The Catalan Office for Climate Change

Generalitat de Catalunya
Government of Catalonia
Ministry of Territory and Sustainability

Barcelona, 12th March 2021

Climate change impacts in Catalonia: water, forest and land use

Oficina Catalana del Canvi Climàtic

Net Forest

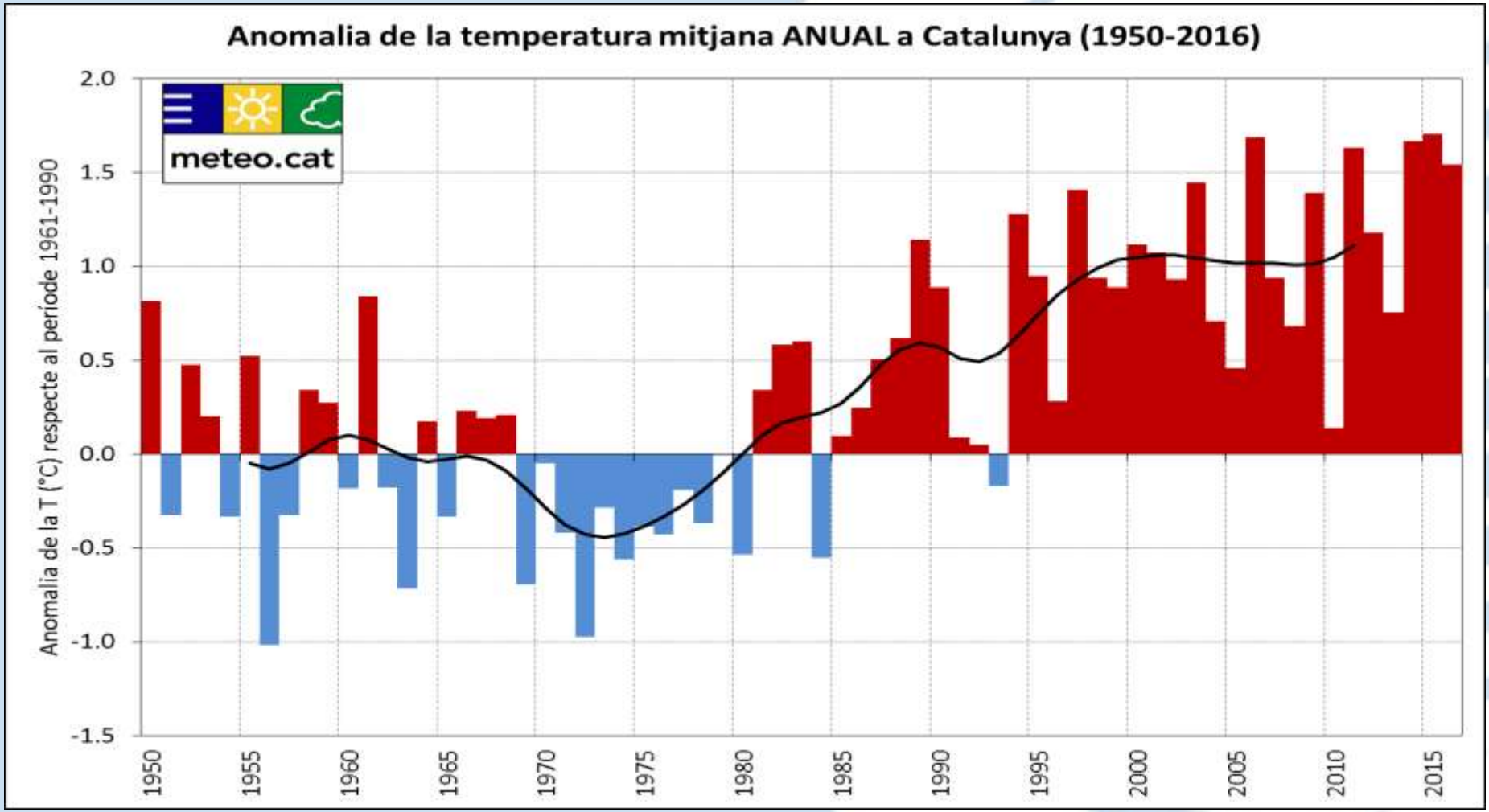
Erasmus+

CTFC

Catalonia

➢ General trends

+ 0,25ºC per decade (+0,35ºC in summer): +1,7ºC from 1950



Catalonia

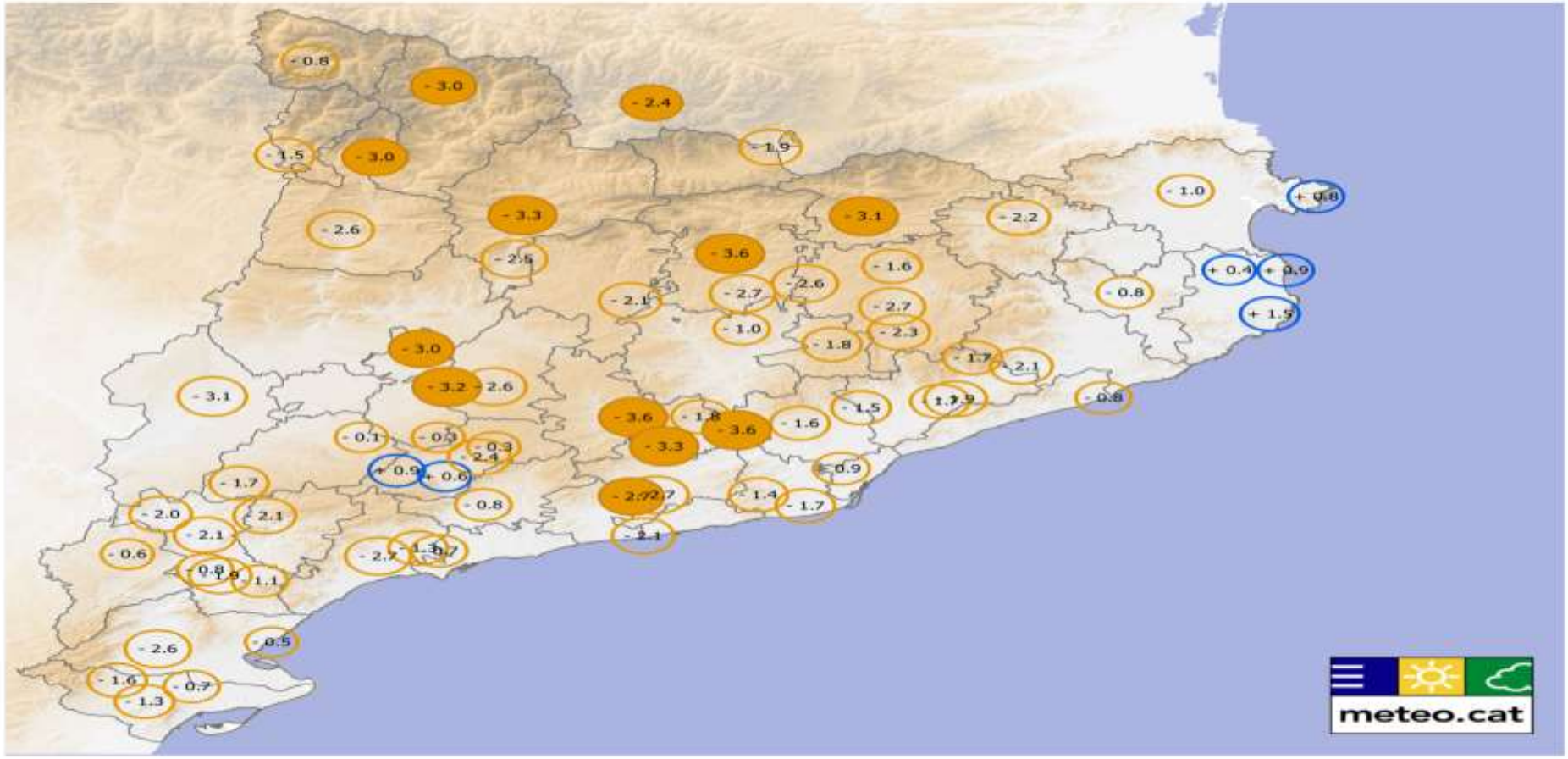
➢ General trends

An increase of 2ºC in the annual average of temperature …
is similar to the gap in the annual average of temperature between the cities of Barcelona and Sevilla.

Catalonia

➢ General trends

-1,7% per decade (-3% per decade in Pyrenees)



L'àrea dels cercles representa el percentatge de canvi per dècada.
Precipitació: blau = positiu, taronja = negatiu
Cercle sòlid indica tendència estadísticament significativa: p < 0.05

Catalan Strategy Adaptation to Climate Change (ESCACC, 2013-2020)

Conclusions ESCACC main climatic impacts:
Temperatures increase and heat waves. Most irregular precipitations.

Conclusions ESCACC most vulnerable areas and system:
Pyrenees (mountain region) and Ebro's Delta (litoral) and Water

Public / Private sector :
Private sector awareness and action are generally low.
Public sector is crucial to guarantee policy coherence across many sectorial policies (mainstreaming) helping to ensure its effectiveness and efficiency

