate ecosystems.

These challenges, identified by local stakeholders and collectively addressed in various participatory workshops, are grouped into four interconnected areas: environmental, social, economic, and governance. Addressing them requires a holistic, cross-cutting, and systemic approach capable of acting at territorial-scale and ensuring a resilient future in the face of climate change, as well as long-term prosperity.

3.1 Environmental challenges

The Ebro Delta faces three critical environmental challenges that affect its long-term viability: climate change, ecosystem degradation, and water/sediment scarcity. These factors, closely interrelated, compromise the ecological integrity of the territory and require specific strategic actions in the environmental field to strengthen its resilience.

1

Climate change:

Sea level rise, the intensification of extreme weather events (mainly droughts but also floods), and changes in precipitation patterns are increasing the fragility of the Ebro Delta. Soil salinisation, rising temperatures, and coastal erosion are among the main impacts of climate change.



CHALLENGE 1

How do we adapt to and mitigate the causes of climate change in a cross-cutting way?

2

Ecosystem degradation:

The loss of natural habitats, water and soil pollution, and the introduction of invasive species are progressively degrading the ecosystems of the Delta. Beaches, wetlands, lagoons, and riparian forests have undergone significant degradation in terms of ecological integrity over the past century.



CHALLENGE 2

How can we restore and expand the surface area, and improve the quality of priority habitats for biodiversity conservation?

3

Water and sediment shortage:

The reduction in the flow of the Ebro River has created a situation of water scarcity in a context of increasing demand for the resource. This directly affects sediment supply, agriculture, fishing, aquaculture, and the ecological condition of ecosystems.



CHALLENGE 3

What strategies can we use to address a context where water and sediment are scarce and highly-demanded resources?

3.2 Social and economic challenges

The Ebro Delta faces four socio-economic challenges that condition the viability of productive activities and the social cohesion of the territory.

4

Fragility of agriculture:

Recently, agriculture has been suffering from the consequences of high production costs and international competition. Rice cultivation is undergoing a process of agronomic intensification and economies of scale, driven by substantial reductions in farm yields. In addition, soil salinisation and water scarcity significantly worsen agricultural productivity, increasing financial risks. Organic rice production is declining due to the difficulty of controlling weeds and the lack of a scalable business model. Currently there is no consolidated system of regenerative and organic production, which limits the replicability and scalability of this more nature-positive production system.



CHALLENGE 4

How do we generate a business model based on regenerative and organic rice cultivation that is viable, replicable, and scalable?

5

Tourism

The Delta is experiencing an increase in tourism, both national and international, particularly in ecotourism, rural tourism, and nature-based tourism. Despite its economic potential, the strong concentration of tourist demand in the summer months generates problems of overcrowding, pressure on ecosystems, transformation of the territory and gentrification of the most frequented municipalities and natural spaces.



CHALLENGE 5

What regenerative tourism model do we promote? What capacity does the territory have to absorb tourist demand? How do we organise the territory and the people who visit it to minimise impacts and regenerate natural spaces?

Decline of aquaculture and fishing

Overexploitation, pollution, and the warming of waters are negatively affecting aquaculture and fishing activities. This is reflected in the decline of fish populations and severe limitations in ensuring shellfish production, due to high mortality rates caused by elevated water temperatures and anoxia.

CHALLENGE 6

How do we rethink and incentivise the regenerative blue economy?

Generational shift

The Ebro Delta is suffering from an accelerated ageing process. The lack of job opportunities, especially for the young, is leading to a migration process towards the cities, although it is not as critical as in other Mediterranean territories. This causes a diaspora phenomenon, a decrease in the active population and the ageing of the local population.

CHALLENGE 7

How do we generate local prosperity, quality services, and attract youth talent?



Figure 7: *View of the Ebro River from the Serra de Montsià Natural Area, one of the emblematic viewpoints from which the transition between forested areas and the agroecosystem mosaic of the Ebro Delta can be seen.*

3.3 Challenges related to governance

Governance is a key element for the success of any plan, such as the one presented in this document. In the case of the Ebro Delta, the institutional complexity, the multiplicity of interests and the absence of a shared long-term vision have generated a fragmented management of the territory. This translates into three main challenges:

Institutional fragmentation

The lack of coordination between the different public administrations at different levels (local, regional, state, and European) makes it difficult to implement coherent, transversal, and effective policies for the development of the territory in terms of bioeconomy and climate resilience.

CHALLENGE 8

What model of shared governance and leadership do we have the capacity to promote, implement, and sustain to advance the bioeconomy across the whole territory?

Deep-rooted dynamics

As a result of institutional fragmentation, the Delta inherits historical power dynamics. This leads to strong tensions around the use and management of natural resources.

CHALLENGE 9

How can the territory transform these entrenched dynamics and make the transition towards management models based on the regeneration of nature that are fair, democratic, and horizontal?

