

**-ECOLOGY OF HEATHLANDS-
“Heathlands in the Cantabrian mountain range: structural and
functional singularities”**

Leonor Calvo, Javier Calvo, Ángela Taboada, José Manuel Fernández-
Guisuraga, Elena Marcos

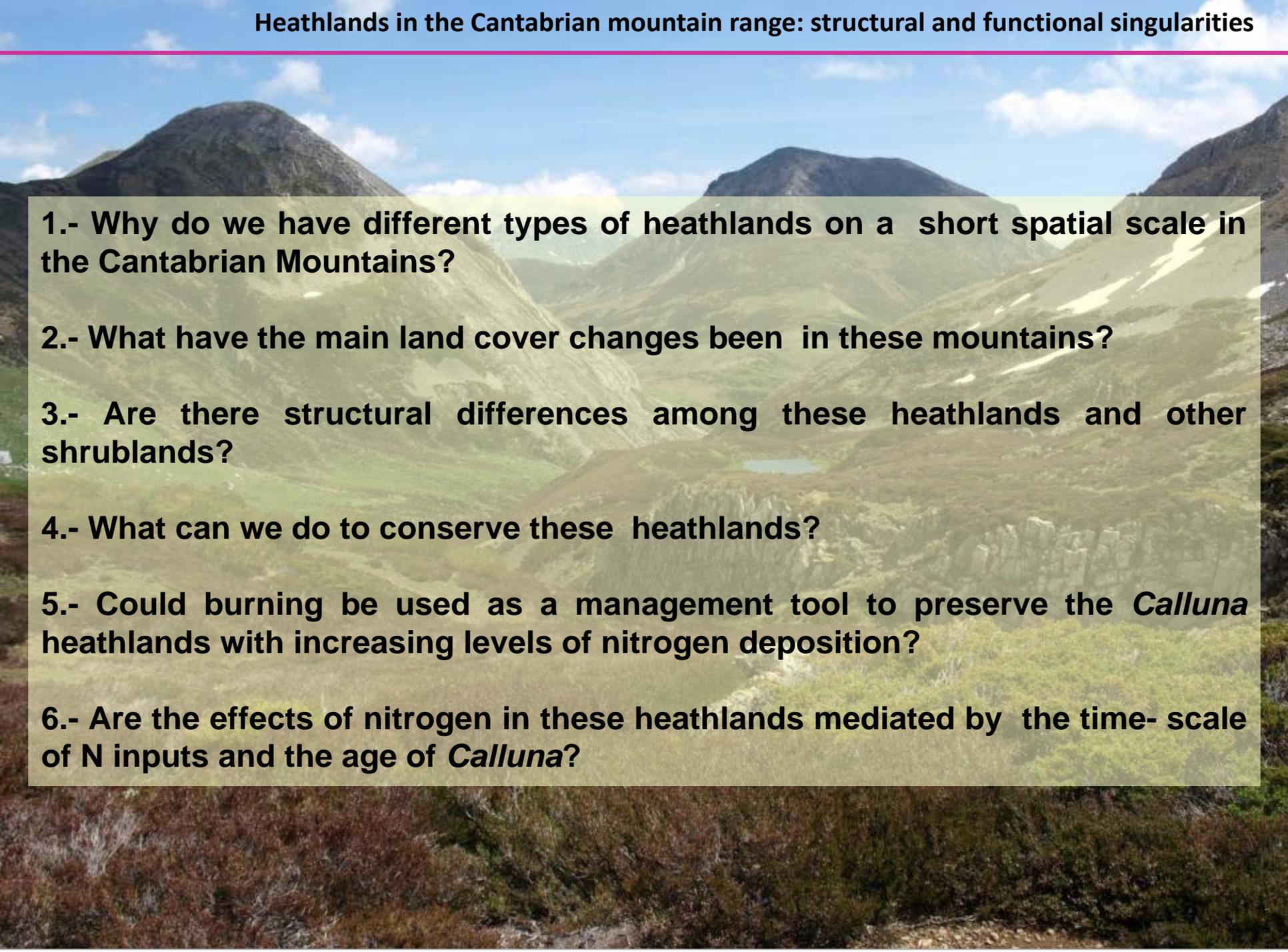


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University of León
20th August 2017**





“Heathlands in the Cantabrian mountain range: structural and functional singularities”

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- 1.- Why do we have different types of heathlands on a short spatial scale in the Cantabrian Mountains?
 - 2.- What have the main land cover changes been in these mountains?
 - 3.- Are there structural differences among these heathlands and other shrublands?
 - 4.- What can we do to conserve these heathlands?
 - 5.- Could burning be used as a management tool to preserve the *Calluna* heathlands with increasing levels of nitrogen deposition?
 - 6.- Are the effects of nitrogen in these heathlands mediated by the time-scale of N inputs and the age of *Calluna*?

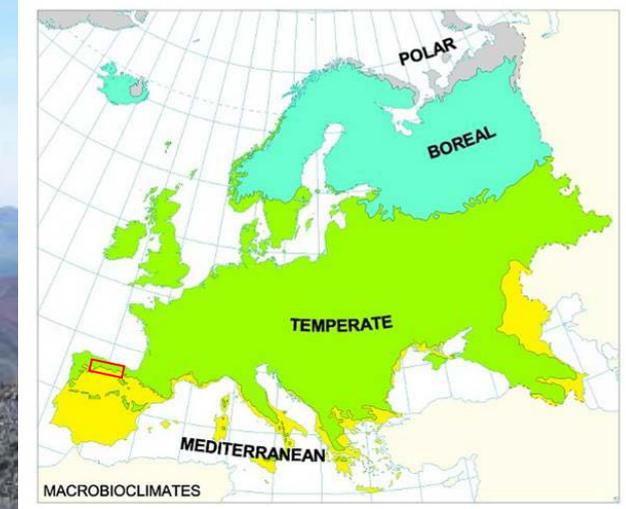
1.- Why do we have different type of heathlands on a short spatial scale in the Cantabrian Mountains?