Generalitat de Catalunya
Departament de Territori i Sostenibilitat

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Catalan Strategy Adaptation to Climate Change (ESCACC, 2013-2020)

Strategic goal

To become less vulnerable to climate change impacts

Operational goal

Generating knowledge and transferring Information

Building capacity

Transversal goal

RDI

POLICY PLANNING

OPORTUNITIES

152 Specific measures for:

Natural systems:
- Agriculture and livestock
- Biodiversity
- Water management
- Forest Management

Socioeconomic sectors:
- Energy sector
- Fisheries
- Health
- Industry, Services and Trade
- Mobility and transport infrastructure
- Tourism
- Town Planning and Housing

30 Generic measures cross-cutting natural systems and socioeconomic sectors

Generalitat de Catalunya
Departament de Territori i Sostenibilitat

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2016 Evaluation & Monitoring Catalan Strategy for adapting to climate change

2013-2016: 72% of measures have been started	**Generating knowledge and transferring Information**	**Building capacity**
Agriculture and livestock	😐	☹
Biodiversity	😐	☹
Water management	😐	😊
Forest management	😊	😐
Industry, services and commerce	☹	😐
Mobility and transport infrastructure	😐	☹
Fishing and marine ecosystems	😐	☹
Energy Sector	😐	☹
Health	😊	😐
Tourism	☹	😐
Urban planning and housing	😊	😐

