Tracking plant population dynamics with a citizen science network

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ADOPTA UNA PLANTA
CSIC • Instituto Pirenaico de Ecología •

Pyrenean Institute of Ecology (CSIC)

- Aragón ≈ 3500 vascular plants (≈ ¼ European flora)
- ~ 150 catalogued as threatened or priority

Herbarium (1950)

Pyrenean Institute of Ecology (CSIC)

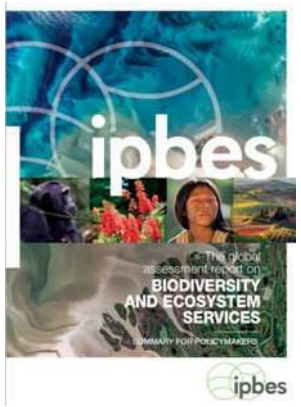
- Aragón ≈ 3500 vascular plants (≈ ¼ European flora)
- ~ 150 catalogued as threatened or priority
- No Faculty of Biology (no students) & few botanists

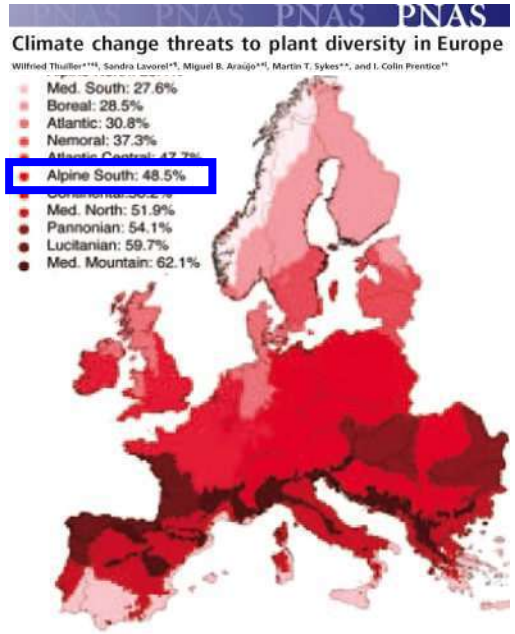
Herbarium (1950)

FLORAGON (2000)

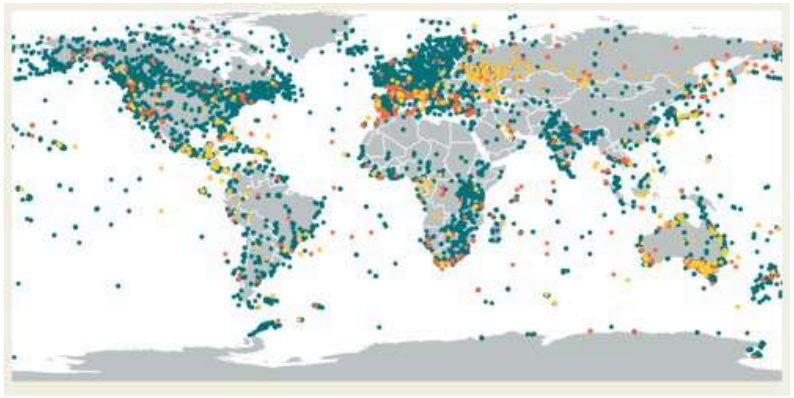
We often weak up listening **bad news about nature,** like species extinctions, longer lists of threatened species, or habitat degradation…

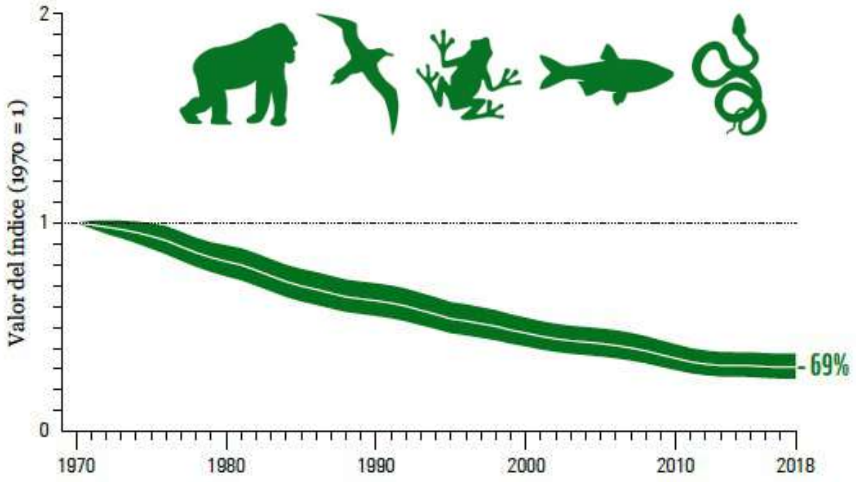
Also, the **scientific community** has often forecasted a dark future for biodiversity, mostly based on models of climate change





The living planet index (2022)



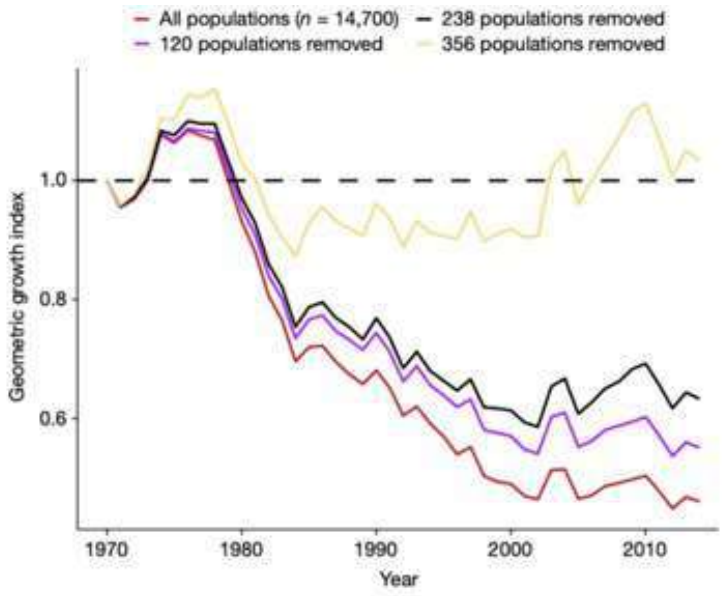


32000 pops,
> 5000 vertebrates
(terrestrial & aquatic)