Erica australis heathlands

Genista hispanica shrublands

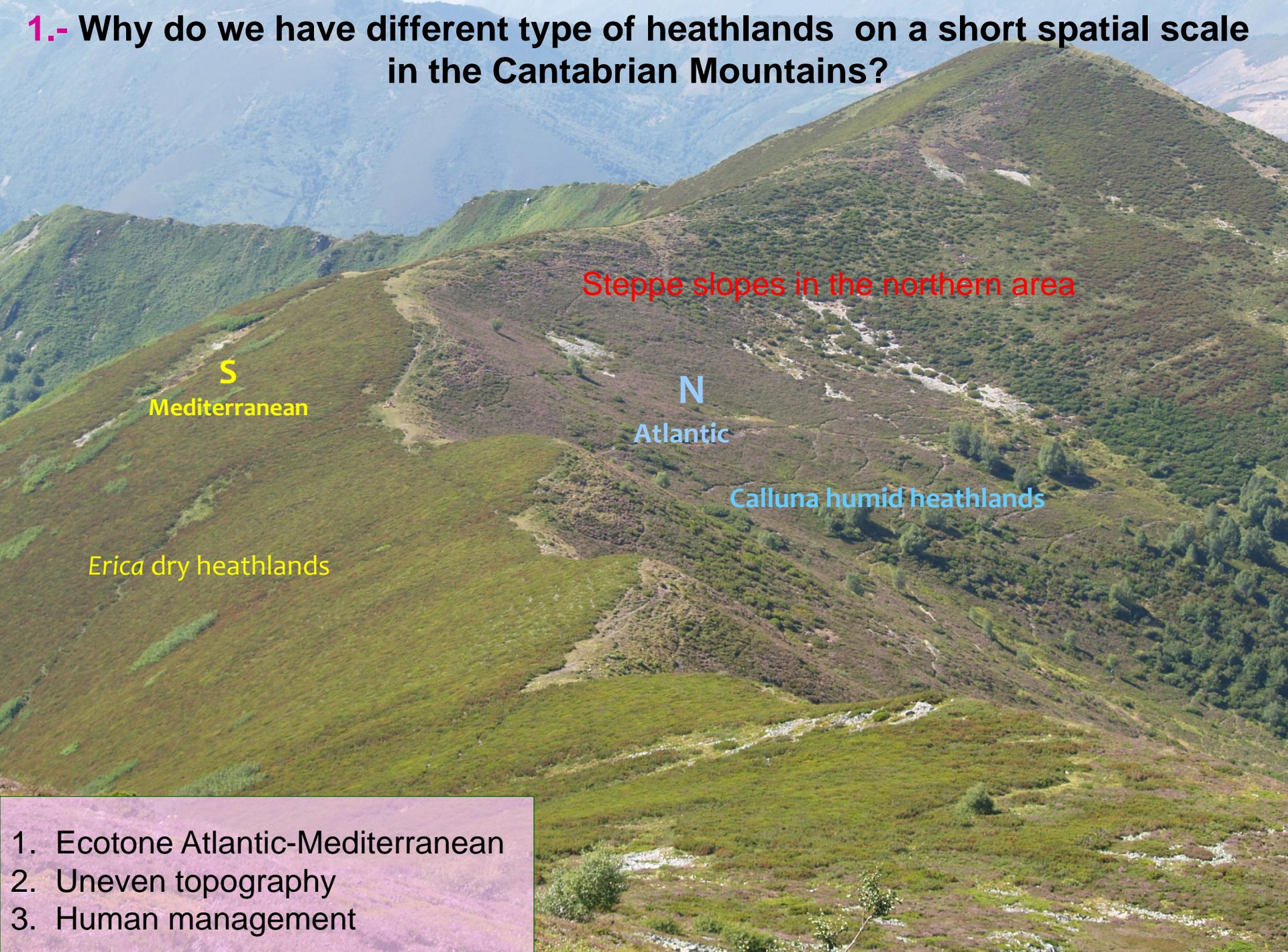
Genista florida shrublands

Calluna vulgaris heathlands



1. Ecotone Atlantic-Mediterranean
2. Uneven topography
3. Human management

1.- Why do we have different type of heathlands on a short spatial scale in the Cantabrian Mountains?



S

Mediterranean

Erica dry heathlands

N

Atlantic

Calluna humid heathlands

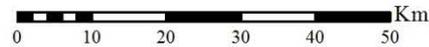
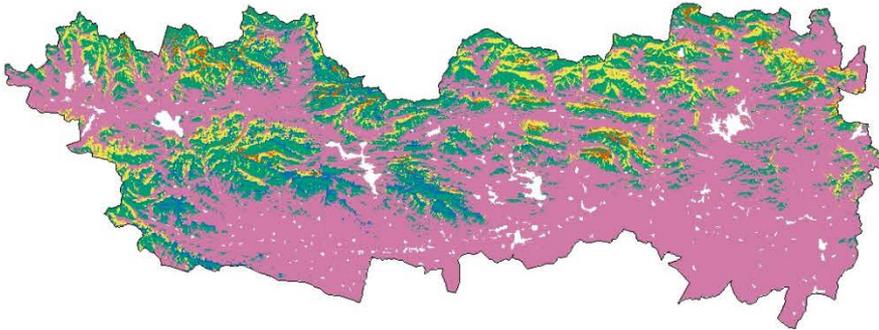
Steppe slopes in the northern area

1. Ecotone Atlantic-Mediterranean
2. Uneven topography
3. Human management

1.- Why do we have different type of heathlands on a short spatial scale in the Cantabrian Mountains?

Humid heathlands

Number of limiting factors



Calluna

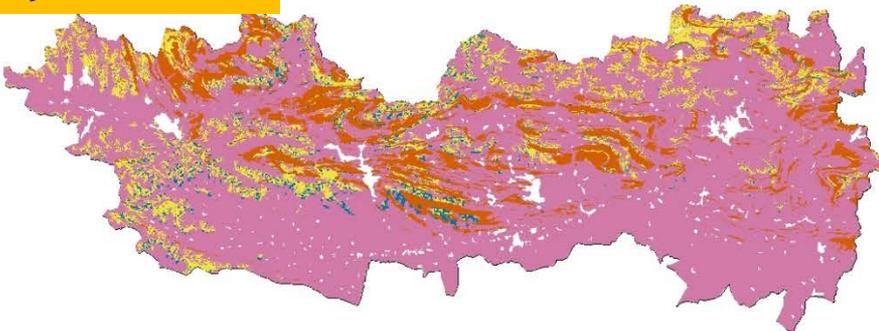


SPECIALIST

more sensitive to climate change



Dry heathlands

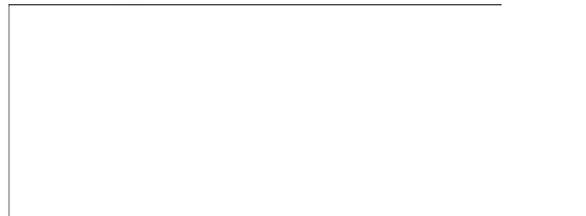


Erica

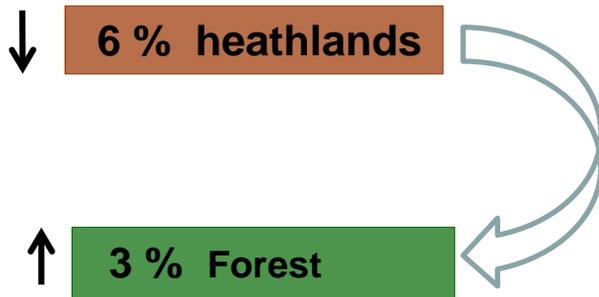
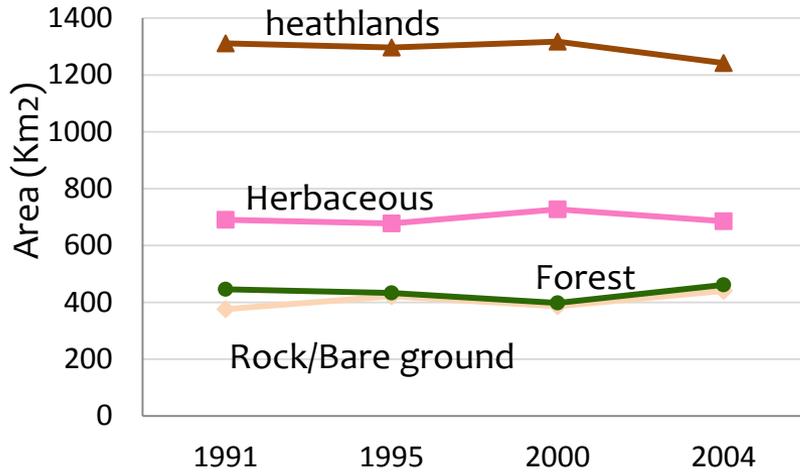