Lack of operational governance and strategic planning

The Ebro Delta is a complex territory, where multiple uses, values, and divergent visions of the territory overlap. Currently, there is no entity or alliance capable of articulating a clear and shared vision of the future, nor operational mechanisms that guarantee efficient implementation. The absence of a long-term strategic vision has led to uncoordinated management between various institutions with competences in the territory. As a result, there is a lack of coherence in territorial policies and a clear and agreed roadmap focused on ensuring prosperity and a dignified future for the people and ecosystems of the Ebro Delta.

CHALLENGE 10

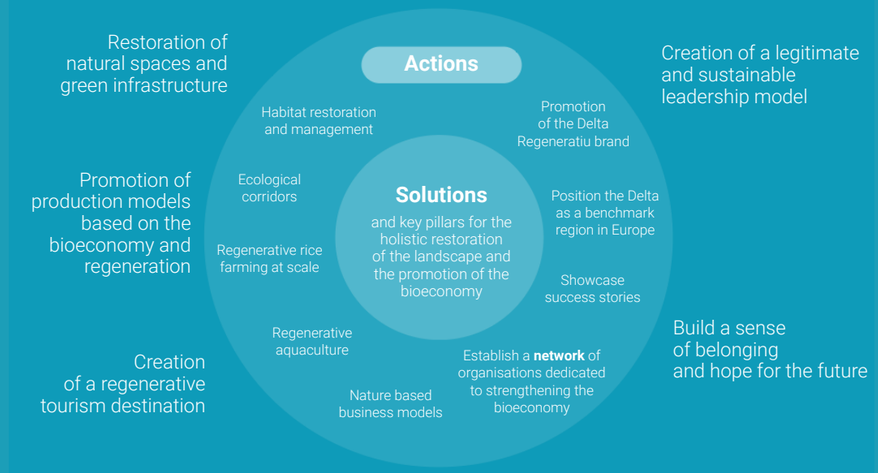
How do we collaboratively plan and execute a territorial model based on regeneration?

4. Strategic opportunities for the bioeconomy

Despite the challenges identified, the Ebro Delta has a wide range of opportunities to consolidate itself as a leading territory in the Mediterranean in socio-economic regeneration.

The trajectory of several pioneering initiatives already established in the territory generates the ideal conditions for a leap towards a socio-economic model based on the restoration of natural capital.

Materialising these opportunities can become a lever capable of catalysing the large-scale transformation of the Delta. This section identifies five strategic axes to drive territorial regeneration and promote the bioeconomy at scale:



4.1 Restoration of natural spaces and green infrastructure

The conservation and restoration of natural areas is essential to ensure the resilience of the territory and its capacity to contribute to the wellbeing of the people who inhabit it, in the short, medium, and long term. The territory currently includes a network of public and private natural spaces. It is therefore essential to protect existing ecosystems and improve the management of current areas, as well as to restore new ones in order to increase ecological integrity and preserve biodiversity. Priority restoration areas include the coastal front, riparian forests, springs and marshes, as well as the creation of biological corridors that link and interconnect ecosystems.

4.2 Development of a regenerative rice production model

The promotion of business models based on nature and oriented towards the regeneration of natural capital is key to consolidating the bioeconomy as a driver for generating social, environmental, and economic benefits. In this sense, developing a production model for organic, regenerative rice, with a low carbon footprint and high ecological value, that is viable, replicable, and scalable, becomes an essential line of work.

4.3 Creation of a regenerative tourist destination

The Ebro Delta is already a consolidated ecotourism destination, with more than 1.4 million annual visits, an offering linked to the Natural Park supported by the European Charter for Sustainable Tourism. However, tourist pressure, concentrated in the summer months, generates negative impacts on natural ecosystems (overcrowding, pressure on ecosystems, and gentrification). We must strive to position the Ebro Delta as **a tourist destination with regenerative criteria**, where each tourist experience actively contributes to the restoration of natural heritage, the socio-economic development of the territory, and the conservation of the culture, traditions, and gastronomy of the Delta. The main intention is to **make the territory a European benchmark in regenerative tourism**.

4.4 Promoting a leadership model to promote the bioeconomy

The Ebro Delta needs a structure or mechanism focused on leading and articulating a shared vision based on territorial regeneration, responsible for ensuring the long term implementation of a development model grounded in the bioeconomy. The main intention is to build shared leadership that is legitimate, inclusive, and capable of enduring beyond individual projects, acting as the main driver and catalyst of deep territorial change.

The ambition is to structure a set of organisations dedicated to strengthening the existing network of bioeconomy-based businesses, creating, and establishing collaboration and support networks among diverse actors. To achieve this, it is necessary to deploy a set of financial, operational, and monitoring infrastructures, tools, and mechanisms to drive the transformation.

