DISCOVERING SPANISH LANDSCAPES

Topic 3: overview

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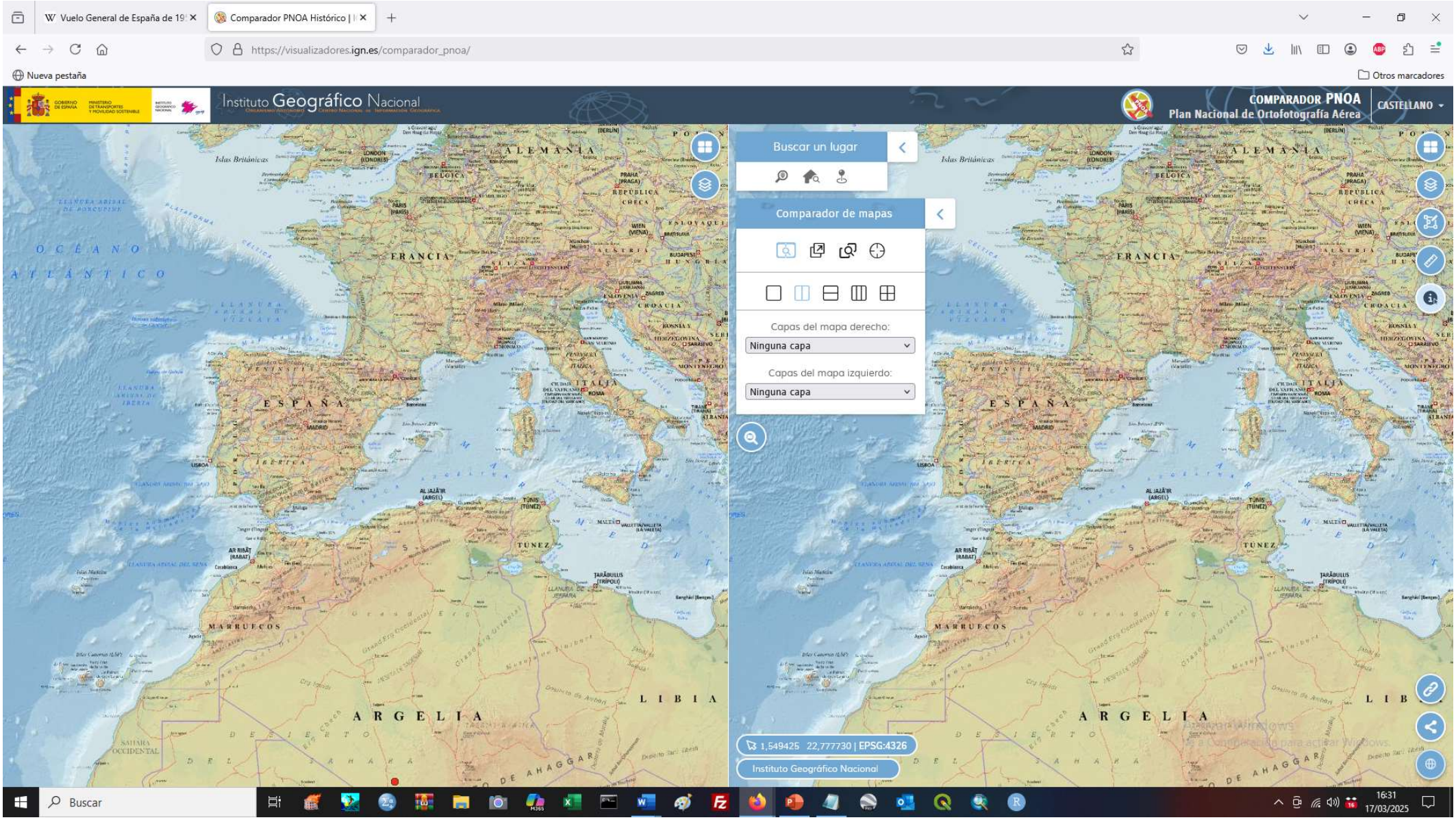
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CHANGES IN THE RURAL LANDSCAPES

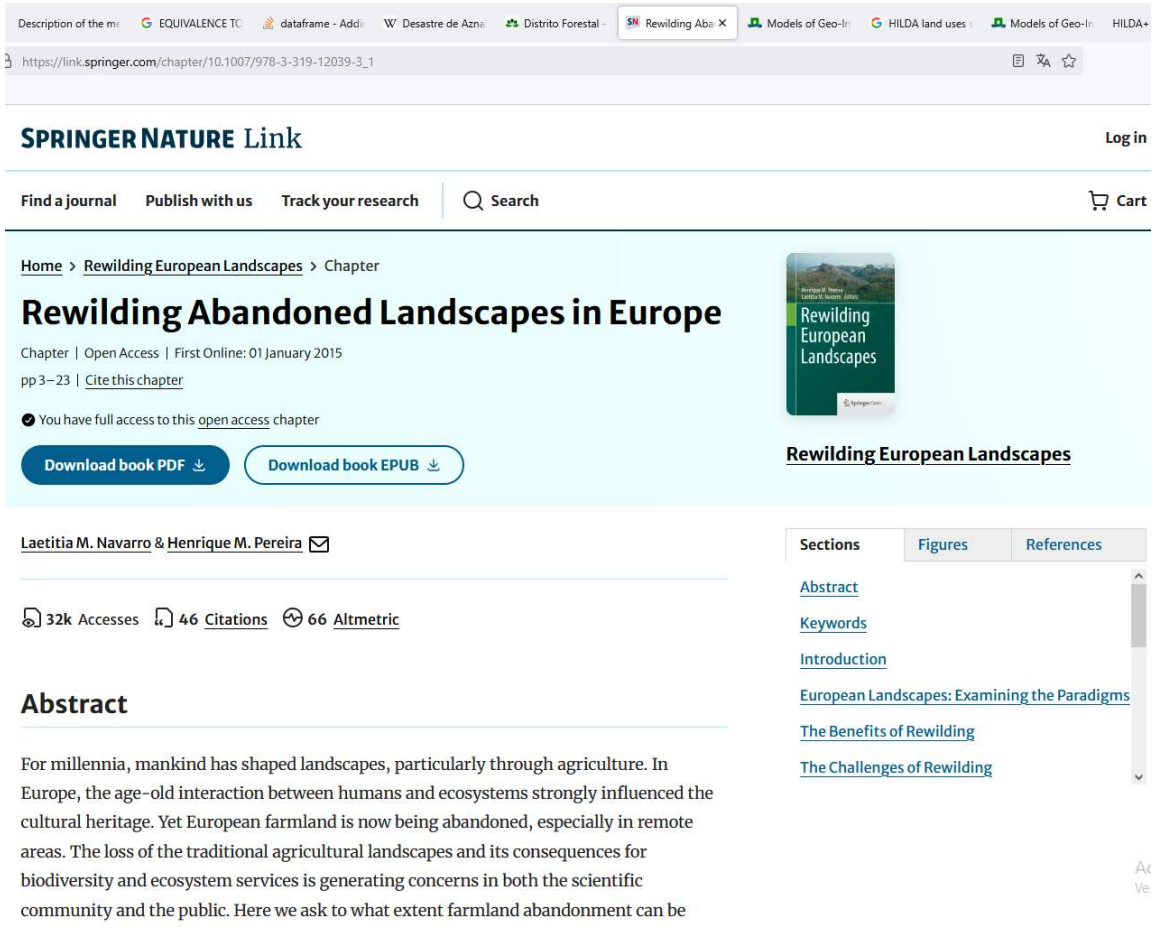
CONSEQUENCES

- **RURAL AREAS**

  - ✓ **Abandonment of agricultural or livestock activities**…
    - Replaced by new forest landscapes (reforestation policies).
    - Protection of some natural landscapes (forming the current natural and cultural heritage).
  - ✓ Expansion of **irrigation**.
  - ✓ Emergence of **intensive crops based on new technologies** (e.g. greenhouses).
  - ✓ **Substitution of traditional polycultures by monocultures** (pastures for dairy or meat production, eg. Northern Spain).

AFORESTATION
(Rewilding)

- Migration from the countryside has led to the abandonment of large quantities of
  - Arable lands, especially marginal crops.
  - Pastures used by extensive livestock farming.
- This phenomenon has occurred since the 2nd half of the twentieth century.



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Rewilding Abandoned Landscapes in Europe

Chapter | Open Access | First Online: 01 January 2015

pp 3–23 | Cite this chapter

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Laetitia M. Navarro & Henrique M. Pereira

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Abstract

For millennia, mankind has shaped landscapes, particularly through agriculture. In Europe, the age-old interaction between humans and ecosystems strongly influenced the cultural heritage. Yet European farmland is now being abandoned, especially in remote areas. The loss of the traditional agricultural landscapes and its consequences for biodiversity and ecosystem services is generating concerns in both the scientific community and the public. Here we ask to what extent farmland abandonment can be

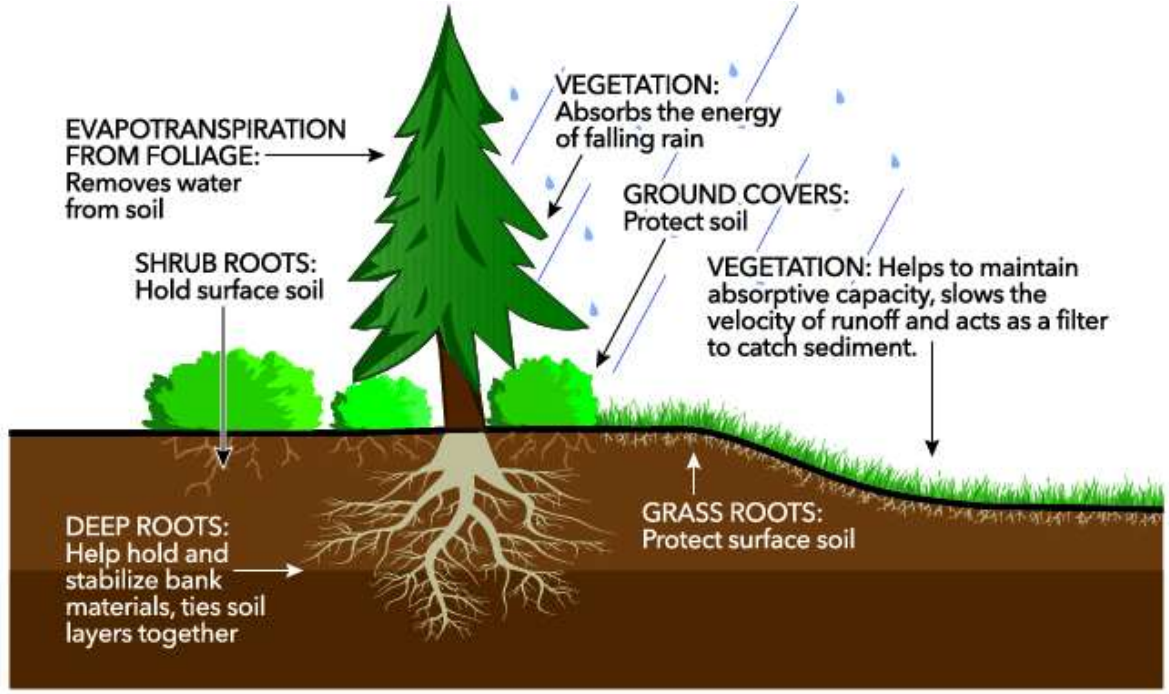
Rewilding European Landscapes

Sections | Figures | References

- Like most countries in the Mediterranean region, **Spain was very poor in forests**. Vegetation cover degraded by:

  - Overgrazing

  - Clearing of forest land to convert it into agricultural crops or pasture for extensive cattle ranching, due to the transfer of institutionally owned forest lands to private owners, with the aim of promoting greater economic dynamism (Desamortización).



EFFECTS OF VEGETATION IN MINIMIZING EROSION

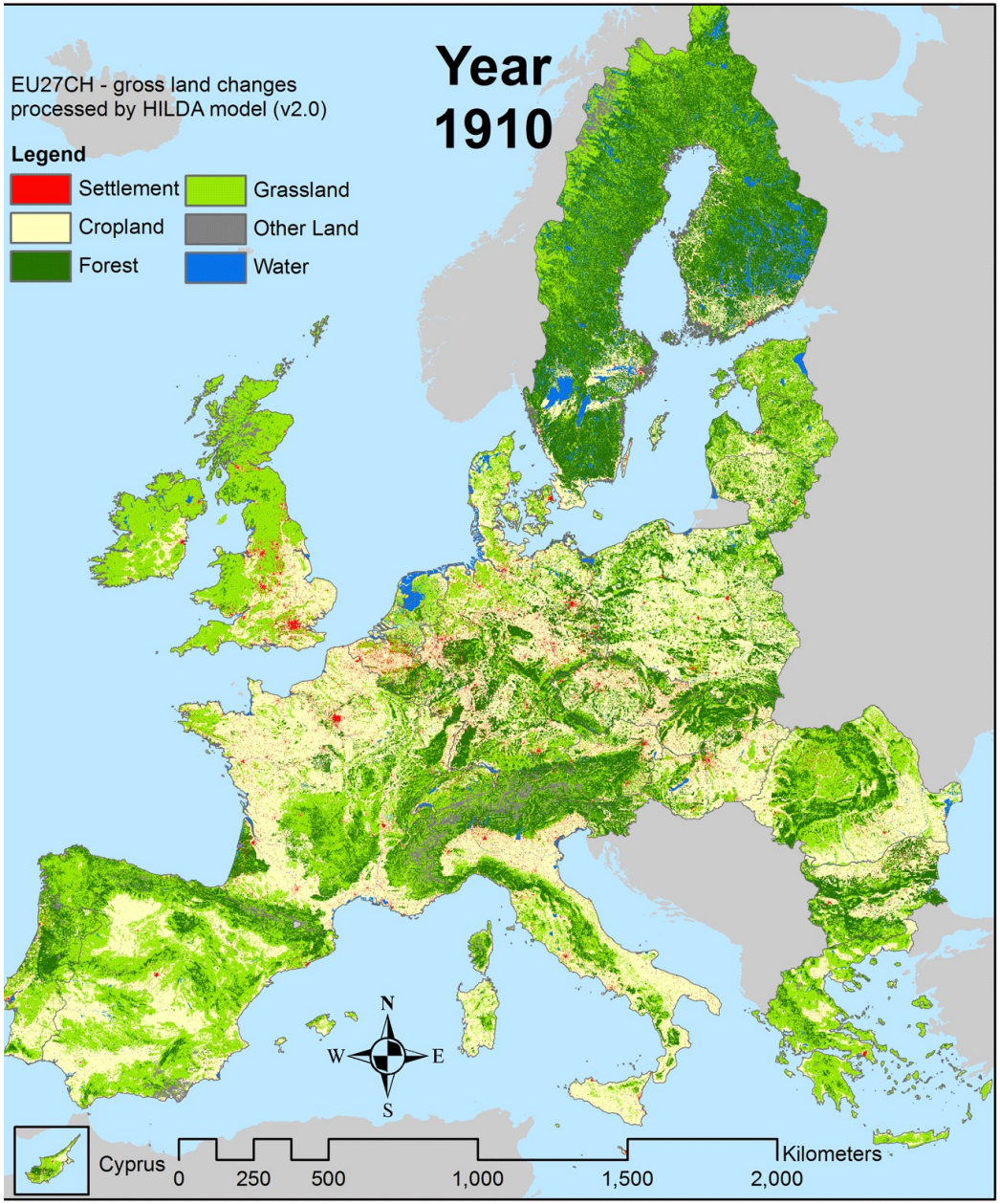
- The disappearance of the forest cover was related **floods and torrential phenomena** → caused large damages in the population centers near the riverbeds and substantial economic losses by destroying numerous agricultural crops.

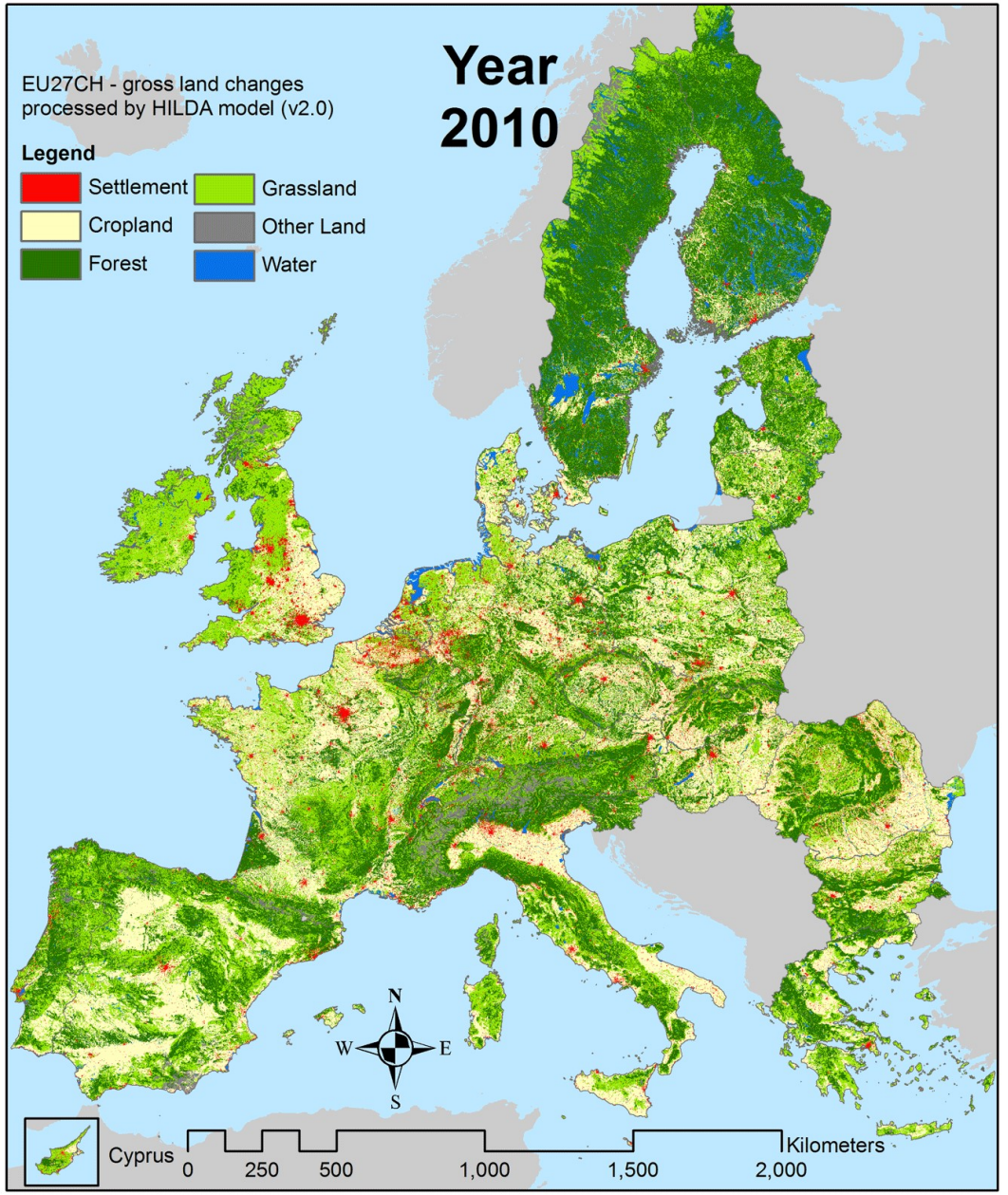
FIG. 5. *Aspecto de las casas destruidas en el camino de Beniaján tras la riada de Santa Teresa.* Albúmina sobre cartón. Tarjeta americana. Juan Almagro Roca, 1879 (Archivo General de la Región de Murcia: FOT POS.084/084).

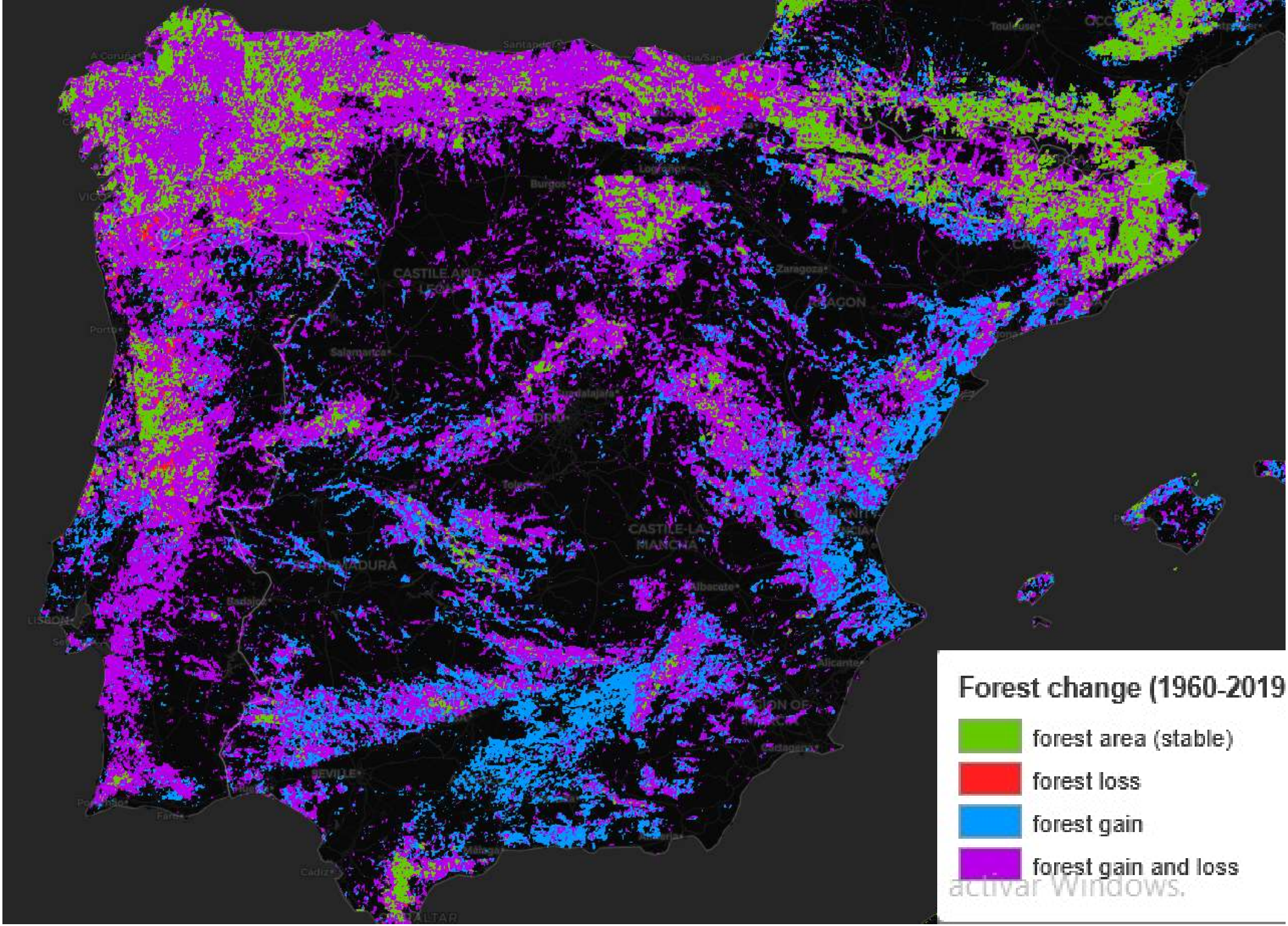
- Plans for the construction of reservoirs demonstrated the need to **contain erosion (and floodings) by recovering the forest**.

- Governments undertook a state policy to reforest Spain.
  - **Protective legislation**: contested by some owners.
  - **Reforestation activity**: National Reforestation Plans.
    - Accelerated after the Spanish Civil War
    - Large massive repopulations, sometimes without subsequent management.
    - Aggressiveness in the preparation of the land (terraces).
    - Prioritizing productive restocking over protection: use of fast-growing species (timber industries and pulp mills), such as Eucalyptus and Pinus radiata.

- **CONSEQUENCE**: Spain has tripled its forest area since 1900 (from approximately 8% to 25% of the territory).