GENERALIST

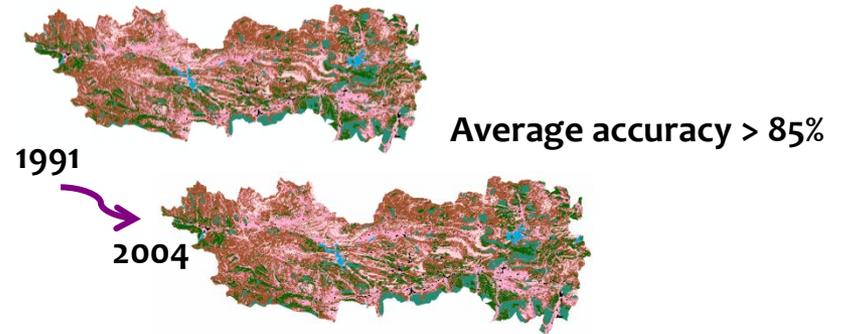
more resistant to climate change



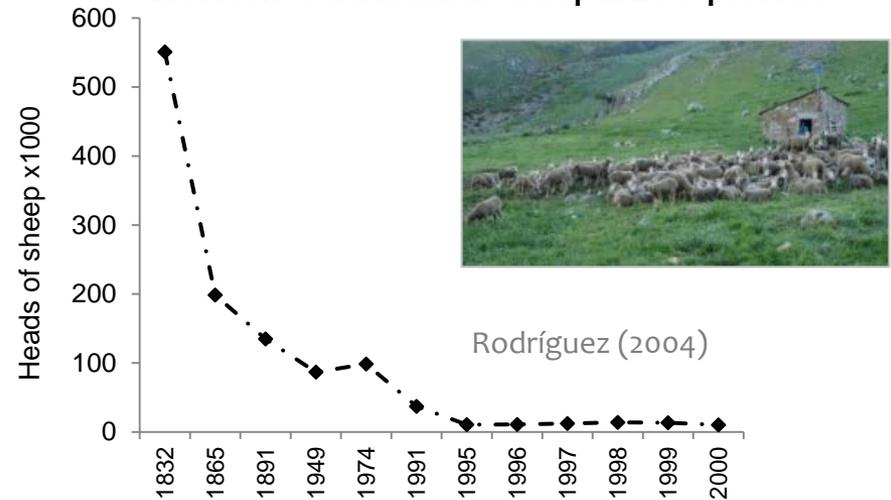
2.- What have the main land cover changes been in these mountains?



Land cover maps



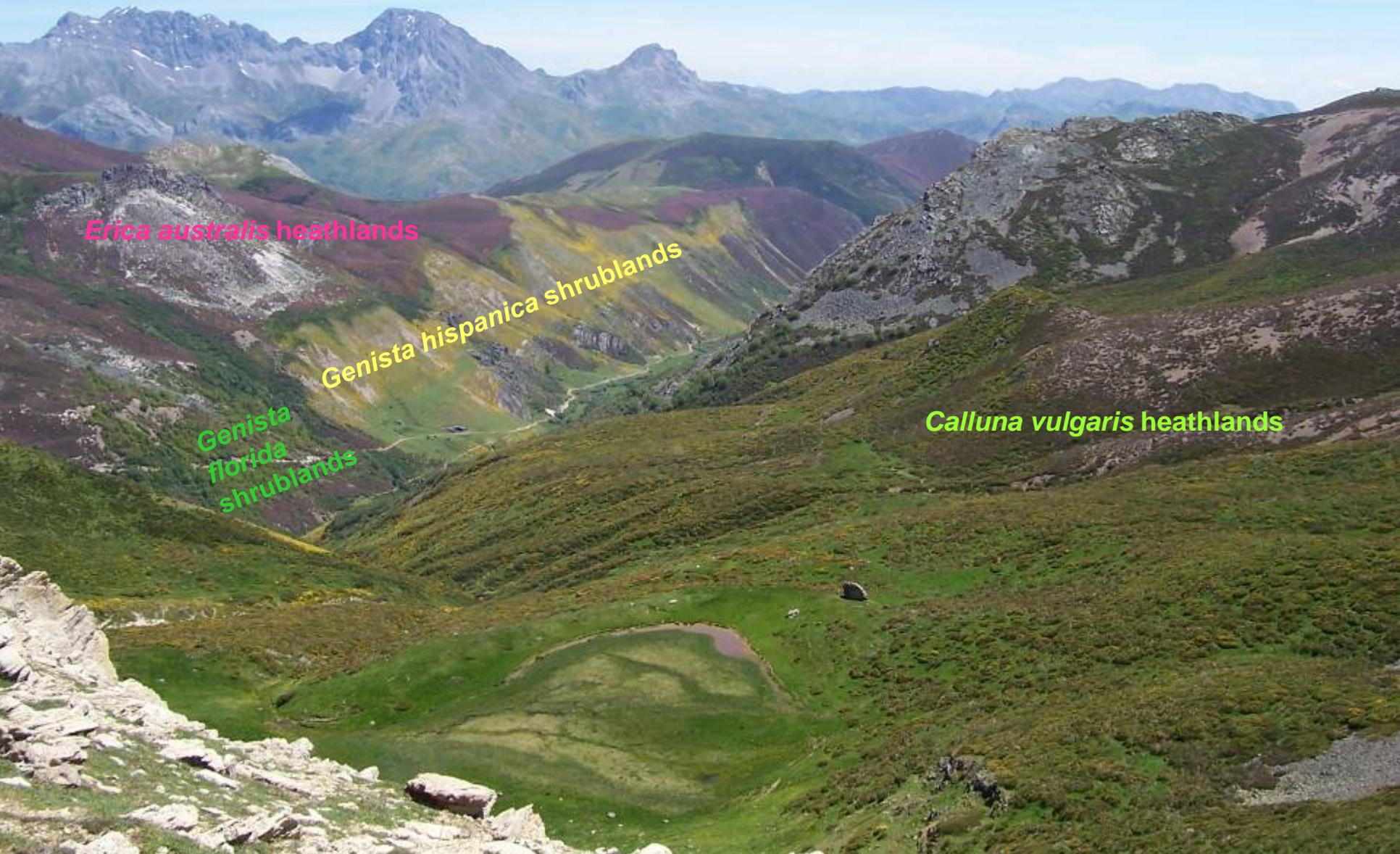
Evolution of transhumant sheep in León province



Abandonment of traditional uses (pastures) ----- succession process

“Demonstrate the ecological value of these systems”

3.- Are there structural differences among these heathlands and other shrublands?