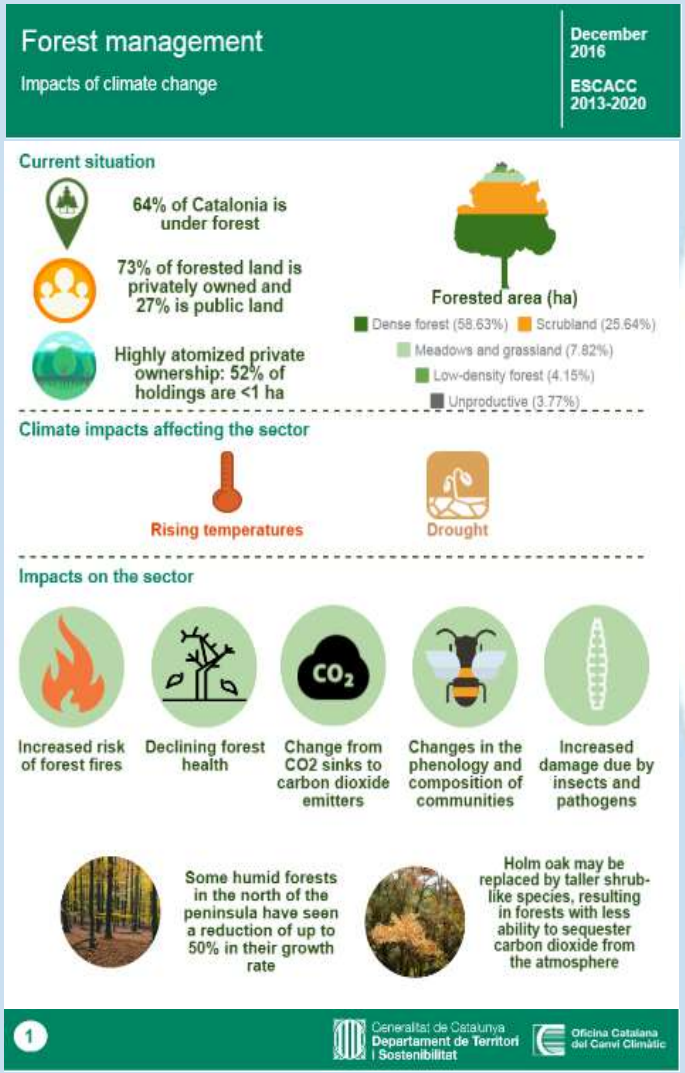
☹ Not yet started adapatation measure or bad adaptation

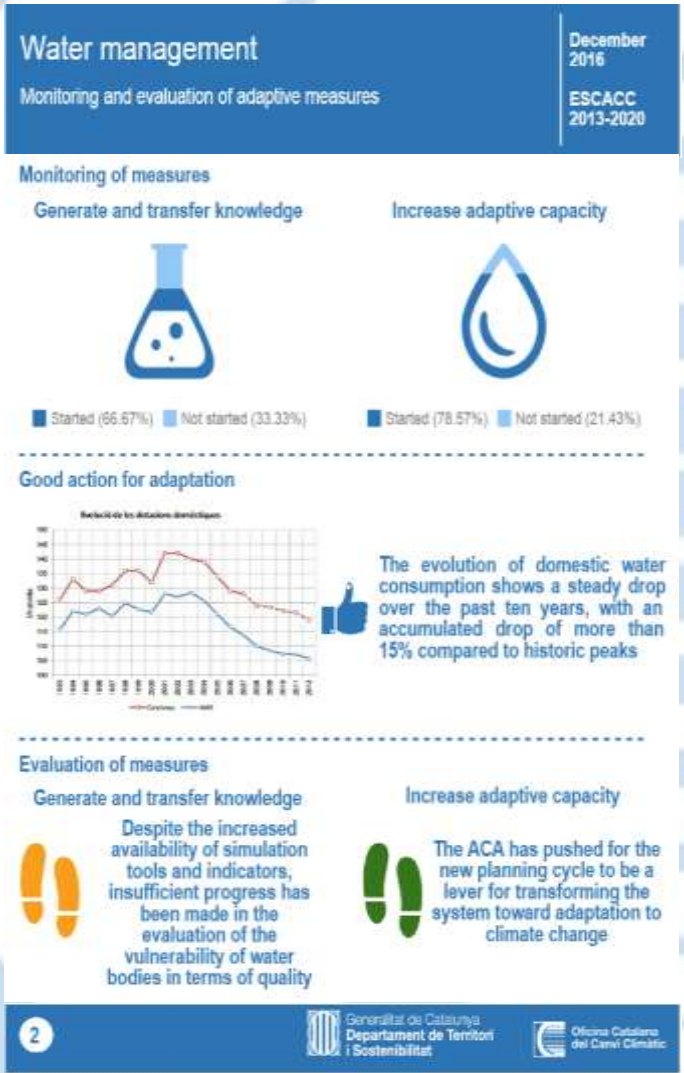
😐 Specific but insufficient adaptation measure

😊 Succesfull adaptation measure

2016 Evaluation & Monitoring Catalan Strategy for adapting to climate change

Infographic impacts, assessment and evaluation of Catalan Strategy Adaptation Climate Change