4.5 Promoting culture, identity, and heritage

Each of the previous sections is highly relevant, but it is essential to highlight the importance of generating and strengthening a sense of belonging and hope for the future of the territory, especially among the people who live in and are part of the Ebro Delta. Through the promotion of the bioeconomy and territorial regeneration, cultural assets should be valued, local success stories showcased, and the benefits and challenges of the territory communicated in a shared and cohesive way, so that all people can be inspired by the Delta itself and it can become a beacon for other regions of the Mediterranean.

In addition to the various events such as rice planting festivals and harvest celebrations, as well as a range of gastronomic and cultural events (such as the Mescla festival, the Festa del Mercat a la Plaça, Orígens, and gastronomic events on rice, prawns, artichokes, and baldana), it is essential to promote flagship events such as the Delta Birding Festival [25] or the Ecotourism Festival [26]. These events act as **economic drivers that support the positioning of the territory** in ecosystem conservation, local culture, and the regeneration of natural capital. At the same time, it is necessary to promote environmental education and outreach programmes, both for local communities and visitors, integrating scientific knowledge with local experience. It is also necessary to mobilise public support, encourage citizen participation in governance, and build a stable collective movement in favour of territorial regeneration.



Figure 8: *l'Espai Natural de la Serra del Montsià seen from the deltaic plain, with rice fields in the foreground and the mountain range in the background.*

[25] *Delta Birding Festival*

[26] *Festa de l'Ecoturisme del delta de l'Ebre*

5.
The future vision of the territory

To define the long-term future of the territory, a key step is to set out a desired future scenario that reflects the collective aspirations of the Ebro Delta. To this end, a shared vision was co-designed through a participatory process involving key stakeholders from across the territory. In one of the workshops held at the Living Lab Ebre Bioterritori, participants developed both desired and undesired future scenarios for the Ebro Delta in 2050. The result of this shared long-term vision is as follows:

> By 2050, the Ebro Delta has become a global reference in ecological restoration and rural development, contributing to the prosperity and future of the territory through holistic regeneration.



Figure 9:
Participatory session where the shared future vision of the Ebro Delta was designed collaboratively, on 25 June 2024.

The group of pioneers in the bioeconomy in the Ebro Delta imagine a territory where the economy thrives in harmony with nature and with the conservation of biodiversity. In this scenario, the Delta will be a **mosaic of ecosystems of high ecological integrity**, as significant efforts will have been made to restore and protect habitats and species through regenerative businesses that preserve local traditions, gastronomy, and knowledge. Both agriculture and aquaculture, fishing, and other productive activities will be developed in:

- **Rice**, cultivated using organic, regenerative, low-carbon methods and with high biodiversity benefits, could become a key driver in the diversification of agriculture and economic activity in the Delta.
- **Tourism**, which is also regenerative, will also have become a key pillar of the Delta's economy. It will offer high-quality, low-density experiences focused on nature and the promotion of local culture. Visitors will be able to enjoy and contribute to the preservation of a natural environment of high ecological integrity.
- **Fishing and aquaculture** will be carried out sustainably, ensuring the health of marine ecosystems and the continued abundance of fishery resources.

In addition to these three main activities, the Delta economy will have diversified, promoting traditional economic activities such as salt production, the circular economy, or bioconstruction. Nature-based business models will have been implemented that will generate local products and experiences of exceptional quality, highly valued nationally and internationally.

The population of the Delta will be an active community committed to regeneration, inspired by other territories that believe in the development model based on the bioeconomy. The population will participate in decision-making and work collaboratively to address common challenges. Young people will find job opportunities in sectors such as agriculture, aquaculture, tourism, and applied research, focused on the regeneration of the territory. The governance of the Delta will be horizontal, transparent, and democratic, with strong interaction between public administrations, businesses, and civil society. An entity will have been created that works at territorial level and promotes practices based on regeneration and the promotion of the bioeconomy.



Figure 10: *Participatory session held on 5 June 2024 in which the challenges facing the territory were identified.*

Basic principles for the development of the long-term vision of the Ebro Delta:

1 Positive impact on nature:

The Ebro Delta must promote socio-economic activities that improve the biodiversity of flora and fauna, the quantity and quality of habitats, soil, and water. In addition, they must enhance the ecological value of the Delta territory as a connector. The impact will be visible and measurable.

2 Quality of life and prosperity for people:

Bioeconomy-based activities should contribute to improving people's wellbeing, both material and immaterial. This can be achieved by promoting regenerative entrepreneurship and quality employment, as well as the attraction and retention of talent around value-added economic activities that are respectful of the territory. It is also necessary to address the challenges of generational renewal in agriculture, aquaculture, and fisheries, strengthening social and economic cohesion and regenerating the local social fabric, while fostering coexistence and access to essential goods and services such as housing, education, health, leisure, mobility, and safety.

3 Resilience:

The promotion of the bioeconomy must increase the territory's capacity to adapt to, mitigate and respond to the impacts of climate change, natural disasters, and socio-economic fluctuations, while maintaining the integrity and value of the territory.