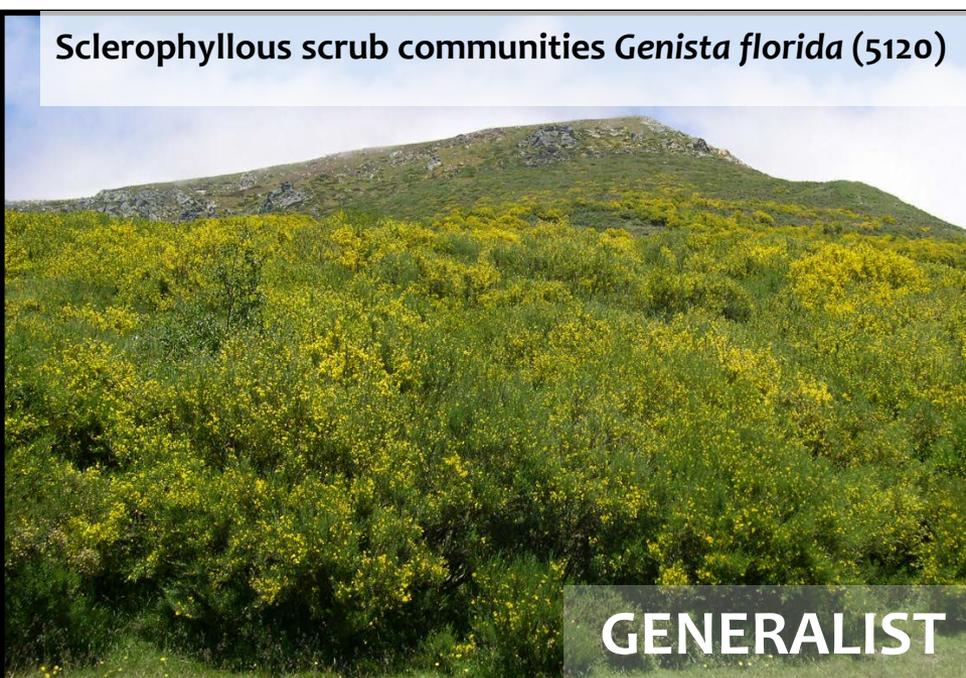
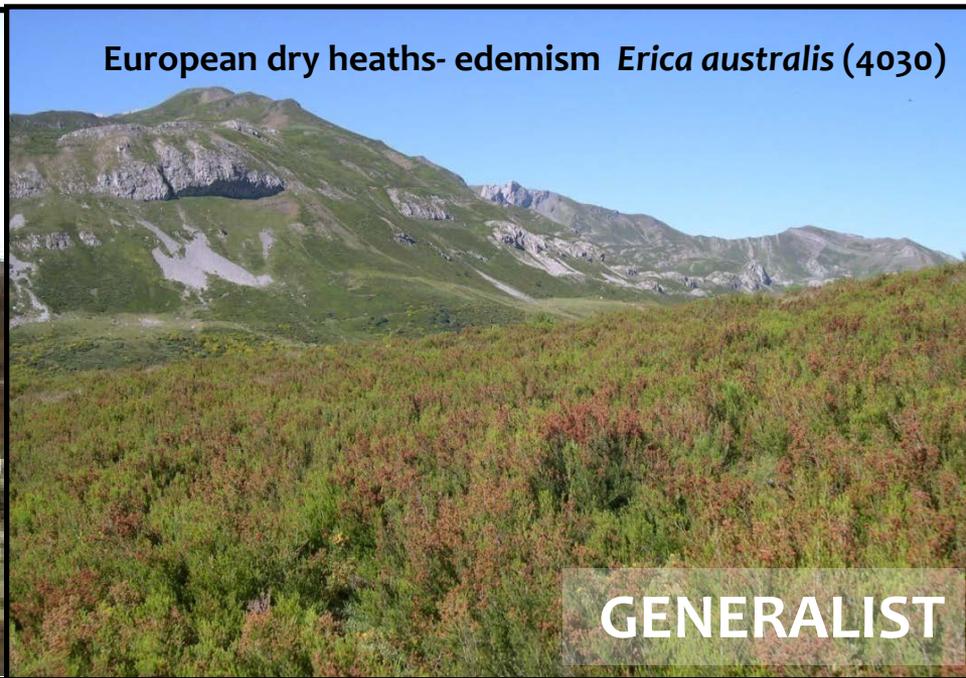


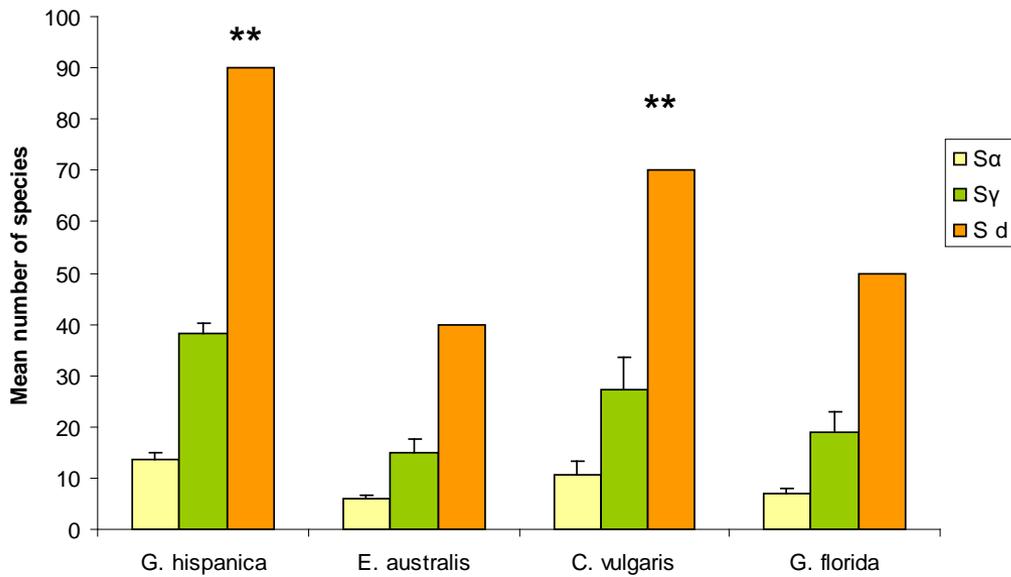
Erica australis heathlands

Genista hispanica shrublands

Genista florida
shrublands

Calluna vulgaris heathlands





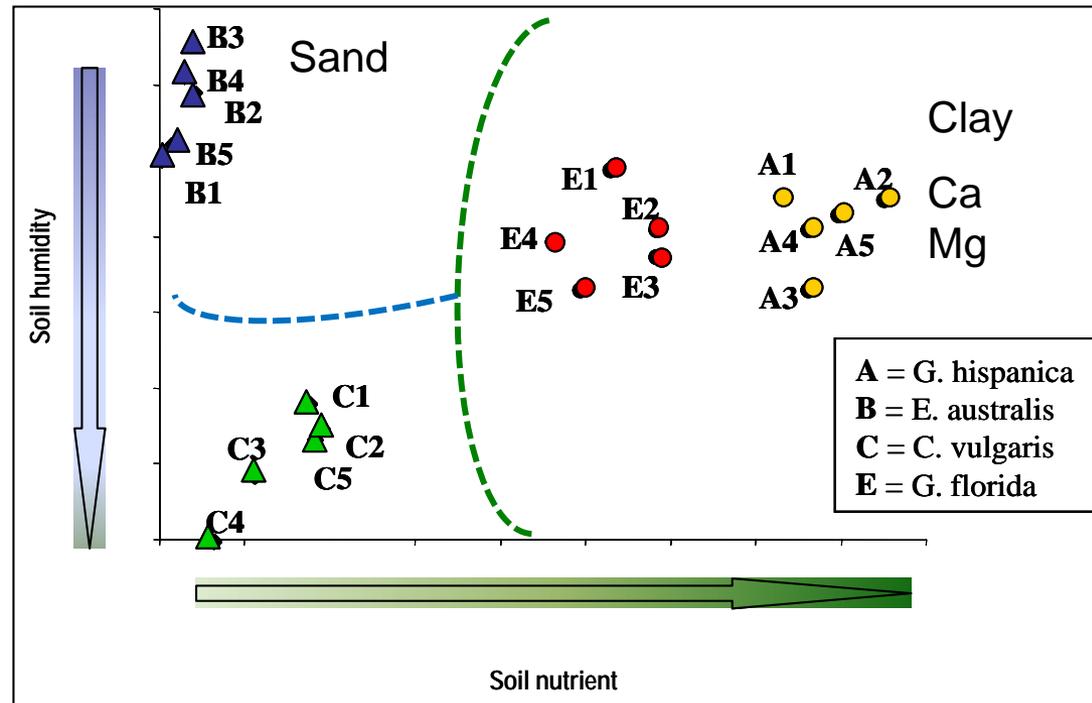
-**Positive relationship:** spatial scale (patch, local and regional) and vegetation biodiversity