69% of decline in population sizes between 1970 – 2018

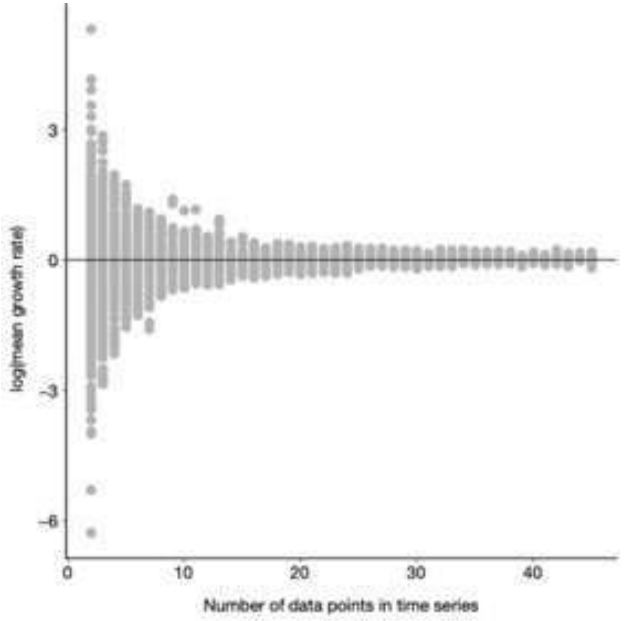
Some issues about estimating trends

Decline turns into stability after removing 2.4% of temporal series

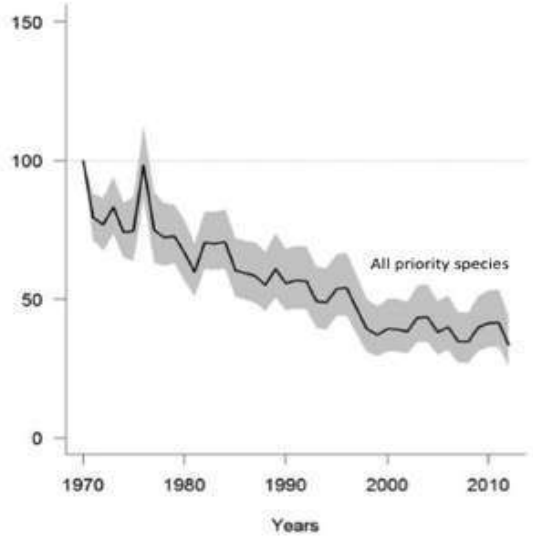


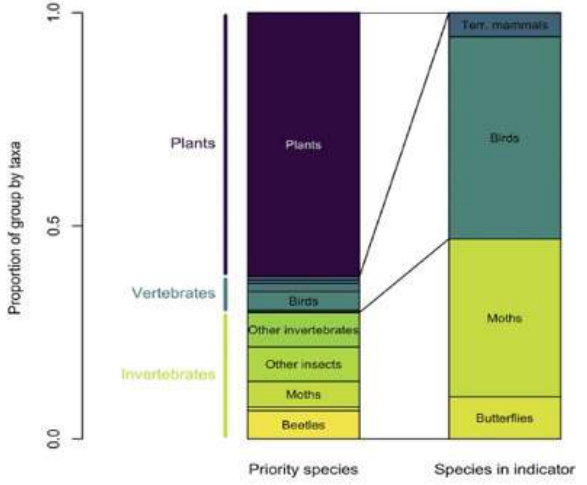
Leung et al. 2020. Nature

Increasing and decreasing trends mostly among short term monitored populations



UK: not a god fit between "priority species" and "studied species"





Buckland & Johnston 2017. Biol Cons

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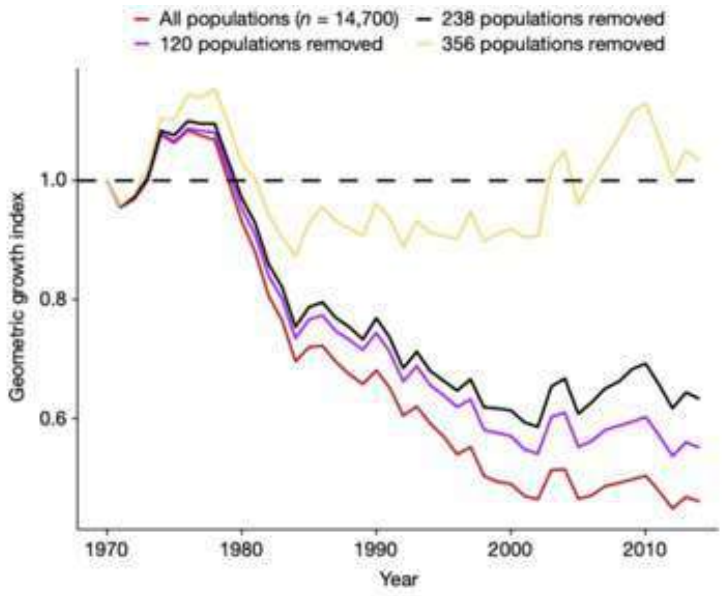

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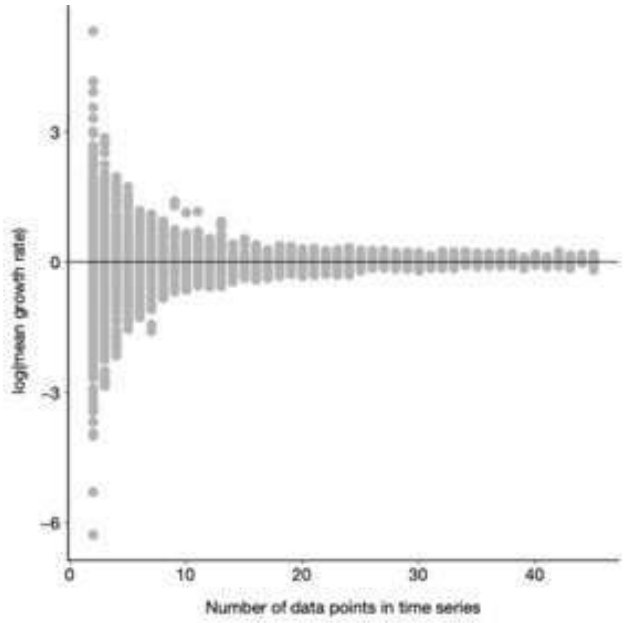