Climate change considerations on environmental impact assessment

Climate change adaptation on sectorial planning

Agriculture livestock

Water management

Biodiversity

Forest management

Energy

Industry

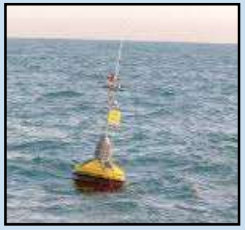
Infrastructure

Waste

Transport and mobility

Health

Turism



RDI

Urbanism

Some specific adaptation projects

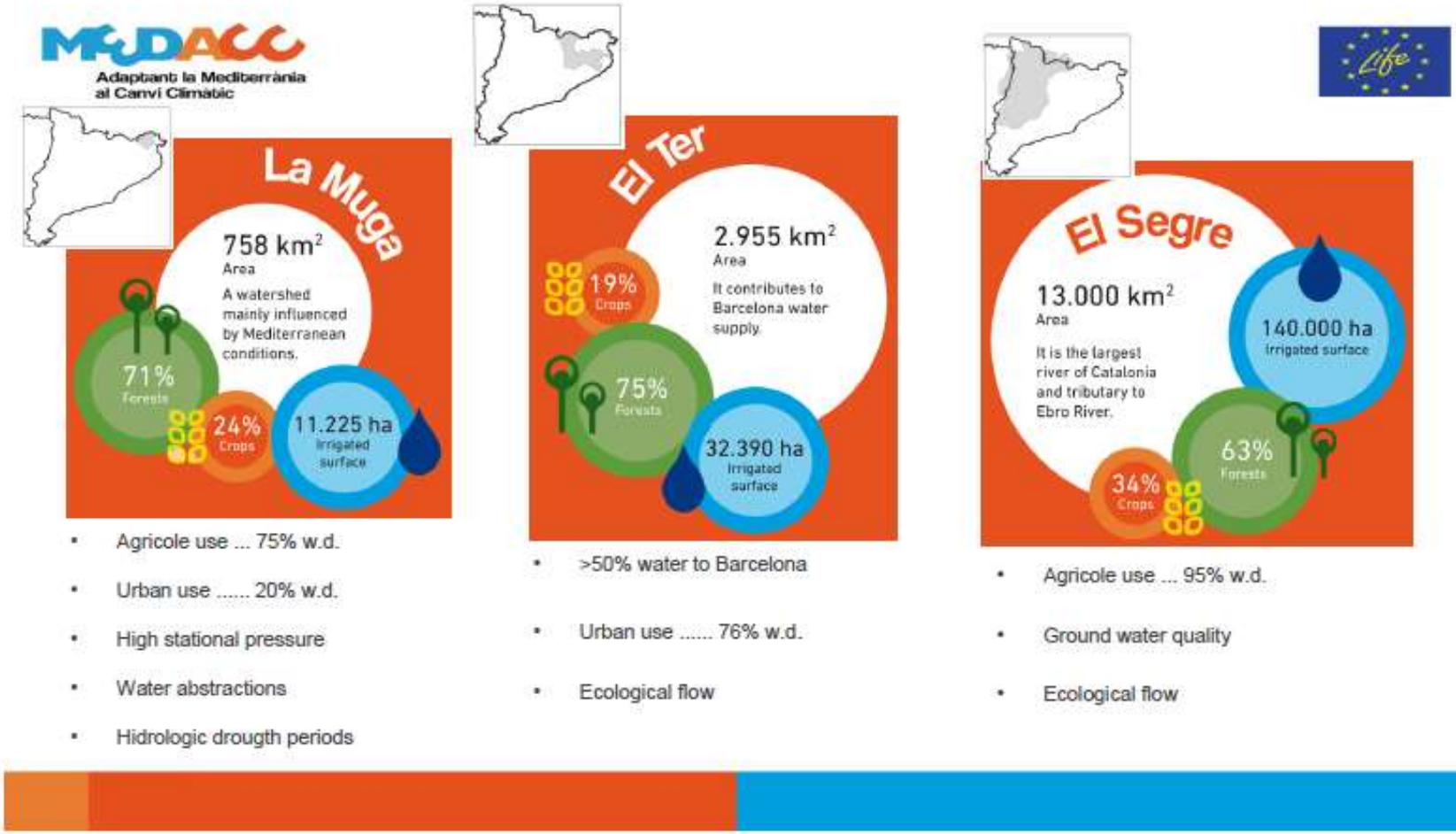
MEDACC
Adaptant la Mediterrània al Canvi Climàtic

Project

MEDACC is a 5-year **LIFE+** project where some innovative solutions **will be tried** to **adapt** the **agroforest** and **urban** systems to the climate change impacts through demostrative actions in three basins of Catalonia.

Oficina Catalana del Canvi Climàtic
CREAF
IRTA
IPE CSIC

Some specific adaptation projects



- Agricole use ... 75% w.d.
- Urban use ..... 20% w.d.
- High stational pressure
- Water abstractions
- Hidrologic drougth periods

- >50% water to Barcelona
- Urban use ..... 76% w.d.
- Ecological flow

- Agricole use ... 95% w.d.
- Ground water quality
- Ecological flow

Streamflow, precipitation and evapotranspiration in Muga river 1951-2013

	1951-2013	
Cabal	**EA Boadella**	
Anual	**-48.9%**	
Hivern	**-54.4%**	
Primavera	**-55.0%**	
Estiu	**63.6%**	
Tardor	**-95.2%**	
Precipitació		
Anual	-12.0%	
Hivern	29.4%	
Primavera	-7.4%	
Estiu	**-46.7%**	
Tardor	-11.0%	
ETo		
Anual	**9.4%**	
Hivern	**10.4%**	
Primavera	**8.3%**	
Estiu	**10.9%**	
Tardor	**7.5%**	

Streamflow, precipitation and evapotranspiration in Ter river 1971-2013

Anual	Cabal	Precipitació	ETo
Ripoll	**-41,7**	**-37,5**	**19,7**
Roda de Ter	**-57,2**	**-31,8**	**16,3**
Girona	**-65,7**	-23,8	**15,2**
Hivern			
Ripoll	-37,5	-22,6	**15,8**
Roda de Ter	-55,0	-10,1	**13,2**
Girona	**-72,6**	0,5	**11,9**
Primavera			
Ripoll	-22,2	-31,8	**28,6**
Roda de Ter	-46,5	-29,1	**24,3**
Girona	-51,3	-23,7	**22,9**
Estiu			
Ripoll	**-63,3**	**-68,1**	**18,4**
Roda de Ter	**-76,0**	**-65,8**	**15,0**
Girona	-62,6	**-62,6**	**13,8**
Tardor			
Ripoll	-40,9	5,2	13,9
Roda de Ter	-47,3	16,3	11,0
Girona	**-75,9**	27,1	10,4