-***G. hispanica* shrublands and *Calluna*-heathlands:** showed significantly higher plant richness

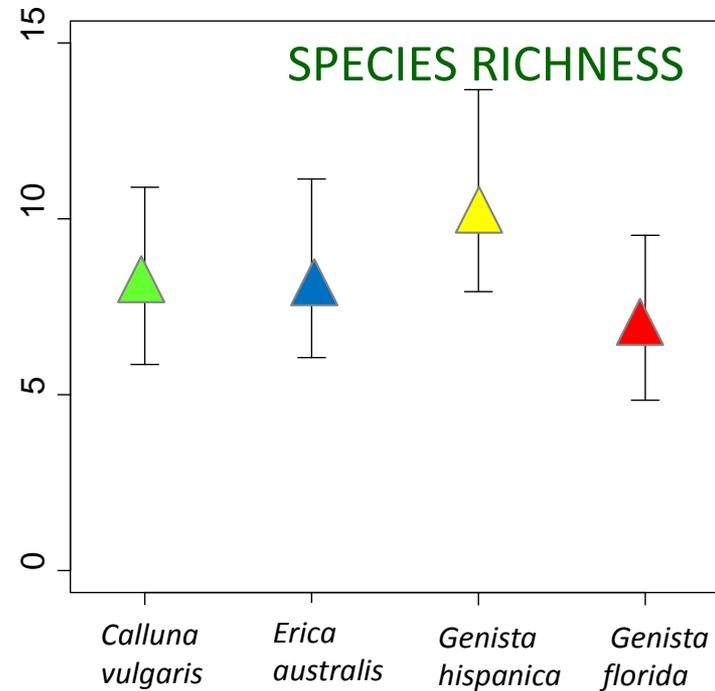
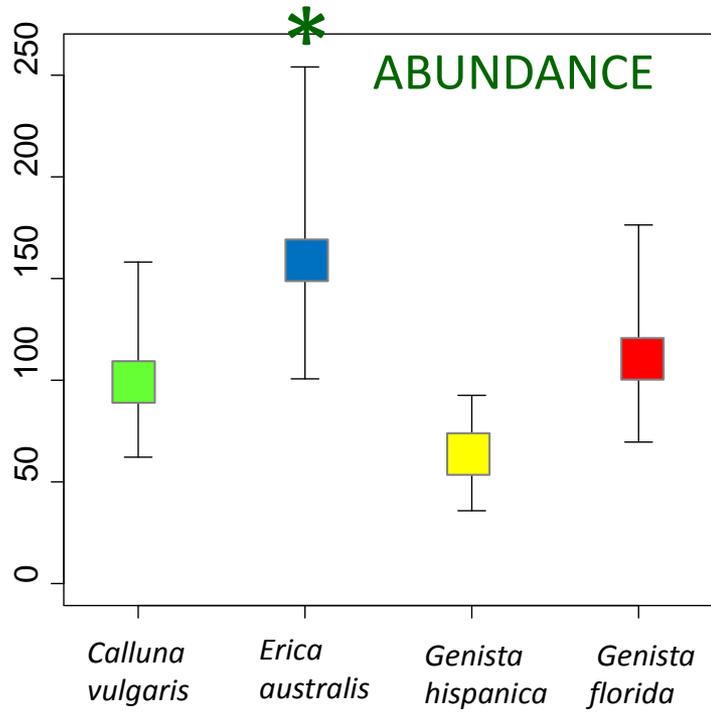
- ***G. hispanica*:** great number of endemic species

-**Heathlands:** very poor soils

- ***Genista* communities:** high amount of nutrients



Carabid beetles communities



(1) There were low proportion of species shared among them

(2) *Calluna* heathlands showed the highest number in endemic

species: *Cryobius cantabricus*, *Nebria asturiensis* and *Pterostichus cantaber*



Cryobius cantabricus

Conserve the mosaic of all these communities to preserve the maximum biodiversity in the Cantabrian Mountains- BIODIVERSITY HOTSPOT -

4.- What can we do to conserve these heathlands?

Building/Mature-PHASE

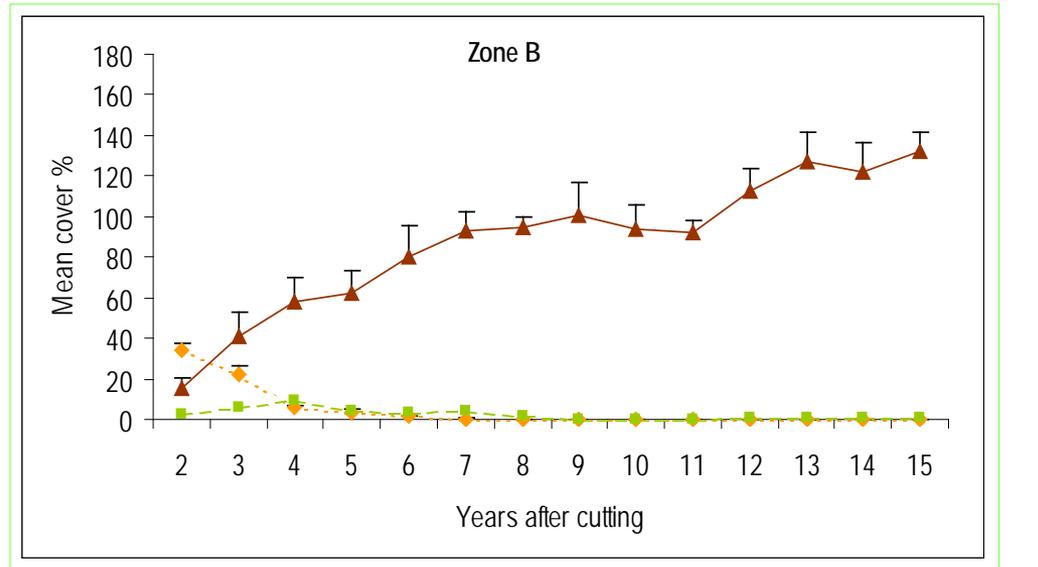
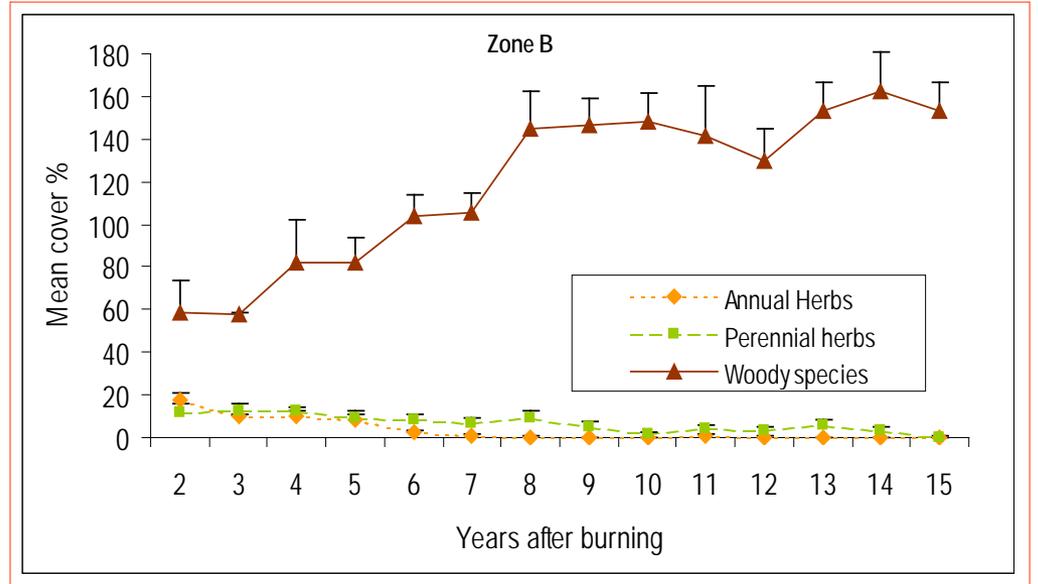
Burning