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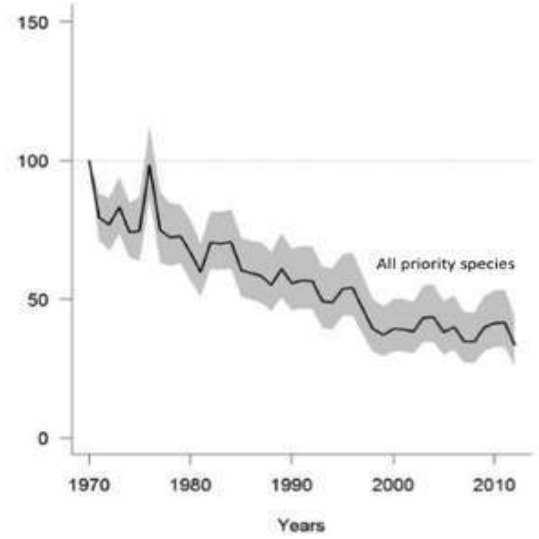
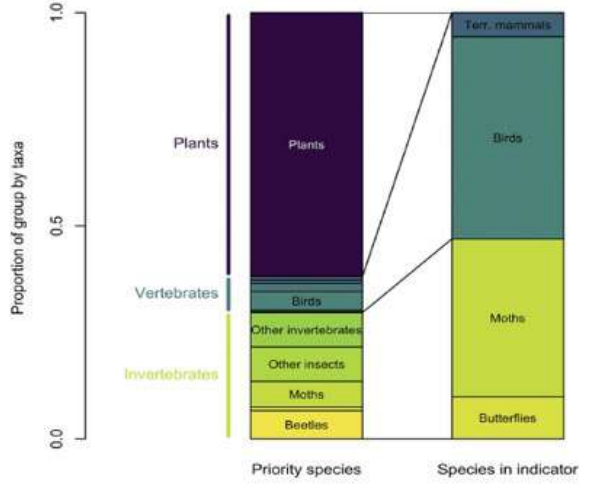




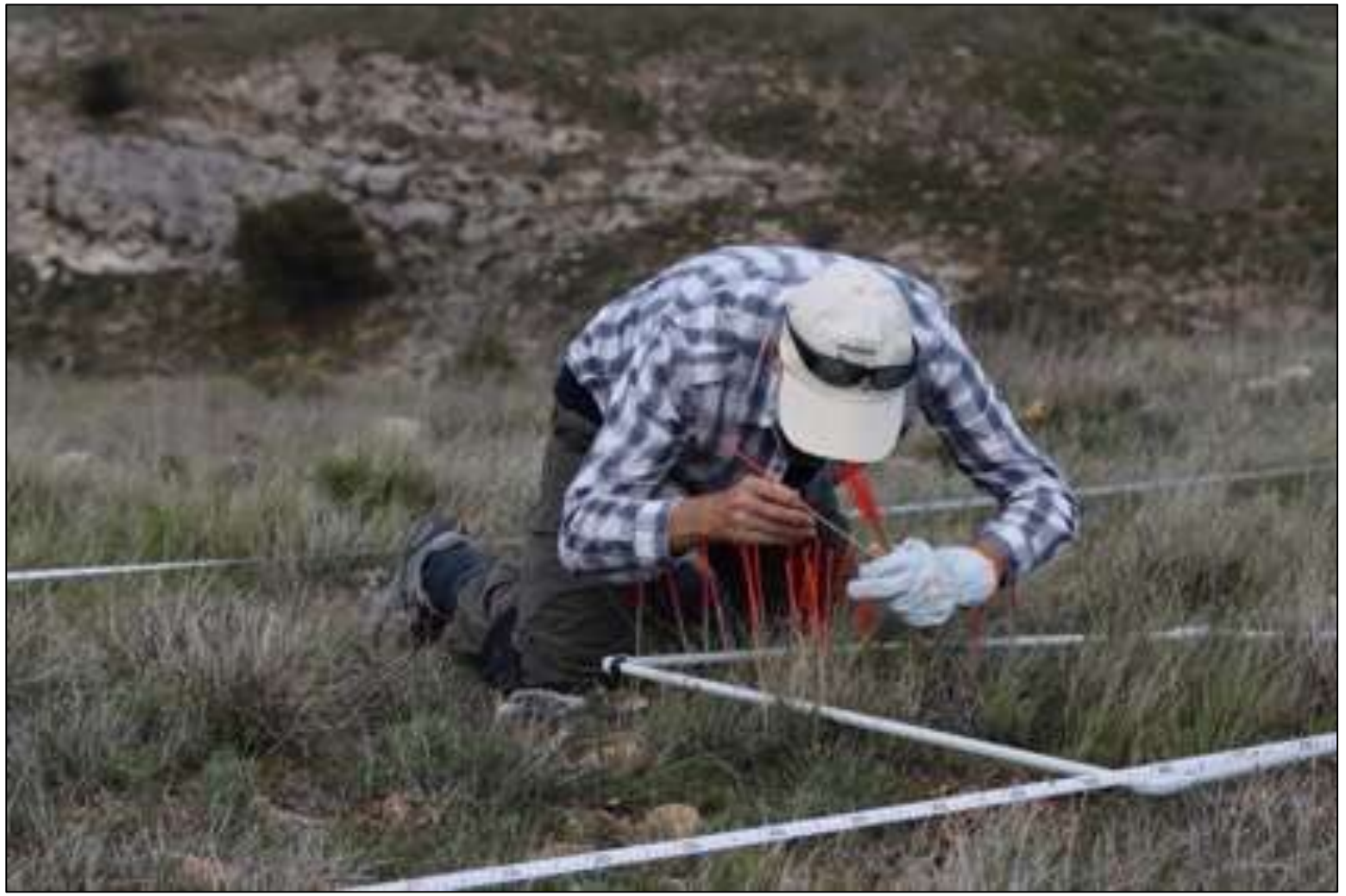
Buckland & Johnston 2017. Biol Cons

Can we make generalizations?
We probably need much more long-term information before assuming that plants follow the same pattern

“ADOPT A PLANT”

How are plant populations and species doing on in the current scenario of global change?