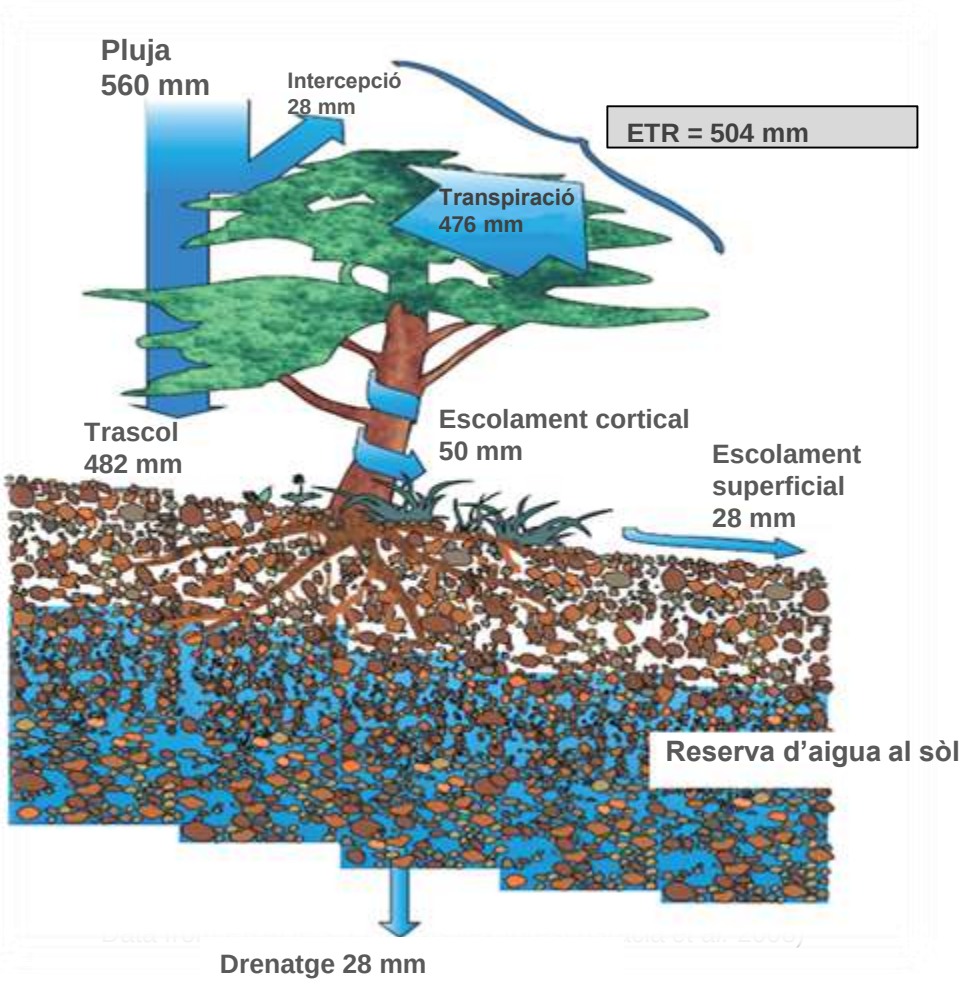
Mensual and annual streamflow in Segre river 1950-2013

	Pont de Suert	La P. Segur	Pinyana	Puigcerdà	Organyà	Oliana	Seròs	Balaguer
gener	11.8	-15.3	**-75.6**	**-22.0**	-0.4	**-19.8**	**-51.1**	**-79.0**
febrer	0,4	-29.8	**-84.3**	**-44.2**	**-30.3**	**-38.0**	**-64.4**	**-92.0**
març	-22.6	-17.9	**-81.6**	-27.5	**-31.5**	**-39.5**	**-72.0**	**-97.7**
abril	-15.2	3.7	**-66.7**	-25.6	-23.6	**-36.5**	**-60.9**	**-98.0**
maig	**-15.4**	1.9	**-69.3**	-6.3	-6.7	-2.6	**-48.5**	**-72.8**
juny	**-38.5**	-15.3	**-63.4**	**-36.2**	**-31.9**	**-41.2**	**-69.0**	**-87.1**
juliol	**-50.3**	**-33.0**	**-49.3**	**-54.3**	**-53.1**	**-38.6**	**-73.6**	**-96.1**
agost	**-45.1**	**-28.8**	-26.4	**-50.1**	**-50.2**	**-33.0**	**-53.6**	**-95.3**
setembre	**-48.3**	**-33.3**	**-42.8**	**-63.7**	**-47.3**	**-57.0**	**-49.8**	**-98.2**
octubre	-41.8	-34.5	**-77.9**	**-53.4**	-35.7	**-63.5**	**-73.7**	**-97.8**
novembre	-33.9	-25.1	**-84.6**	**-39.9**	-26.9	**-34.6**	**-61.6**	**-82.6**
desembre	5.5	-23.9	**-87.1**	**-33.1**	**-23.2**	**-35.3**	**-60.9**	**-78.5**
anual	**-28.2**	-16.7	**-67.6**	**-32.8**	**-27.6**	**-34.6**	**-61.8**	**-91.3**

