

Tracking plant population dynamics with a citizen science network



María Begoña García

mariab@ipe.csic.es





Pyrenean Institute of Ecology (CSIC)



- Aragón \approx 3500 vascular plants (\approx $\frac{1}{4}$ European flora)
- \sim 150 catalogued as threatened or priority

Herbarium (1950)





Pyrenean Institute of Ecology (CSIC)

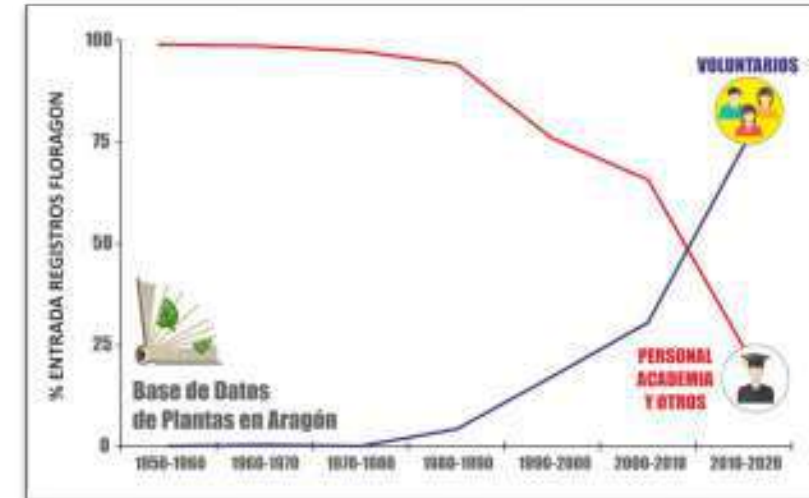


- Aragón \approx 3500 vascular plants (\approx 1/4 European flora)
- \sim 150 catalogued as threatened or priority
- No Faculty of Biology (no students) & few botanists



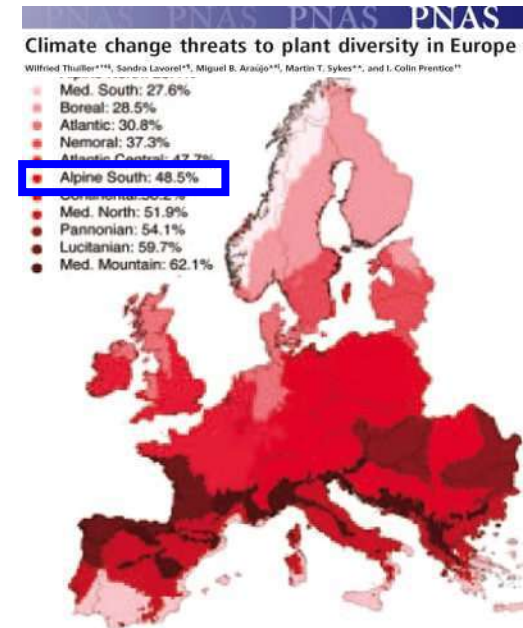
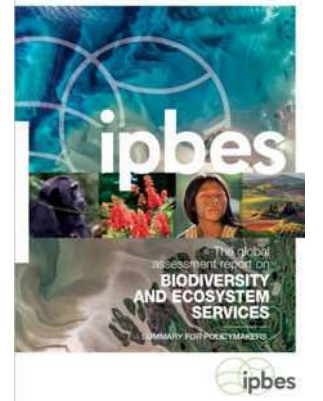
Herbarium (1950)

FLORAGON (2000)



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

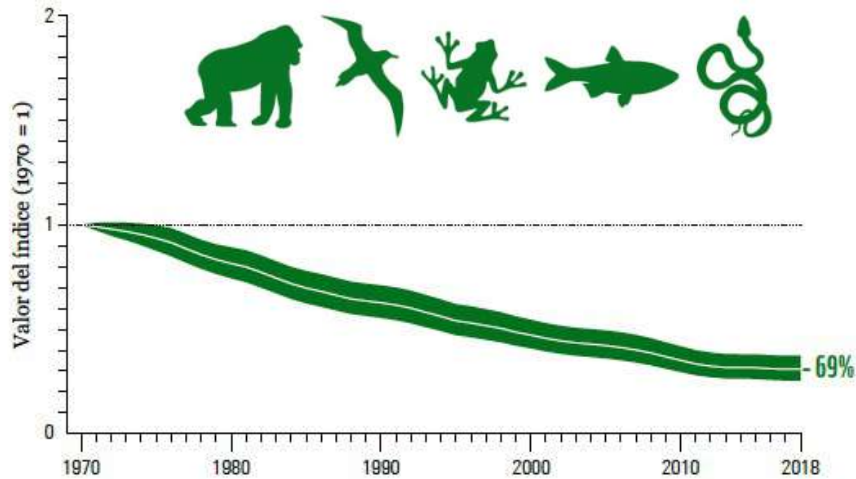
Also, the **scientific community** has often forecasted a dark future for biodiversity, mostly based on models of climate change



The living planet index (2022)