Based on detailed information of populations of many plant species, lifeforms, across hábitats. No digital devices



“Adopt a plant”

Detect early-waring signals of decline before it is too late, to better face the challenge of halting biodiversity loss

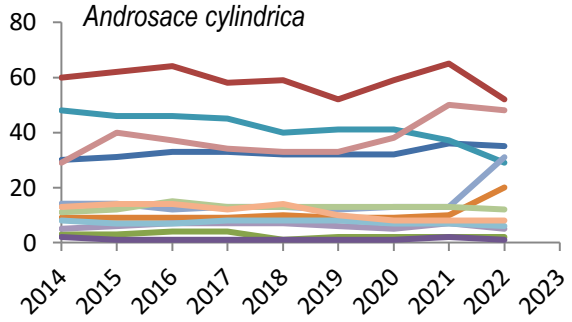
Objectives:

1- Build **a network of people committed with the long-term monitoring of plant populations**. **Everybody can collaborate**, no matters the age, academic background or previous experience, because they will be trained in the field.

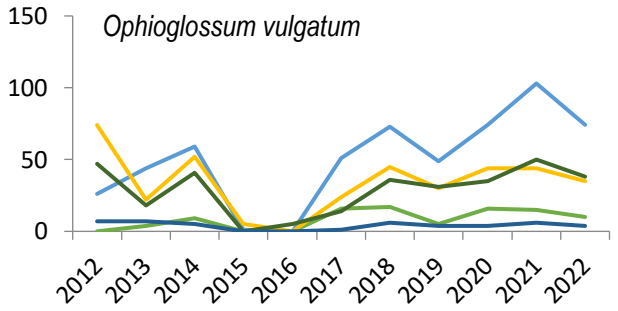
2- **Generate high quality datasets of population abundance/densiy through time**, to produce **standardized indicators (trends in %),** explore and compare the dynamics of many kinds of plants (rare, threatened, structural of habitats…), and **extinction risk**.

3- **Bring together scientists** (responsible for sampling desing & data analysis), **managers** (responsible for conservation actions) **and the society** (awareness)

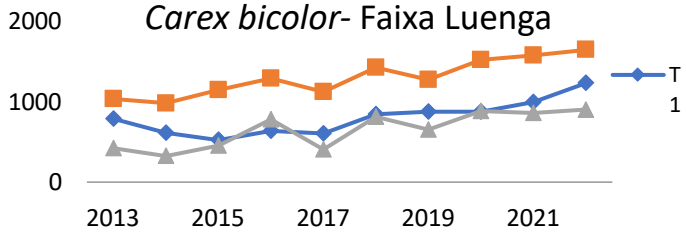
Androsace cylindrica

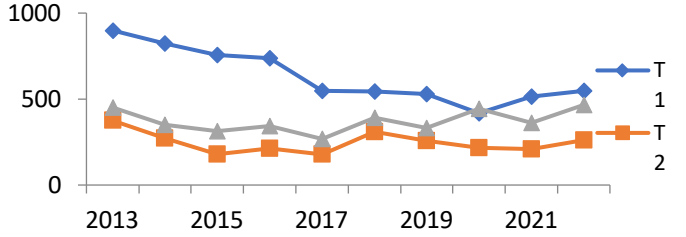


Ophioglossum vulgatum



Carex bicolor





1- list of sps/habitats of interest

SCIENTIFIC NAME (Flora Iberica)	CEAA	LESRPE	HD
Aceras anthropophorum (L.) W.T.Aiton			
Actaea spicata L.			
Allium ursinum L. subsp. *ursinum*			
Anacamptis pyramidalis (L.) Rich.			
Androsace ciliata DC. in Lam. & DC.			
Androsace cylindrica DC. in Lam. & DC. subsp. *cylindrica*		LESRPE	IV
Androsace cylindrica subsp. *hirtella* (Dufour) Greuter & Burdet		LESRPE	IV
Androsace cylindrica subsp. *willkommii* P.Monts.		LESRPE	IV
Androsace pyrenaica Lam.	VU	VU	II and I'
Androsace vitaliana subsp. *assoana* (M.Laínz) Kress	VU		
Arenaria tetraquetra L. subsp. *tetraquetra*			
Arnica montana L. subsp. *montana*			
Artemisia eriantha Ten.			
Arthrocnemum macrostachyum (Moric.) Moris in Moris & Delponte			
Asphodelus fistulosus L.			

>150 plants listed at the regional level, plus the ones in the Habitats Directive and red lists…

Most European Habitats except the marine/coastal ones
Semideserts -> alpine level (3350 m a.s.l.)

High-quality dataset

2- Meetings and talks

Intensive mentoring

3- Personal training

Seguimiento demográfico anual de *Cypripedium calceolus*

Especie de Interés Comunitario según la Directiva Hábitats (LIFE-RESECOM)

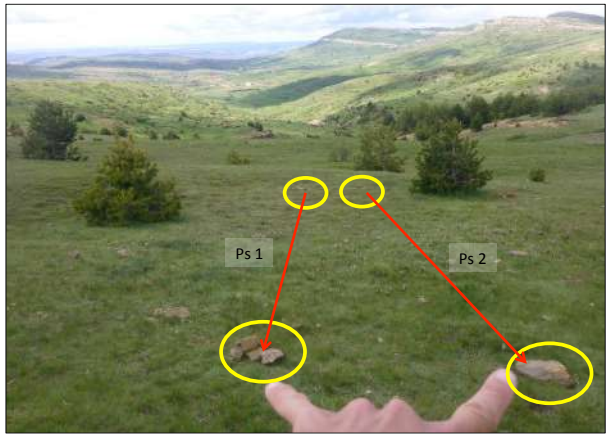
Código de seguimiento: **cypcal_sal1**
Localidad: Sallent de Gállego, AMA 2, Alto Gállego
Localización: 30T 715698 4738313 WGS84

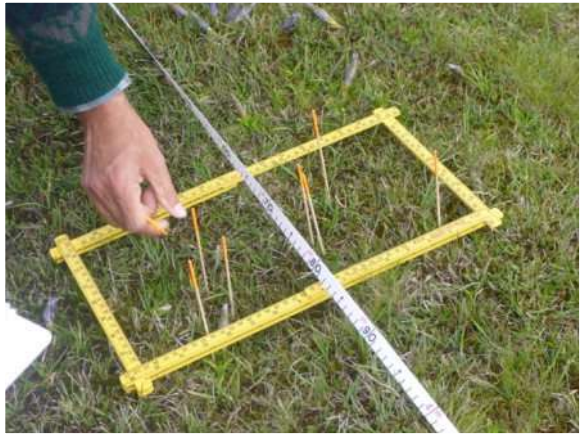
Responsables: **Fernando de Frutos Irujo** y **Elisa Andrés Gil**
Asesora del Instituto Pirenaico de Ecología: María Begoña García.
Enviar los datos tras realizar el censo anual a biodiversidad@ipe.csic.es