Water: future projections

Hydrologial modelling + CC + LUC

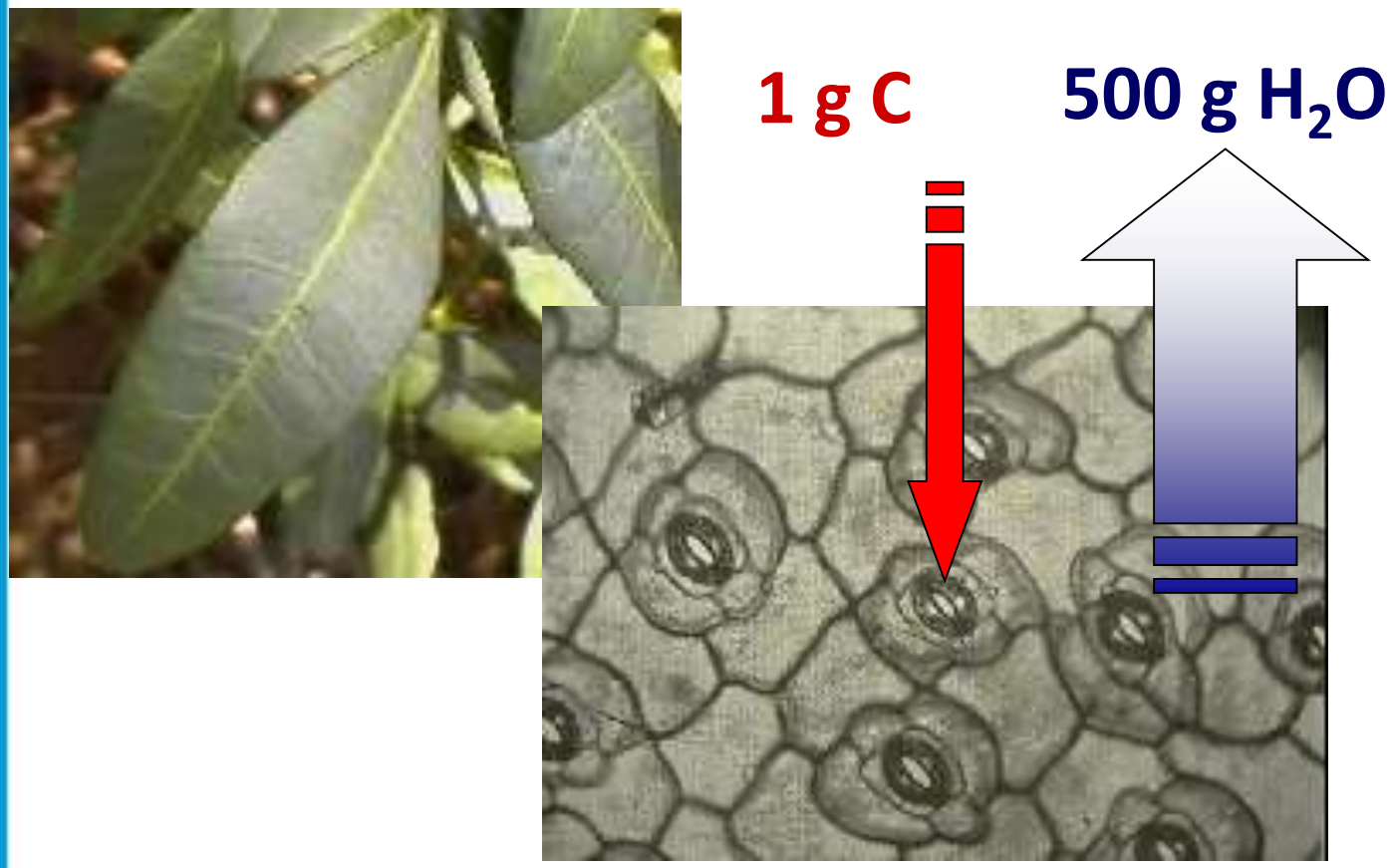
Evapotranspiration in mediterraean forests



Around 80-90% of precipitation is Green water and only between 10-20% is Blue water

Font: Dades de l'alzinar de Prades (Gracia *et al.* 1999)

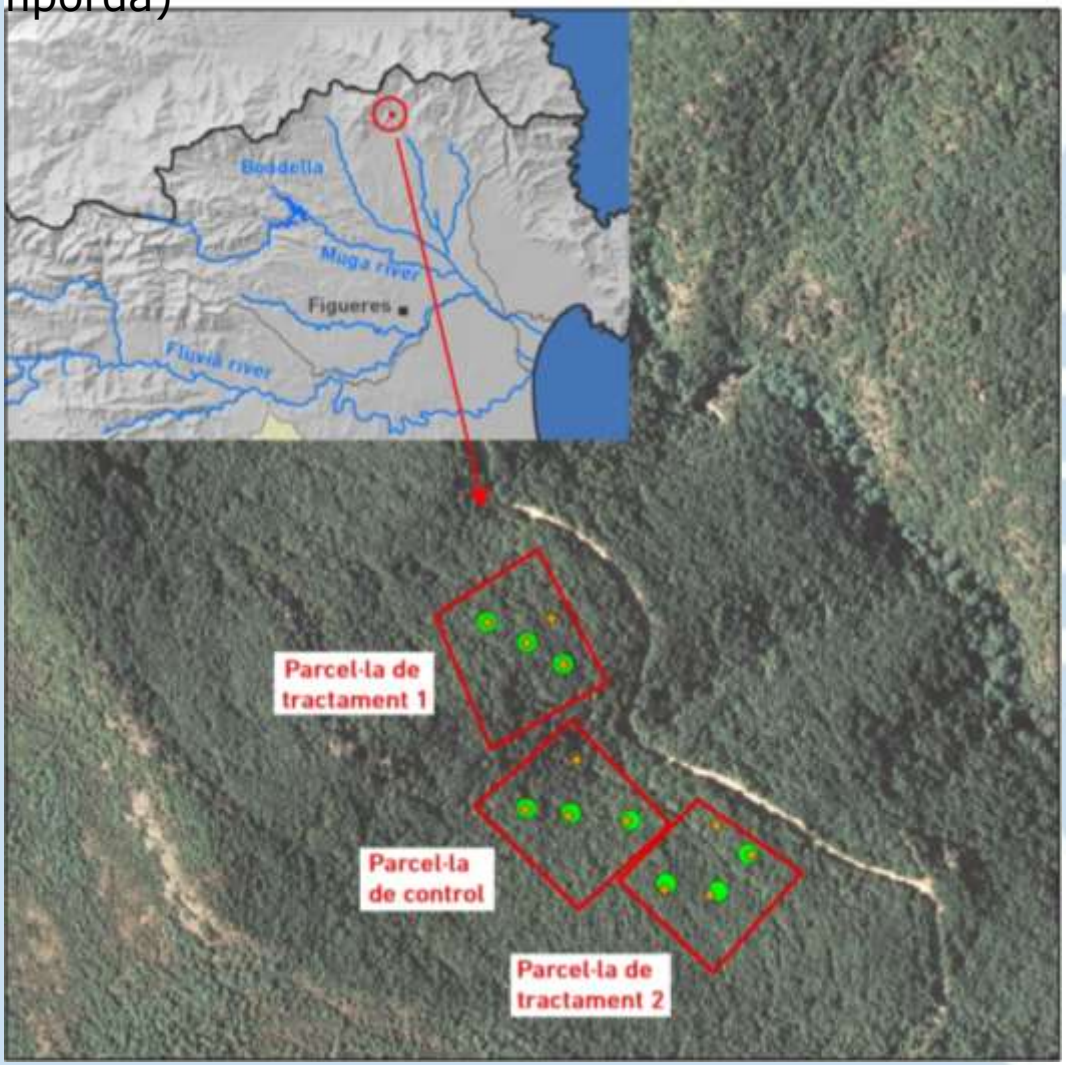
Carbon and water balances in mediterranean forests