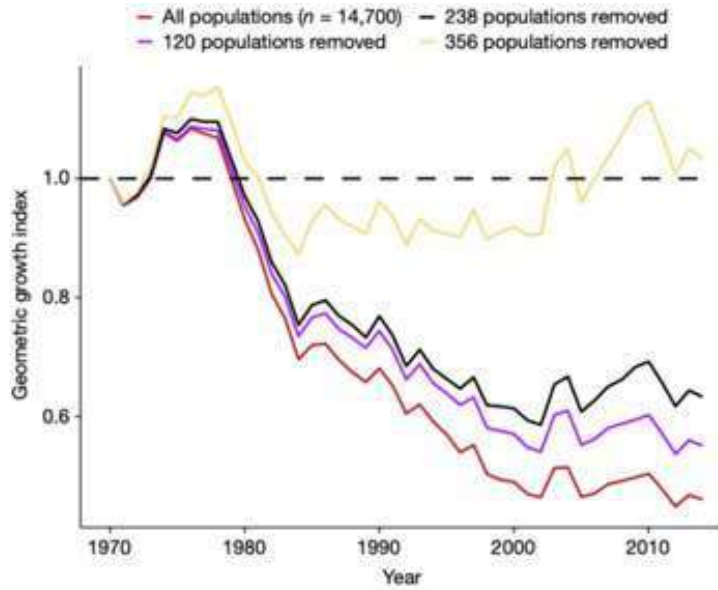
32000 pops,
> 5000 vertebrates
(terrestrial & aquatic)



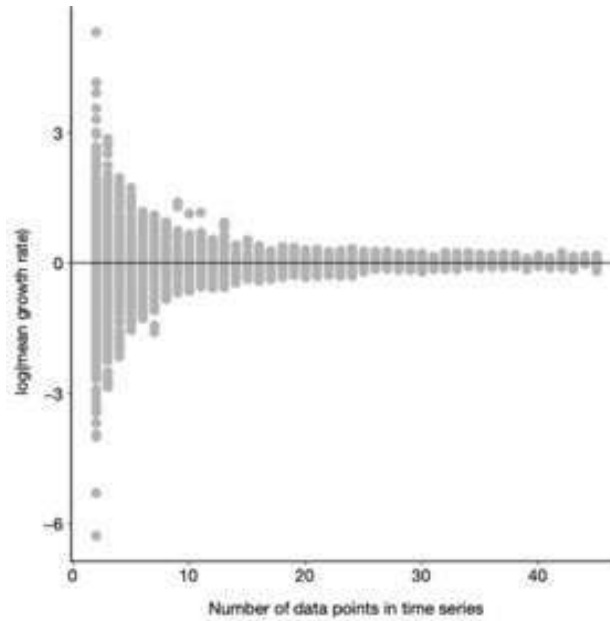
69% of decline in population sizes between 1970 – 2018

Some issues about estimating trends

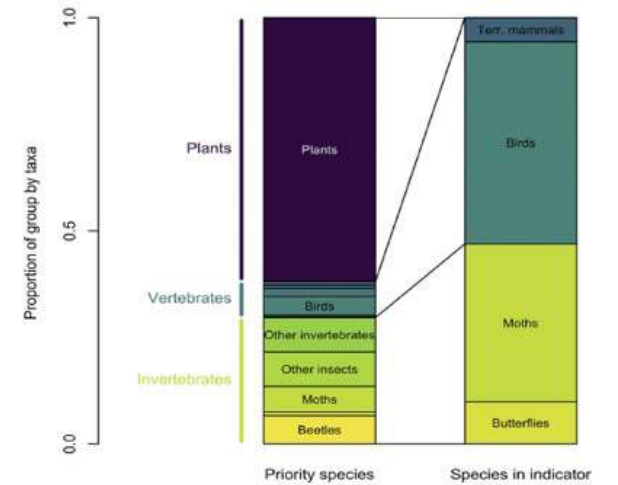
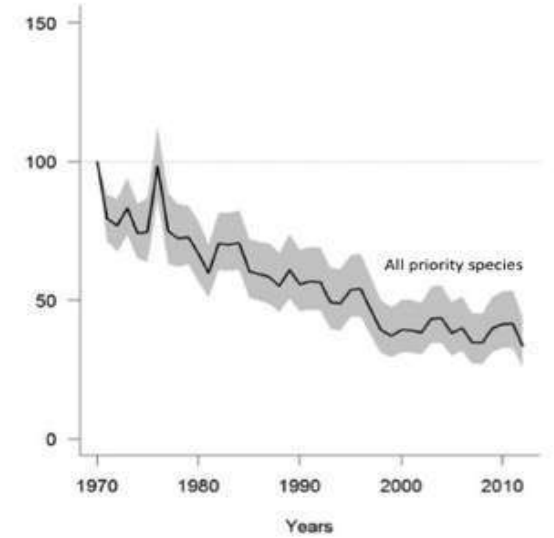
Decline turns into stability after removing 2.4% of temporal series