Inicio del seguimiento: junio de 2015

Dossier with all relevant information to visit the place every year for 10 yrs

Specific for each
[monitoring site – plant species - team]



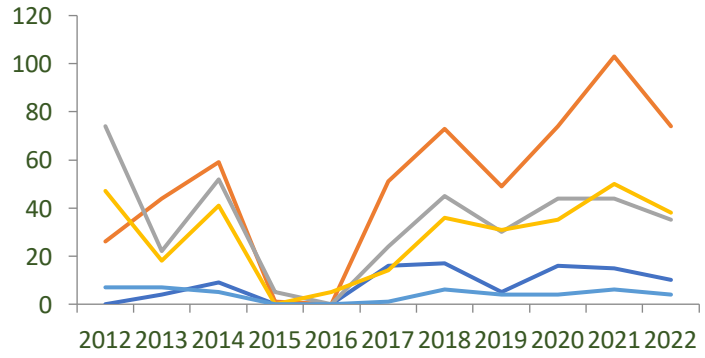


Different methods are set up ‘on the go’ (habitat, species size and detectability…)
They must be easy for participants & robust for researchers

Excel file with tables to calculate trends and visualize them.

After annual fieldwork, every year participants send data in a spreadsheet with graphics, to be **validated by scientists**

			22/6/17	22/6/18	26/6/19	15/6/20	Doble recuento total 27/05/2021 y :					
			2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
TOTAL	astclu	TOTAL	96	92	95	98	86.0	0	0	0	0	0
		V	22	5	26	18	4.0	0	0	0	0	0
		R	74	87	69	80	82.0	0	0	0	0	0
	gensco	TOTAL	64	58	59	57	55.0	0	0	0	0	0
	Lambda astclu		-	0.96	1.03	1.03	0.88	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!
	Lambda gensco		-	0.91	1.02	0.97	0.96	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!	#¡DIV/0!
Transecto 1	astclu	V	11	0	7	6	0.0	0	0	0	0	0
		R	5	15	8	11	16.0	0	0	0	0	0
		Total	16	15	15	17	16.0	0	0	0	0	0
	gensco		6	6	7	9	8.0	0	0	0	0	0
Transecto 2	astclu	V	2	1	1	3	0.0	0	0	0	0	0
		R	15	13	14	15	15.0	0	0	0	0	0
		Total	17	14	15	18	15.0	0	0	0	0	0
	gensco		14	12	12	10	14.5	0	0	0	0	0
Transecto 3	astclu	V	5	1	13	2	2.0	0	0	0	0	0
		R	22	26	16	27	22.0	0	0	0	0	0
		Total	27	27	29	29	24.0	0	0	0	0	0
	gensco		21	21	22	20	16.5	0	0	0	0	0
Transecto 4	astclu	V	2	2	3	2	0.5	0	0	0	0	0
		R	6	6	5	7	7.5	0	0	0	0	0
		Total	8	8	8	9	8.0	0	0	0	0	0
	gensco		6	5	5	6	4.0	0	0	0	0	0
Transecto 5	astclu	V	2	1	2	5	1.5	0	0	0	0	0
		R	26	27	26	20	23.0	0	0	0	0	0
		Total	28	28	28	25	24.5	0	0	0	0	0
	gensco		17	14	13	12	9.5	0	0	0	0	0



4- Presentation of results

ADOPT A PLANT CELEBRATION

Certificates for the ones that collaborated for 10 yr of monitoring

CERTIFICADO
DE PARTICIPACIÓN

POR MEDIO DE ESTE DOCUMENTO, SE CERTIFICA QUE

Pilar Grasa Sancho

HA COLABORADO EN LA RED DE SEGUIMIENTO DE BIODIVERSIDAD DE ARAGÓN ADOPTANDO POBLACIONES DE
Arenaria tetraquetra tetraquetra, Leontopodium alpinum alpinum, Ramonda myconi, Valeriana longiflora

DURANTE MÁS DE UNA DÉCADA

MARÍA BEGOÑA GARCÍA
CIENTÍFICA TITULAR IPE(CSIC)

JOSÉ DANIEL GÓMEZ
CIENTÍFICO TITULAR IPE(CSIC)