The management of forests, without considering the water flows, is led to the failure

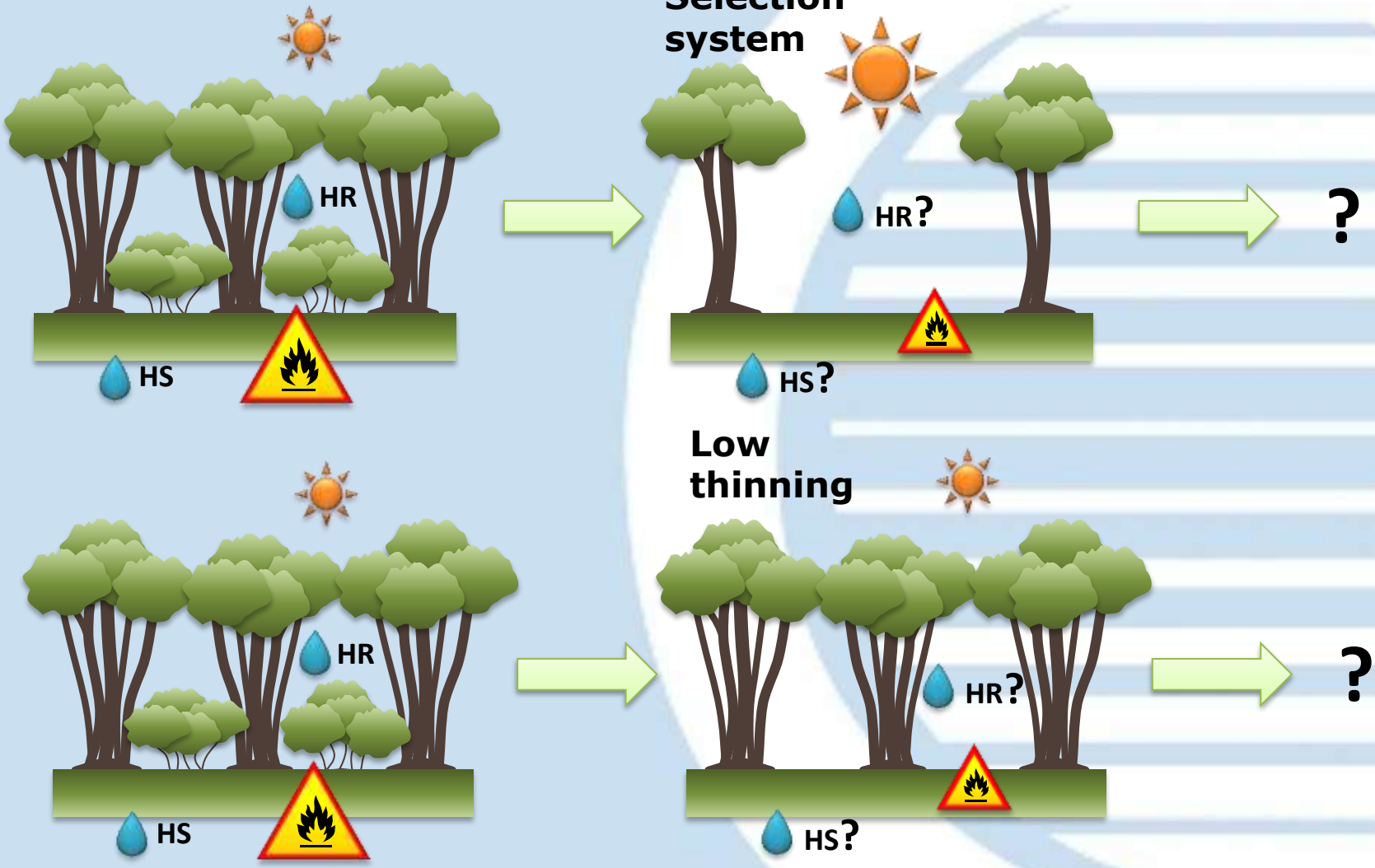
Font: Gracia *et al.* 2010. 2n Informe CC a Catalunya

Muga: Holm oak (*Quercus ilex*) in the **Requesens estate** (PNIN l'Albera, Alt Empordà)



Life – Medacc remarkable action.