Forest change (1960-2019
forest area (stable)
forest loss
forest gain
forest gain and loss

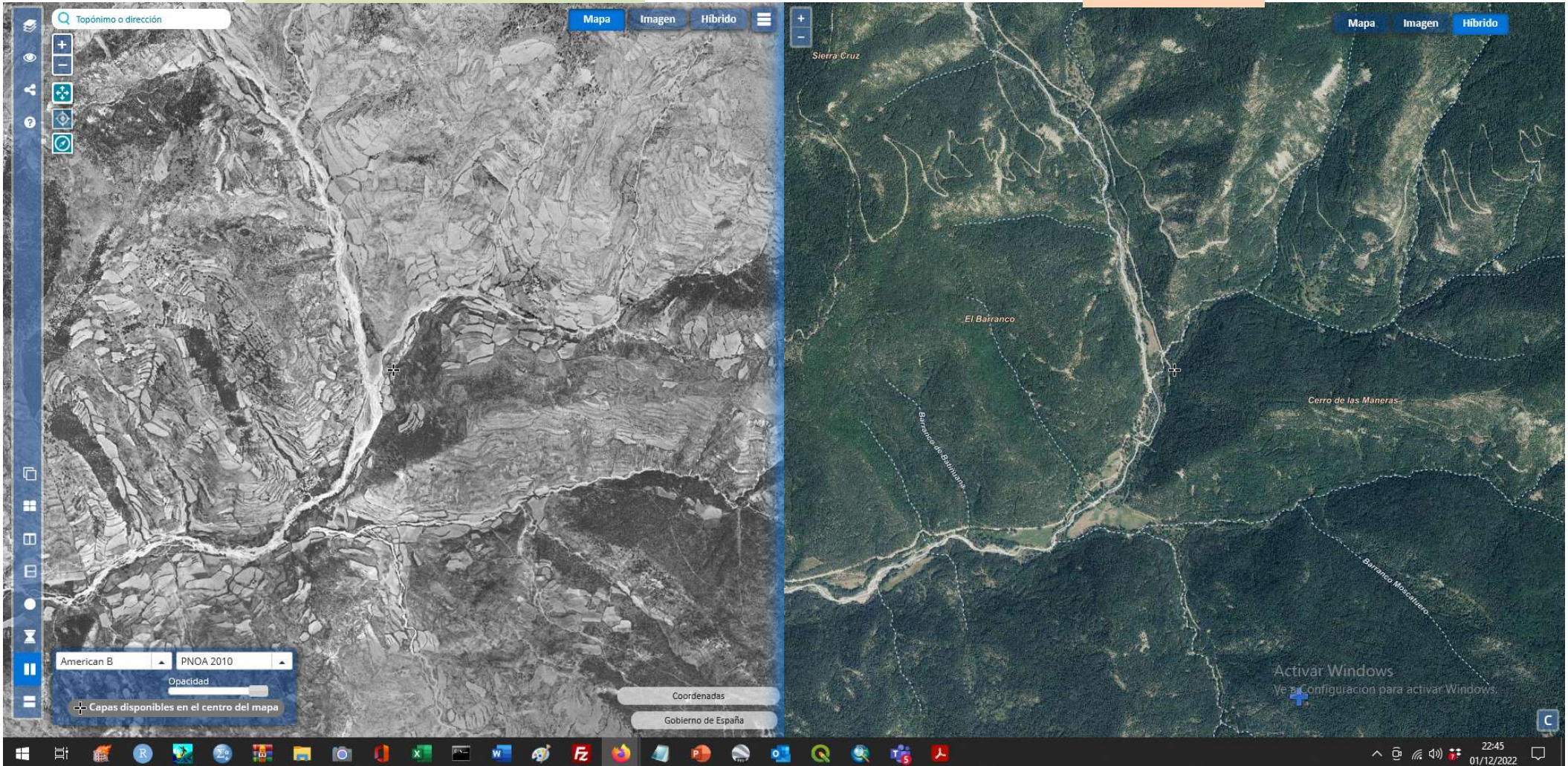
RUTAL LANDSCAPES

(Human) Afforestation

Bescós de la Garcipollera (Huesca)

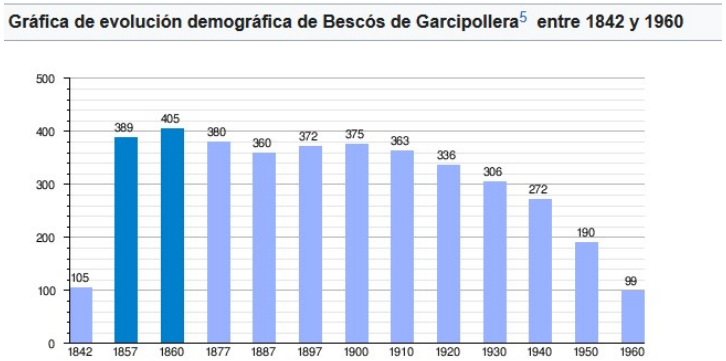
AMERICAN FLIGHT 1956

PNOA 2018



- Located in the Central Pyrenees (Jacetania, province of Huesca, Aragon).

- 2nd half of the 19th century: clearing of common lands (Mendizábal's confiscation) → expansion of the arable lands area.



- 1960: construction of the Yesa reservoir on the Aragón river.

  - Expropriation of buildings (village abandoned since the 1960s) and farmlands.

  - Mountains repopulated with pine trees to delay the filling of the reservoir basin with materials dragged by erosion.

  - Become a National Hunting Reserve → deer repopulation (1962).

- Today the ruins of Bescós are property of the State, later transferred to the Government of Aragón.

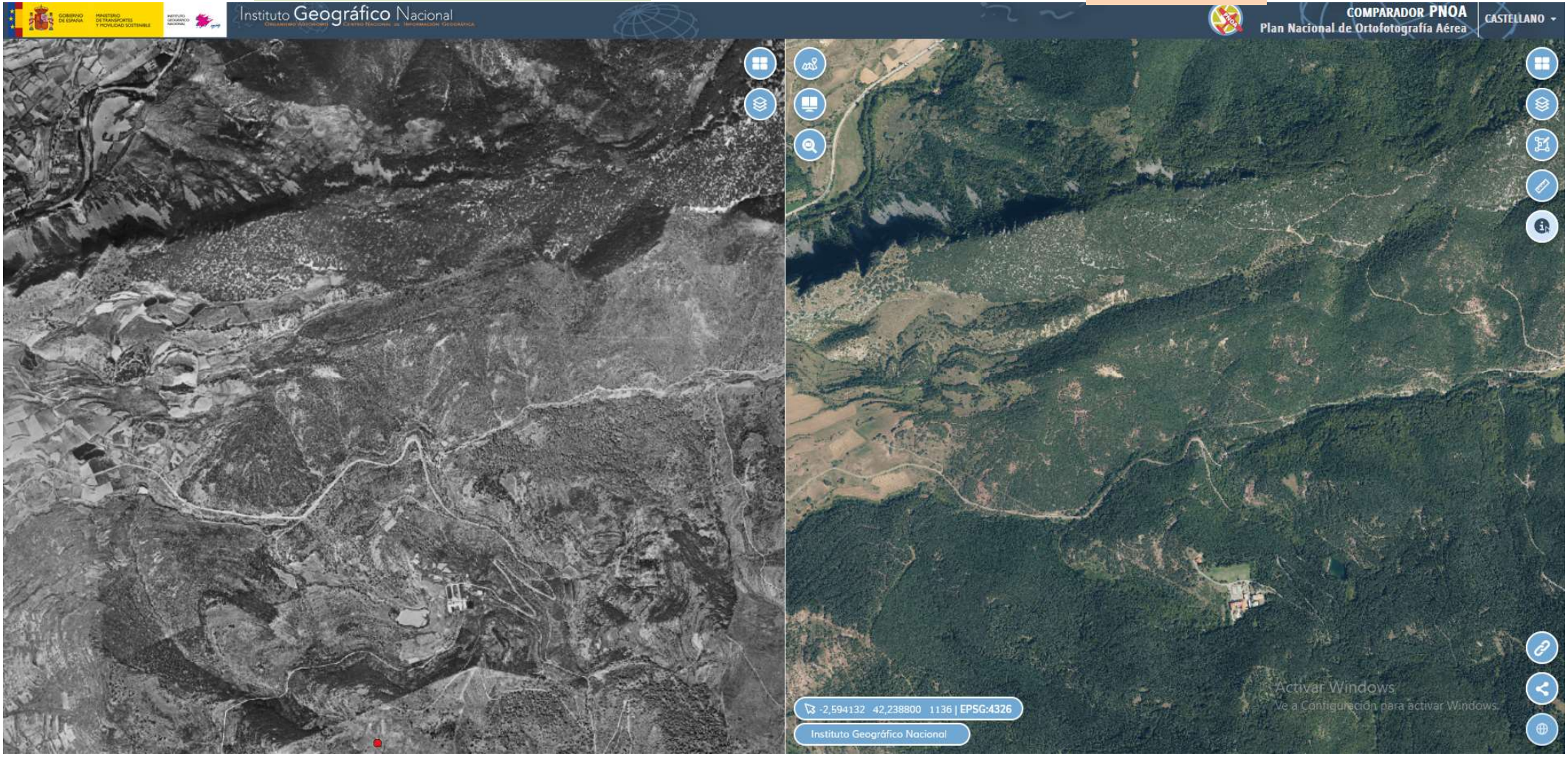
RURAL LANDSCAPES

(Natural and human) Afforestation

Almarza de Cameros (La Rioja)

AMERICAN FLIGHT
1956

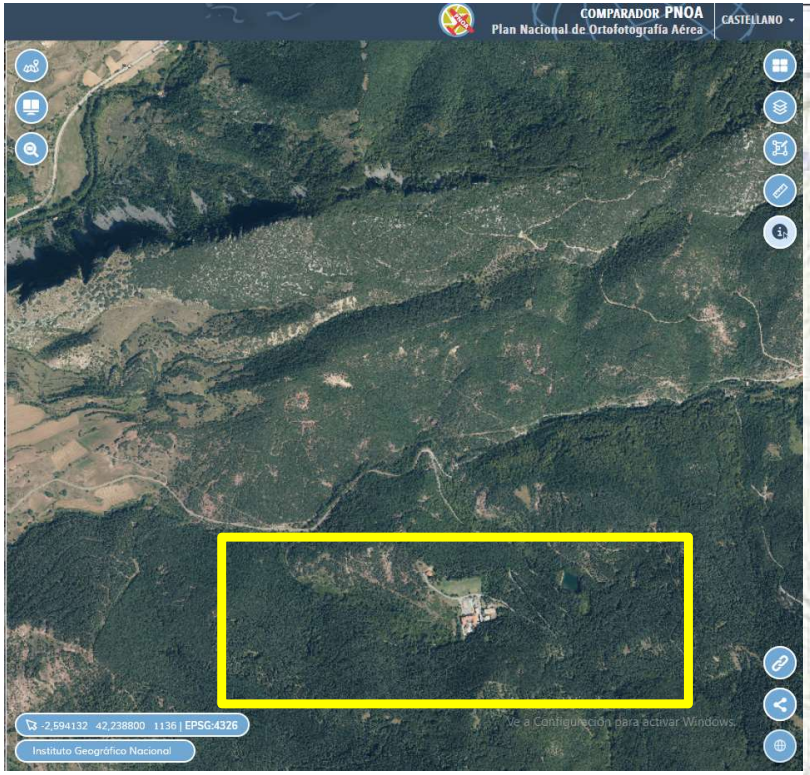
PNOA
2018

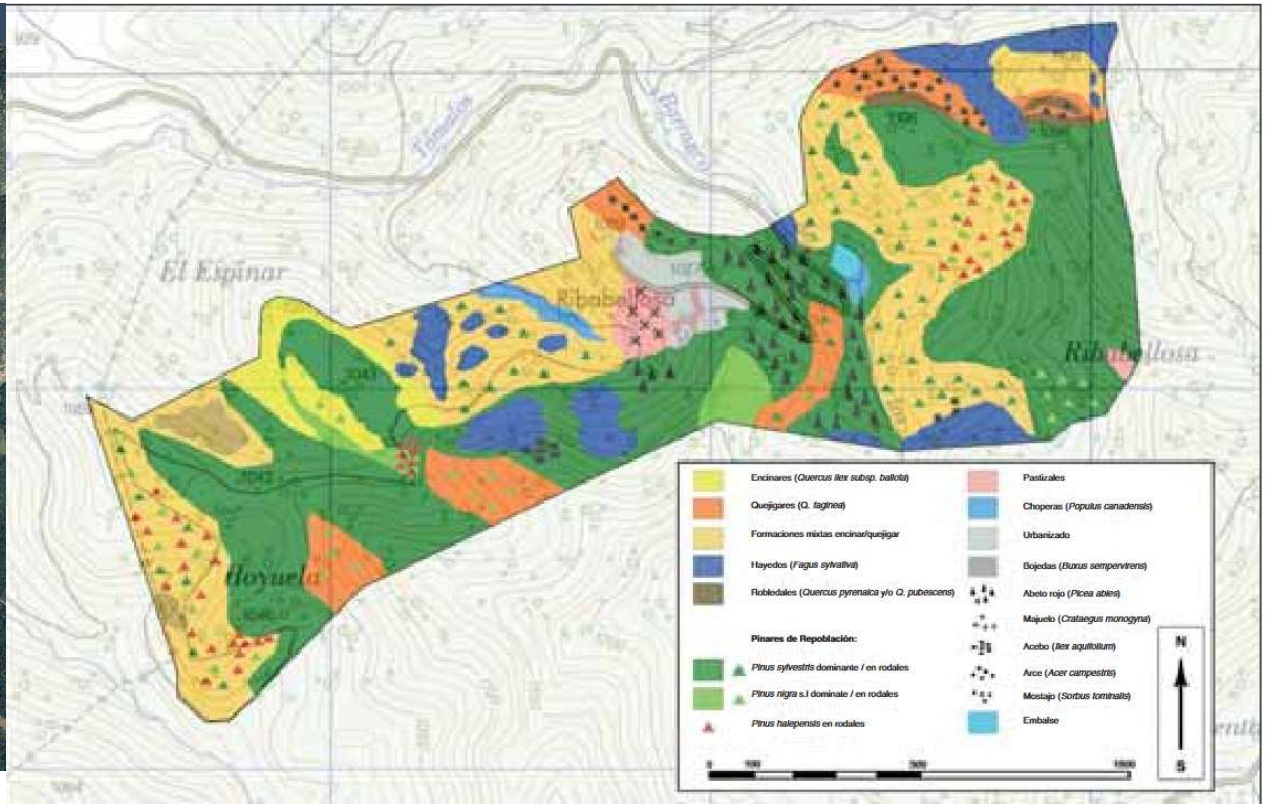


RURAL LANDSCAPES

(Natural and human) Afforestation

Almarza de Cameros (La Rioja)





SOME (unespected) CONSEQUENCES

RURAL LANDSCAPES

Forest fires

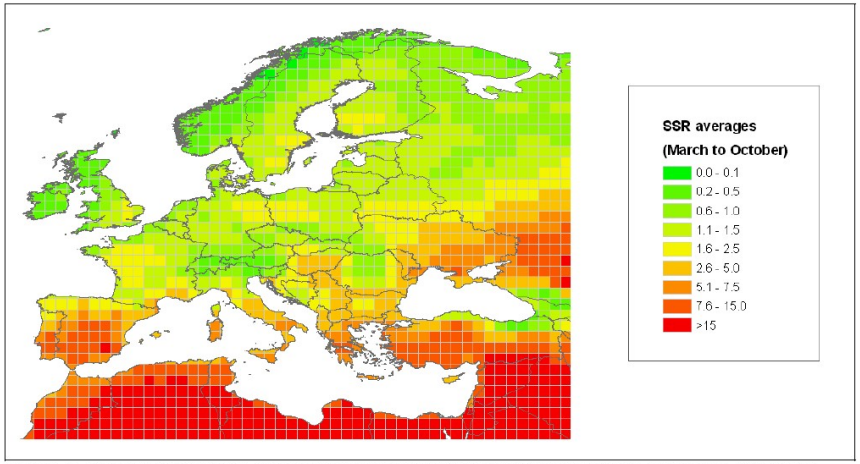
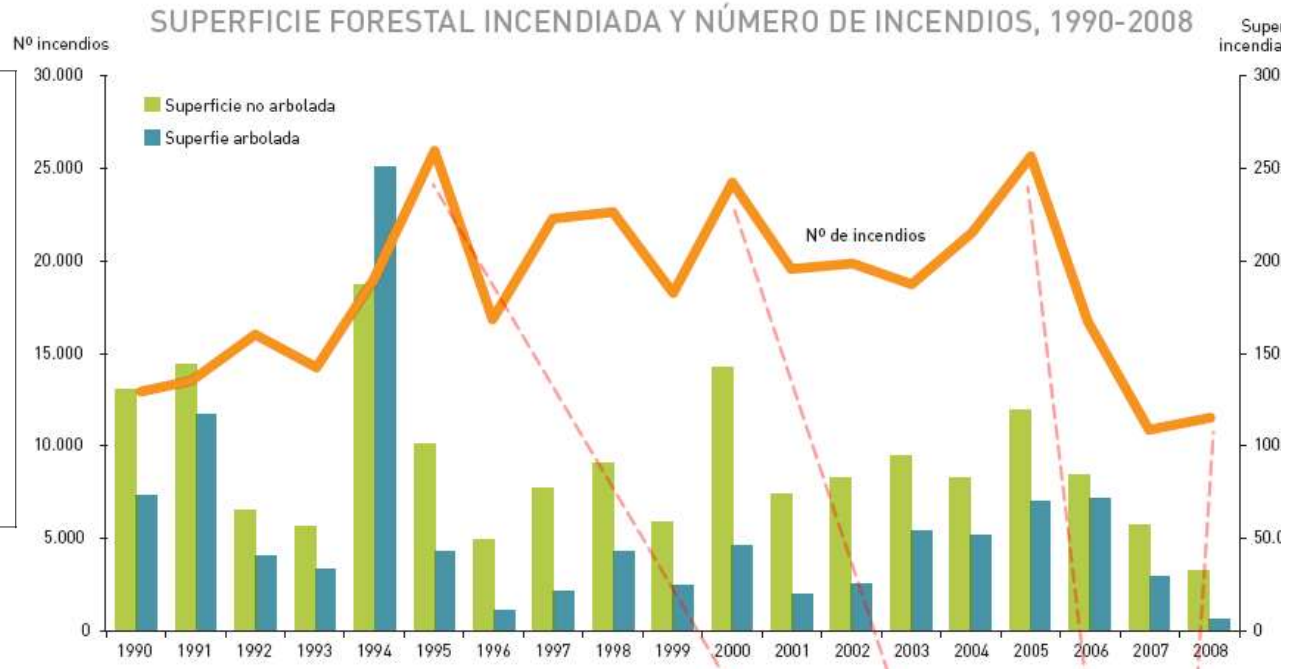


Figure 1. Spatial distribution of Seasonal Severity Rating (SSR) long term averages (49 years, 1958 to 2006)



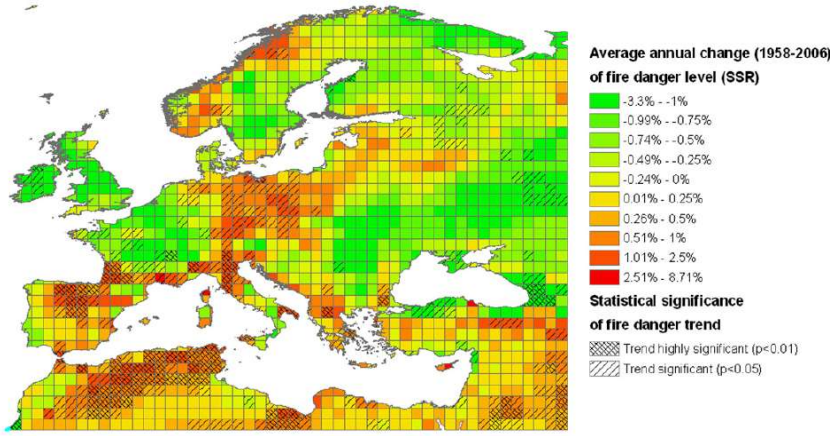
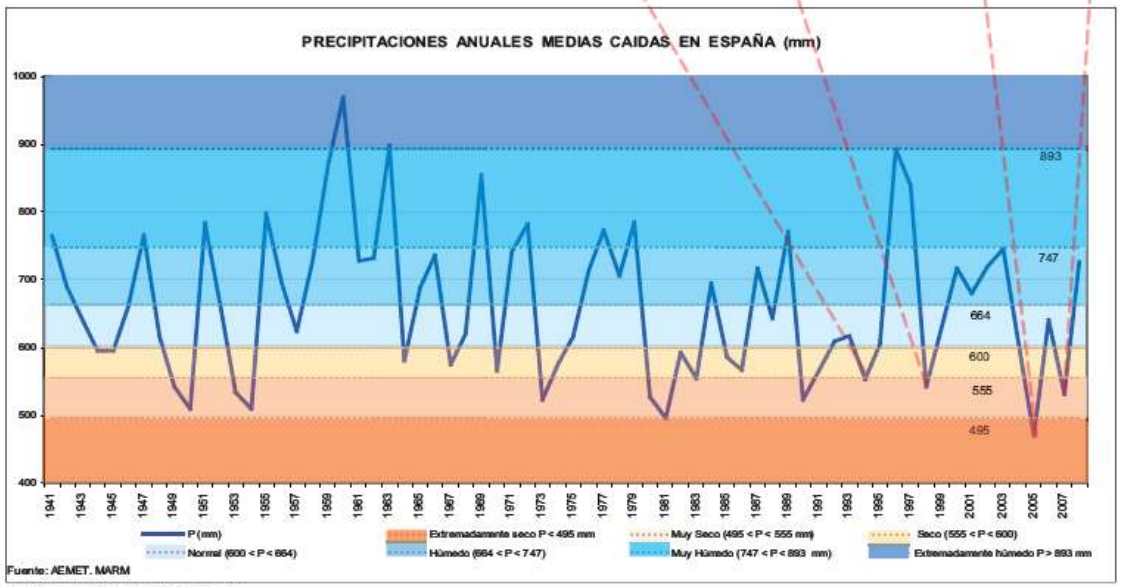


Figure 2. Trends of fire danger level from 1958-2006 assessed using the Seasonal Severity Rating (SSR).