4 Asset value and infrastructure quality:

Land use transformation through nature-positive activities can help increase the economic and social value of existing and future assets, including properties, infrastructure, and natural resources, for the benefit of the people of the territory, and an economic development based on the regeneration of nature.

5 Open, non-extractive system:

The promotion of the bioeconomy, by developing regenerative businesses, will facilitate the participation of local companies in collaboration with investors and external actors. This can be achieved through investment models and transparent, balanced governance, increasing the availability of financial resources for the regeneration of the territory, driven by increasing interest in investing to promote the bioeconomy in the Ebro Delta.

6.
Strategy of Regeneration

In line with the vision for the future and the different opportunity areas identified, the strategy to achieve it is based on four fundamental pillars that are applied across the three major areas of the territory.

1. Natural Zone

2. Combined Zone

3. Economic Zone

6.1 Strategic pillars

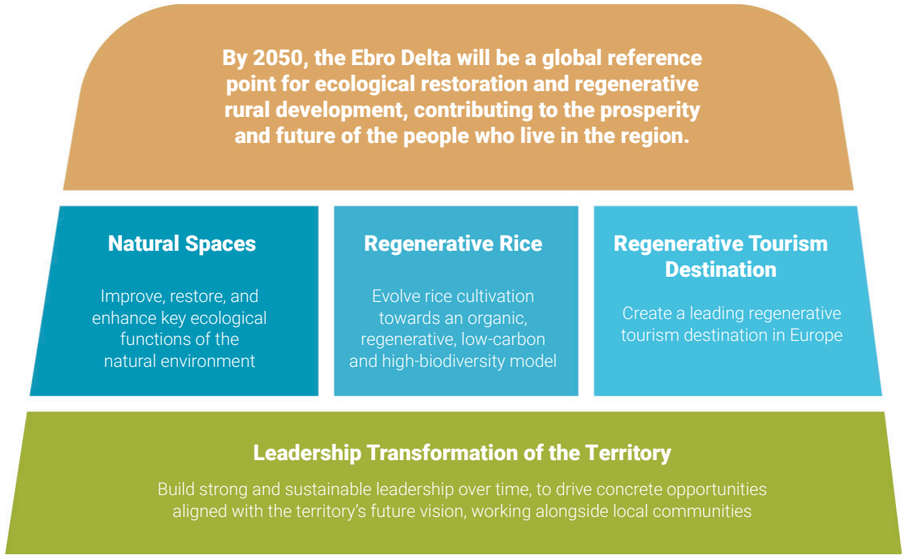


Figure 11: *Infographic of the strategic pillars for promoting the bioeconomy in the Ebro Delta.*

6.2 Natural Zone

The natural zone of the Ebro Delta includes a terrestrial and marine area where ecological processes develop with minimal human intervention, allowing biodiversity to be preserved, restored, and to thrive. It includes coastal lagoons such as the Encanyissada and the Tancada, freshwater springs and marshes, riparian forests and river islands in the final stretch of the Ebro, as well as the coastal front, dunes, beaches, and bays, where seagrass meadows are particularly notable. These environments form the high ecological value core of the Delta, supporting most of its biodiversity and providing essential ecosystem services.

The strategy for the natural area focuses on **strengthening the resilience** of the Delta's natural capital, ensuring that ecosystems can adapt to climate pressures and human activity. This involves **restoring degraded habitats, recovering native biodiversity, and improving ecological connectivity between natural areas**. It also involves strengthening the provision of ecosystem services that support human wellbeing and the identity of the territory, such as water regulation, coastal protection, carbon sequestration, invasive species control, and the maintenance of the landscape and cultural values that define the Delta. To achieve this, it is necessary to expand and connect spaces, restore wetlands, riverbank forests, and dune systems, and promote ecological corridors that ensure territorial continuity. With this vision, the natural area becomes the essential green infrastructure of the Delta, a space of preservation and regeneration that safeguards biodiversity and positions the territory as a Mediterranean reference in ecological restoration and climate resilience.