Increasing and decreasing trends mostly among short term monitored populations

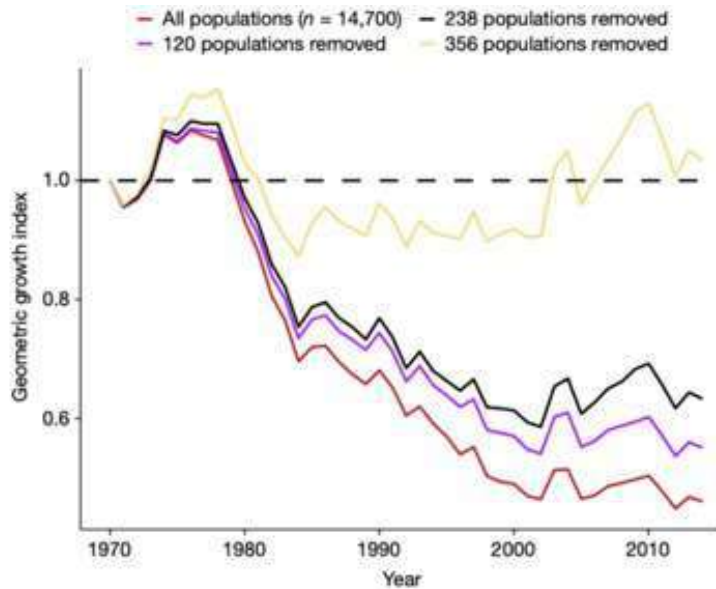


UK: not a good fit between “priority species” and “studied species”

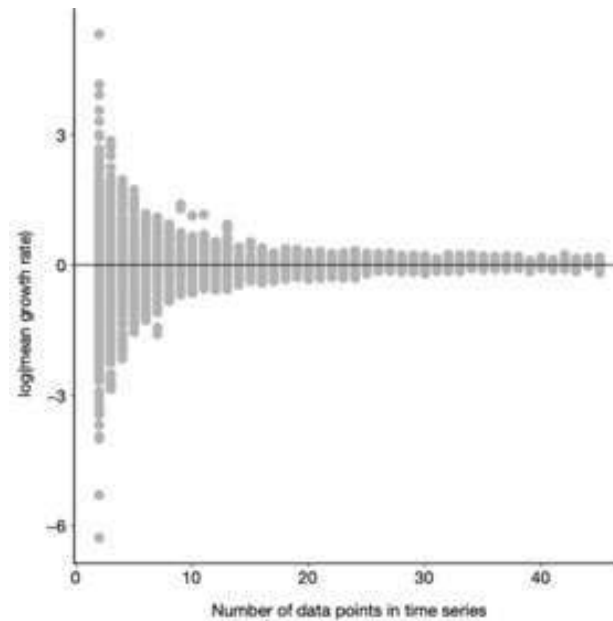


Some issues about estimating trends

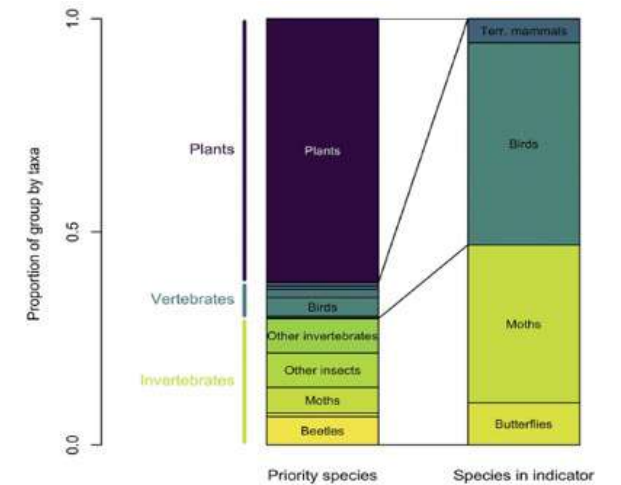
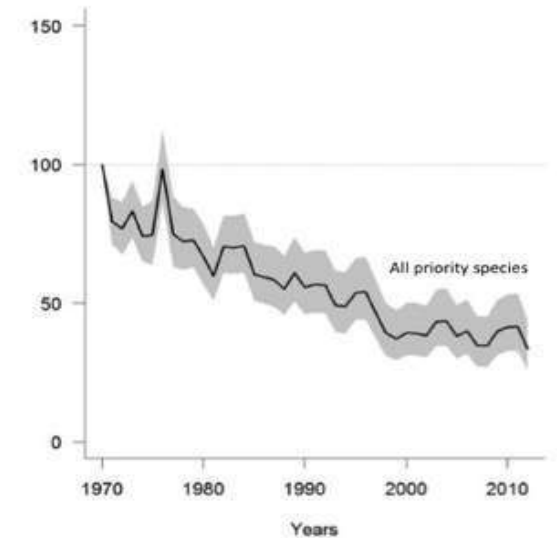
Decline turns into stability after removing 2.4% of temporal series



Increasing and decreasing trends mostly among short term monitored populations



UK: not a good fit between “priority species” and “studied species”



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-warning 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/density 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)