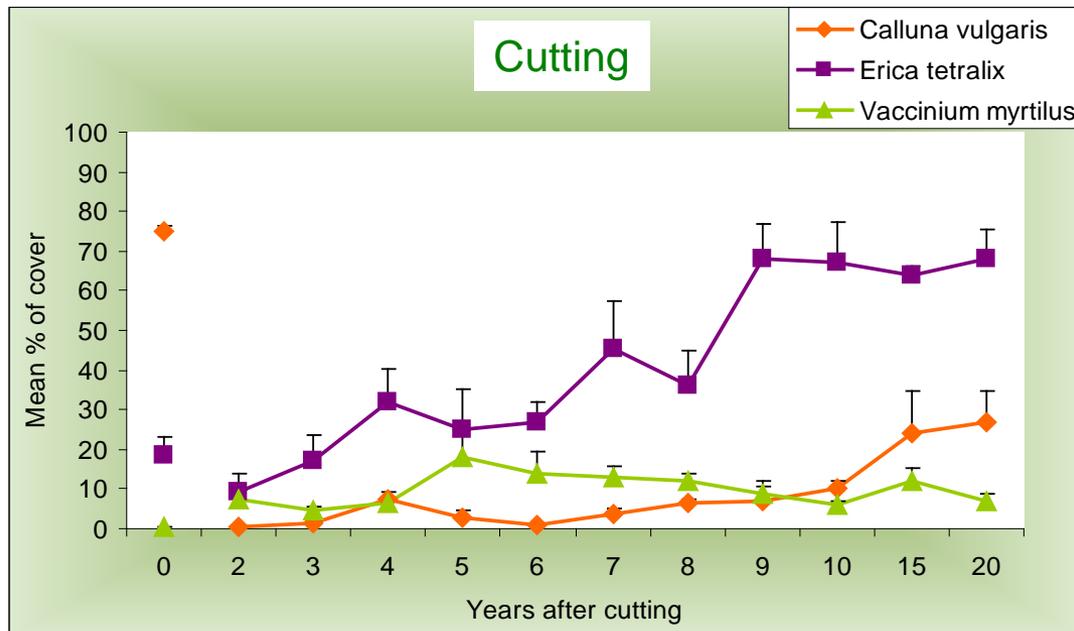
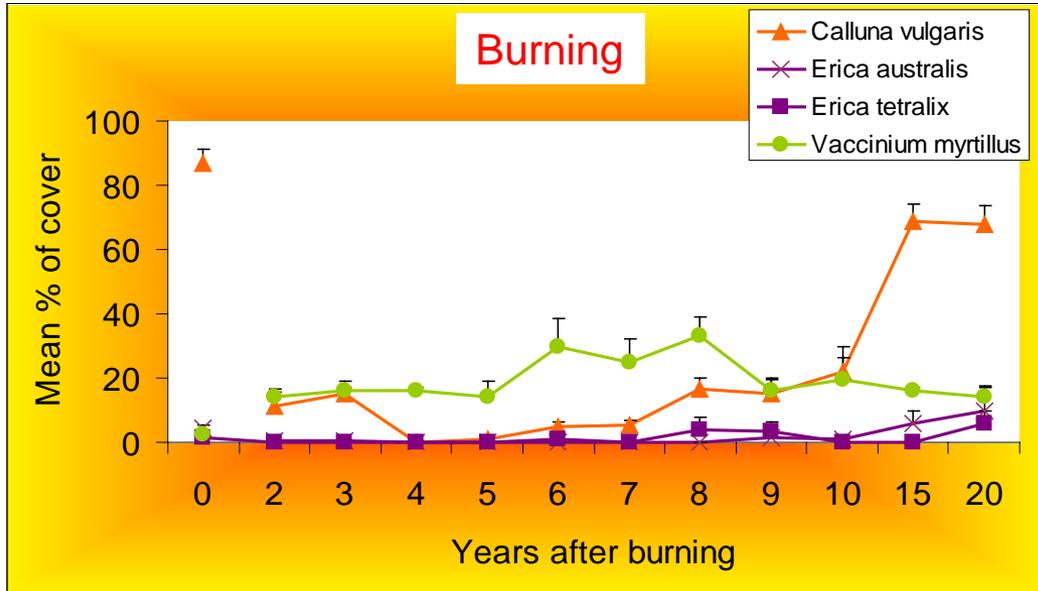
Cutting