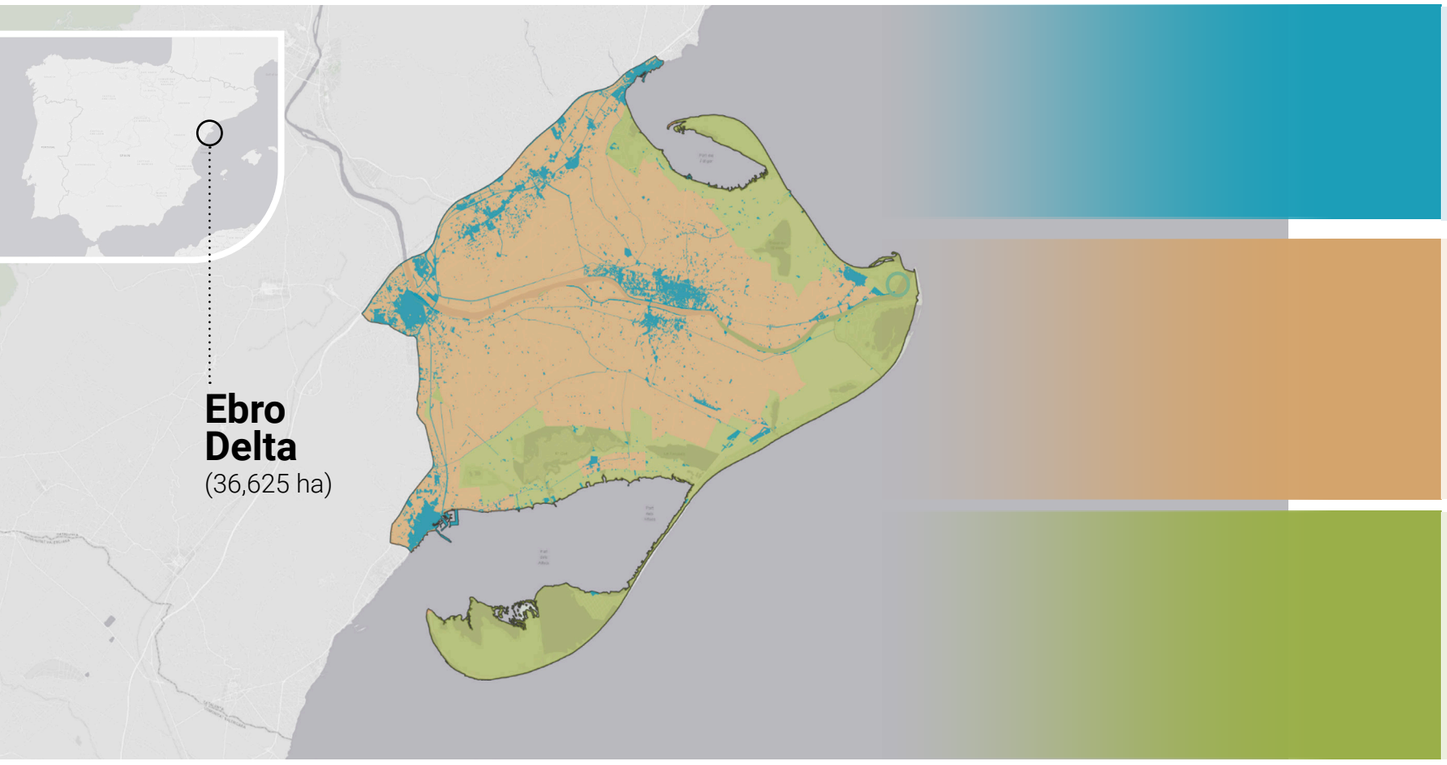


Figure 12: *Map of the Ebro Delta showing the three main zones: economic, combined, and natural.*

Strategic objective:

Consolidate and expand the protected natural area, ensuring active and sustainable long-term management of both protected and non-protected spaces.

Key action areas:

- **Habitat restoration and management**
  - » Increase the surface area of natural spaces, conserve ecological processes and biodiversity, and maximise the provision of ecosystem services.
  - » Prioritise actions in emblematic spaces such as the Bombita Estate, Buda Island, the Garxal, or the Alfacada Lagoon, among others.
  - » Create green infrastructure such as vegetated filters, marshes, and artificial lagoons to improve water quality.
- **Ecological corridors and connectors**
  - » Create and restore ecological corridors that connect different natural spaces to facilitate the flow of species.
  - » Promote the riverside forest and the freshwater springs.
  - » Develop a network of coastal wetlands.

6.3 Combined Zone

The combined zone of the Ebro Delta is the **transition space between strictly natural areas and urban and industrial areas**. It is the area where the main economic activities take place, such as rice farming, nature-based tourism, active tourism, and ecotourism. This area is made up of rice fields. Managed as artificial wetlands, the rice fields provide habitat for a great diversity of species, including birds, fish (such as eel), amphibians (such as the green frog), insects, and mammals.

The main intention in the combined zone is to create an integrated productive mosaic, combining nature-positive agriculture, such as organic and regenerative farming, with regenerative tourism activities. These socio-economic activities should contribute to ecosystem wellbeing and to the preservation of the cultural and historical identity of the territory. In this zone, the aim is to promote a framework of bioeconomy-based practices that regenerate and restore the territory, foster biodiversity, and offer high-value experiences for the socio-economic development of the Delta. In this sense, organic and regenerative production and consumption should be encouraged and recognised, demonstrating their viability and scalability, and strengthening distribution channels and consumer networks.

This implies:

1. Work a significant area to demonstrate that organic and regenerative farming is viable, with low carbon impact and high biodiversity.
2. Supporting the transition of young farmers to increase production hectares, position local brands in channels that maximize product added value, make use of by-products, and develop synergistic crops.
3. Promote applied research and define an internationally recognised standard for organic and regenerative rice.