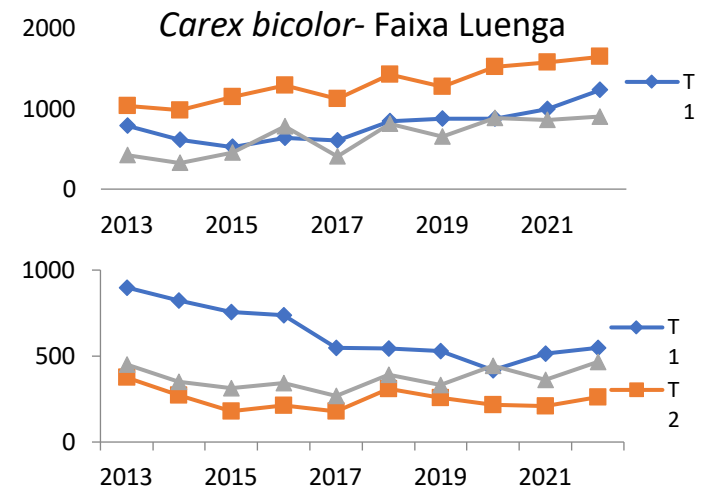
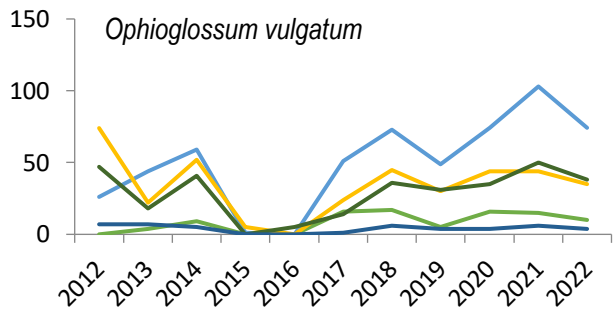
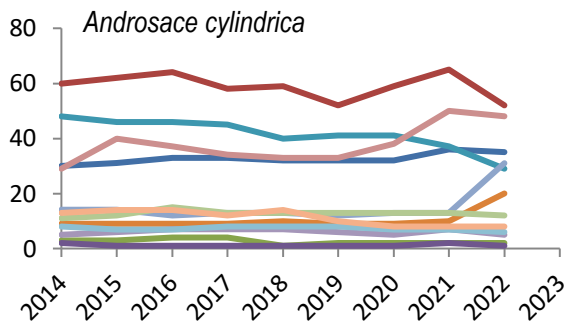


Androsace cylindrica



Carex bicolor

Ophioglossum vulgatum



1- list of sps/habitats of interest

SCIENTIFIC NAME (Flora Iberica)	CEAA	LESRPE	HD
<i>Aceras anthropophorum</i> (L.) W.T.Aiton			
<i>Actaea spicata</i> L.			
<i>Allium ursinum</i> L. subsp. <i>ursinum</i>			
<i>Anacamptis pyramidalis</i> (L.) Rich.			
<i>Androsace ciliata</i> DC. in Lam. & DC.			
<i>Androsace cylindrica</i> DC. in Lam. & DC. subsp. <i>cylindrica</i>		LESRPE	IV
<i>Androsace cylindrica</i> subsp. <i>hirtella</i> (Dufour) Greuter & Burdet		LESRPE	IV
<i>Androsace cylindrica</i> subsp. <i>willkommii</i> P.Monts.		LESRPE	IV
<i>Androsace pyrenaica</i> Lam.	VU	VU	II and I'
<i>Androsace vitaliana</i> subsp. <i>assoana</i> (M.Lainz) Kress	VU		
<i>Arenaria tetraquetra</i> L. subsp. <i>tetraquetra</i>			
<i>Arnica montana</i> L. subsp. <i>montana</i>			
<i>Artemisia eriantha</i> Ten.			
<i>Arthrocnemum macrostachyum</i> (Moric.) Moris in Moris & Delponte			
<i>Asphodelus fistulosus</i> 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_sa11
Localidad: Salient de Gállego, AMA 2, Aito 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

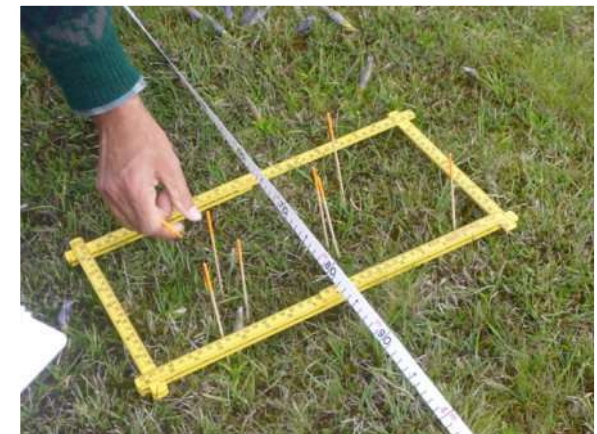
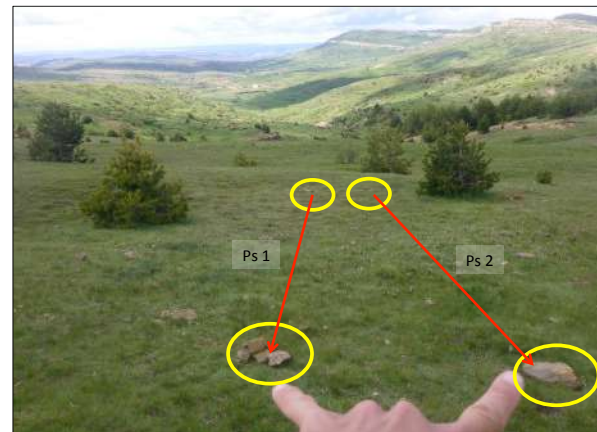
Inicio del seguimiento: junio de 2015