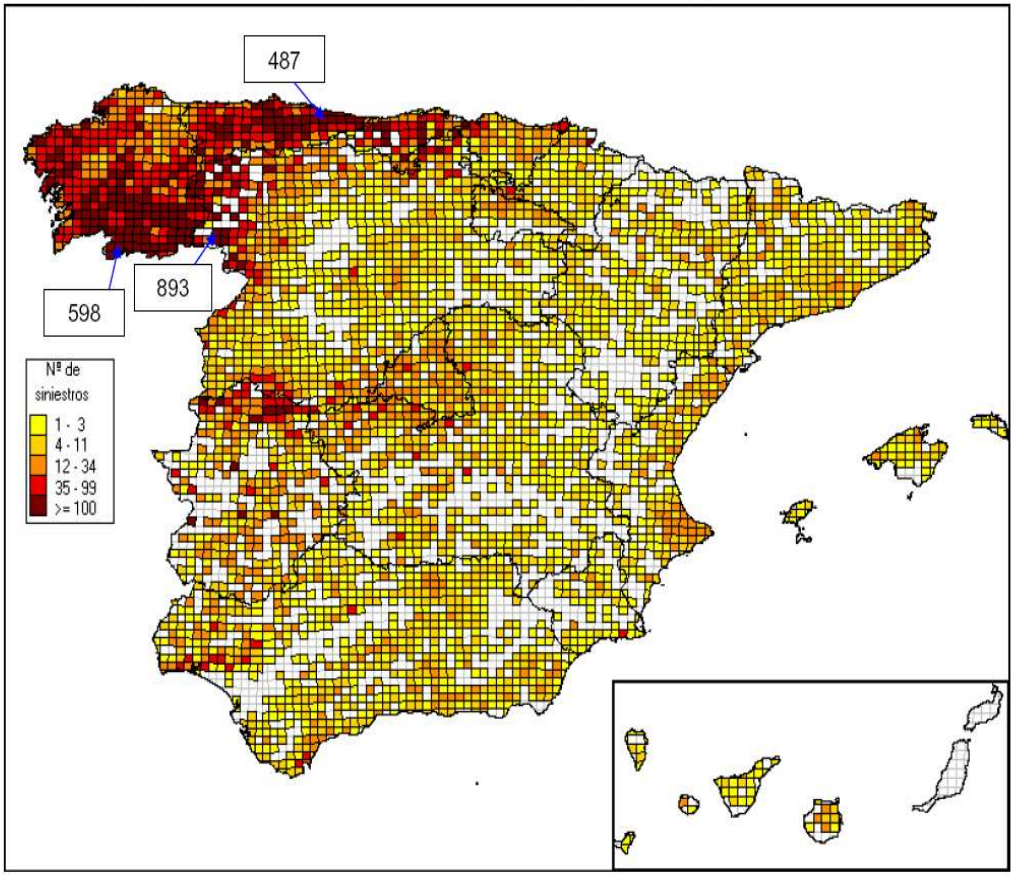
Tomado de "Indicadores ambientales" (MMARM)

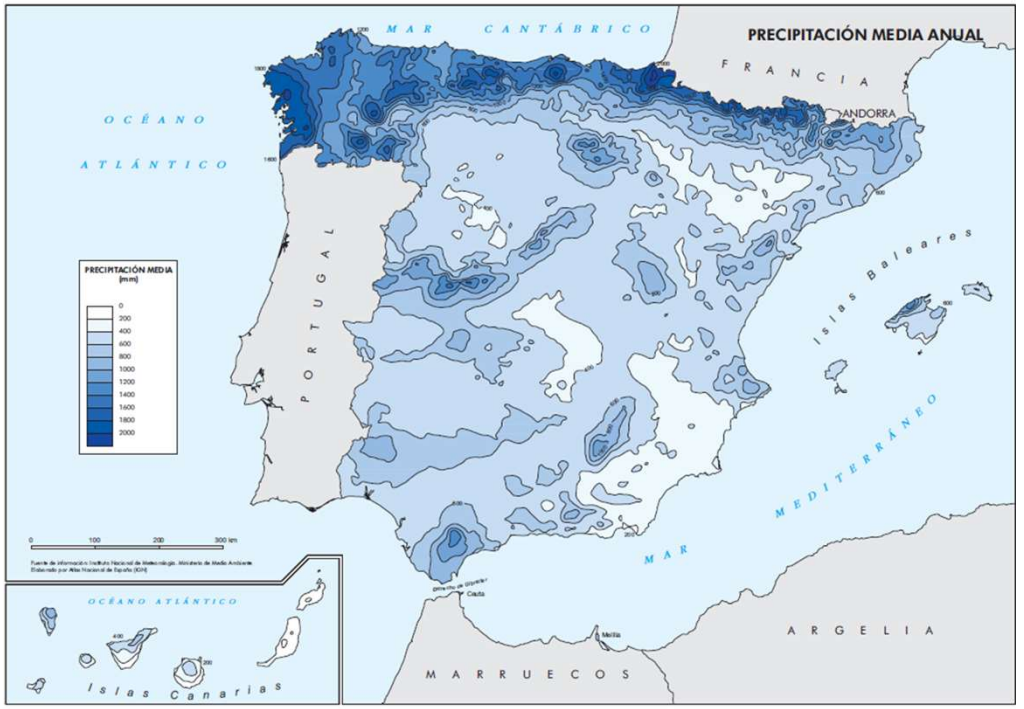
¿CLIMATE CHANGE OR …

RURAL LANDSCAPES

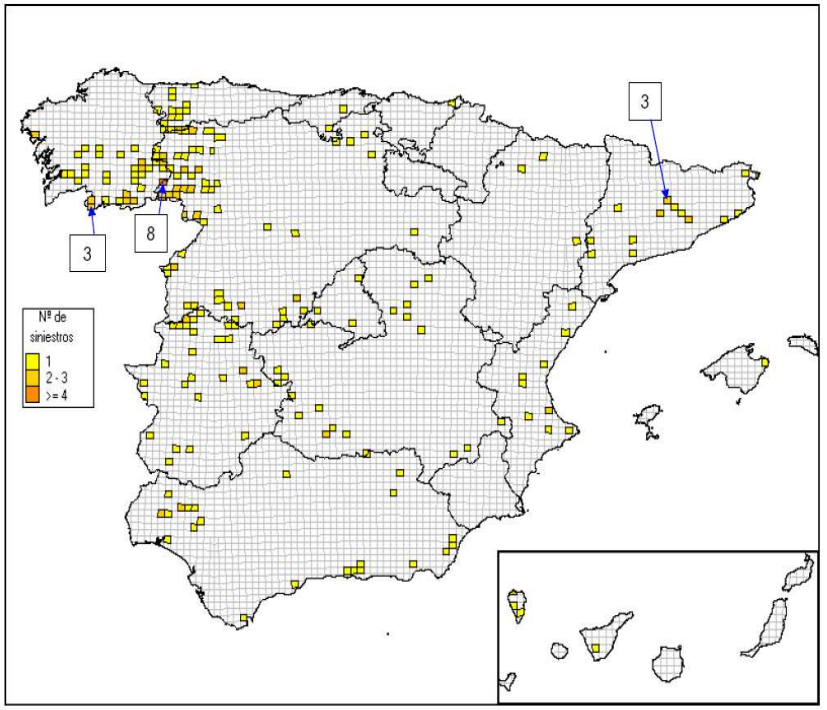
Forest fires

Mapa nº 3 Número de Incendios (>= 1 ha) por Cuadrícula





Mapa nº 4 Grandes Incendios (>500 ha) por Cuadrícula de Origen

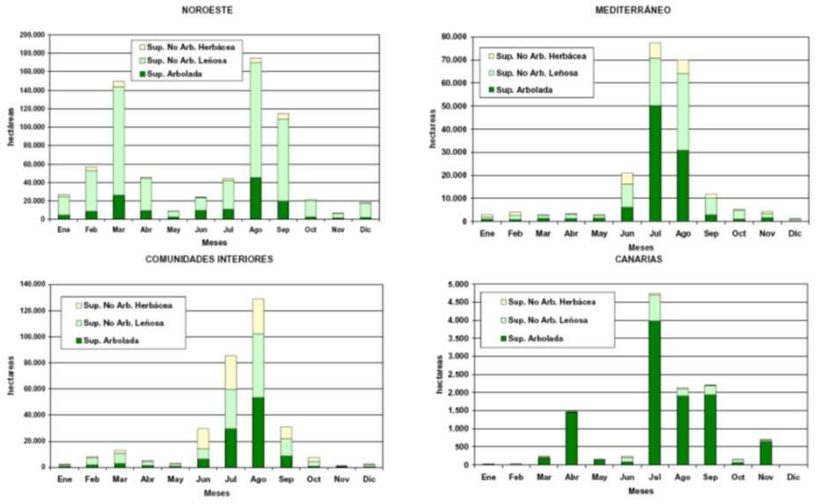


¿... OR HUMAN CHANGE?

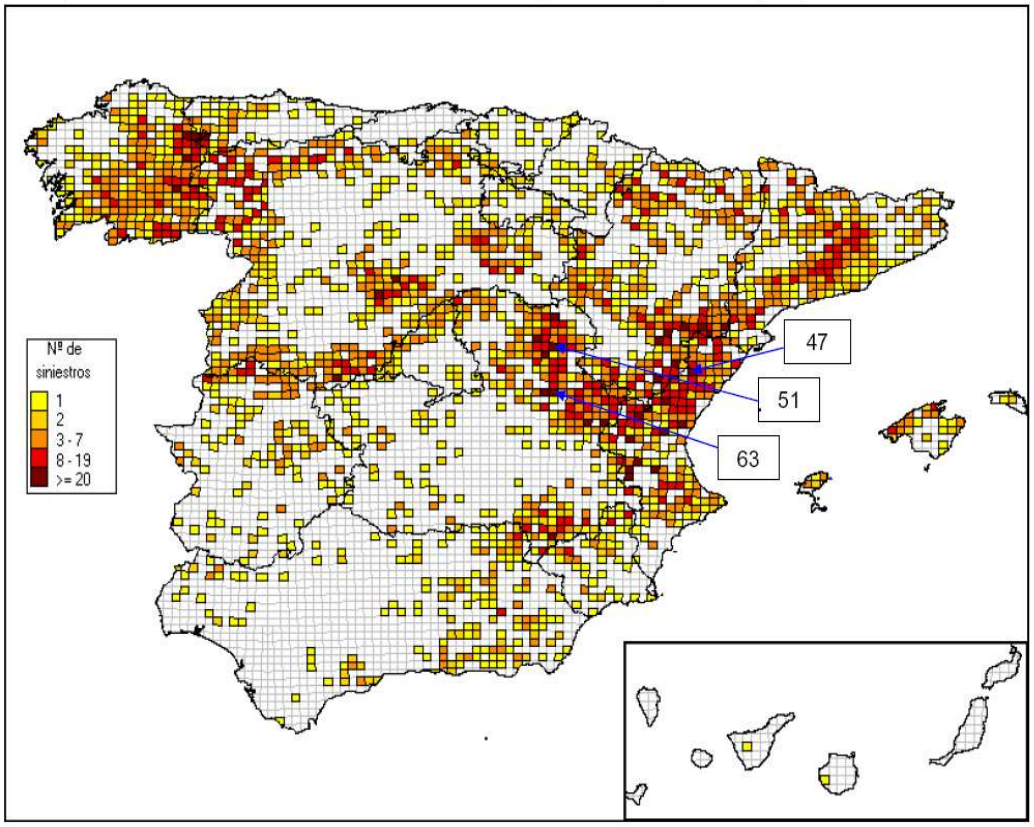
RURAL LANDSCAPES

Forest fires

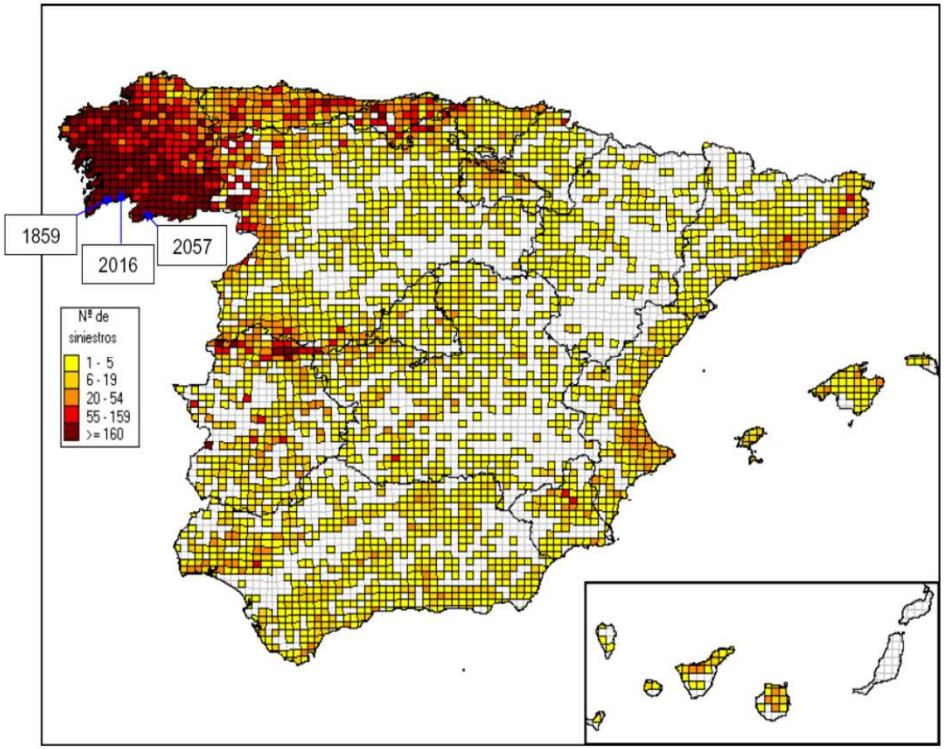
Gráfico nº 20
Distribución Mensual de Superficies por Áreas Geográficas



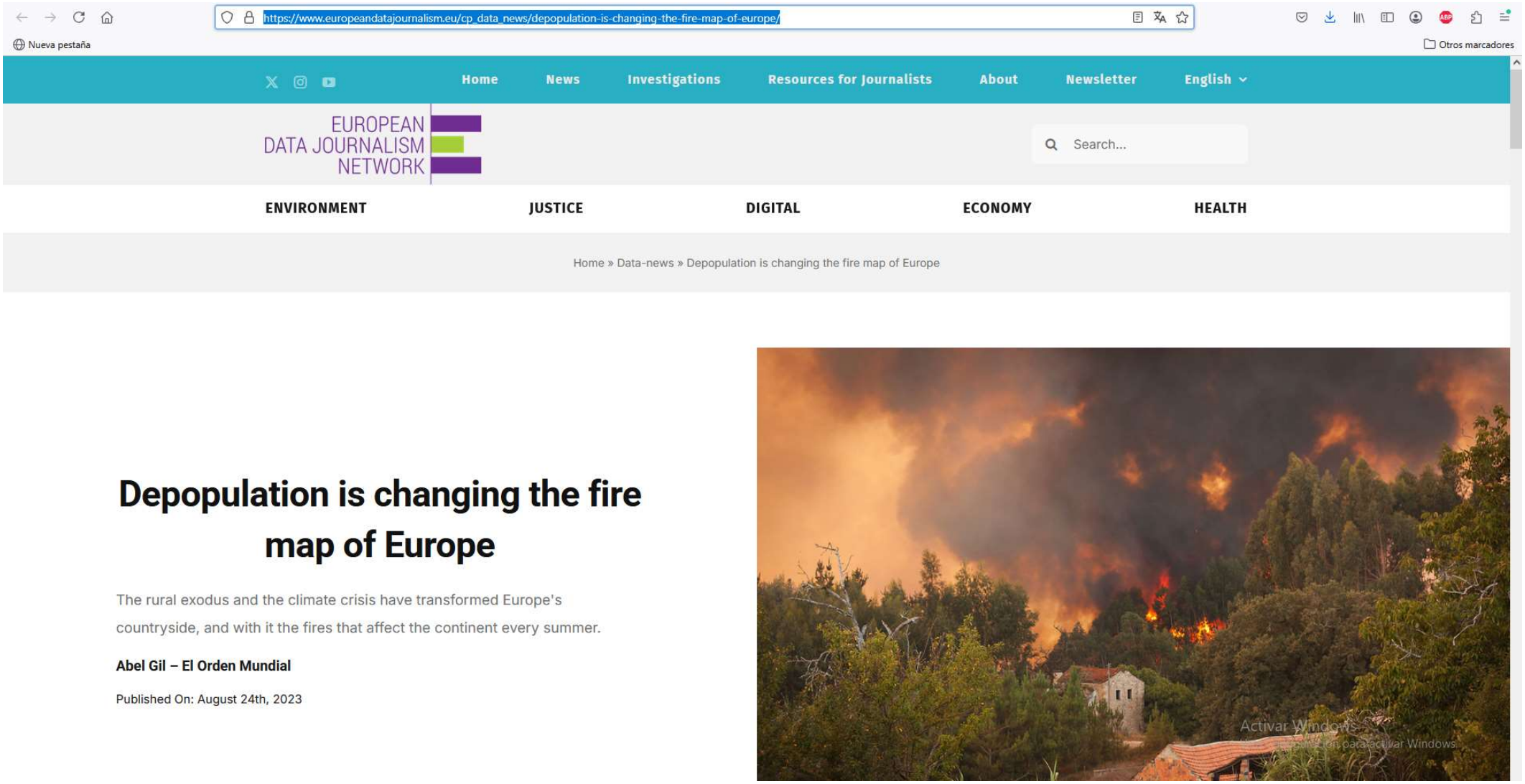
Mapa nº 5 Número de Siniestros Originados por Rayo por Cuadrícula



Mapa nº 6 Número de Siniestros Intencionados por Cuadrícula



https://www.europeandatajournalism.eu/cp_data_news/depopulation-is-changing-the-fire-map-of-europe/



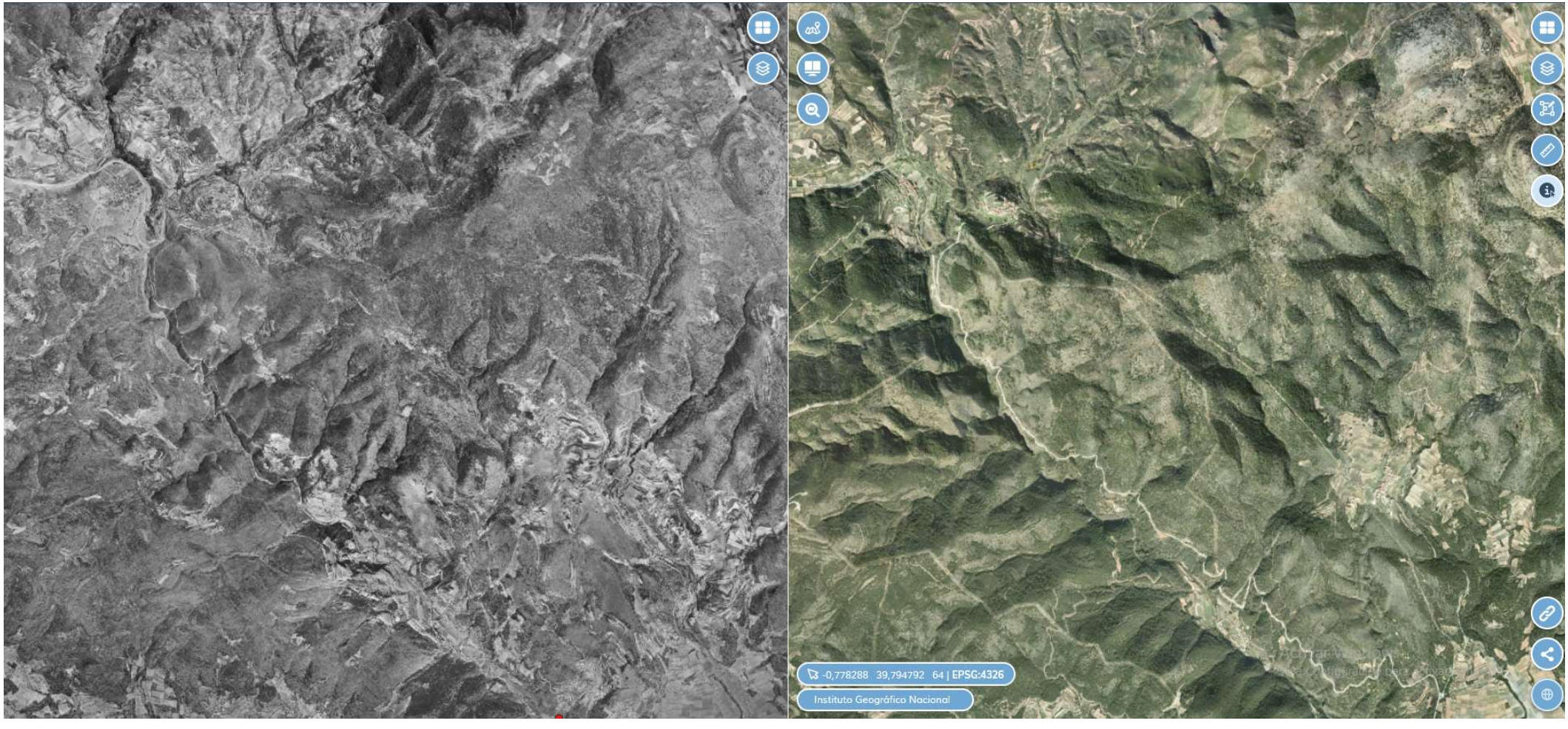
RURAL LANDSCAPES

Forest fires

Andilla (Valencia/Castellón, 2012)

AMERICAN FLIGHT
1956

PNOA
2008



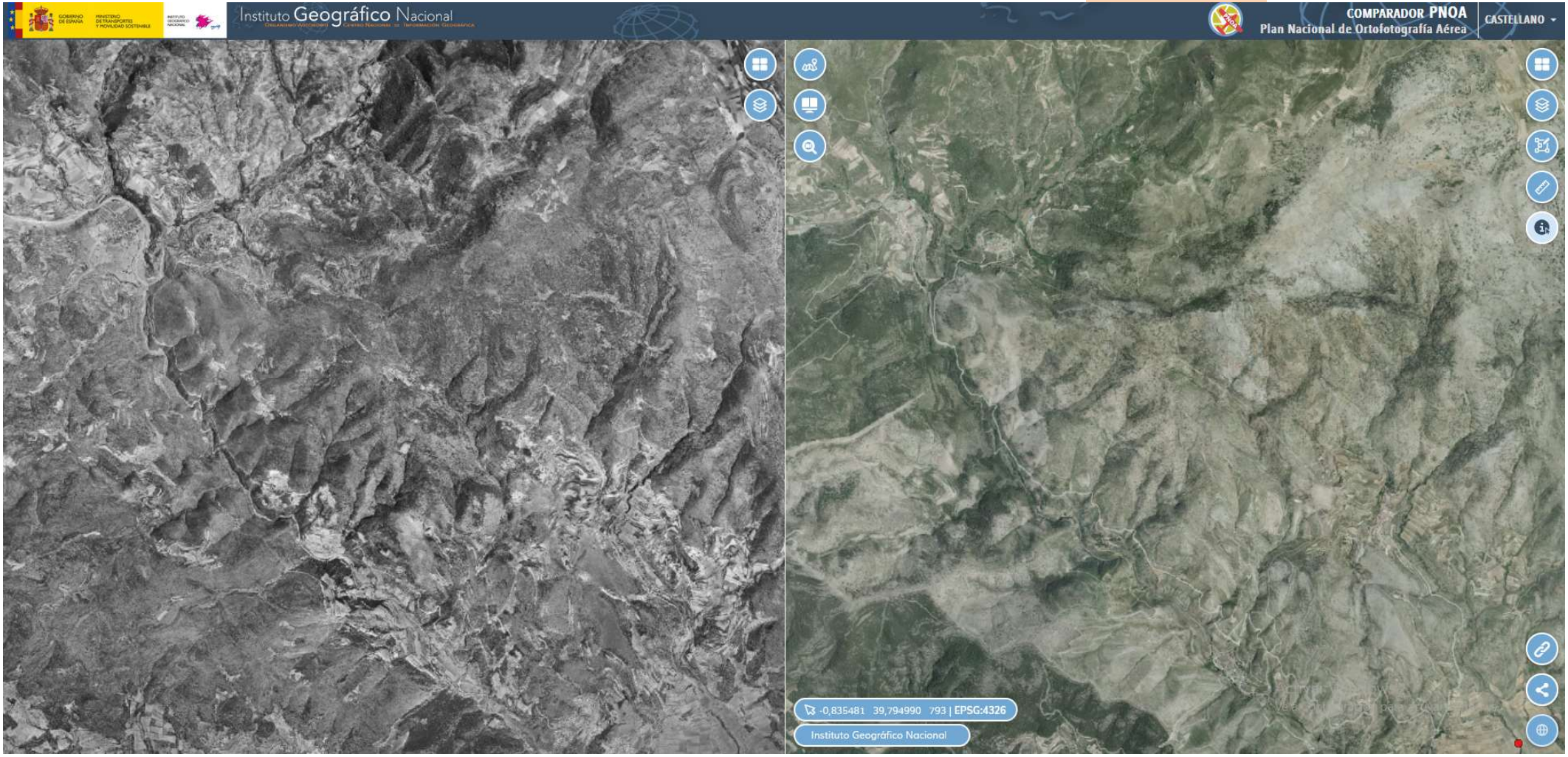
RURAL LANDSCAPES

Forest fires

Andilla (Valencia/Castellón, 2012)

AMERICAN FLIGHT
1956

PNOA
2014



RURAL LANDSCAPES

Forest fires

Castrocontrigo (León, 2012)

AMERICAN FLIGHT 1956

PNOA 2008

RURAL LANDSCAPES

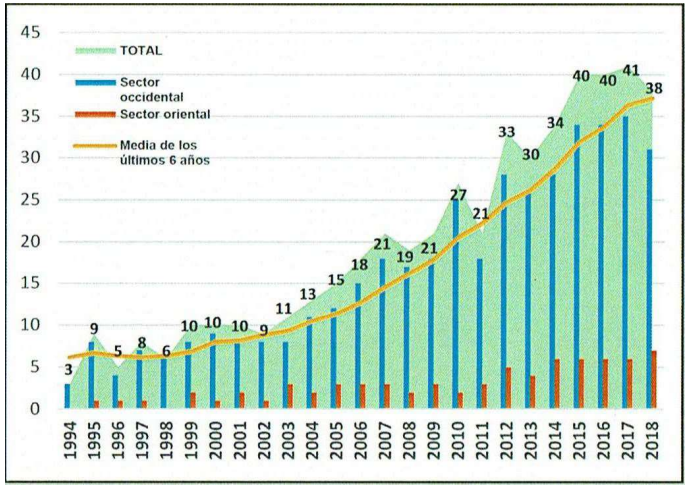
Recolonization by the wild fauna

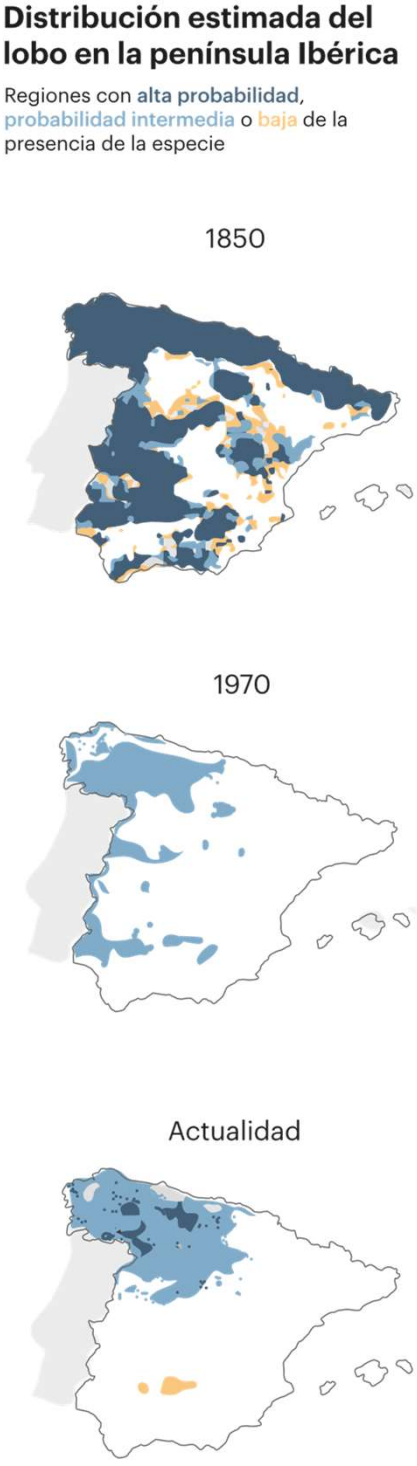
- The recovery of the vegetation cover is accompanied by the recolonization of the fauna.