Página web: https://biodiversidadipe.csic.es / e-mail: biodiversidad@ipe.csic.es

Excursion

5- Other activities

Newsletter, merchandising, talks, courses…

2014

2015

2016

2017

2018

2019

2020

2021

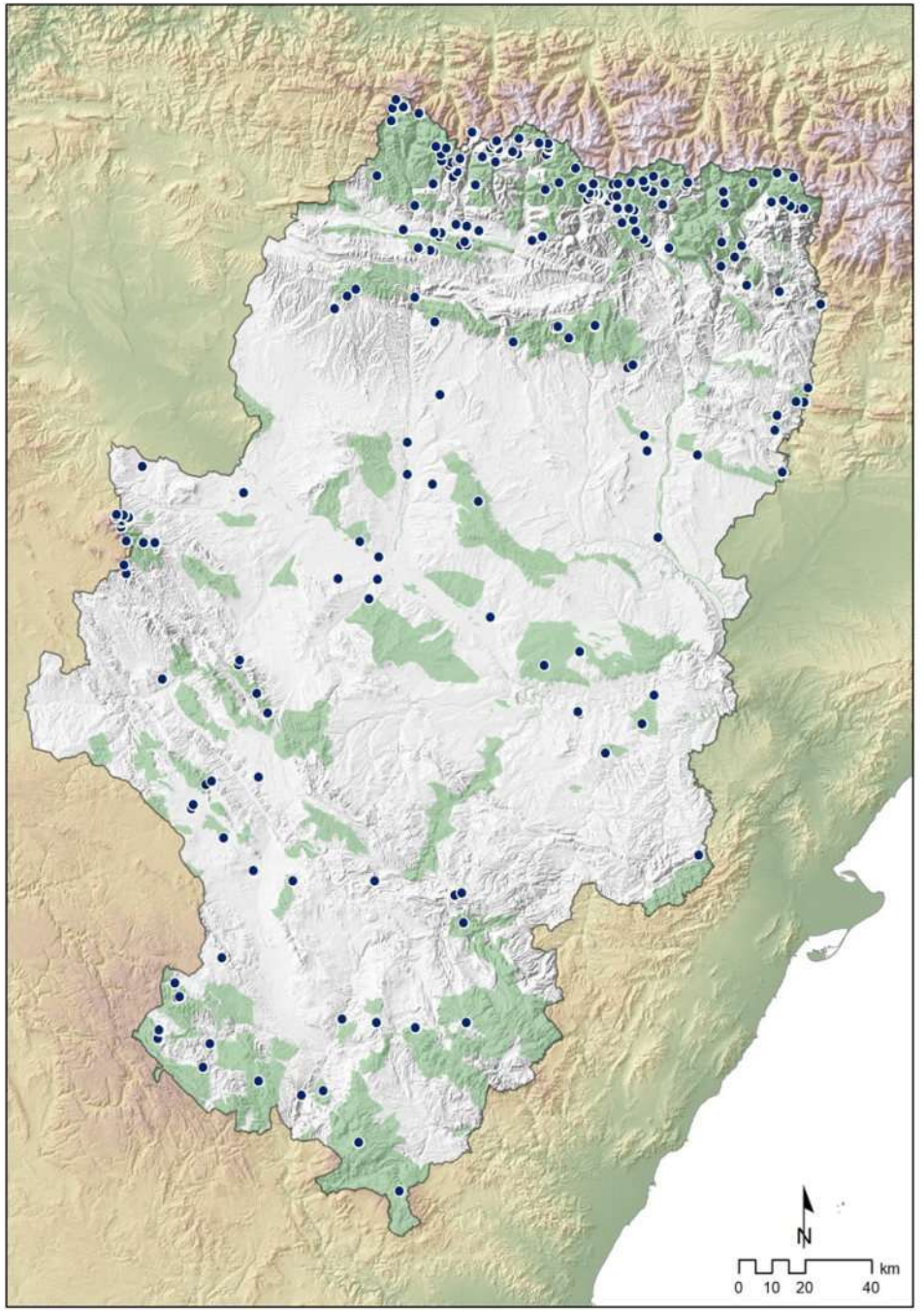
2022

~ 250 Monitored sites

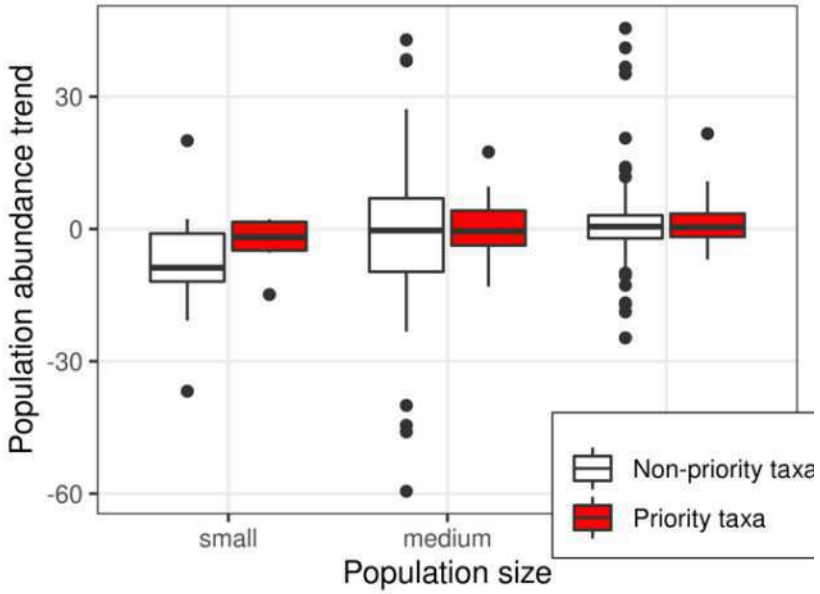
210 sps (30% threatened)