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

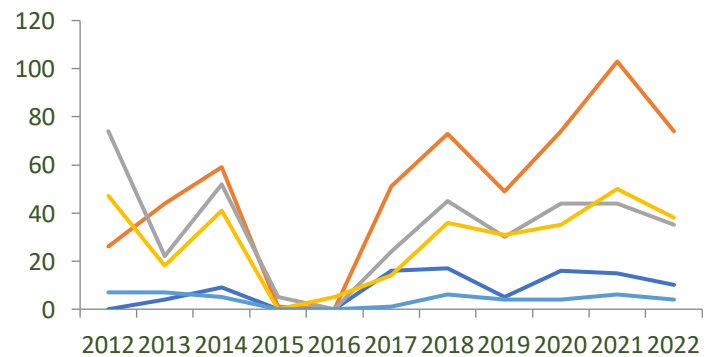


Excel file with tables to calculate trends and visualize them.

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



Excursion



5- Other activities

Newsletter, merchandising, talks, courses...



Adopta una planta 2022



BIENVENIDOS A LA SEGUNDA *NEWSLETTER* DEL "ADOPTA UNA PLANTA"!

En esta segunda entrega os contamos novedades y algunas de las actividades realizadas en el equipo y con vosotros, en relación a la conservación de plantas.





2014



2015



2016



2017



2018



2019



2020



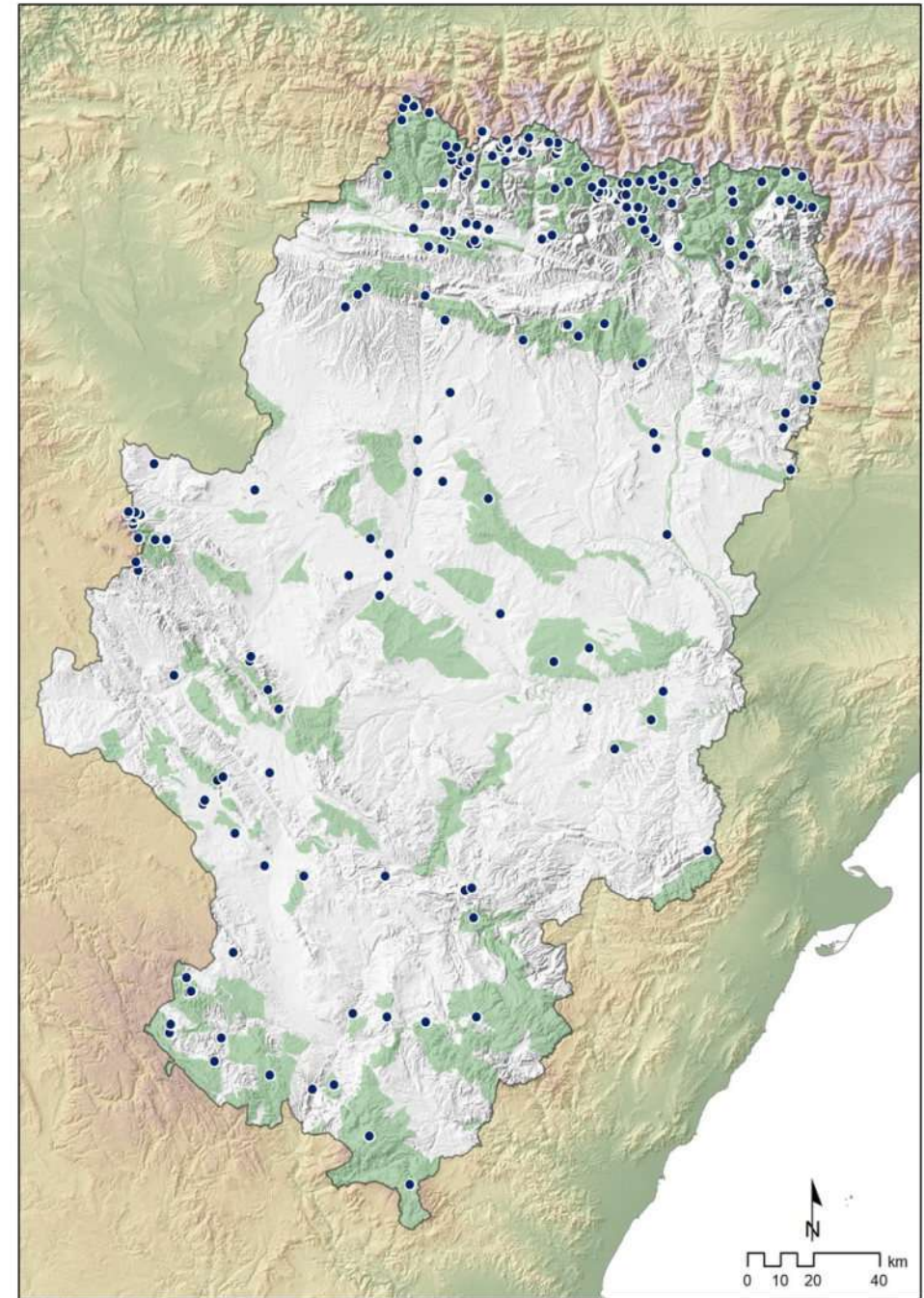
2021

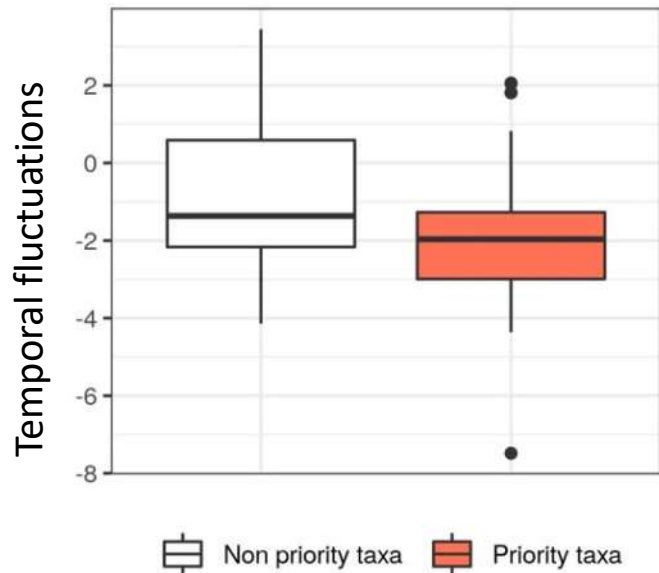
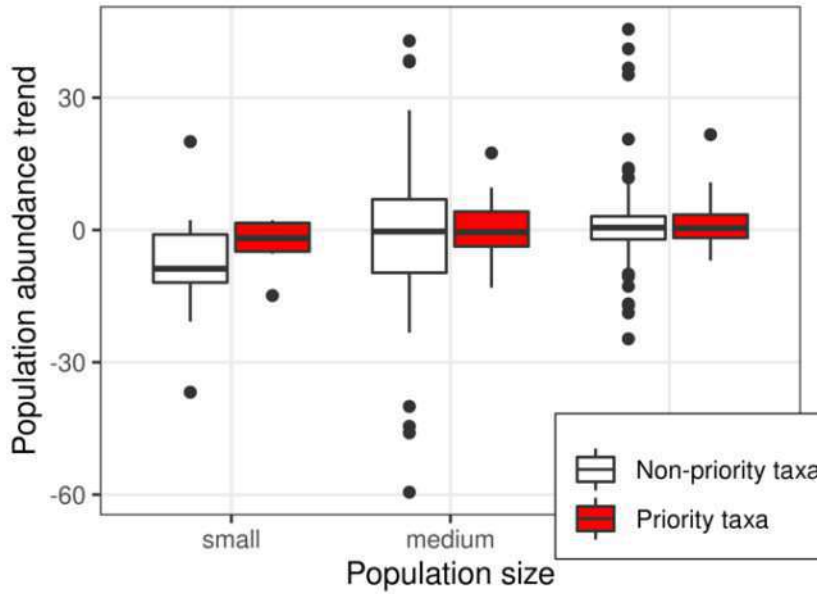