Erica australis heathlands



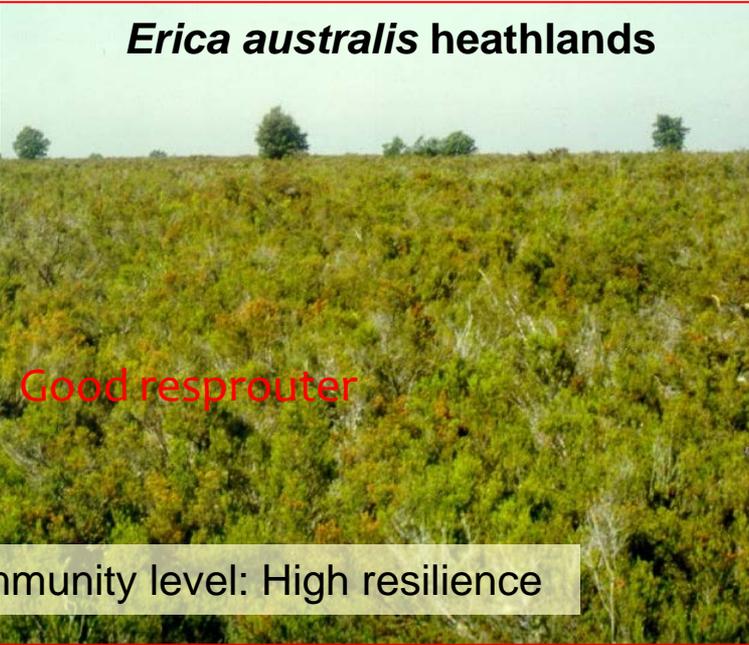
Calluna vulgaris heathlands



***Erica australis* heathlands**



Good resprouter



Community level: High resilience

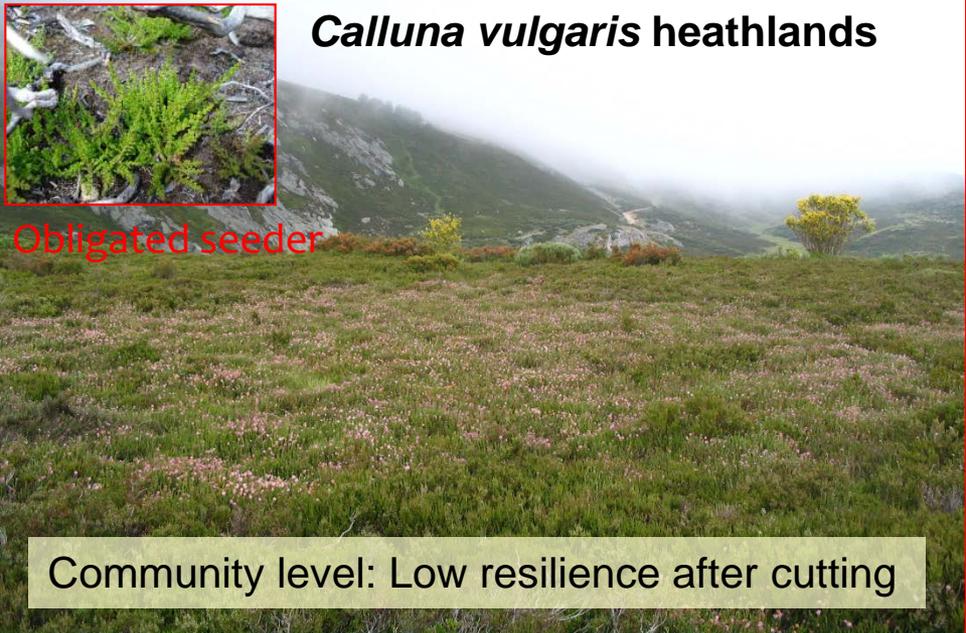


Intervals of 10-15 years

***Calluna vulgaris* heathlands**



Obligated seeder



Community level: Low resilience after cutting



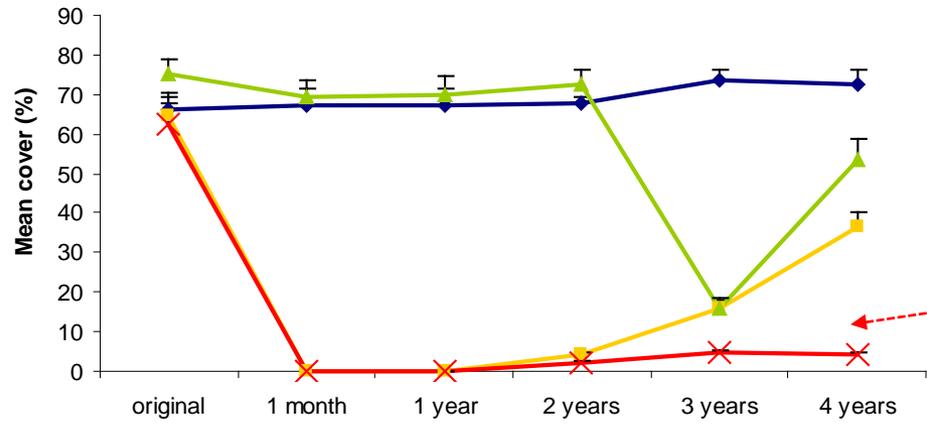
Intervals of 20-25 years

5.- Could burning be used as a management tool to preserve the *Calluna* heathlands with increasing levels of nitrogen deposition?

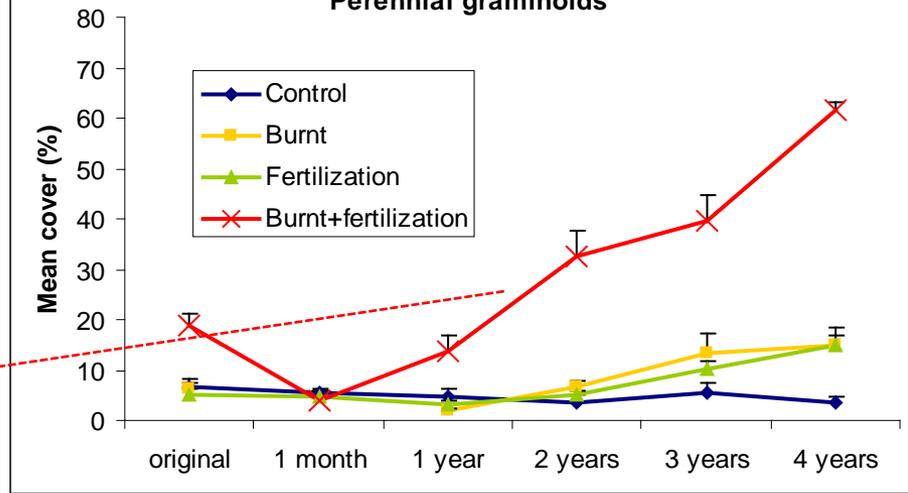


1998=The fertiliser level ($56 \text{ kgN ha}^{-1} \text{ year}^{-1}$) was equivalent to twice the pollution levels in this area

Calluna vulgaris



Perennial graminoids



4 years after burning



4 years After burning+fertilization



Calluna only regenerates by germination after burning

pH and soil nutrient concentration

	pH	Total P mg kg ⁻¹	PO ₄ ³⁻ mg kg ⁻¹	Total N mg g ⁻¹	NH ₄ ⁺ mg kg ⁻¹	NO ₃ ⁻ mg kg ⁻¹
Control	4.6	637.0	6.5	5.0	25.1	3.2
Fertilized	4.7	506.1	6.5	4.6	29.2	2.9
Burnt	4.7	610.3	6.1	5.3	50.1	3.3
Burnt + Fertilized	4.9	717.8	8.5	5.6	69.5	4.5

We propose the use of **burning** as a **management tool** under current conditions of nitrogen deposition, but

...