- Increased populations of

  - Large carnivores such as the brown bear, the wolf, the lynx have increased.

  - Large and medium-sized herbivores such as deer, wild boar, roe deer and ibex

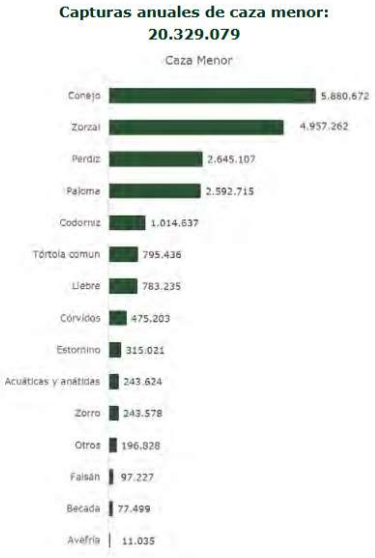


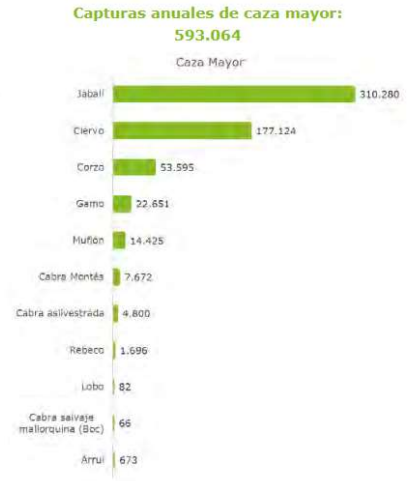


RURAL LANDSCAPES

Recolonization by the wild fauna

- Beneficts and harms
  - Hunting as a source of additional resources in many parts of inland Spain.

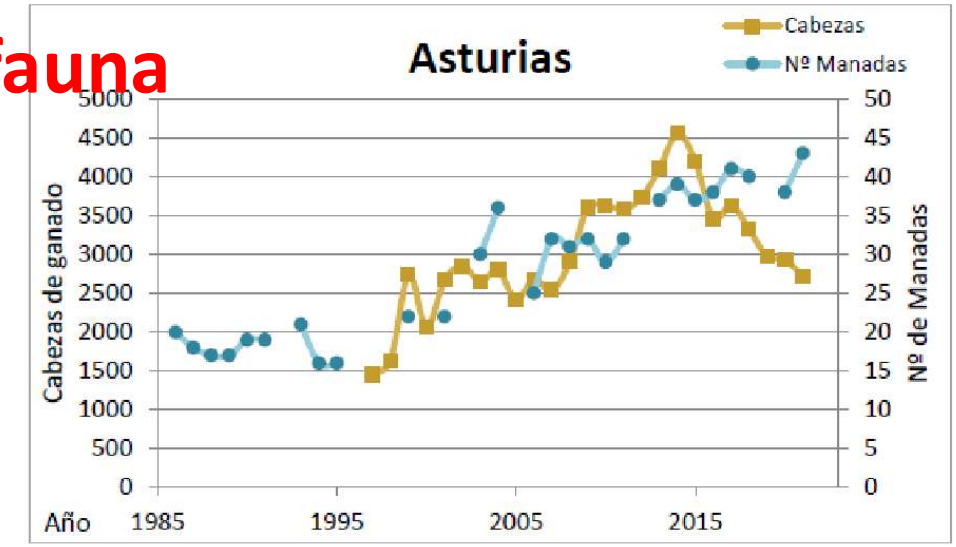




RURAL LANDSCAPES

Recolonization by the wild fauna

- Beneficts vs harms
  - Conflicts between extensive livestock farming and the wild fauna
  - Contact with the population (¿plagues?)



olución del número de ataques de lobo en Asturias (recopilado por Beneit, 2023).

https://www.youtube.com/watch?app=desktop&v=vI8zv5AF2ts

16 PROVINCIA | DIARIO DE LEÓN | MIÉRCOLES, 23 DE AGOSTO DE 2023

La FCQ considera que la actual protección del lobo deja desprotegida a la ganadería

◆ Promueve un estudio con 25 ganaderos de Picos de Europa sobre la relación de los ataques del lobo y la defensa del rebaño

ARMANDO MEDINA | LEÓN

■ La Fundación para la Conservación del Quebrantahuesos defiende la inclusión del lobo en el Lespre (Listado de Especies Silvestres en Régimen de Protección Especial y Catálogo de Especies Amenazadas) pero no como está planteado actualmente de protección absoluta de la especie, sino con un modelo de gestión de la misma. «No podemos plantear que el Lespre sólo proteja al lobo y deje desprotegida a la población que convive con él», afirma el vicepresidente de FCQ, Gerardo Báguena.

Según señala, el conflicto con el lobo tiene dos vías. En primer lugar, la FCQ está trabajando «para que se reconsidere» su inclusión en el Lespre. «Aunque consideramos que debe estar, estamos trabajando en que se desarrolle un contenido de gestión distinto al actual. Es decir, para el lobo es montenga en el Lespre, necesita protegerse y ser protegido. No podemos plantear que el Lespre sólo proteja a la especie y deje desprotegida a la población que convive con él».

Báguena afirma que el lobo es un depredador que tiene una función esencial en el paisaje, pero en una Europa humanizada tiene que tener algún tipo de control. «Y el control no puede ser ambiguo ni laxo, tiene que ser concreto, claro y que se pueda ejecutar. Estamos trabajando legalmente para que el contenido del Lespre, sin cambiar el sentido de la norma, sí que se cambie el orden de las actuaciones de tal manera que las competencias y la decisión última de actuar o no para que eliminar un núcleo concreto que da problemas la tenga el Gobierno regional y no el Ministerio. Hemos encontrado un encaje jurídico que así lo demuestra y ahora lo estamos intentando armar. Esta propuesta se la hemos hecho al Principado de Asturias, al Gobierno de Cantabria... al propio Ministerio».

Repite que lo que está planteando la FCQ, que promueve un proyecto sobre la convivencia de la ganadería extensiva a través de una marca de garantía, es que lobo tiene que estar en el Lespre, «pero vamos a ver cómo lo gestionamos. Cómo podemos autorizar batidas cuando corresponda y cómo podemos, de alguna manera, generar un documento útil que valga de verdad para gestionar y no sólo proteger». Subraya que «el Lespre plantea un modelo sólo de protección y nosotros planteamos un modelo de gestión»

Imagen de un mastín cuidando un rebaño de ovejas en las montañas leonesas. JESÚS F. SALVADORES

Investigación
La FCQ estudia con la UAM los excrementos de los mastines para inhibir los ataques del lobo

Por otro lado, Báguena tiene claro que la convivencia con el lobo es efectivamente problemática. «Tenemos un grupo de trabajo en el que tenemos la suerte de compartir información con más de 25 ganaderos de los Picos de Europa, de la zona Cero de conflicto de lobos en España, que conviven directamente con el conflicto, que tienen bajas todos los días... A partir de ellos podemos disponer de muy buena información». Gracias a ello «estamos planteando un estudio entre la relación que hay entre los ataques del lobo y la defensa de los ganados. Estamos viendo que los lobos son capaces de discernir o de poder evaluar si en la contienda que van a tener con rebaño donde hay mastines les compensa o no atacar. Es decir, no es lo mismo que lobo detecte por el olfato que hay tres mastines machos allá que son de 50 kilos cada uno que me van a triturar si me cogen, o que detecte que sí, que hay perros, pero que son perrines pequeños, o que hay dos hembras, un macho joven... que no van a ser un rival al que yo deba temer. Los lobos no hacen ataques al azar, lo que hacen es valorar el riesgo. Se acercan a un grupo de ganado, si ven 18 mastines como 18 armarios, no va a entrar».

Modelo de gestión
La fundación defiende que la inclusión del lobo en el Lespre se aplique como un modelo de gestión

«¿Eso cómo lo detectan?», dice. «La mayoría de los ataques son nocturnos, de tal manera que los lobos no siempre pueden ver al rival. Los lobos no saben contar. Los perros no saben contar. La información que les llega generalmente es por el olor. Cuando se acerca a la caca de otro perro sabe perfectamente si esa caca era de un macho, de una hembra, si estaba en celo, si era un macho joven, si era un macho alfa... Tienen toda la información. «Cómo? A partir del análisis de las hormonas volátiles que se desprenden de los excrementos. Esto es algo muy conocido. Y través de cortisol que se desprende también en los excrementos se expresa el nivel de estrés que el perro tiene en el cuerpo. Es decir, no sólo soy un perro fuerte sino que estoy nervioso porque sé que estás ahí», explica gráficamente Báguena.

Esta información que los lobos detectan, la FCQ está intentando ser capaz de valorar si es capaz de inhibir un ataque o no. Un grupo de lobos que se enfrenta a un grupo de perros poderosos que le están esperando es muy posible que decida no actuar. Eso lo están haciendo con la Universidad Autónoma de Madrid, con la doctora Isabel Barja, «con la que estamos tratando de aislar las hormonas asociadas a la jerarquía de la defensa para poder replicarlas de forma artificial y poder ensayar modelos que actúen como un inhibidor de ataques de lobo. Son ensayos que se están haciendo con mucho rigor científico. No lo hemos expuesto como un avance porque queremos ser sensatos. Se están haciendo ensayos y hasta que no haya datos reveladores no haremos un gran comunicado», asegura.

Conclusión
«Queremos aportar algo al conflicto entre lobos y ganadería. Con la queja no conseguiremos nada»

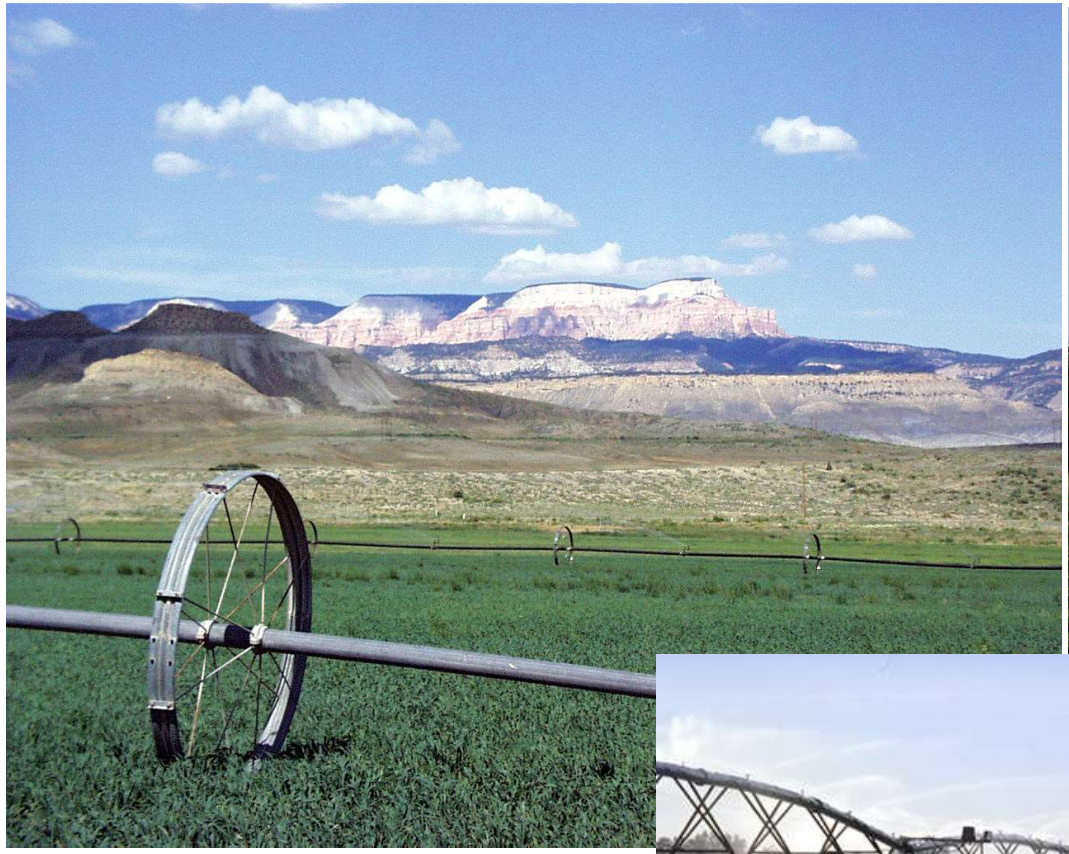
Otro aspecto en el que están trabajando es que «nos hemos dado cuenta que un ganadero nos dice que tiene nueve perros y que están matando los lobos igual. Y otro dice, yo tengo tres y a mí no me atacan. Posiblemente la respuesta está en qué tipo de perros tiene. No es lo mismo tener tres hembras y tres machos jóvenes a tener cuatro machos alfa dominantes o cuatro machos sin castrar en los que el nivel de testosterona está muy alto y en los que el nivel de agresividad y de exposición al conflicto es muy alto. Y eso los lobos también lo detectan».

«Con todo este material sobre etología animal —concluye el vicepresidente a la Fundación para la Conservación del Quebrantahuesos— estamos trabajando para aportar algo útil a este conflicto tan tedioso de la rivalidad entre la ganadería y los lobos. Mediante la queja no conseguiremos nada».

FROM RAINFED TO IRRIGATION

RURAL LANDSCAPES

From rainfed to irrigated (cereal) crops



RURAL LANDSCAPES

From rainfed to irrigated (cereal) crops

IRRIGATION

- Practice of applying controlled amounts of water to land
- A key aspect of agriculture for over 5,000 years and has been developed by many cultures around the world.

- Adventages:
  - Helps to grow more (better).
  - Revegetates disturbed soils in dry areas and during times of below-average rainfall.
  - Protects crops from frost.
  - Suppress weed growth in grain fields,
  - Prevent soil consolidation, reducing dust, dispose of sewage.
- Jevons paradox → as the water consumption efficiency has improved over the years, farmers planted more intensively and irrigated more land → depletion of water resources.

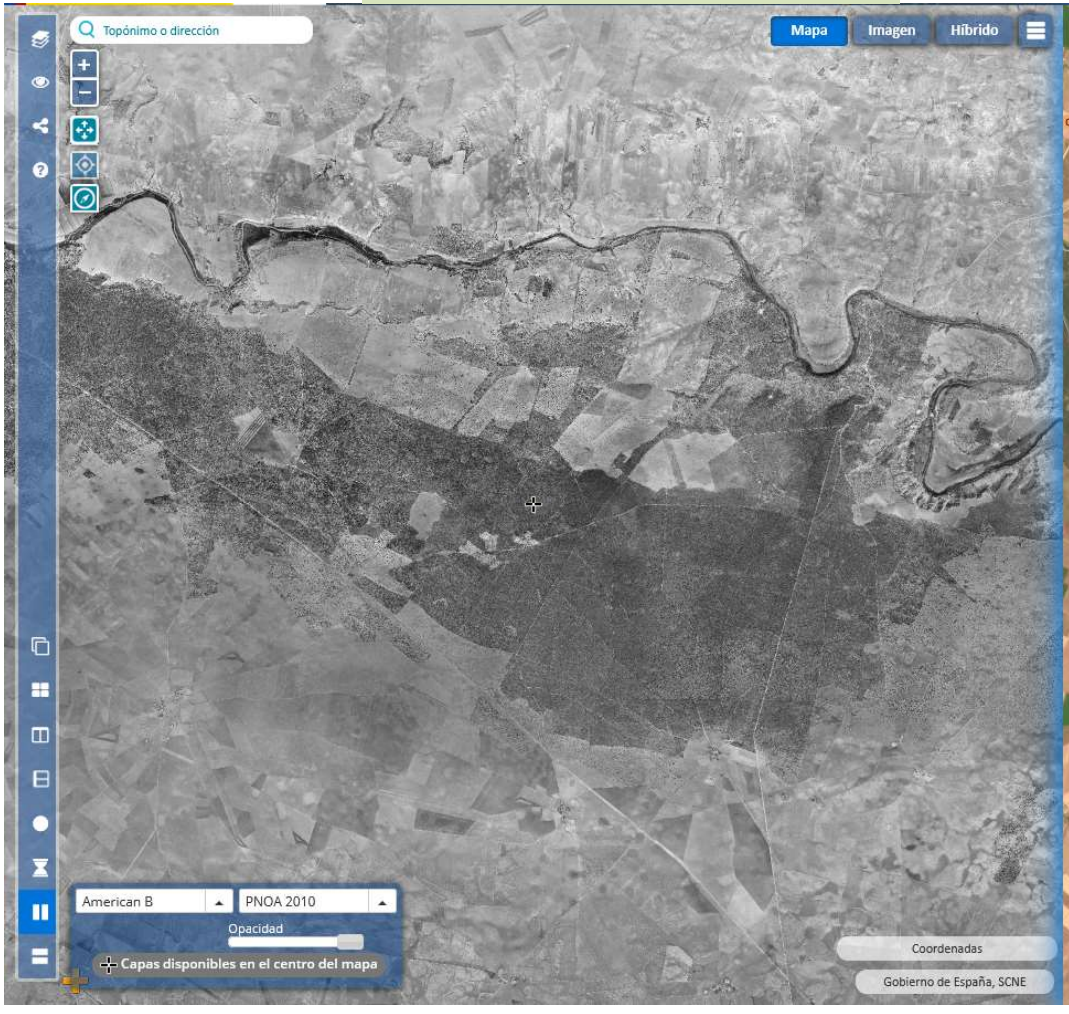
RURAL LANDSCAPES

From rainfed to irrigated (cereal) crops

La Gineta (Albacete)

AMERICAN FLIGHT 1956

PNOA 2008



RURAL LANDSCAPES

From rainfed to irrigated (cereal) crops

Center-pivot irrigation

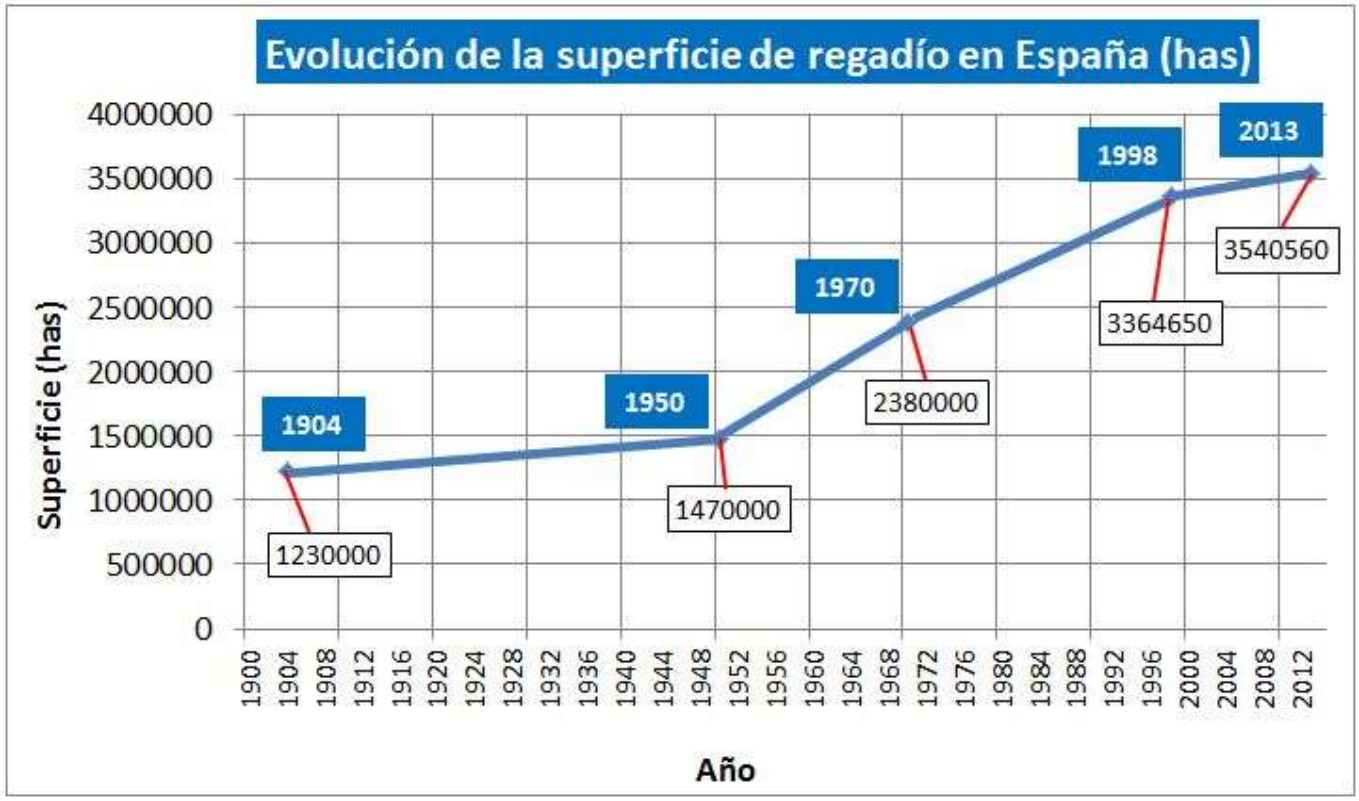
- Central pivot irrigation/water-Wheel/circle irrigation
- A method of crop irrigation in which equipment rotates around a pivot and crops are watered with sprinklers → creates a circular pattern in crops fields.
- Usually propelled by electric engines.
- Beneficial due to their ability to efficiently use water and optimize a farm's yield, specially on large land fields → the terrain needs to be reasonably flat, but one major advantage of center pivots is the ability to function in undulating terrain.