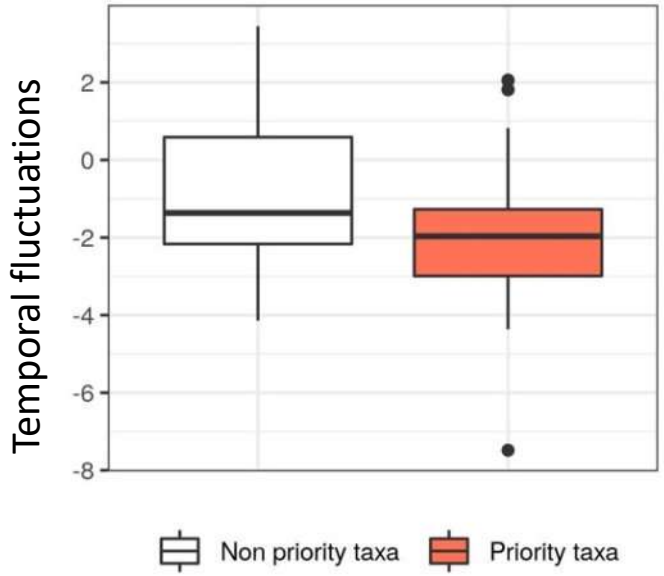
~300 plant populations

70% inside the Natura 2000 Network

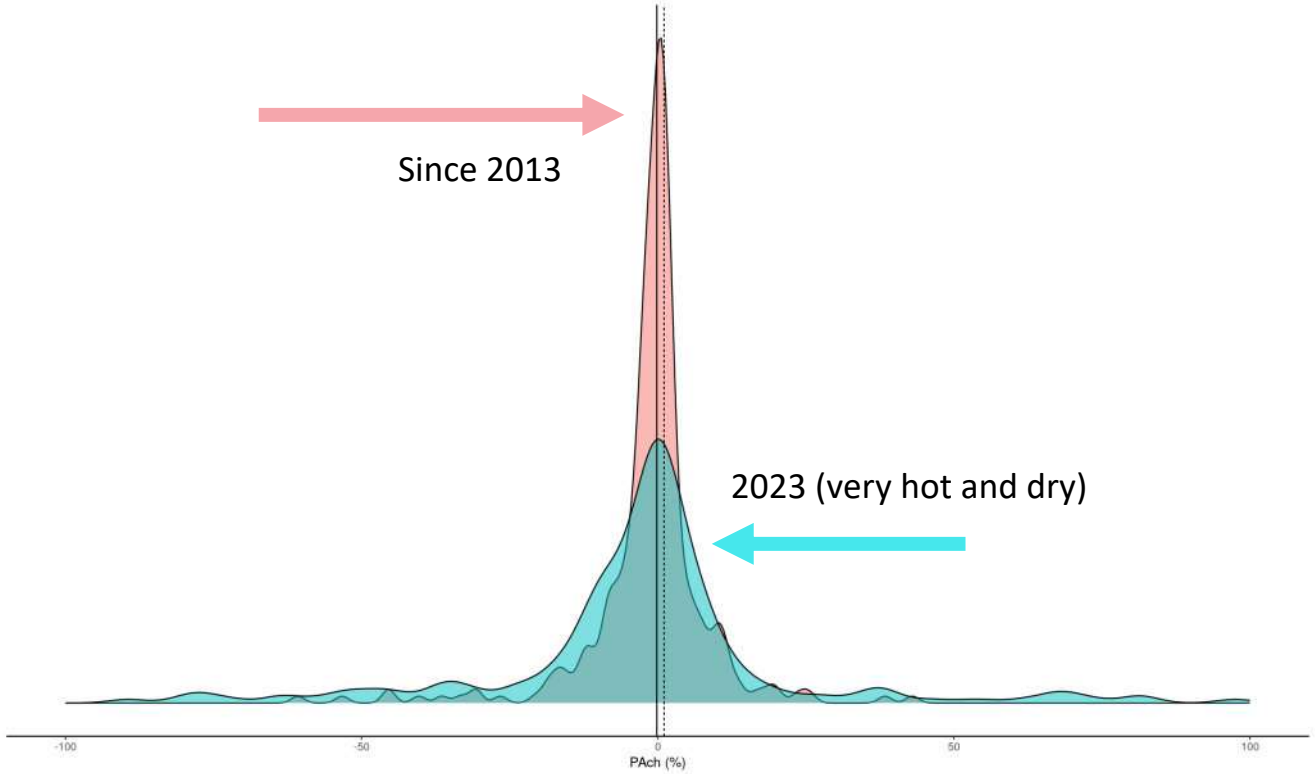


Priority species show similar trends and lower temporal fluctuations





García et al, J Appl Ecol, 2021



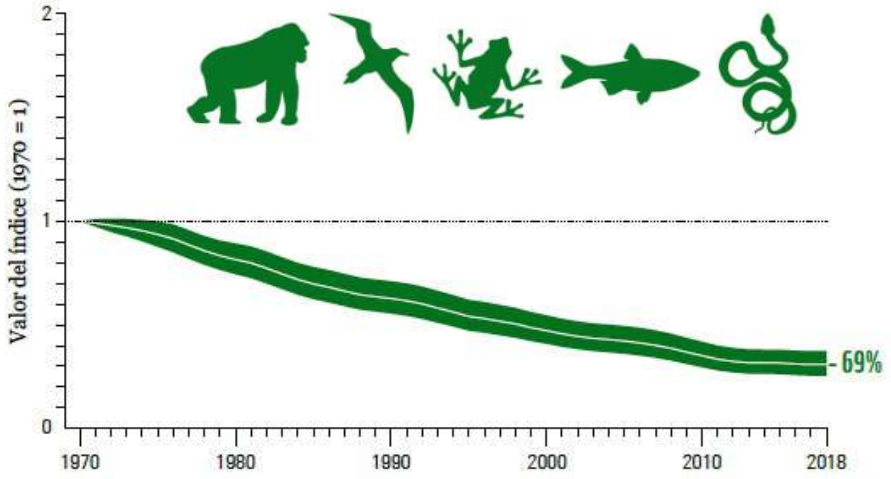
CITIZEN SCIENCE
Research Article

Journal of Applied Ecology

Detecting early-warning signals of concern in plant populations with a Citizen Science network. Are threatened and other priority species for conservation performing worse?

María B. García | José L. Silva | Pablo Tejero | Iker Pardo

The living planet index (2022)



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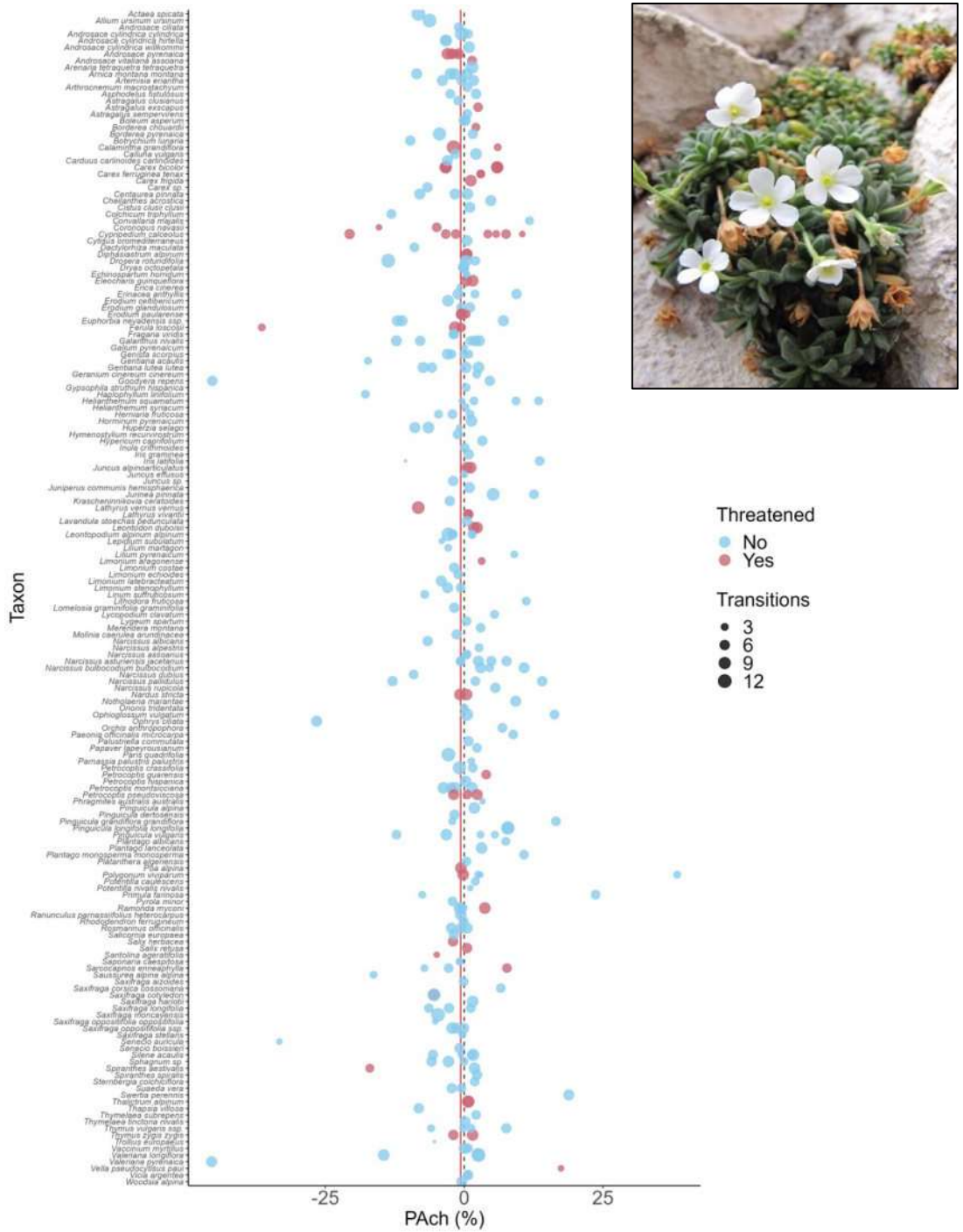