At the same time, it is essential to recognise and communicate the **pioneering initiatives** already taking place in the territory that are promoting business models based on nature regeneration, such as regenerative rice cultivation and regenerative tourism. It is also necessary to highlight and project new initiatives under a shared identity, positioning the Ebro Delta as a reference territory in regenerative production and in the preservation of its cultural and natural heritage.

These practices, **compatible with biodiversity conservation**, can help to renaturalise and regenerate the agricultural mosaic, providing green infrastructure that connects the territory and tourism facilities that showcase the appeal of the Delta. This combined zone acts as an intermediate area that **balances economic performance with nature conservation**.

Strategic objective 1:

To lead the production of organic, regenerative, low-carbon, and high-biodiversity rice at a European level, guaranteeing the profitability of producing companies and increasing the support of the rice community towards models based on the regeneration of the territory.

Strategic objective 2:

To be a benchmark in three segments of regenerative tourism by creating a high-quality and low-impact offering, which positions the territory as a leading reference in Europe.

Key action areas:

- **Regenerative rice farming on a large scale**
  - » Co-design, with local farmers, an ecological and regenerative rice production system, low in carbon and with high ecological value.
  - » Support the transition from conventional rice cultivation towards more profitable models based on the regeneration of natural capital.
- **Promote a high-level regenerative tourism brand**
  - » Develop a brand with a strong identity that positions the Delta as a tourist destination that actively improves its natural and cultural assets.
  - » Create or use certification and monitoring mechanisms to guarantee the regenerative impact of tourism businesses and activities.
  - » Promote tourism products with high added value that directly contribute to the regeneration of the territory.
  - » Use the network of interpretation centres and experience points as nodes of knowledge and engagement with the territory, connecting visitors with the nature, culture, and local communities of the Delta.
- **Traditional and alternative activities**
  - » Encourage the recovery and promotion of traditional activities, such as salt production and harvesting of salicornia and the cultivation of marram grass to add value to low productivity agricultural areas.
  - » Promote mechanisms based on environmental compensation such as carbon and biodiversity credits to ensure the diversification of funding sources within rice cultivation.

6.4 Economic Zone

The economic zone of the Ebro Delta consists of **urban centres and industrial estates**, where human activity has most intensely transformed the territory, with functions centred on residential use, services and industrial production. These are areas of high infrastructure and activity density that have replaced natural habitats, concentrating most of the territory's population and services. However, the urban fabric of the Ebro Delta includes **spaces with potential for renaturalisation and regeneration**.

The main focus is to **create an ecosystem of regenerative entrepreneurship** to boost the bioeconomy. This involves facilitating the transition of companies and services towards management models based on regenerative criteria, creating a business framework with sustainability labels and certifications and measurable positive impact, and establishing collaboration networks between municipalities and local stakeholders. In this way, urban and industrial areas can shift from being sources of environmental pressure to becoming **catalysts for regeneration**, reinvesting part of their profits into territorial restoration. In the economic zone, it is necessary to restore spaces that contribute to connectivity and to develop a network of high-value natural areas. It is also key to promote nature-based solutions within urban and industrial environments. This should be accompanied by the promotion of sustainable mobility within and between municipalities through restored ecological corridors, improved waste management, and a commitment to energy sovereignty and self-production based on renewable sources.

Strategic objective:

Consolidate the economic zone as an innovation and diversification hub capable of generating new economic opportunities based on the bioeconomy, supported by a network of green infrastructure and ecological corridors.

Key areas of action:

Regenerative businesses: Develop business models to support the implementation of regenerative activities across different types.

Secure public and private funding to promote the bioeconomy at territorial level

- Develop a strategy to attract public funding (EU, national, and regional) and private investment (impact investment, green funds, etc).
- Create a dedicated regenerative bioeconomy fund for the Delta to support strategic projects.

Alliance and shared governance

- Create a group of stakeholders with shared governance and collective commitment to regenerating the Delta, establishing mechanisms for citizen participation (forums, assemblies, digital channels) and fostering shared responsibility among local actors in decision making.

New narrative, education, and learning

- Develop a positive and inspiring story about the future of the Delta to maximize the sense of belonging, the restoration of hope, and shared inspiration.
- Create educational programmes for schools, Delta communities, and visitors.

Events and festivals

- Strengthen existing events and create new social events focused on territorial regeneration and the promotion of the bioeconomy.
- Create spaces for gathering, celebration, and shared inspiration around regeneration.

7. Roadmap for the restoration of the territory

The strategy to achieve the shared 2050 vision is based on specific objectives and indicators across the natural area, the combined area and the economic area. This section sets out the roadmap for tracking progress and consolidating the plan.



Figure 13:
Community of practice during the session on 10 December 2024 at the Eurecat Amposta Climate Resilience Centre.