RURAL LANDSCAPES

From rainfed to irrigated crops

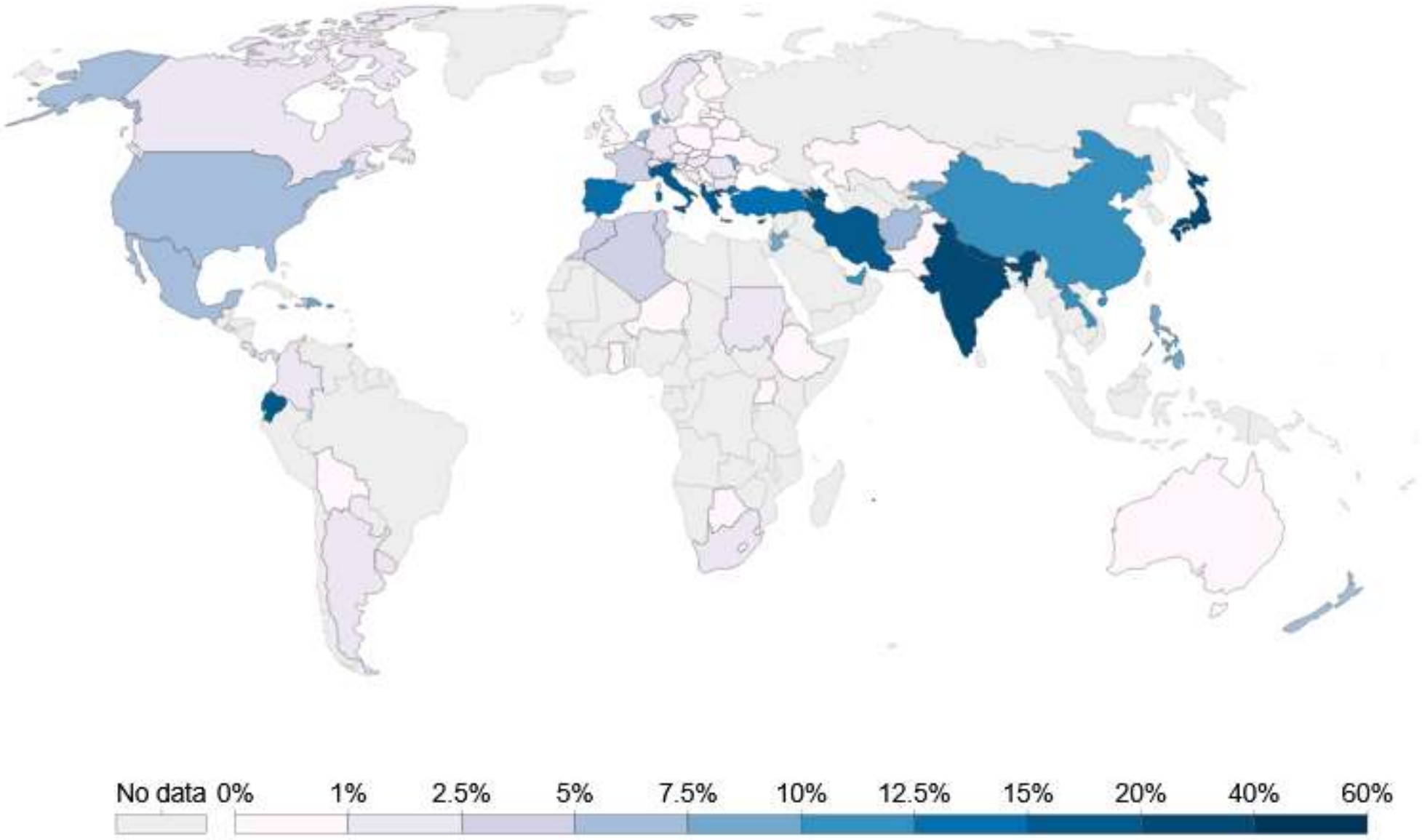
- Irrigation:
  - To guarantee **abundant and regular agricultural production**, in a country with great climatic variability/poor soils.

  - **To reduce the depopulation of rural areas** → the availability of water for irrigation substantially modifies the possibilities of development of an area.



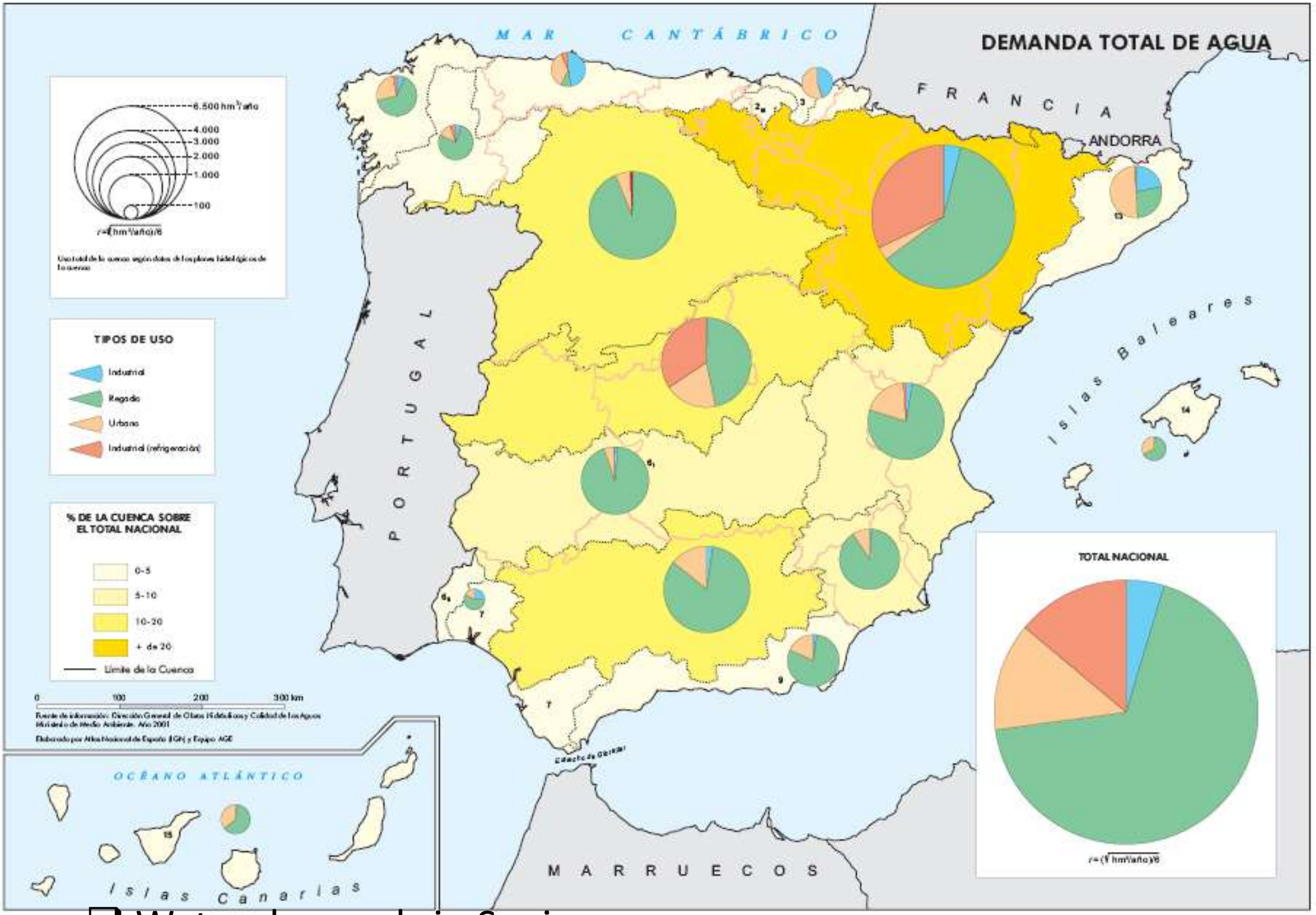
Share of agricultural land which is irrigated, 2015

he percentage of total agricultural land area which is irrigated (i.e. purposely provided with water), including land rigated by controlled flooding. Agricultural land is the combination of crop (arable) and grazing land.

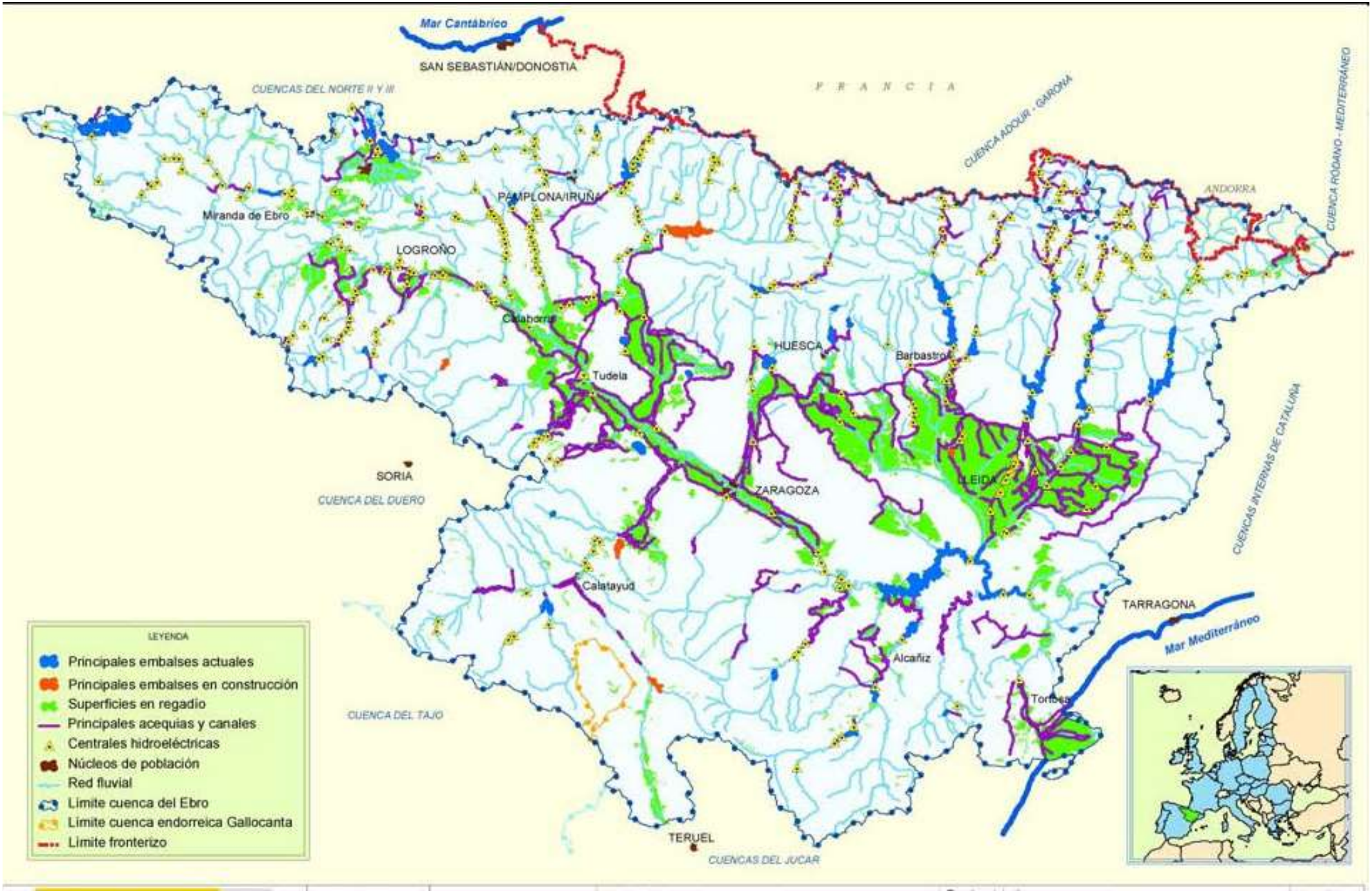


ource: World Bank


SUPERFICIE DE REGADÍO
MAR CANTÁBRICO
FRANCIA
ANDORRA
OCÉANO ATLÁNTICO
PORTUGAL
Islas Baleares
MEDITERRÁNEO
MAR
ARGELIA
MARRUECOS
Ceuta
Melilla
ORIGEN DEL AGUA
Superficial
Subterráneo
Otro
0 100 200 300 km
Elaborado por Grupo AGE
OCÉANO ATLÁNTICO
Islas Canarias

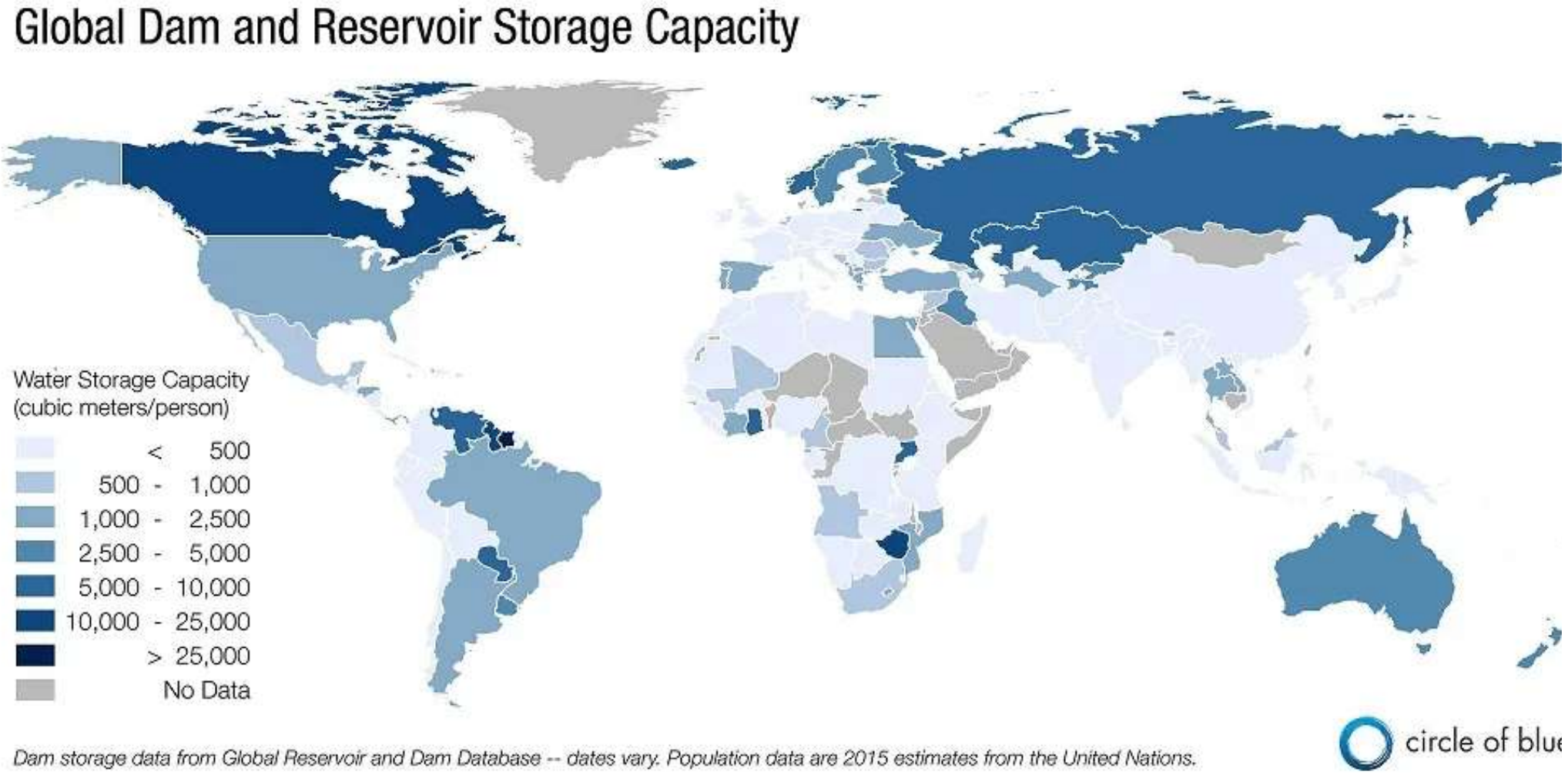


- Water demands in Spain
  - Mostly for agriculture.

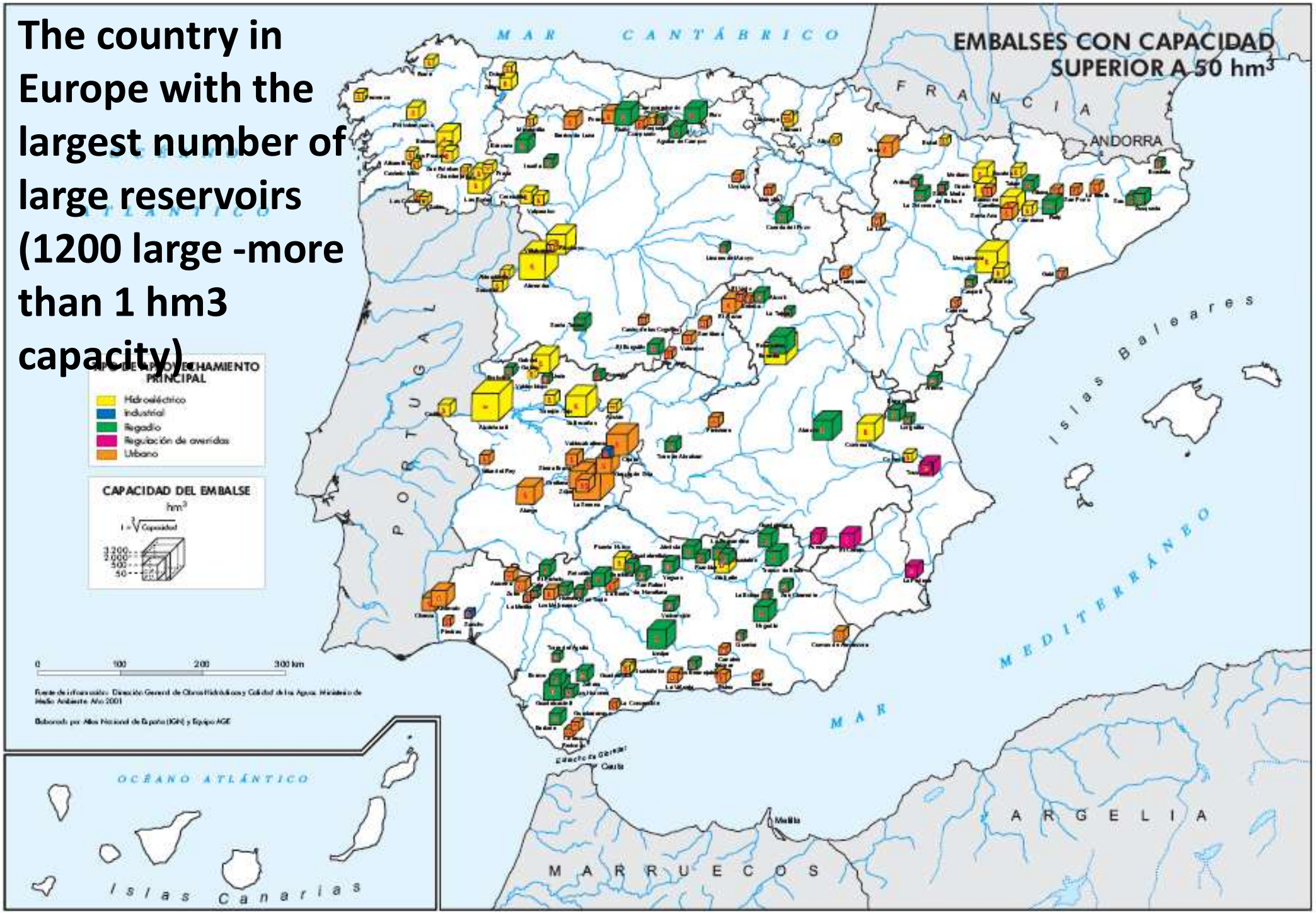

Mar Cantábrico
SAN SEBASTIÁN/DONOSTIA
CUENCAS DEL NORTE II Y III
F R A N C I A
CUENCA ADOUR - GARONA
CUENCA RÓDANO - MEDITERRÁNEO
ANDORRA
PAMPLONA/IRUÑA
Miranda de Ebro
LOGROÑO
Calahorra
Tudela
HUESCA
Barbastro
SORIA
CUENCA DEL DUERO
ZARAGOZA
LLEIDA
CUENCAS INTERNAS DE CATALUÑA
Calatayud
TARRAGONA
Mar Mediterráneo
Alcañiz
Tortosa
CUENCA DEL TAJO
TERUEL
CUENCAS DEL JUCAR
LEYENDA
Principales embalses actuales
Principales embalses en construcción
Superficies en regadío
Principales acequias y canales
Centrales hidroeléctricas
Núcleos de población
Red fluvial
Limite cuenca del Ebro
Limite cuenca endorreica Gallocanta
Limite fronterizo

¿Having more reservoirs would be a solution to the problems of drought/irrigation?

- It is one of the European countries with more water storage capacity.



The country in Europe with the largest number of large reservoirs (1200 large -more than 1 hm3 capacity)




CONSTRUCCIÓN DE GRANDES EMBALSES HASTA LA DÉCADA DE 1970
Embalses (año de construcción)
Ebro (1945)
Aguilar (1965)
Yesa (1960)
La Sotonera (1961)
Santa Ana (1957)
Oliana (1959)
Mequinenza (1966)
Riba-roja (1969)
Almendra (1970)
Saucelle (1956)
El Atazar (1972)
Entrepeñas (1956)
Buendía (1957)
Gabriel y Galán (1961)
Valdecañas (1965)
Cijara (1956)
Alcántara (1955)
Orellana (1961)
García de Sola (1962)
Alarcón (1955)
Benagéber (1955)
Montijo (1954)
Zújar-La Serena (1964)
Camarillas (1960)
Guadalén (1961)
Puente Nuevo (1972)
Tranco de Beas (1945)
Iznájar (1969)
0 100 200 300 km
Compilación científica: Isidoro González Gallego e Ignacio Martín Jiménez
Elaborado por: Instituto Geográfico Nacional. Atlas Nacional de España

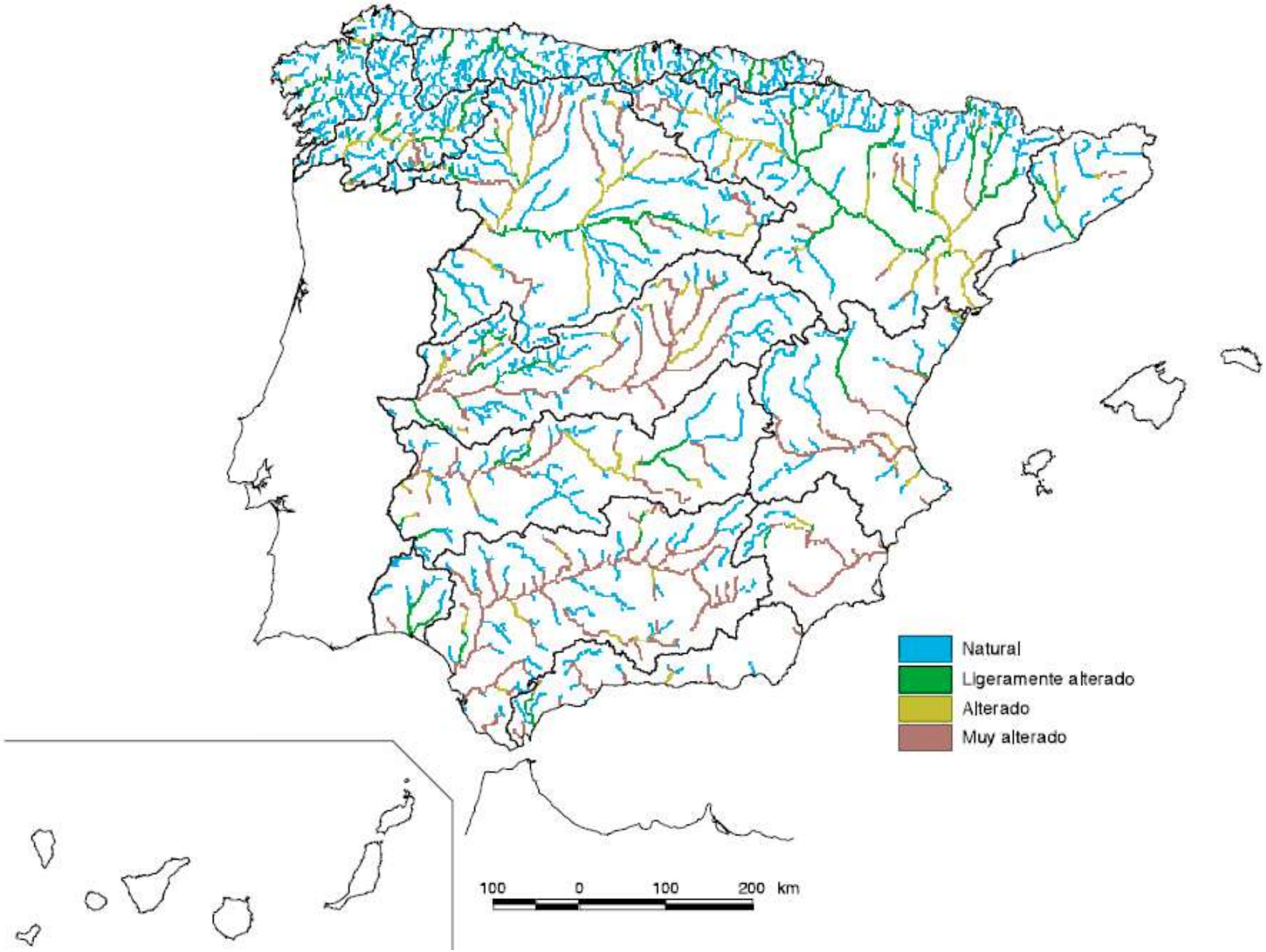
RURAL LANDSCAPES

From rainfed to irrigated (cereal) crops

Dams

- The channels of the main rivers are completely segmented and artificialized → impact on the natural environment.