Conclusions:

- Collaborative programs supervised by scientists are a **very promising tool** for tackling the huge task of monitoring biodiversity
- As a showcase, in NE Spain we were able to build a **high quality datasets** from the long-term program “Adopt a plant”
- The information gathered **could not probably be payed** at all by any Administration (~4000 working days)
- Analysis revealed that **threatened species tend to be more stable than other less vulnerable species**

Other projects related to the monitoring of:

Plant populations

visitors (pollinators and others)

the landscapes where they occur

Facilitating the use of iNaturalist/PlantNet

http://bitly.ws/qsVw

CÓDIGO QR

ESCANEA Y DESCARGA LA GUÍA RÁPIDA DE USO DE iNaturalist

Plants sustain mcuh biodiversity at local scale

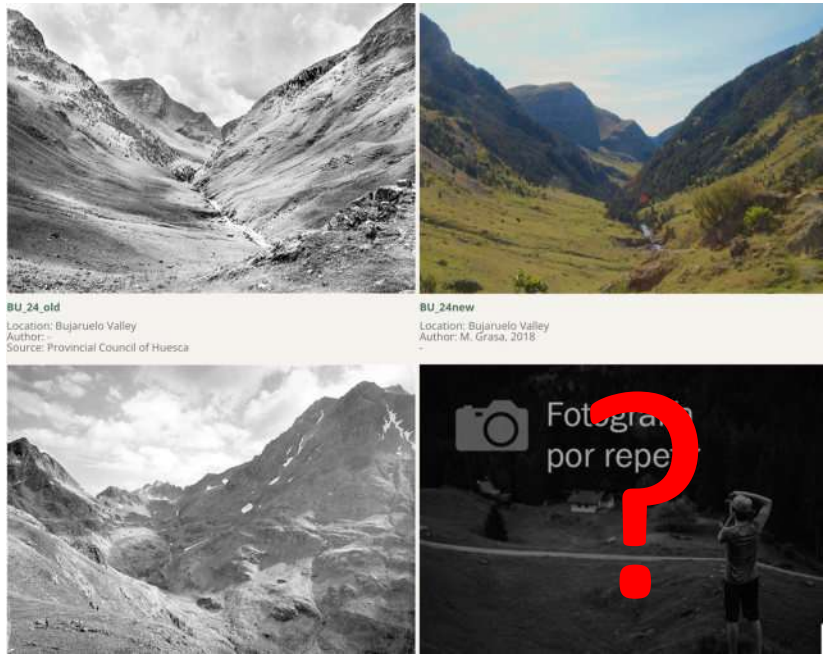
50 experts and naturalists helped to identify hundreds of arthropods visiting 6 rare Pyrenean plants
("*Loosing the network*" project)

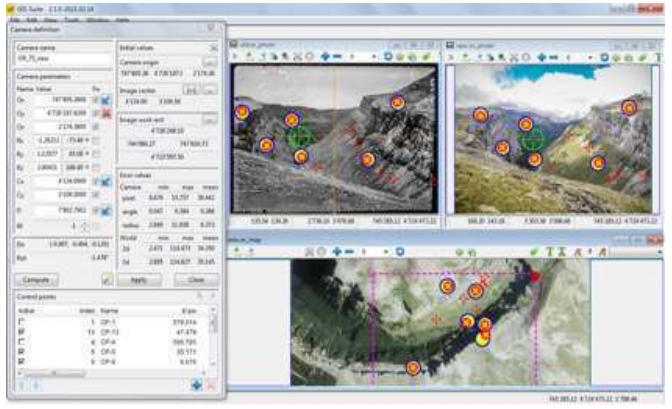
Fundación BBVA

Citizen Science Project to repeat old images of landscapes

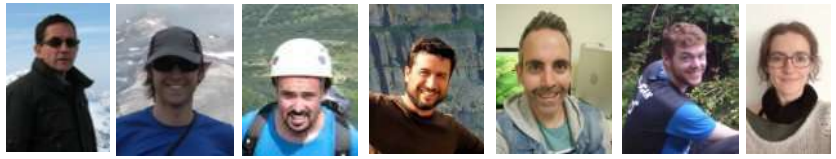
https://paisajescentenarios.csic.es

Gallery of very old pictures (≥ 100 yr old), to repeat them and visualize landscape changes. That helps scientists to quantify them and see what promotes landcover transformation





The very best: the enthusiasm and persistence of collaborators

Thanks! To you and to the army of ~400 volunteers and rangers that believe in this Project (with awards but no funding)

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