2022



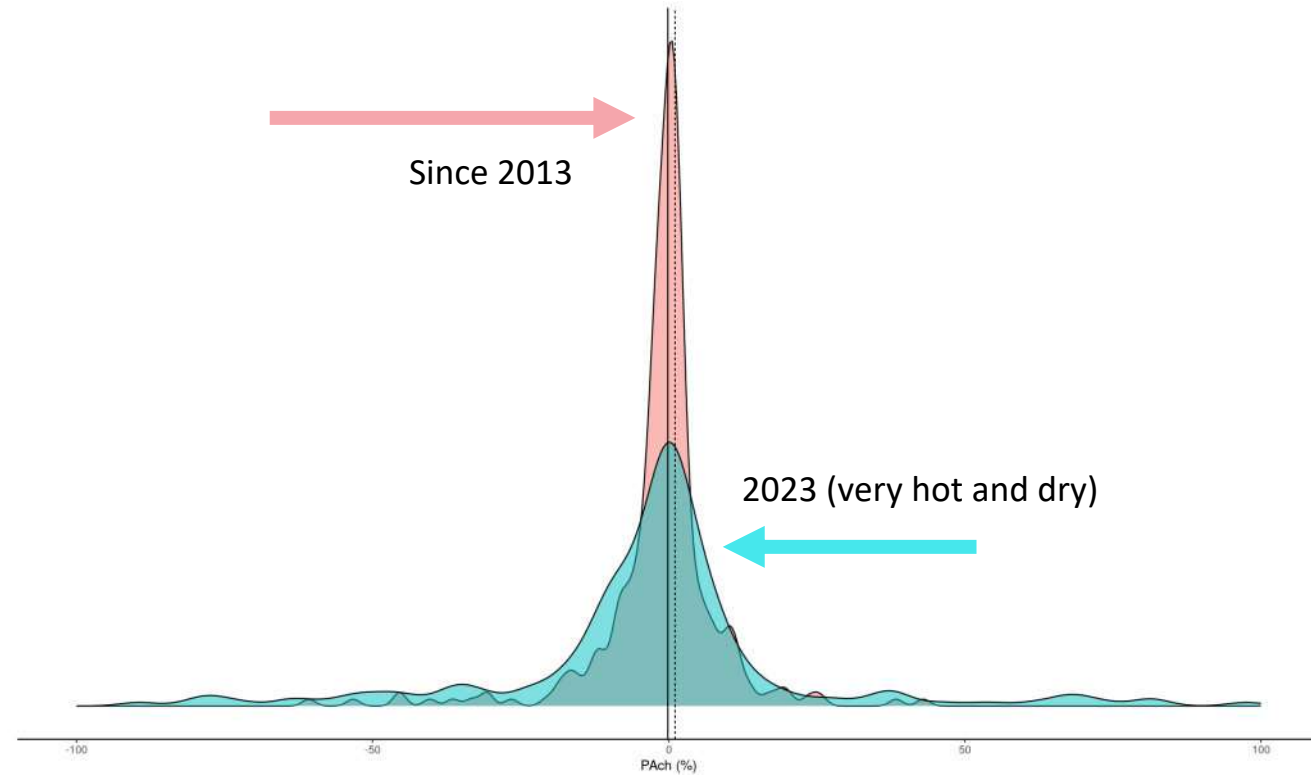
~ 250 Monitored sites
210 sps (30% threatened)
~300 plant populations
70% inside the Natura 2000 Network





García et al, J Appl Ecol, 2021

Priority species show similar trends and lower temporal fluctuations



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?

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

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

AYÚDANOS A CONOCER LA FLORA DE PIRINEOS

FLORAPYR AVANCE apcc

¿CÓMO PUEDO PARTICIPAR?

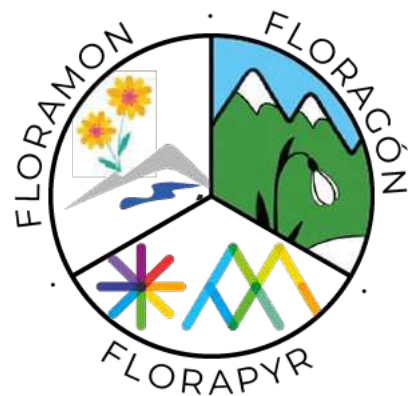
- DESCARGA EN TU MÓVIL LA "APP" **iNaturalist**
- ACTIVA EL GPS EN TU DISPOSITIVO
- BUSCA EL PROYECTO "FLORAPYR PIRINEOS" Y ÚNETE A OTROS PROYECTOS
- HAZ VARIAS FOTOS DE LA PLANTA (FLOR, HOJAS, ...) Y ENVIÁ LOS DATOS CON TU MÓVIL O PC

FLORACON AYÚDANOS A CONOCER LA FLORA DE ARAGON

¿CÓMO PUEDO PARTICIPAR?

- DESCARGA EN TU MÓVIL LA "APP" **iNaturalist**
- ACTIVA EL GPS EN TU DISPOSITIVO
- BUSCA EL PROYECTO "FLORACON" Y ÚNETE A OTROS PROYECTOS
- HAZ VARIAS FOTOS DE LA PLANTA (FLOR, HOJAS, ...) Y ENVIÁ LOS DATOS CON TU MÓVIL O PC