- These infrastructures have wiped out around 500 nuclei of population inhabited since 1940.


Natural
Ligeramente alterado
Alterado
Muy alterado
100 0 100 200 km

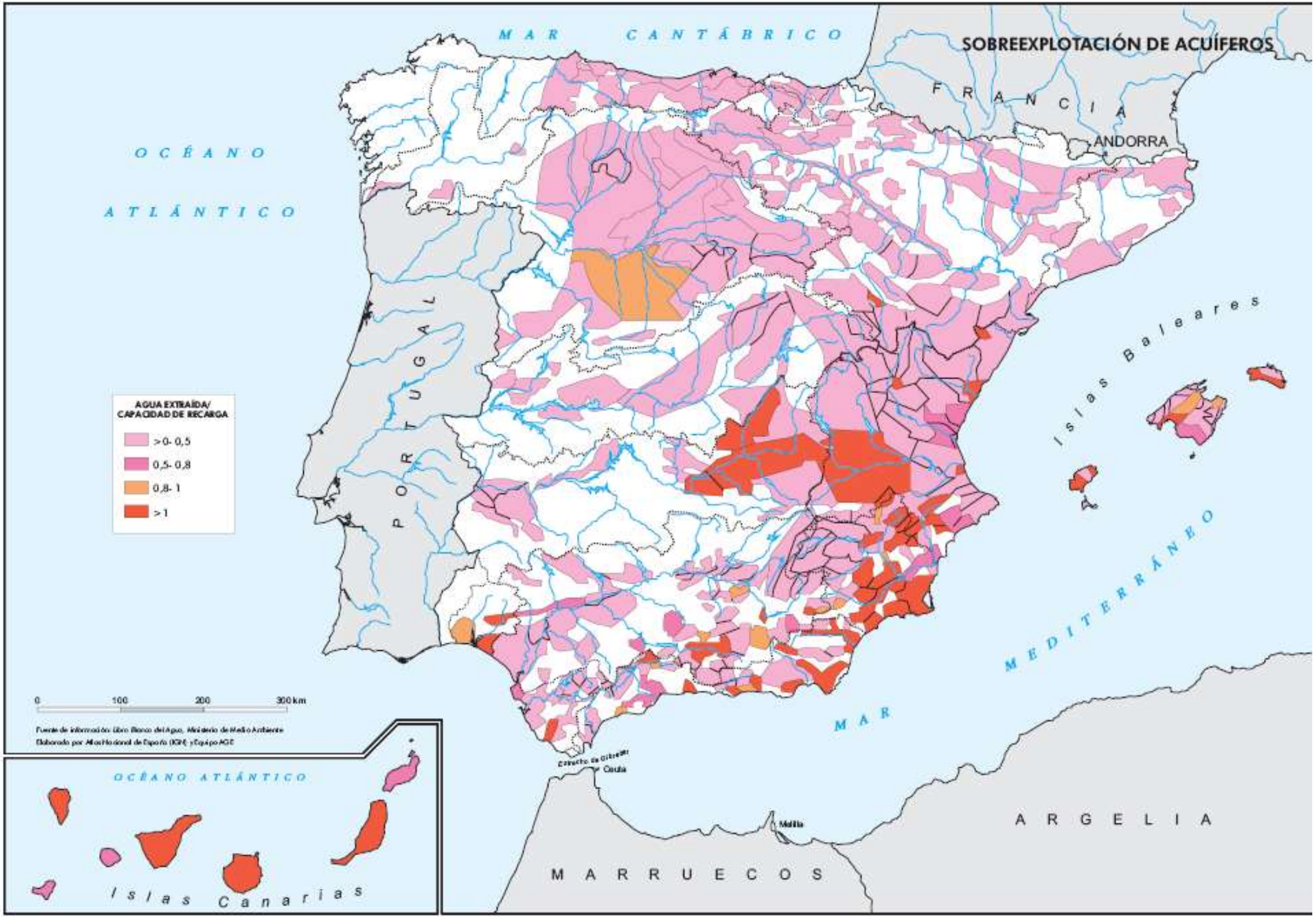
RURAL LANDSCAPES

From rainfed to irrigated (cereal) crops

Underground water

- When surface water is not available or its exploitation is complicated, groundwater is used, especially for agriculture and supply of populations.
- It is estimated that the volume is equivalent to 7 times the capacity of the reservoirs (400,000 hm3).
- Only about 35,000 hm3 is sustainably tractable so as not to overexploit groundwater

SOBREEXPLOTACIÓN DE ACUÍFEROS



RURAL LANDSCAPES

From rainfed to irrigated (cereal) crops

Interbasin transfer

- Transbasin diversion of water
- Man-made water resource engineering schemes which move water from one river basin where it is available, to another basin where water is less available
- Such projects may be controversial due to their scale, costs and environmental or developmental impacts → represents a subtraction of water at the source.


Sistema de Cabecera
E. de Entrepeñas
Río Guadiela
E. de Bolarque
E. de Buendía
Río Tajo
E. de la Bujeda
Trasvase Tajo-Segura
Tramo I
Tramo Alarcón
E. de Alarcón
VALENCIA
Río Júcar
ALBACETE
Trasvase Tajo-Segura
Tramo II
Río Mundo
E. de Talave
ALICANTE
Río Segura
Postrasvase
MURCIA


CENTRO PROFESIONAL DE ID
DORSIA
Total
INMOBILIARIA Domínguez
Morales
RESTAURANTE
FUENTE ÁLAMO
DEL TRASVASE TAJO-SI
TUTO DE CASTILLA-LAMAN

NEW CROPS

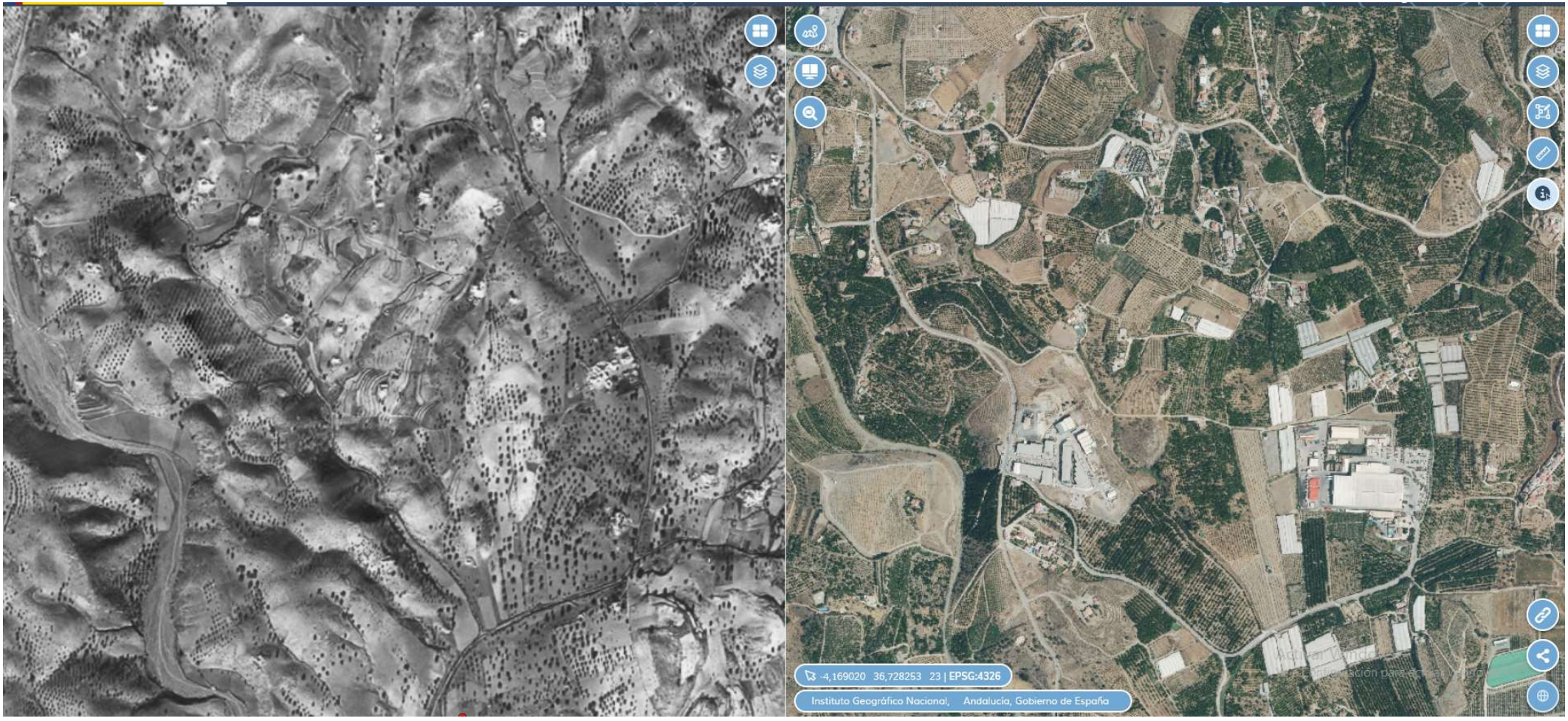
RURAL LANDSCAPES

New crops (avocado)

La Axarquía, Cajiz (Malaga)

AMERICAN FLIGHT 1956

PNOA 2022



SUBTROPICAL FRUITS: THE AVOCADO (mango)

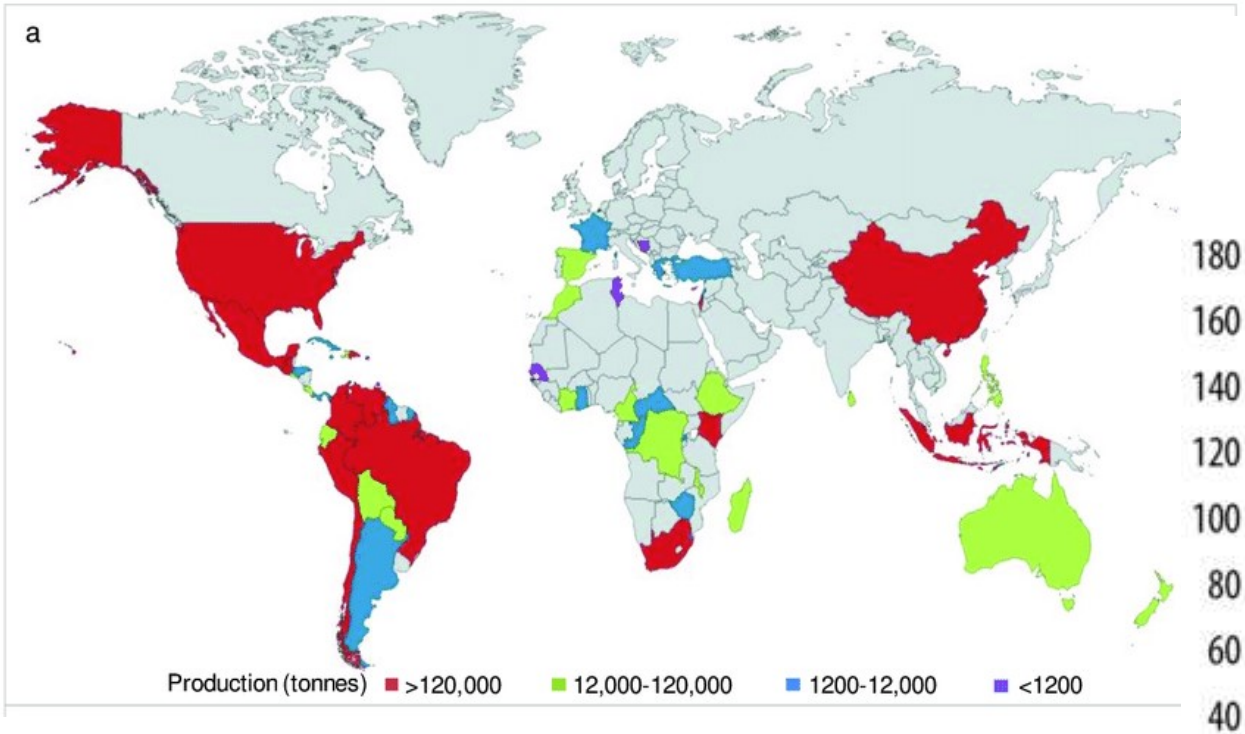
- Native to Central America.

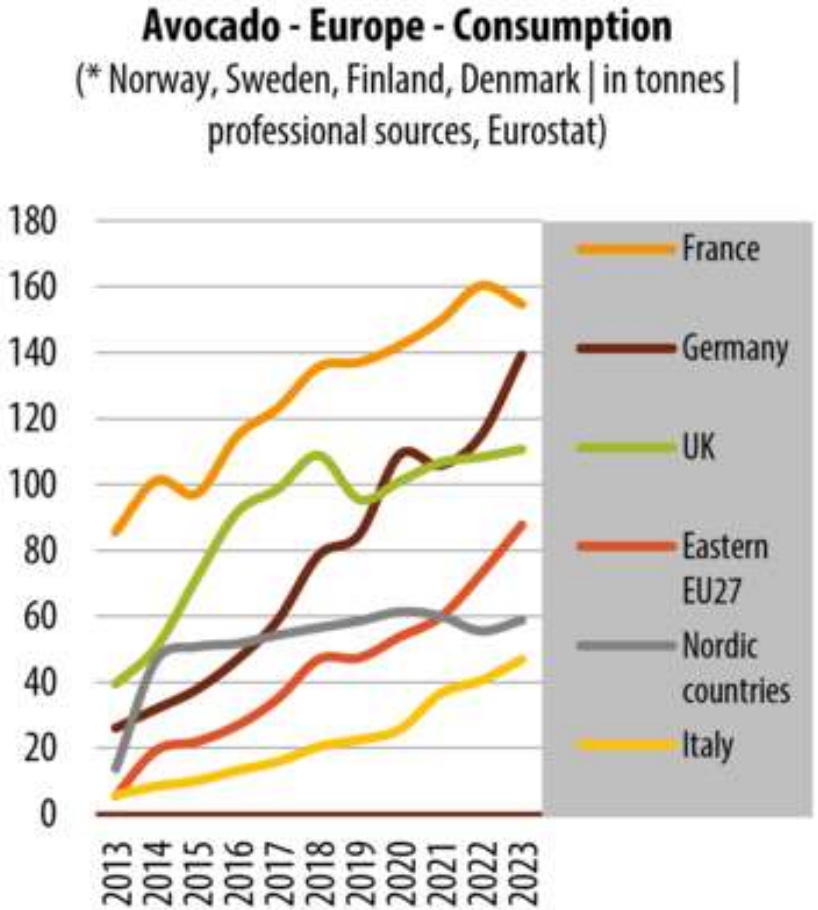
- The first plantations date back to the 16th century.

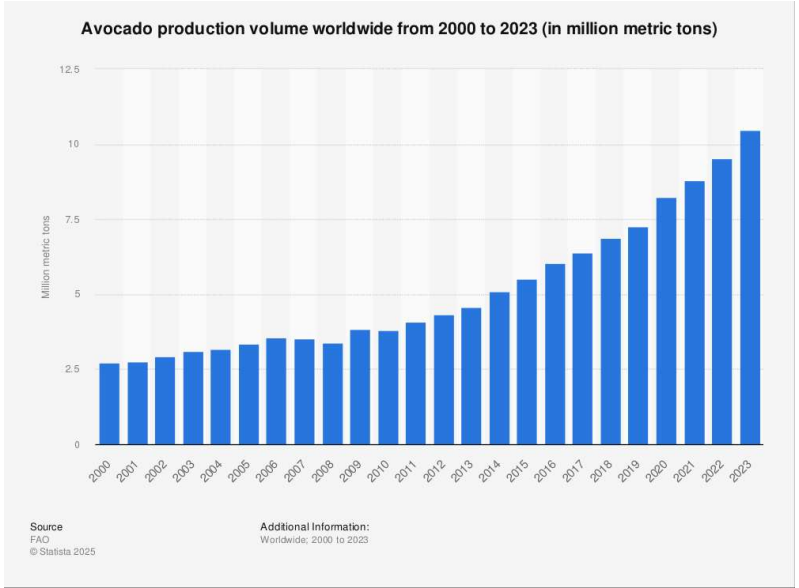
- 2nd half of the 20th century:
  - Transported from other areas in chambers to prevent its ripening.
  - Arrived still green, so its quality left much to be desired.

- It began to be cultivated in Spain for commercial purposes in the 80s.

SUBTROPICAL FRUITS: THE AVOCADO (mango)







SUBTROPICAL FRUITS: THE AVOCADO (mango)

- Current spatial distribution

- Two areas cover about 80% of production:
  - Granada: 3500 hectares.
  - Málaga: 8500 hectares.

- Spatial distribution
  - Along the Mediterranean coast to Valencia and the Balearic archipelago,
  - Along the Atlantic coast to Cape St. Vincent, in Portugal.
  - Canary Islands > 1200 hectares.

SUBTROPICAL FRUITS: THE AVOCADO (mango)

Why this distribution? Limiting factors:

- ❑ Temperature: it does not withstand temperatures below 0 °C.

- ❑ High water demands:
  - The average water footprint for a kg is estimated at 1100 liters (average value of the fruit 875 liters per kg).

  - Each hectare of avocado needs around 8000 m3 of water per year and hectare.

  - On the SE coast of Spain the irrigation available is ± 6500 cubic meters per hectare/yr (20% less than needed for optimal production→ a yield loss of approximately 16%.

  - Decrease in water availability → high water stress → decrease in productivity for trees.

RURAL LANDSCAPES

New crops (avocado)

- Traditional landscape:
  - Area subject to a high risk of erosion:
    - Abrupt terrain, with steep slopes.
    - Irregularity and scarcity of rainfall + torrential events.
  - Typical rainfed mediterranean landscape (included in the Unesco Representative List of the Intangible Heritage) → Balate
    - Crops: citrus, vines, almond trees, olive trees.
    - Non cultivated areas: matorral de jarales (“menchones”)

Dry stone wall (without concrete or binder) that rises about two or three meters from the lower part of the slope, serving as a foundation to later fill the hole,
first with rubble that drains the water and then with arable earth.

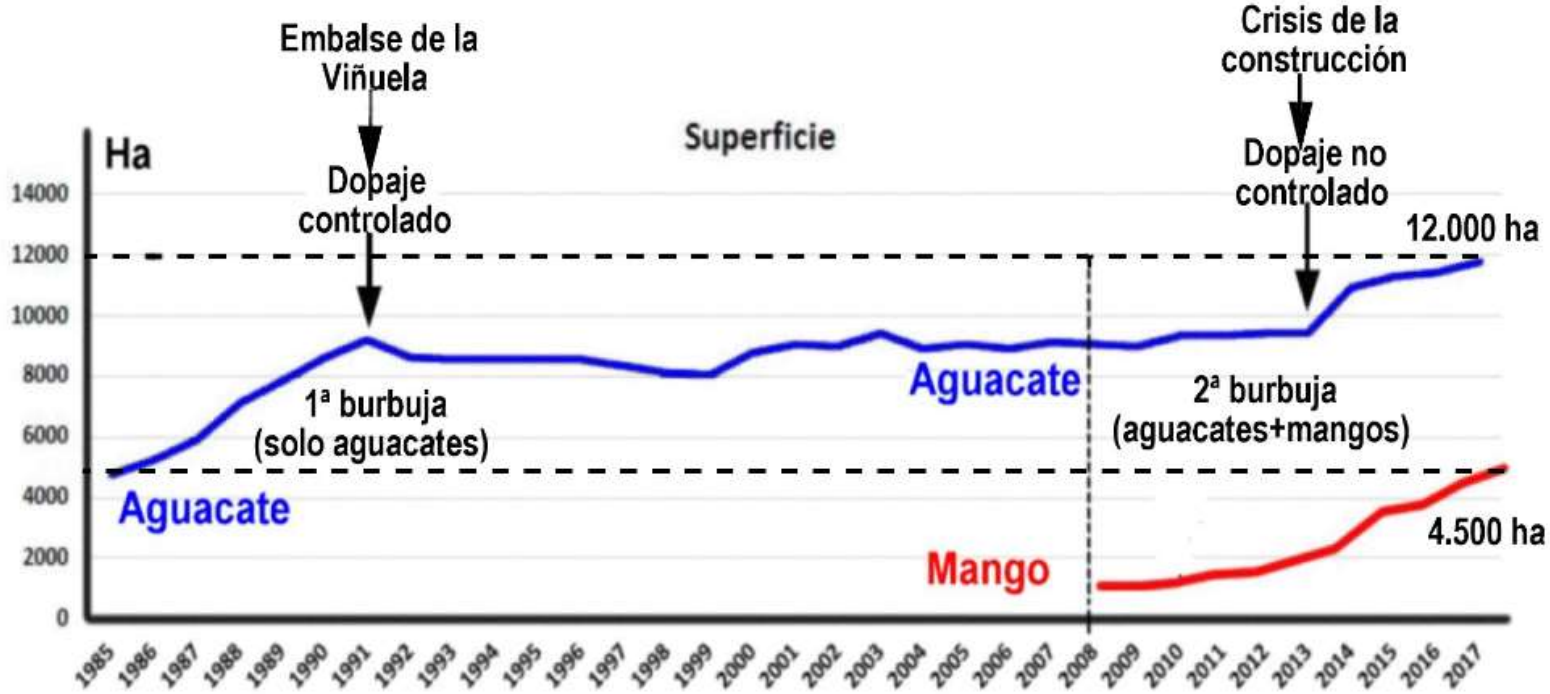
RURAL LANDSCAPES

New crops (avocado)

❑ **Events:**

❑ Construction of the Viñuela dam

- Increase in water availability → increased the irrigated area from about 5,000 ha to about 8,700 ha.



❑ Economic crisis 2008:

- Crisis of the homebuiliding industry (turism).
- Increased profitability due to the greater demand in Europe.
- Diversion of investment from construction to agriculture → 12,000 ha of avocados and 4,500 ha of mango.

RURAL LANDSCAPES

New crops (avocado)

- New landscape
  - Visual and environmental impact
  - Topography transformation: conversion of hills into flat surfaces or terraced slopes by introducing heavy machinery.

- Artificial increase of water resources:
  - Construction of open-air tanks and cisterns.
  - Development of non-conventional water: wastewater (construction of water treatment plants), construction of a desalination plant.
  - Resources transferred from other sub-basins.
  - Illegal wells: between 30% and 40% of the irrigated lands in the Axarquía were illegal plantations.

PRECISION AGRICULTURE

DEFINITION

- A decision support system for whole farm management to optimize returns on inputs while preserving resources.

- Consists on:
  - Recollection, processing and analyzing temporal, spatial and individual plant and animal data.
  - Combined with other information
  - to support management decisions for improved resource use efficiency, productivity, quality, profitability and sustainability of agricultural production.

- Employs technologies to automate agricultural operations.

DEFINITION

- A key component of the third wave of modern agricultural revolutions.
  - The first agricultural revolution: the mechanized agriculture (from 1900 to 1930). Each farmer produced enough food to feed about 26 people.
  - The 1960s prompted the Green Revolution with new methods of genetic modification, which led to each farmer feeding about 156 people.
  - If, by 2050, the global population reach about 9.6 billion: each farmer should be able to feed 265 people on the same acreage.

