New paired FLUXNET sites to evaluate the potential of adaptive forest management to enhance carbon sequestration, water use efficiency, and resilience of Mediterranean oak forests

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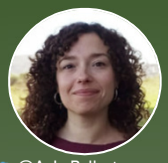

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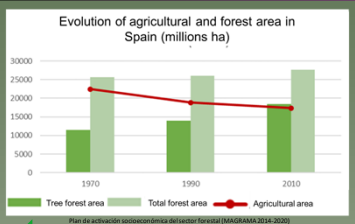
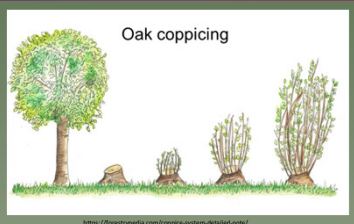
Context

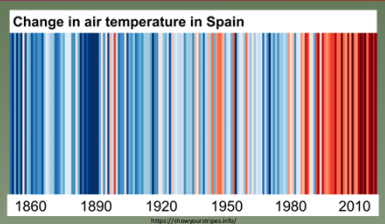
Forest area increase + **Abandonment of traditional management** + **Climate change** = **Higher Vulnerability and Decline**



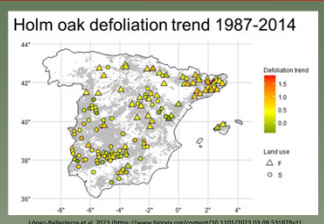
Plan de activación socioeconómica del sector forestal (MAGRAMA 2014-2020)



https://forestrypedia.com/coppice-system-detailed-note/



https://showyourstripes.info/



López-Ballesteros et al. 2023 (https://www.biorxiv.org/content/10.1101/2023.03.09.531879v1)

Potential solution: Thinning as a practice of Adaptive Forest Management

Thinning: the selective removal of trees to reduce water and nutrient competition. It can reactivate tree growth and improve forest health.

MANAGE 4FUTURE

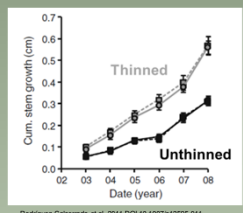
- For how long is growth reactivated?
- Is this growth reactivation linked to a higher carbon sequestration?
- How does it affect forest resilience against climate extremes?
- And ecosystem water and carbon balances?

Project website: https://sites.google.com/view/manage4future/

Ecosystem of interest:

holm oak forests

As the most dominant tree spp (15% of the national forested area)
As a highly vulnerable ecosystem that has shown worrying signs of decline

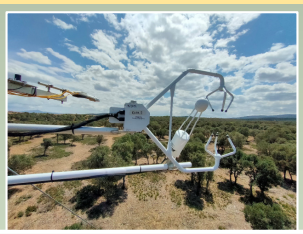


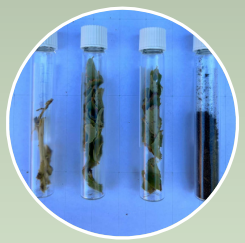
Rodriguez-Calcerrada et al. 2011 DOI 10.1007/s13595-011-0050-x

Experimental Design

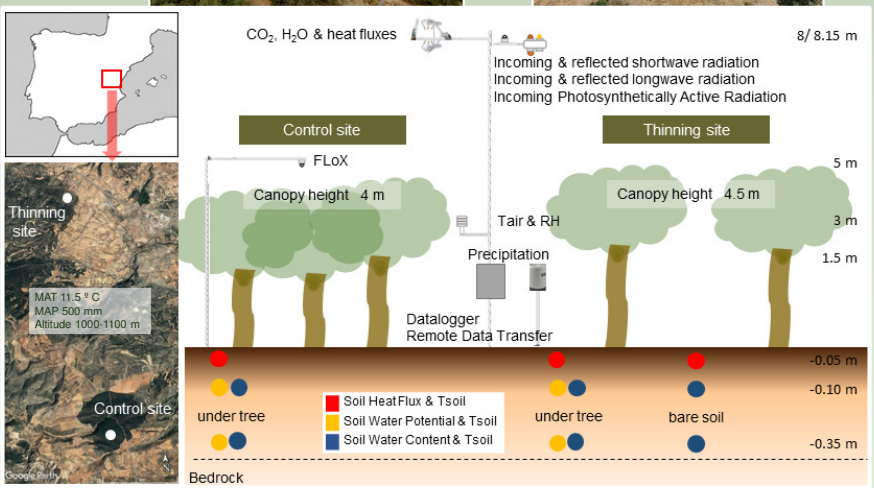
Leaf Water Potential
Hydraulic conductivity

Installed at the end of May 2023





Stable Isotopes
Carbon and Oxygen
(precipitation, plant material, soil)



Leaf
net CO_2 assimilation,
transpiration,
stomatal conductance

Soil CO_2 efflux

Soil characterization data

Site	pH	Sand (%)	Silt (%)	Clay (%)	NO_3^--N (mg N kg^{-1})	NH_4^+-N (mg N kg^{-1})	TN (g $100g^{-1}$)	TC (g $100g^{-1}$)	$CaCO_3$ (g $100g^{-1}$)	C_{org} (g $100g^{-1}$)	C/N	TK (mg Kg^{-1})	AP (mg P kg^{-1})
Control	8.1 ± 0.03a	73.97 ± 0.97a	16.9 ± 4.02a	9.13 ± 3.66a	6.65 ± 4.84a	5.2 ± 3.02a	0.45 ± 0.5a	10.01 ± 2.87a	43.78 ± 16.91a	4.76 ± 2.22a	10.23 ± 1.1a	12845.87 ± 1330.08a	1.82 ± 1.69a
Thinning	8.22 ± 0.18a	71.17 ± 1.7a	19.27 ± 3.14a	9.57 ± 4.84a	8.82 ± 3.19a	7.09 ± 0.95a	0.49 ± 0.01a	7.87 ± 0.77a	19.25 ± 7.51b	5.56 ± 1.07a	11.26 ± 2a	13600.67 ± 1505.6a	1.69 ± 0.39a

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