The strategy to achieve the shared vision for 2050 focuses on specific objectives and indicators in the natural, mixed, and economic areas. However, this section outlines the roadmap to articulate, measure, and progress towards the implementation of the plan.

The roadmap is structured into three territorial transformation zones (Natural, Combined, and Economic). This structure enables adaptive planning of actions that are coherent with restoration objectives, climate resilience strategies, and the principles of the bioeconomy.

The initial stages of the plan involve the **implementation of robust, consolidated, and financially sustainable projects**. These projects must become flagship initiatives that exemplify and demonstrate the viability of territorial regeneration. In this line, a set of programmes and projects is being designed, including ecosystem restoration, regenerative rice production, and high-value experiences based on regenerative tourism.

7.1 Roadmap and indicators for the regeneration of the Ebro Delta

Note on indicators and associated figures:

This document is a first draft of the plan to promote the bioeconomy in the Ebro Delta. The figures and indicators included are based on the best available information at this stage. However, they will be refined and updated to ensure consistency across the plan and its different phases. These figures should be understood as estimates intended to reflect realistic potential scenarios and to guide the large scale development of the bioeconomy and territorial regeneration.

Natural Zone

2,500 ha
Restored natural area (wetlands, riverbanks, dunes, seagrass meadows)

40 km
Restored riverbank forest

+20%
Increase in biodiversity



Combined Zone

5,000 ha
Area of regenerative rice

100 jobs created
Employment generated through regenerative rice production

20 million tonnes
Annual regenerative rice production

60
Regenerative tourism businesses



Economic Zone

20
Newly created businesses

€500 million
Total investment in Delta regeneration



7.2 General description of each zone's roadmap to achieve the 2030 vision

Natural zone

By 2030, the main intention is to **restore one to two historic wetlands.**

To achieve the set objectives, the first step is to develop a **project portfolio** with the technical definition of the different wetlands to be restored. This will be built on a comprehensive analysis of land parcels, which will allow the selection of two strategic and viable sites for ecosystem restoration. This analysis will also include a priority assessment of potential funding sources and wetland uses, helping to generate economic resources.

Due to the distribution of a large part of coastal land within the public domain, it is essential to **coordinate the relevant public administrati**ons to define a strategy for access to land and the financing required for habitat restoration. It is necessary to agree on proper management based on nature conservation and the regenerative use of natural spaces.

Experience in the restoration of one to two historic wetlands will make it possible to develop the necessary procedures to restore these areas and understand the mechanisms that will facilitate replicability in other parts of the delta. Therefore, a technical team will be activated to coordinate the design, planning, execution, and monitoring of restoration projects and their outcomes, with the aim of scaling them across different areas of the Ebro Delta.



Combined zone

By 2030, it is necessary to create **strong operators in the fields** of regenerative rice cultivation and regenerative tourism.

Firstly, a study of local operators in organic rice and ecological tourism will be carried out. This mapping will enable a series of technical visits and will support the analysis of potential business opportunities based on the regeneration of natural capital and the promotion of the bioeconomy.

Prioritising this set of operators will make it possible to assess the feasibility of strengthening existing companies in the territory. To do so, it is necessary to align operators with the implementation of the plan and their capacity for scalability in both rice production and regenerative tourism, increasing their impact.

In parallel, a process of exploring international tour operators and local actors with leadership potential will be initiated, in order to **encourage investment in the territory** following the criteria of the shared long-term vision.

How operators should work in the bioeconomy

Operators in the Ebro Delta bioeconomy should work across the full chain, either by integrating processing and commercial activities into production or by diversifying products across different sales channels.

A key priority is to **strengthen regenerative rice and tourism systems**. This requires combining access to land, productive efficiency, and farm management with clear market positioning for both agricultural products and tourism services. The aim is to **develop high quality products and services that stand out in the market**.

In the agricultural sector, the objective is to reduce production costs and increase productivity per hectare through regenerative practices, carbon reduction, and biodiversity enhancement. To achieve this, mechanisms will need to be established that optimise land use and enable increased yield per unit area.

Pricing should also reflect the full impact of products, including environmental benefits such as carbon capture and wetland biodiversity conservation, as well as social and economic benefits linked to regenerative territorial development.

In addition, mechanisms will be established to acquire and manage demonstration sites. These sites will show how nature conservation, regenerative rice farming, and high quality regenerative tourism can work together. The first step is to **identify specific farms and make arrangements with farmers** that enable the three pillars of the strategy to be developed jointly, including consideration of public and private funding to acquire or operate them. The main short-term objective is to demonstrate the viability of regenerative economic activities and to act as demonstration sites for the bioeconomy.

Economic zone

The main short-term objective is to create a **regenerative socio-economic ecosystem** and the necessary tools to structure it. To achieve this, it is essential to design and implement the organisational and funding structure that facilitates the creation of a constellation of entities and the funding and operational mechanisms necessary to articulate the three pillars of the plan for the promotion of the bioeconomy: rice, tourism, and conservation.