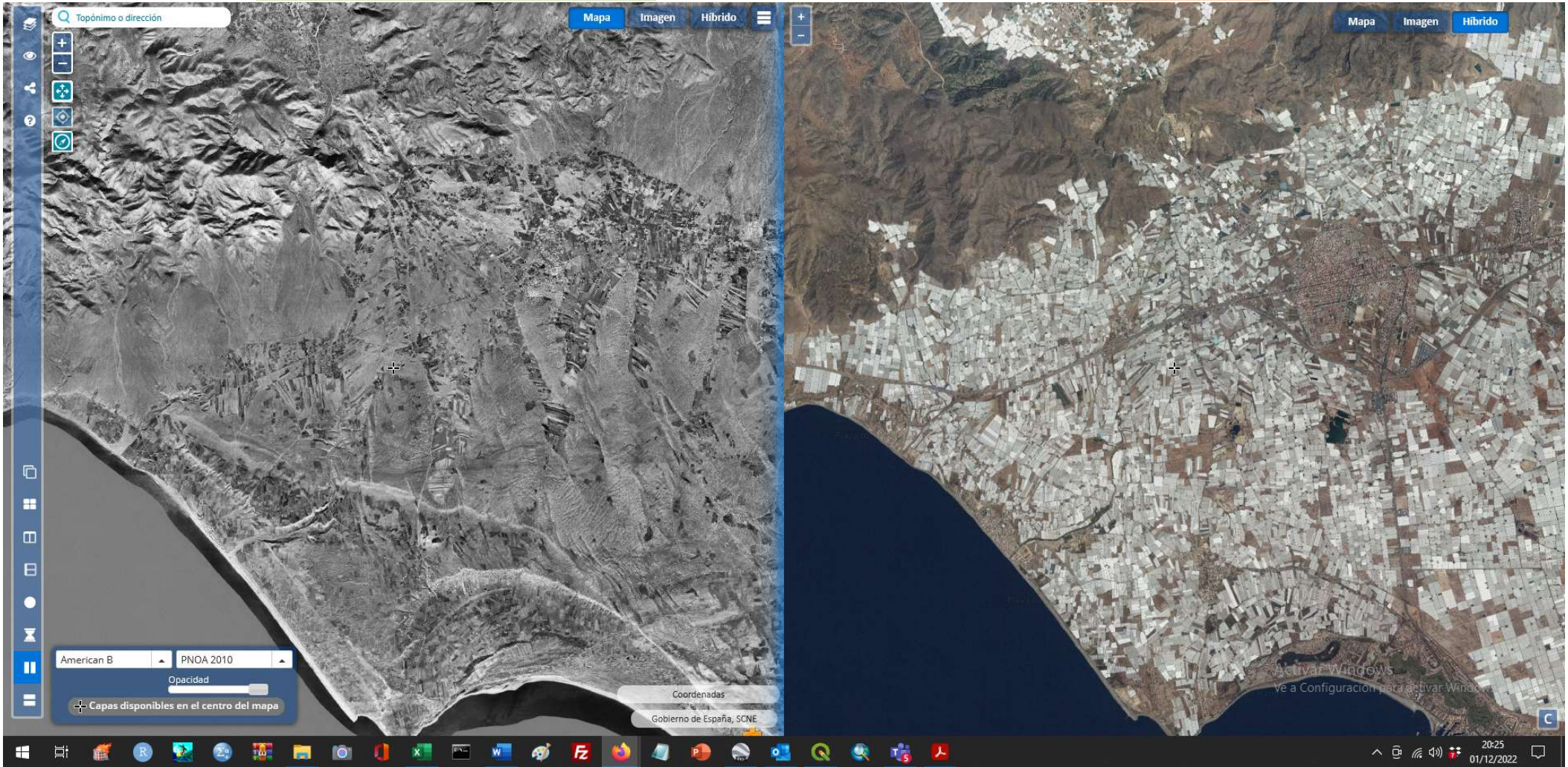
RURAL LANDSCAPES

Precision agriculture

El campo de Dalías

AMERICAN FLIGHT 1956

PNOA 2022



MINING LANDSCAPES

INTRODUCTION

1. The Iberian Peninsula is one of the European regions with the **greatest mineral wealth**.

2. **In the past** the abundance and variety of its mineral resources attracted **foreign people** (phoenicians, carthaginians, romans).

3. Even as late as the **beginning of the 20th century**, Spain still boasted
   - Some of the world's most important mineral deposits (**Rio Tinto**).
   - The **economic development of certain regions** (Basque Country, Asturias) was based on their mineral wealth.

INTRODUCTION

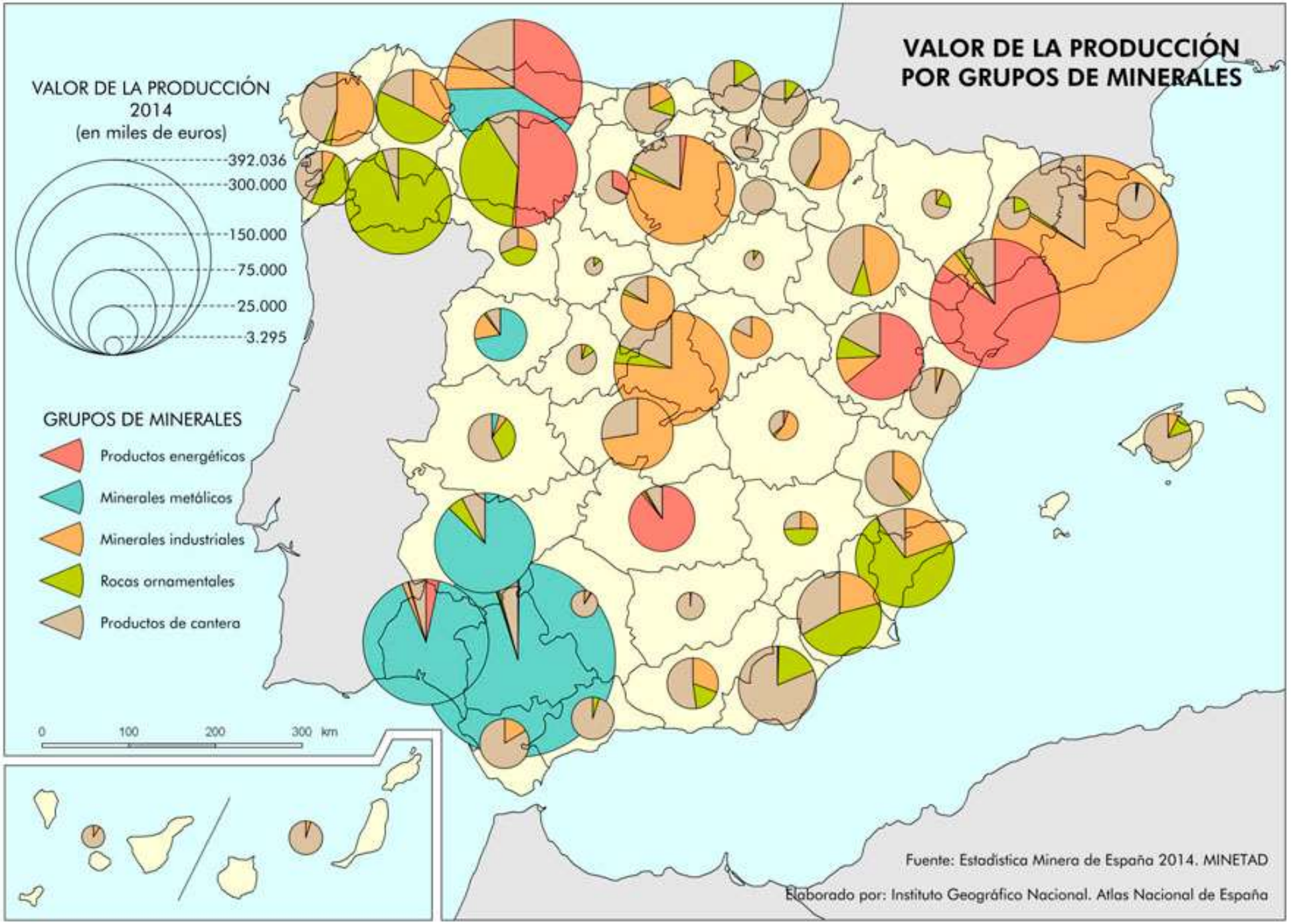
1. Nowadays, the mineral production is characterised by its **diversity**.

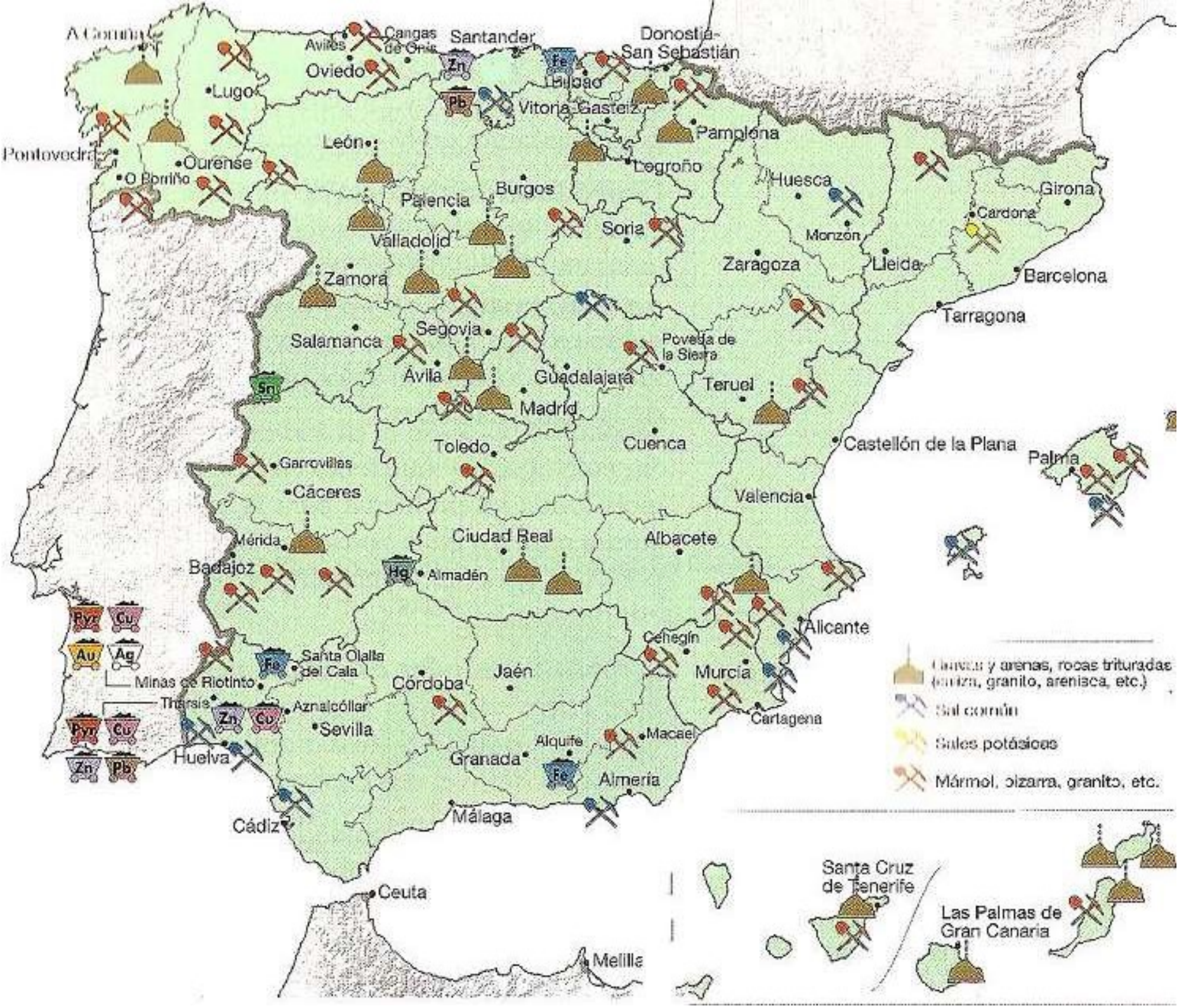
    - There is practically no mineral absent, but the most significant volumes produced are:

        ✓ **Metal minerals**: various pyrites, zinc, copper and lead.

        ✓ **Non-metallic minerals**: sand, refractory argil, bentonite, quartz, fluorite, glauberite, grain magnetite, rock and sea salt, potassium salts and sepiolite.

2. However, while **metal mineral production is insufficient** to meet the country's needs, by contrast, **non-metal minerals are produced to a surplus**, exceeding domestic demand.


VALOR DE LA PRODUCCIÓN POR GRUPOS DE MINERALES
VALOR DE LA PRODUCCIÓN 2014 (en miles de euros)
392.036
300.000
150.000
75.000
25.000
3.295
GRUPOS DE MINERALES
Productos energéticos
Minerales metálicos
Minerales industriales
Rocas ornamentales
Productos de cantera
0 100 200 300 km
Fuente: Estadística Minera de España 2014. MINETAD
Elaborado por: Instituto Geográfico Nacional. Atlas Nacional de España


A Coruña
Avilés
Cangas de Onís
Santander
Donostia-San Sebastián
Oviedo
Bilbao
Lugo
Vitoria-Gasteiz
Pamplona
León
Pontevedra
Ourense
O Porriño
Logroño
Huesca
Girona
Burgos
Palencia
Soria
Cardona
Monzón
Valladolid
Zaragoza
Lleida
Barcelona
Zamora
Tarragona
Segovia
Salamanca
Poveda de la Sierra
Ávila
Guadalajara
Teruel
Madrid
Toledo
Cuenca
Castellón de la Plana
Palma
Garrovillas
Cáceres
Valencia
Mérida
Ciudad Real
Albacete
Badajoz
Almadén
Alicante
Cehegín
Santa Olalla del Cala
Jaén
Murcia
Minas de Riotinto
Córdoba
Tharsis
Aznalcóllar
Cartagena
Sevilla
Alquife
Macael
Huelva
Granada
Almería
Málaga
Cádiz
Ceuta
Melilla
Santa Cruz de Tenerife
Las Palmas de Gran Canaria
Arcillas y arenas, rocas trituradas (caliza, granito, arenisca, etc.)
Sal común
Sales potásicas
Mármol, pizarra, granito, etc.

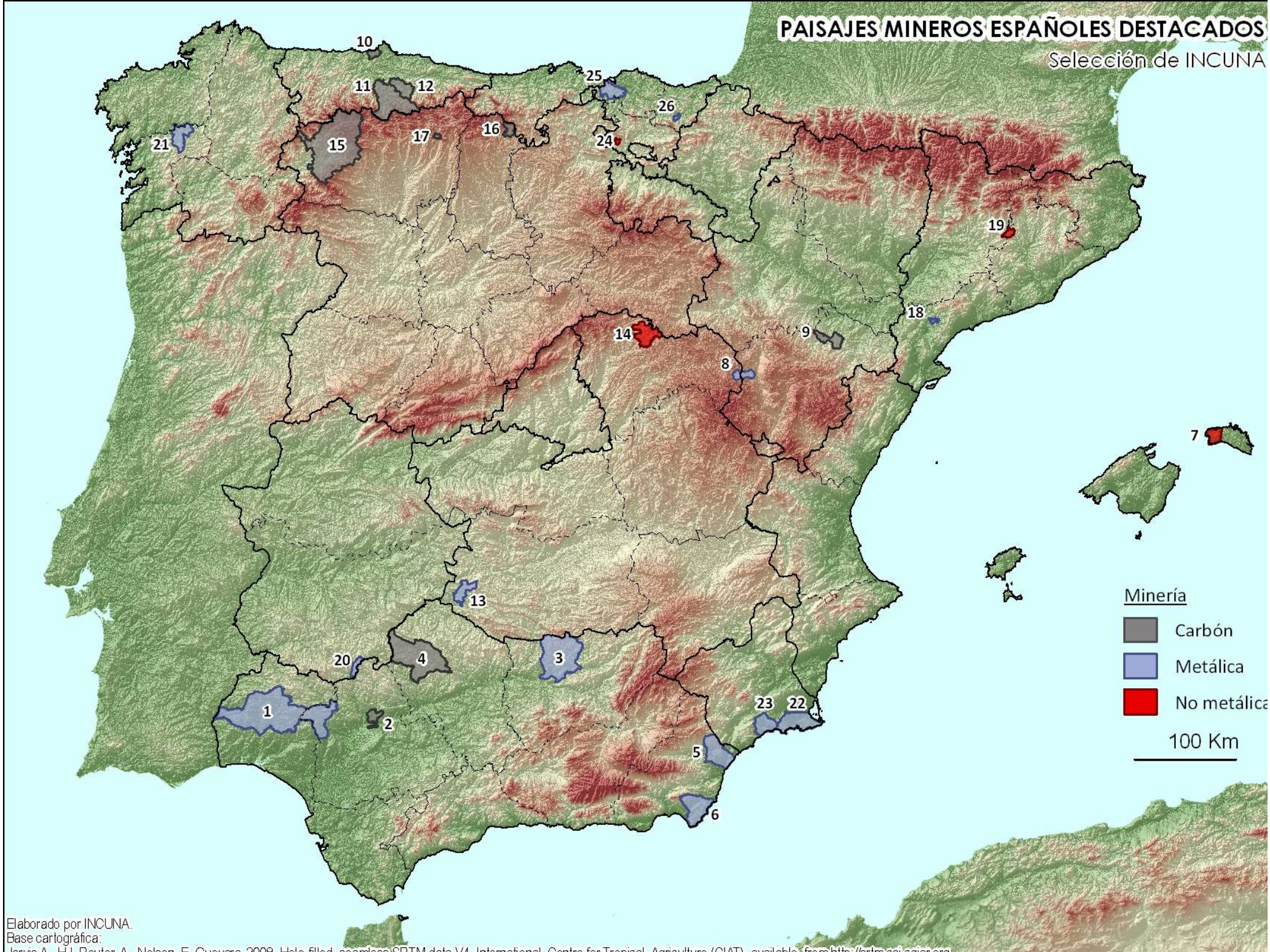
INTRODUCTION

1. After centuries of mining activities on a wide variety of substances, a very **rich mining and metallurgical heritage** has been generated

2. The **state of conservation** of this heritage is not good

    - In part due to the **progress and development of extractive activities** that dismantle the remains of the previous stages,

    - But above all due to **abandonment** (i.e. the great mining of the 19th century)


PAISAJES MINEROS ESPAÑOLES DESTACADOS
Selección de INCUNA
10
11
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19
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13
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6
Minería
Carbón
Metálica
No metálica
100 Km
Elaborado por INCUNA.
Base cartográfica:

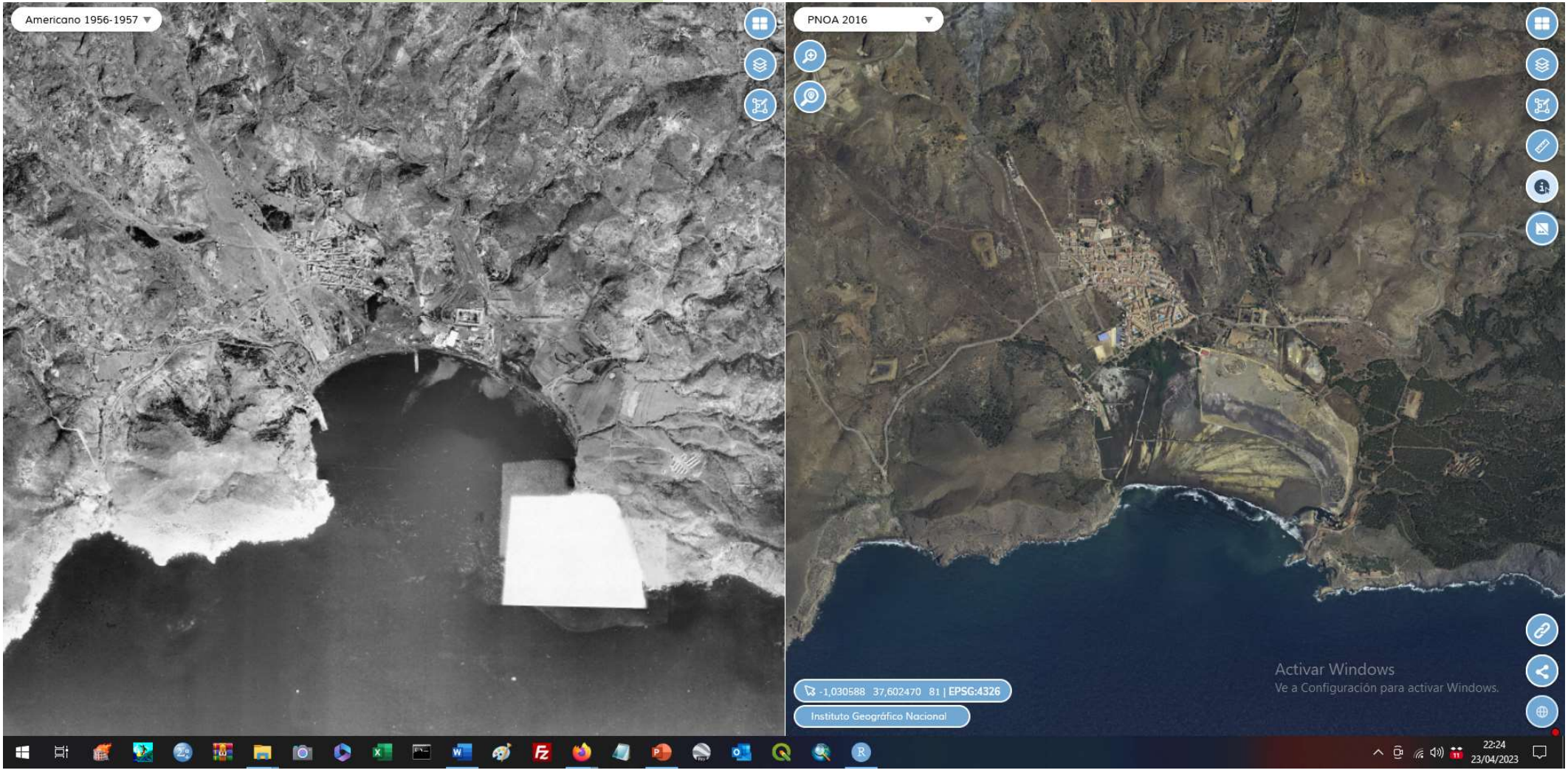
MINING LANDSCAPES

Portman Bay

1956-2024

AMERICAN FLIGHT 1956

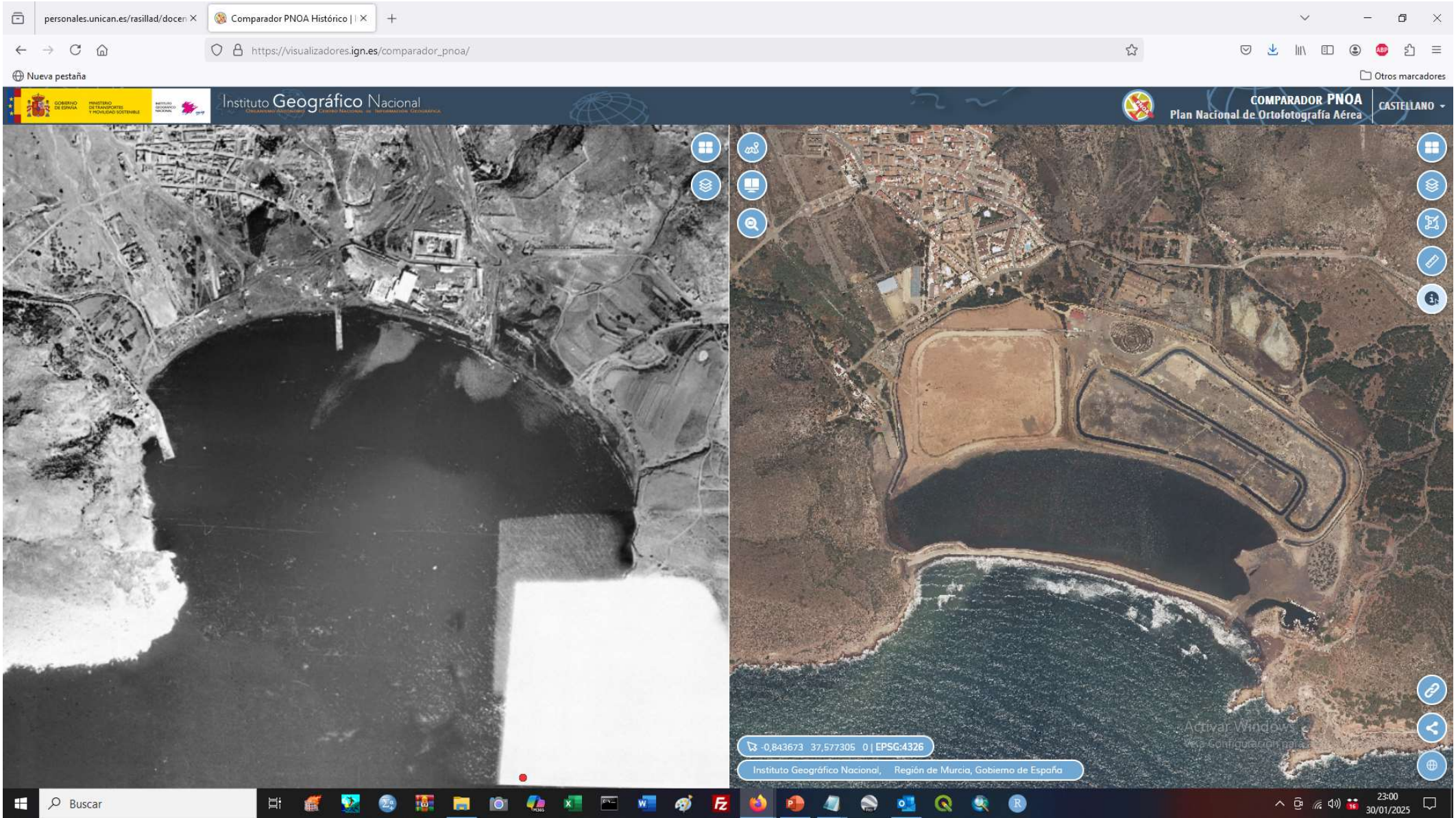
PNOA 2022



MINING LANDSCAPES

Portman Bay

1956-2024



MINING LANDSCAPES

Portman bay

- It may well be the most severe environmental disaster in the Mediterranean.