Objective: To reduce risk of fire


Selection system
HR
HS
HR?
HS?
?
Low thinning
HR
HS
HR?
HS?
?

4.- Some specific adaptation projects

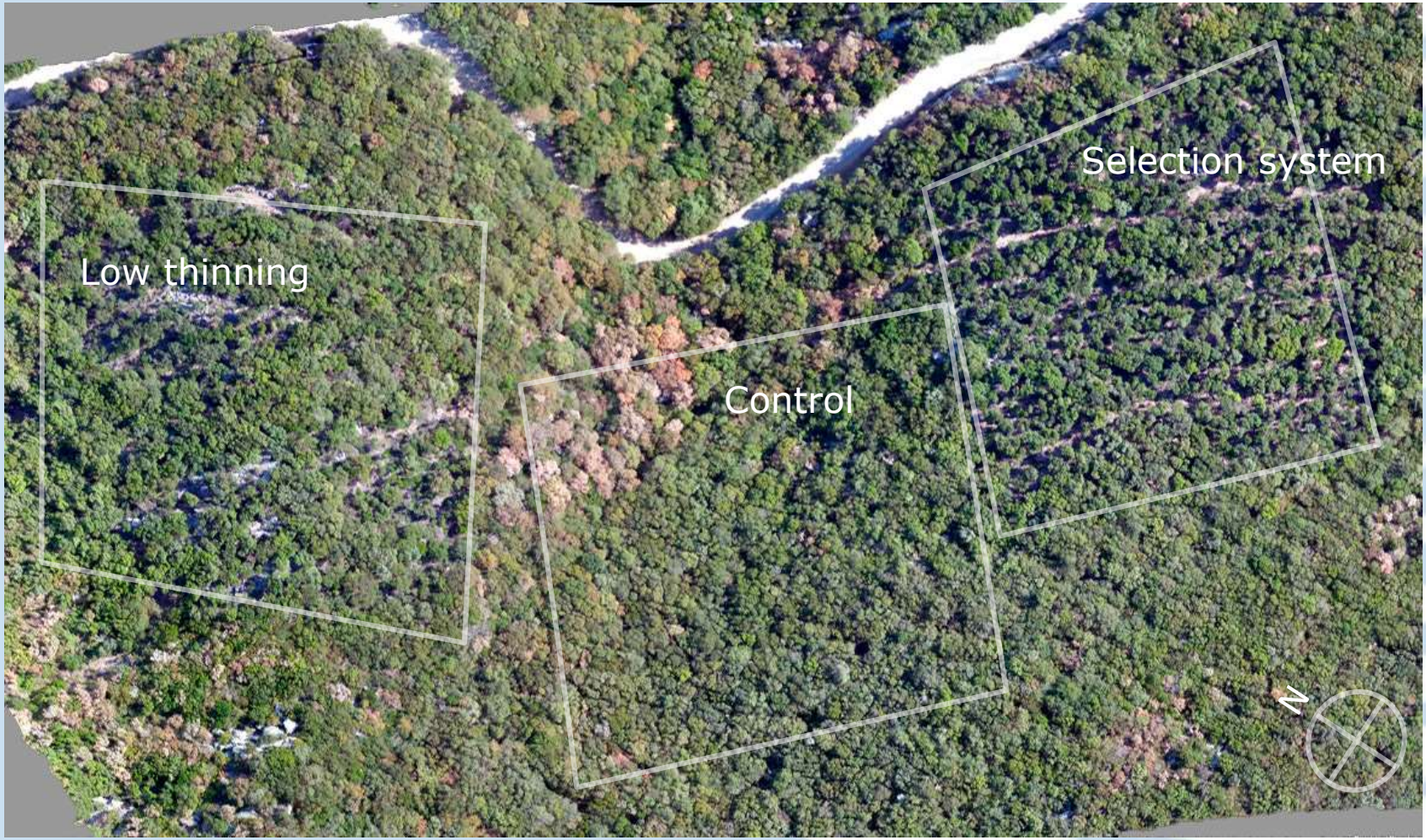
T2
Selection system

T1
Low thinning

Requesens. June 2012

Requesens. June 2015

Requesens. October 2016



Response to thinning and selection systems in white pine masses regenerated after fire: the three pins of the photo (2018) were born after the 1986 fire. They have, therefore, the same age:

-The largest was born out of a crop, alone, without competition. Medium and small in very dense masses, up to 60,000 feet / ha.

-The smallest belongs to a mass of white pine where there has never been any action.

-The medium is from a restored forest with thinning, in 2005, in order to reduce the final density to 1,000 feet / ha.

https://lifemontserrat.eu/wp-content/uploads/2018/10/Article_Leire.pdf

Some specific adaptation projects

The main objectives of Life CLIMARK project are to **contribute to the mitigation of climate change** and increase the carbon sink capacity of Mediterranean forests by fostering the mitigating effects of multifunctional forest management through the creation of a climate credit market. The proposed multifunctional forest management is based on three pillars: carbon, water and biodiversity. The project is being implemented in Catalonia and is being replicated in the region of Veneto (Italy)

Some specific adaptation projects

Some specific adaptation projects

More detailed information in the websites

Life Medacc
http://medacc-life.eu/

Life Climark
https://lifeclimark.eu/?lang=en