First, the **entity responsible for promoting the vision and developing the plan will be established**. With a consolidated team, it will be responsible for coordinating the entities involved and developing the defined programmes and projects. In addition, it will also have to promote access to land through land stewardship agreements and the purchase of spaces at strategic points.

One of the key points will be the **creation of and access to innovative financial resources** of various types. The establishment of a specific fund for regenerative rice projects and tourism projects based on regenerative principles will be explored, promoting collaboration between different producers to coordinate actions and exchange experiences.

Finally, to ensure success and continuous learning, the entity will need to foster collaboration with existing operators, promoting effective governance that enables the coordination of the different programmes.



8.
Conclusions and projection of the proposed territorial plan

BIO RESIL MED

The proposed Plan for the Promotion of the Bioeconomy in the Ebro Delta brings together the main challenges and strategic opportunities for developing the bioeconomy in the Delta, within the framework of the BIORESILMED project.

The document provides a technical and strategic reference framework to guide possible transition scenarios for the territory towards a development model based on the restoration of natural capital and the bioeconomy, in line with the objectives of climate resilience and large-scale territorial development.

The **Plan for the Promotion of the Bioeconomy in the Ebro Delta** is established as a strategic proposal for the transformation of the territory towards a model based on the bioeconomy. This document is the result of a rigorous process of **collaborative governance** and co-creation initiated in 2024 through the **Living Lab Ebre Bioterritori**. Through the active participation of fifteen key entities, a roadmap towards 2050 has been defined based on the bioeconomy and climate resilience, through the development of initiatives that restore ecosystems, promote regenerative tourism, and support an agricultural model based on organic, regenerative, low-carbon rice cultivation that is rich in biodiversity.

The analysis confirms that the Ebro Delta has a **high level of vulnerability** to the impacts of climate change, particularly in relation to coastal regression, salinisation, habitat loss, and the reduced water and sediment supply transported by the Ebro River and deposited along the coast. These factors are compounded by socio-economic and governance challenges that affect the viability of current production models and the territory's capacity to implement coordinated and efficient responses to climate change and to the opportunities present in the region. In this context, there is a clear need for an integrated, cross-cutting, territorial-scale approach to promote and deploy bioeconomy-based mechanisms, understood as socio-economic activities such as organic agriculture, regenerative tourism, and nature restoration.

We are facing a **historic juncture** where the Ebro Delta presents an unprecedented set of opportunities. Taking advantage of this key moment to regenerate part of the territory is not only an environmental necessity, but a key way to promote a new territorial development model that ensures long-term prosperity. By recovering degraded areas and increasing the value of assets through the restoration of natural capital, the Delta can **transform its threats into competitive advantages** and develop new engines for generating wealth, employment, and social well-being.

The plan identifies the **bioeconomy as a structuring development driver** for the territory, as it enables challenges to be addressed in a coordinated way. The restoration of priority ecosystems, the development of a viable and scalable regenerative rice model, the consolidation of tourism with regenerative principles, and the enhancement of natural and cultural heritage are defined as key strategic lines. These lines support progress towards a model that combines ecological functionality, economic profitability, and social return and territorial inspiration or hope, reducing dependence on more intensive and highly vulnerable systems.

The approach of the plan, aligned with the **Commonland 4 Returns Framework** and the **United Nations Decade on Ecosystem Restoration**, shows that the bioeconomy, understood as the recovery of natural capital, is central to territorial development and to ensuring the long term prosperity of the Delta.

This proposed of the plan is based on a **long-term vision** in which ecosystem restoration, together with regenerative agriculture and tourism, act as the main drivers of change. To structure these and ensure the vision translates into tangible, scalable and sustained impact, the next steps are as follows:

This plan is not a fixed implementation tool, but a **framework and dynamic document** that sets out different development pathways through specific operational instruments, such as the rollout of the roadmap, the definition of measurable objectives, the prioritisation of actions and the identification of financing mechanisms. It therefore provides the basis for the territory's **transition towards a large-scale, regeneration-focused management model**. Its implementation will require the strengthening of collaborative governance structures capable of coordinating stakeholders, public and private institutions, various administrations, productive sectors, and the citizens of the Ebro Delta.



Sustainability and financial viability

Development of a detailed economic framework that brings together blended funding sources (public and private) and innovative collaboration mechanisms. This pillar supports the delivery of priority actions, ensuring that environmental restoration also contributes to long-term prosperity through activities such as rice cultivation and regenerative tourism, which help maintain key habitats and species in the Delta.



Shared leadership and governance

Consolidation of a permanent space for dialogue and cooperation between public administrations, the private sector and citizens. With the technical and scientific support of the Climate Resilience Centre (CRC), this pillar ensures rigour in decision making and the application of collaborative solutions, enabling territorial actors to drive large scale regeneration.



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