LIFE CLINOMICS
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Given the seriousness of the predicted **inevitable impacts** of climate change, each geographical region must also take measures that will allow it to **adapt to the changes to come** (resilience).

Therefore we must...

Minimize **vulnerability** to **risks and negative impacts**

Identify **positive impacts** and transform them into **opportunities for all sectors and regions**

Therefore, we must promote adaptive measures for all economic sectors in order to guarantee their **sustainable activity in the new climate scenario.**

The European LIFE CLINOMICS project **has selected three regional areas of Catalonia,** each with ecosystems representative of the country as a whole in order to analyse and evaluate the vulnerability and impacts each region faces from climate change.

The information should allow:

- The adaption/modification of **local socio-economic policies and activities**.
- Catalonia to serve as a **replicable model** in other Mediterranean areas of southern Europe.

Access to the technical report: **http://lifeclinomics.eu/en/informes**

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THE VULNERABILITY OF THE TERRES DE L'EBRE TO CLIMATE CHANGE

THE IMPACT OF CLIMATE CHANGE ON THE AGRO-FORESTRY, FISHERY, AQUACULTURE AND TOURISM SECTORS

THE LIFE CLINOMICS PROJECT OF CATALONIA AND THE ADAPTATION OF THE REGION TO CLIMATE CHANGE

Adapting to climate change is a **collective challenge**.

It calls for a **shared effort** on the part of all social and economic agents, organisations, groups, and public institutions, in all sectors and at all levels.

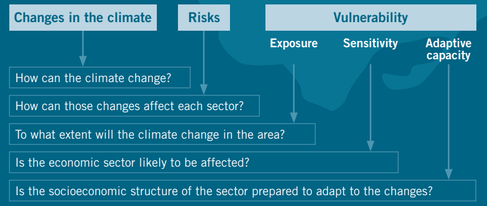
It is no longer enough to avoid further emissions; we must also work to reduce or mitigate the emissions that we produce now.




HOW HAS THE VULNERABILITY OF EACH SECTOR BEEN EVALUATED?

The vulnerability study has focused on the agricultural, livestock, forestry and tourism sectors. The identification of the principal risks that affect each sector has been carried out through the collection of technical information and interlocution with the various social and economic groups within the region.

A set of indicators has also been established for risks that are considered to be the most important for each sector, municipality and the region as a whole. The vulnerability associated with a particular risk has been calculated based on the following variables: exposure, sensitivity and adaptive capacity.



RISKS	SECTOR	VULNERABILITY
Sea level rise (coastal morphological changes)	All sectors	10
Changes in livestock exploitation methods	Livestock farmers	10
Impact on dryland farming	Agriculture	8
Increase in invasive and/or disruptive species	Agriculture / Fisheries	8
Increased demand for irrigation	Agriculture / Livestock / Tourism	7
Impact on crops: nuts, vines and olives	Agriculture	7
Greater risk of fire	Forestry	6
Loss of biodiversity	Forestry / Tourism	6
Decrease in groundwater quality	All sectors	6
Loss of landscape quality	Tourism	6
Increased fire risk	Agriculture / Forestry	5
Decrease in the availability of water and changes in the pattern of demand	Forestry / Tourism	4-5
Reduction of grassland and pasture	Livestock	3
Changes in species distribution patterns	Forestry	2
Impact of heat waves	Public health	7
Worsening climate comfort	Public health	3

0 = low vulnerability *10 = high vulnerability*

WHAT IS THE DEGREE OF VULNERABILITY OF EACH SECTOR?

LIVESTOCK FARMING

The global vulnerability of the sector is high, mainly due to the use of dryland farming methods, a reduction in the availability of water for irrigation and the implementation of new irrigation support systems. The most vulnerable farmlands are those located in the Delta, a consequence of rising sea levels and land subsidence in the areas as a whole, a situation exacerbated by a lack of sediment aggradation.

Dryland farming activities located in the Terra Alta (specifically vines and almonds) are highly vulnerable due to the diminished and irregular distribution of precipitation. However, the implementation of more efficient irrigation techniques or the introduction of plant species and varieties more adapted to a dry climate could reduce the overall risk.

With regard to the extended livestock sector, and despite changes in the rainfall regime the vulnerability is low, simply because it not a major economic activity within the region. However, by increasing livestock activities the region´s capacity to adapt to the risk of forest fires can be improved, although it should be noted that an increase in the incidence of mortality, abortions and stress in livestock due to increasing temperatures is already being observed. In order to mitigate this impact, substantial investment in more efficient techniques and systems for both refrigeration/cooling and water use will be required.

FORESTRY SECTOR

Overall, forestry presents a low vulnerability to climate change from an economic perspective. It is considered to be a medium-high risk, however, with regard to forest fires, and the loss of biodiversity, especially with regard to species that are more sensitive to temperature increases and the effects of a reduction in, and the distribution of precipitation, such as beech, holm oak, the red and black pine forests and riverbank vegetation. An improvement in the management of these habitats and more extensive development of forest management plans can help to mitigate the risk of fire. In addition, highlighting the potential of biomass as an energy resource would reduce the risk of fire and contribute to the mitigation of climate change.

FISHING AND AQUACULTURE

This is a sector with a very high vulnerability, especially in the case of aquaculture located in the Delta bays as it will be affected by morphological changes of the coastline that will result in their closure. Furthermore, climate change implies both the warming of and the eutrophication of sea and estuarial water, phenomena that will affect species mortality and the size of individuals. Unfortunately, the adaptive capacity of the sector cannot reduce its vulnerability so it will be necessary for the public administration organisations in the area to formulate active adaptation policies for the area as a whole.

In the open sea, fishing presents a medium to low vulnerability; since it has a great capacity for adaptation and is a sector that is also affected by other impacts such as water pollution and overfishing throughout the coastal area.

TOURISM SECTOR

The sector presents a medium vulnerability thanks to its good adaptive capacity: changes in the seasonality of tourist visits, improvements in the efficient use of water, the environmental certifications of companies, the redefinition of tourism products, and changes in promotional strategies.

However, the increases in sea level and incidences of heat waves will primarily affect sun and beach tourism, with early palliative adaptation measures (regeneration of beaches, investment in air conditioning in buildings ...), being counteracted by developments in the Delta as a whole such as subsidence, a reduction in surface area and an increase in sea level.

The increase in biting insects such as mosquitoes or the blackfly, may, however, affect the comfort of tourists.

The adaptive capacity transcends into other sectors and therefore it will be necessary to implement risk reduction measures based upon on a regional agreement.