Facilitating the use of iNaturalist/PlantNet



FLORAMON AYÚDANOS CON TU MÓVIL A CONOCER LA FLORA DE LOS PARQUES NACIONALES DE MONTSIÀ

GUÍA RÁPIDA DE USO DE LA APP iNaturalist PARA iNaturalist

FLORAMON AYÚDANOS A CONOCER LA FLORA DE ORDESA Y MONTE PERDIDO

FLORAMON AYÚDANOS A CONOCER LA FLORA DE LOS PICOS DE EUROPA

FLORAMON AYÚDANOS A CONOCER LA FLORA DE AIGUETSORTS TESTANY DE SAINT MAURICI

FLORAMON AYÚDANOS A CONOCER LA FLORA DE LA SIERRA DE GUADARRAMA

FLORAMON AYÚDANOS A CONOCER LA FLORA DE SIERRA NEVADA

FLORAMON AYÚDANOS A CONOCER LA FLORA DE LA SIERRA DE LAS NIEVES

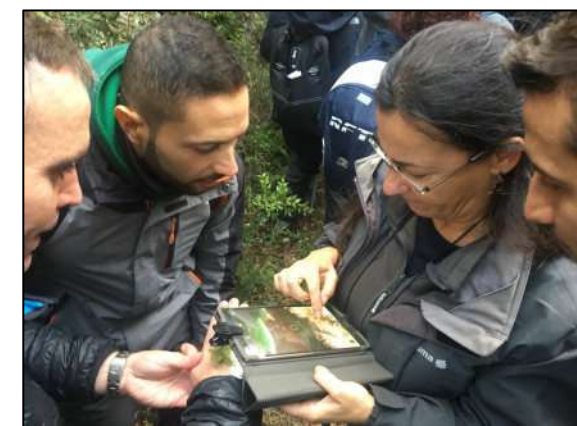
AYÚDANOS A LOCALIZAR LA MARIPOSA APOLO EN LA RED NATURA 2000

Escanea el código QR y descarga la app

<http://bitly.ws/qsVw>



ESCANEA Y DESCARGA LA GUÍA RÁPIDA DE USO DE iNaturalist





Plants sustain much biodiversity at local scale

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



Citizen Science Project to repeat old images of landscapes

PAISAJES CENTENARIOS CSIC

Observatory of Centenary Landscape Changes

IN THE NATURAL SPACES OF THE NATURA 2000 NETWORK

Observatory of Centenary Landscape Changes is a citizen science project to observe the evolution of the landscape by comparing old and modern photographs.

DO YOU DARE TO COLLABORATE?

CITIZEN SCIENCE

The comparison between landscape photographs taken at the beginning of the 20th century and others taken in the same place today allows scientists to visualize and **quantify** long-term changes in the landscape; where the most changes have occurred and which places resist.

In this citizen science project you can participate by providing old photographs of landscapes in natural spaces of the Natura 2000 Network, but you can also help us identify the location of some old photographs and take a current photograph in the same place.

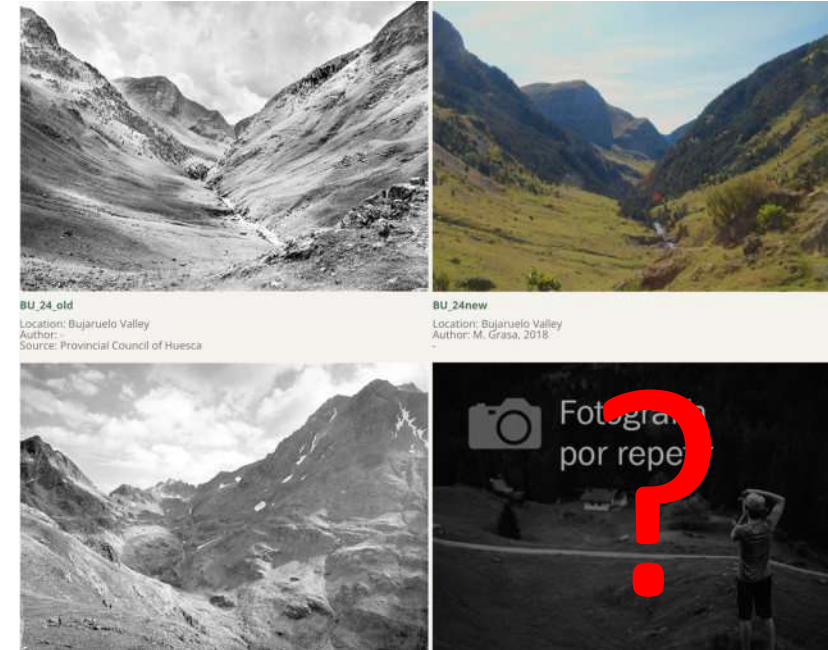


Ordesa and Monte Perdido National Park

Photo 1908: Arxiu Fotogràfic Center Excursionista de Catalunya
Photo 2018: MB Garcia



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



<https://paisajescentenarios.csic.es>

Do you want to collaborate by locating old photographs and/or repeating them again from the same place?

We invite you to enjoy how the landscapes have changed. You will also be able to see those photographs whose location we do not know or do not have a current photograph of. If you recognize any landscape, collaborate with us.



We give you some tips to repeat the photographs.

¿Cómo puedo ayudar?

1. Entra en <https://paisajescentenarios.csic.es>
2. Selecciona el Parque Nacional en el que te encuentras
3. Localiza las imágenes y repítelas de manera idéntica

ALGUNOS CONSEJOS PARA HACERLO BIEN:

Fíjate en que el encuadre sea el mismo. (Especial atención a los laterales de la imagen)

Que no haya nubes.

EJEMPLOS DE COMO NO HACERLO:

Los encuadres no coinciden. El paisaje lejano no es el mismo.

Si hay nieve que sea la misma o menos que la de la foto original. Y evitar las nubes.

Fíjate en el **paisaje lejano**, debe coincidir el cruce de un monte con otro. A veces hay árboles u otros obstáculos. Intentar evitarlos, pero sin modificar el encuadre de la foto.

Y RECUERDA: MARCA EL PUNTO GPS DEL SITIO DESDE DONDE TOMAS LA FOTO



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)