12 years after burning+fertilization

but, in new scenarios of higher N deposition: **Burning+ grazing**

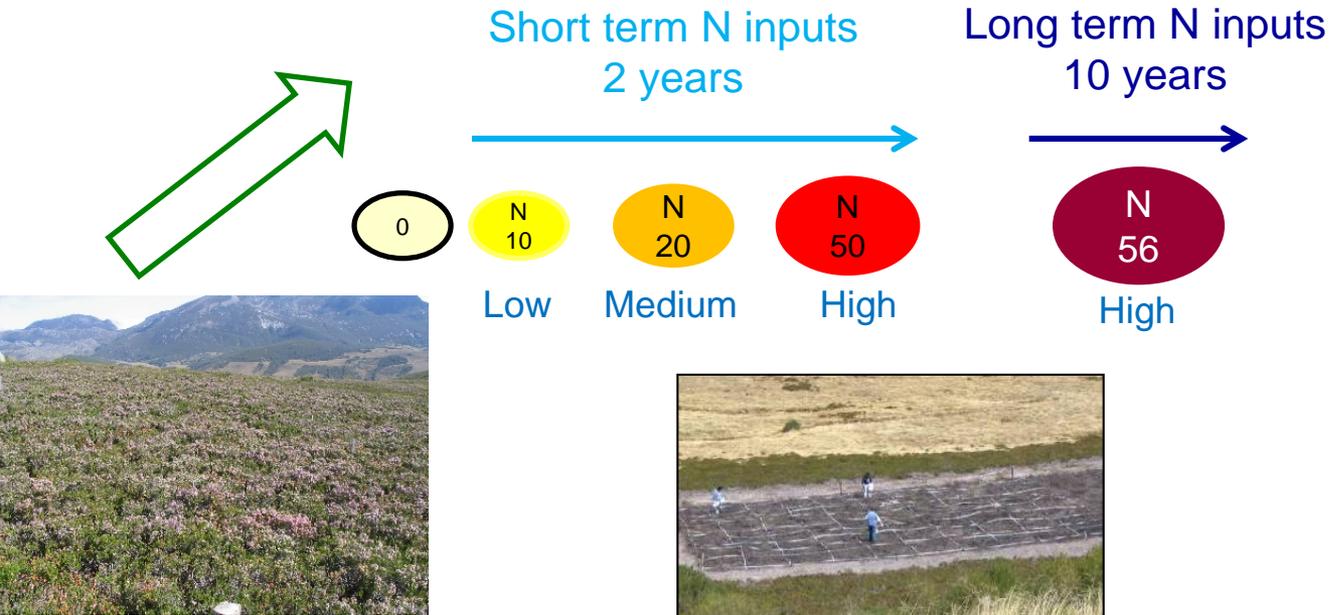


6.- Are the effects of nitrogen in heathlands mediated by a **time- scale** of N inputs and the **age** of *Calluna*?

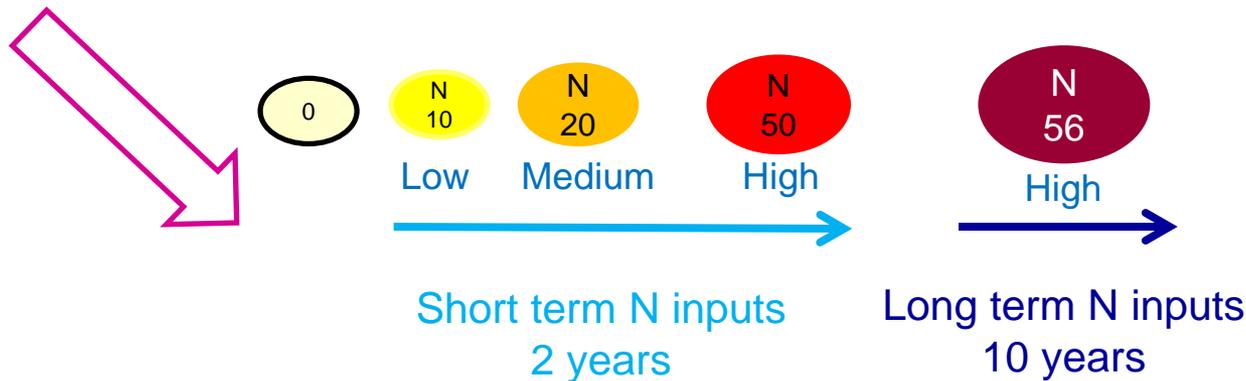
N inputs at two **time scales**

Calluna ages

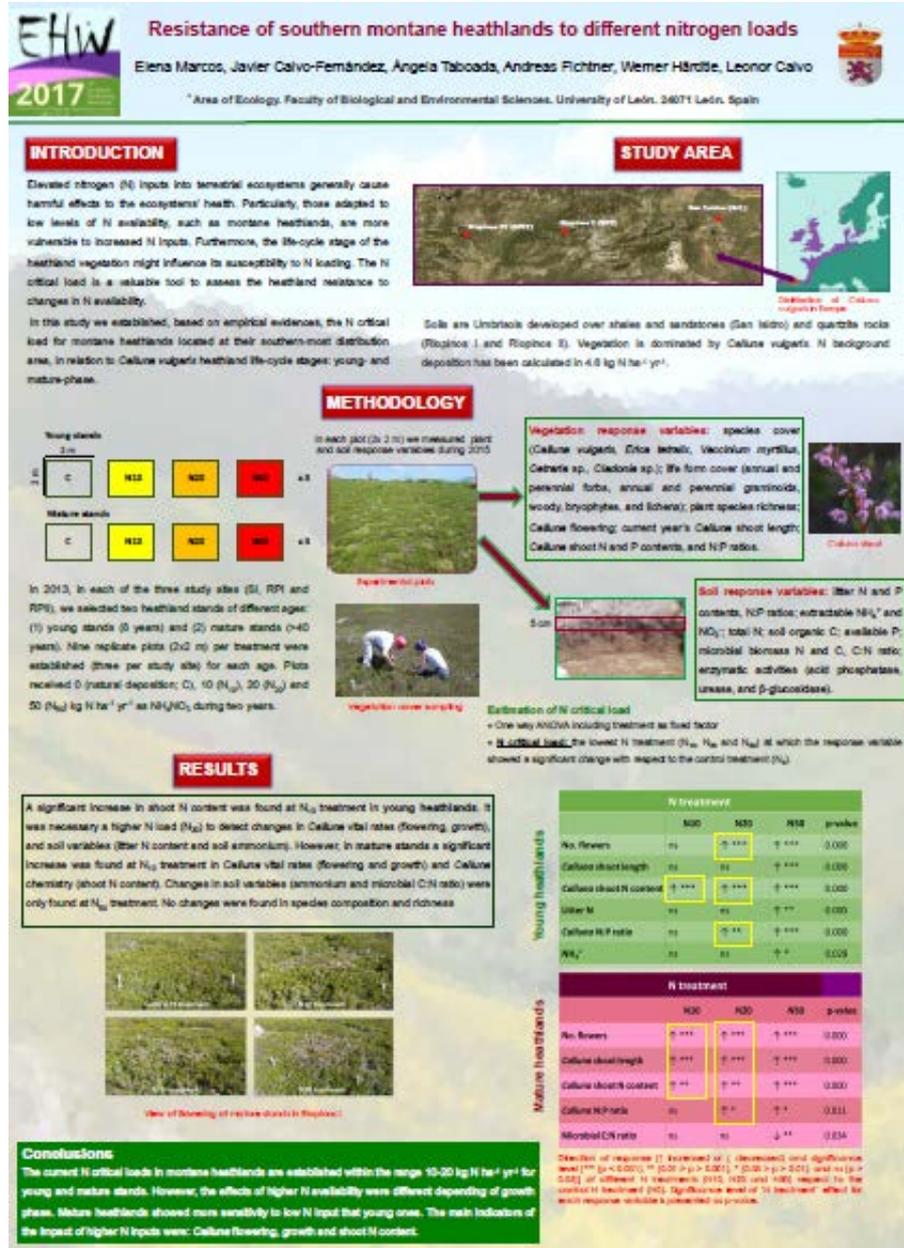
Young=8 years old



Mature >40 years old



Elena Marcos's poster



Scientific bases required for successful conservation of these heathlands



Daboecia cantabrica



Cicindela sylvatica



Luscinea svecica



Dactylorhiza cantabrica



Conserve: Ecosystem services provided by these socio-ecological systems

CULTURAL



Cultural heritage
Protection of biodiversity
Recreation, ecotourism

REGULATING

Prevention of soil erosion
Water purification

Carbon sequestration

PROVISIONING

Goods: honey, meat, wool, etc.
Grazing
Game



Medicines
Gentiana lutea

Provisioning of Habitat
Preserving genetic biodiversity

THANK YOU VERY MUCH FOR YOUR PATIENCE AND ATENTION

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