- Formerly, a natural harbor used by the Romans (Portus Magnus)
  - Strategic enclave: near the mines of Cartagena and La Unión,
  - Numerous remains of Roman mining and industrial facilities for smelting ore throughout the area.

- Today, the biggest outdoor dump of mining refuse in Spain: spoils from the mines filled the bay (up to 14 meters deep) and caused the shoreline to recede 12 kilometers.

MINING LANDSCAPES

Portman bay

- During Roman times, mining took place underground.

- After the Spanish Civil War, it was switched to extensive open-pit mining.
  - More economical.
  - Produced enormous quantities of mineral rubble (¿315 million tonnes of mineral waste between 1957 and 1987).
  - The veins were poor, so the company decided to blow up huge chunks of land and treat it with chemical agents in the wash plant to separate the minerals. Only a tiny part had any value.

- How to remove them?
  - Initially, that debris was deposited at the foot of the quarries, forming large earths, swamps.
  - After it was dumped directly into the sea in the bay of Portmán (7000 tonnes of mining waste per day).

MINING LANDSCAPES

Portman bay

- They contained
  - Dust.
  - A high concentration of heavy metals (cadmium, zinc, lead).
  - Highly toxic products (reaction agents) used in the washing of the ore such as copper sulphate, sodium cyanide, zinc sulphate or sulphuric acid.

- The town of La Unión filed a lawsuit against the dump, but it could not do anything about the permit issued during the Franco regime.
  - The Spanish Supreme Court ruled that the "national interest" of operating the mine (produced 20 % of the silver and 70 % of the lead) was greater than the town's interest in protecting its bay.
  - The fishermen, the only ones who complained, got 25,000 pesetas (about 150 euros) in indemnity and a marina berth in Cabo de Palos, a few kilometers to the east.
- The pipe that dumped the waste was displaced almost every month, because it had eaten up the sea.

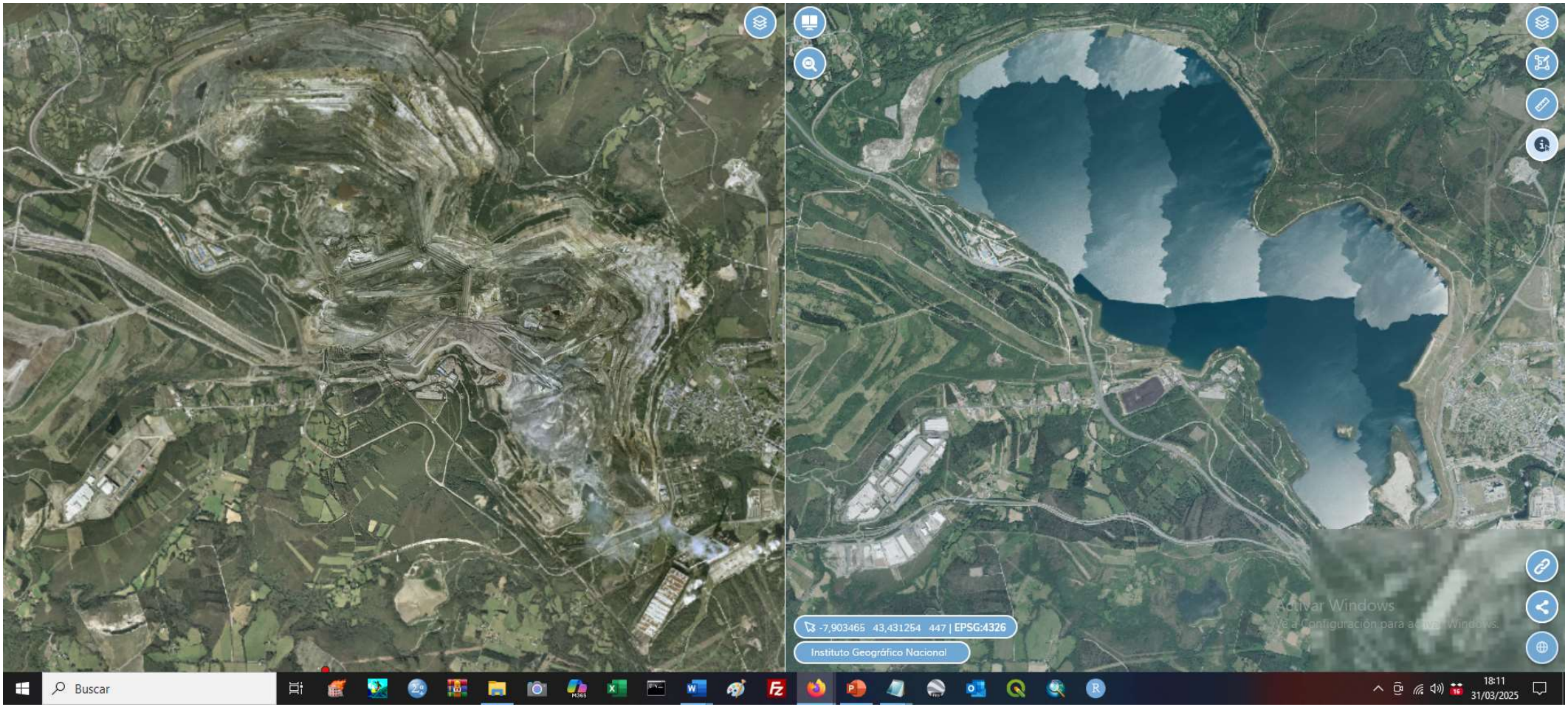
MINING LANDSCAPES

Lago Puentes García Rodríguez

1956-2024

AMERICAN FLIGHT 1956

PNOA 2022



MINING LANDSCAPES

Puentes de García Rodríguez lake

- The largest artificial lake in Europe.

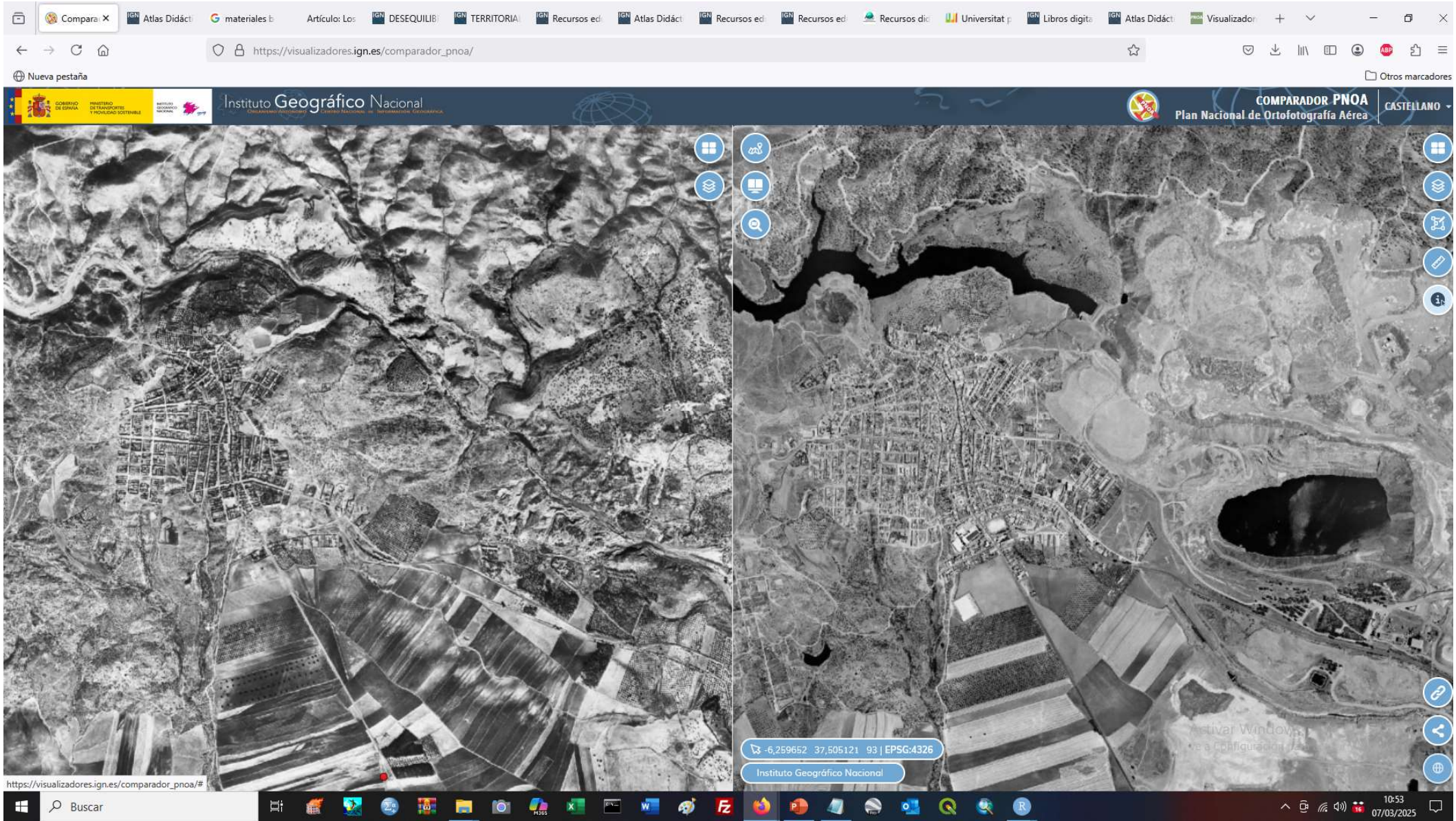
- Created as a result of the recovery and regeneration work of the open-pit mine (lignite).
  - The largest open-pit mine in the Iberian Peninsula.
  - The activity created two dumps to deposit all the extracted earth as well as a large central hole, 288 meters deep.

- Today:
  - An ornithological reserve, with a space for bird watching
  - An artificial beach.

MINING LANDSCAPES

Aználcollar

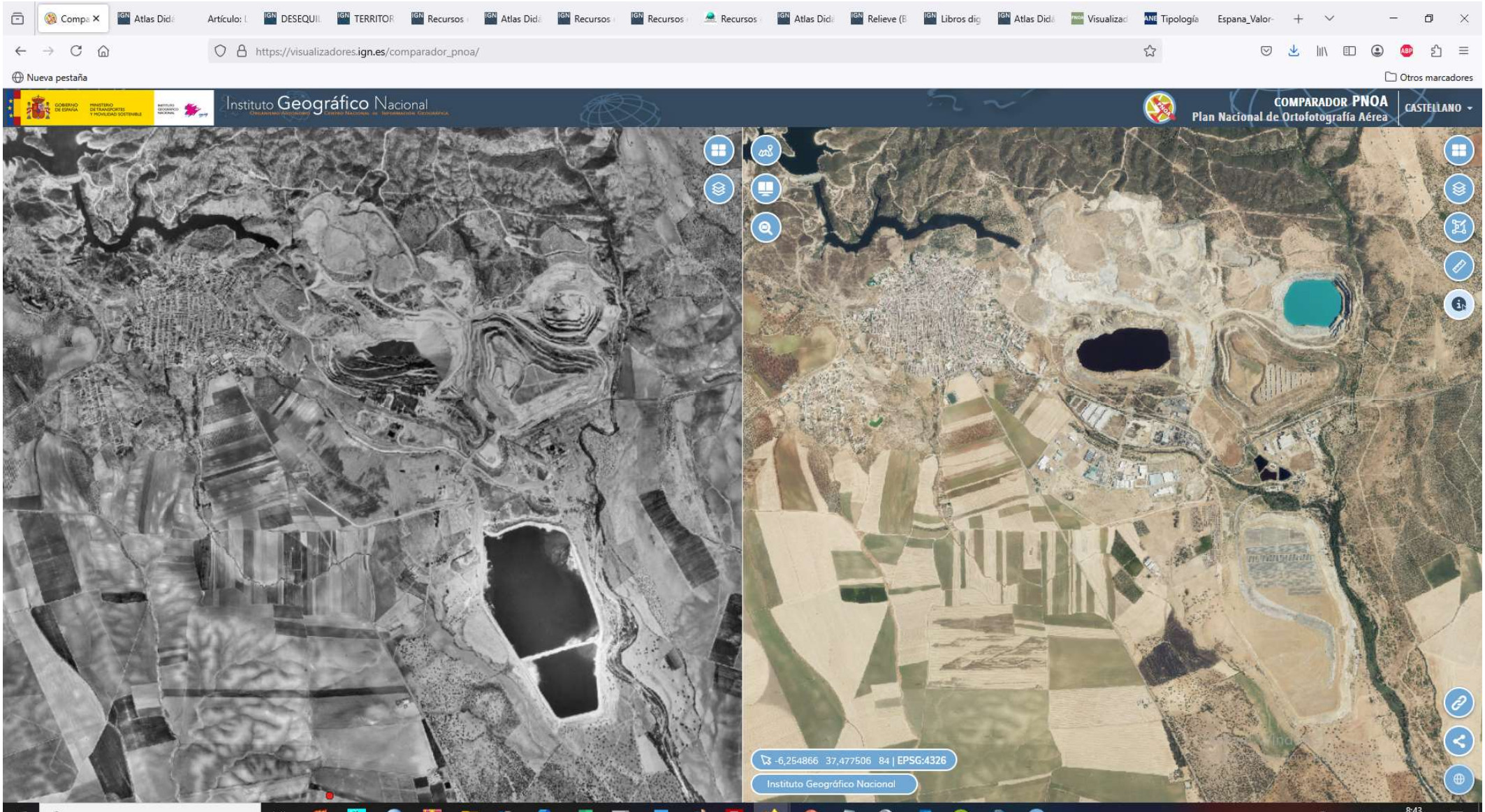
Vuelo SIGPAC (1997-2003), Vuelo OLISTAT (1997-1998)



MINING LANDSCAPES

Aználcollar

... OLISTAT (1997- 1998). Ortofotos SIGPAC (1997 - 2003).



NEW ENERGY SOURCES

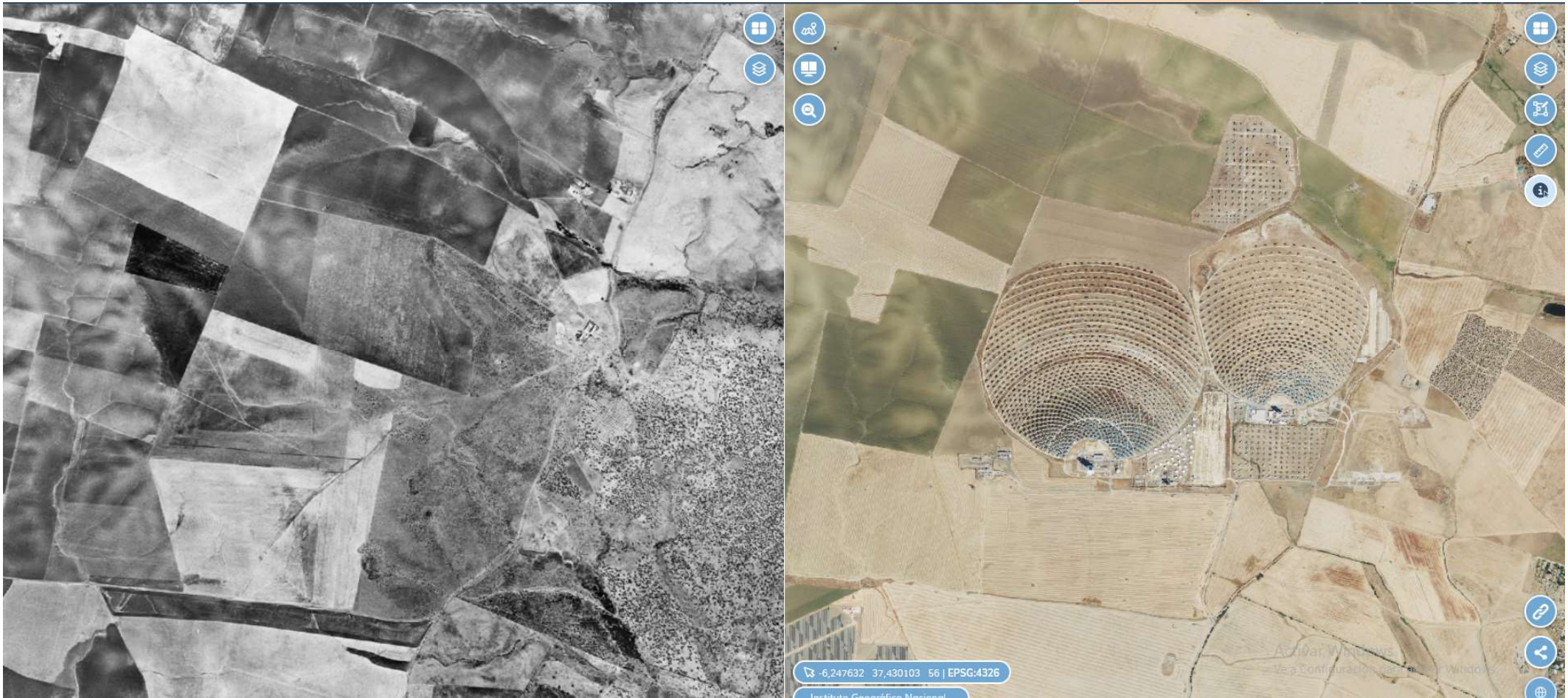
ENERGY LANDSCAPES

Solar thermal power plant

Sanlúcar La Mayor, Sevilla

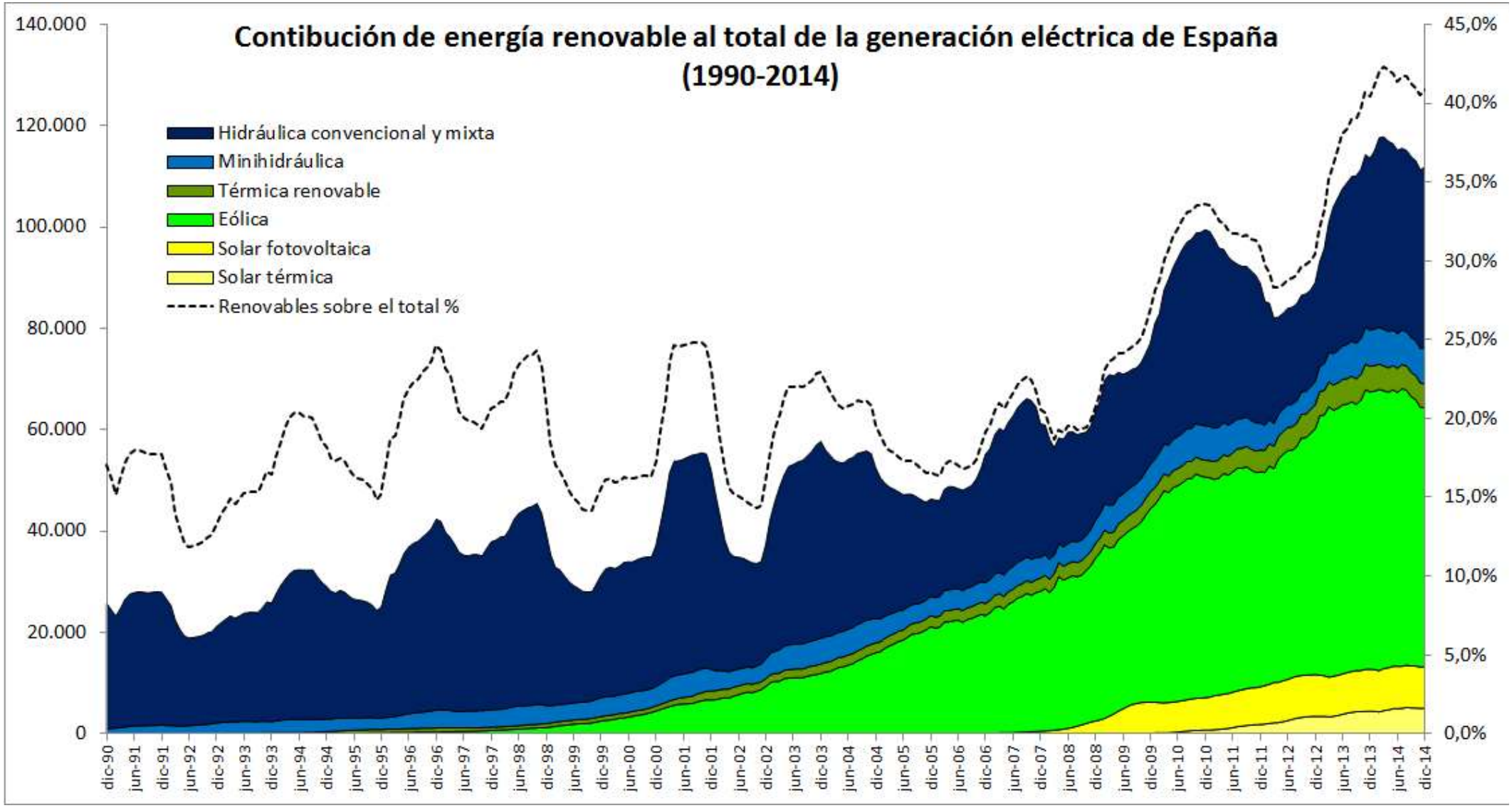
AMERICAN FLIGHT
1956

PNOA
2022



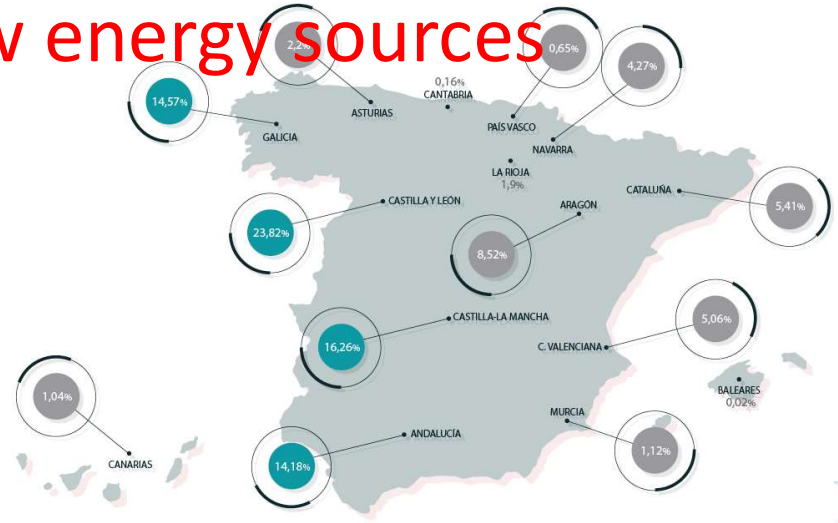
RURAL LANDSCAPES

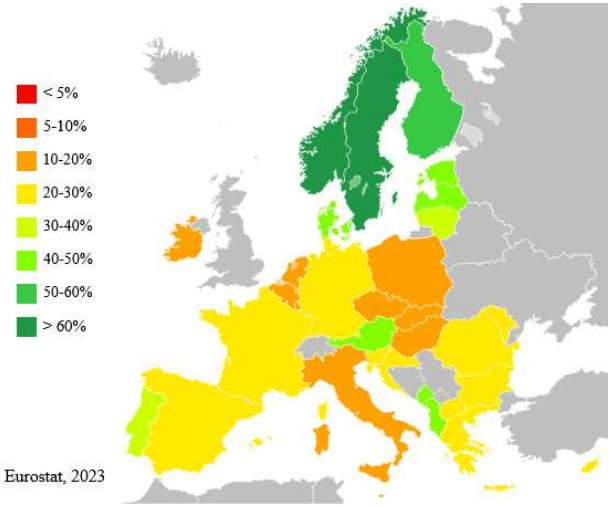
New energy sources



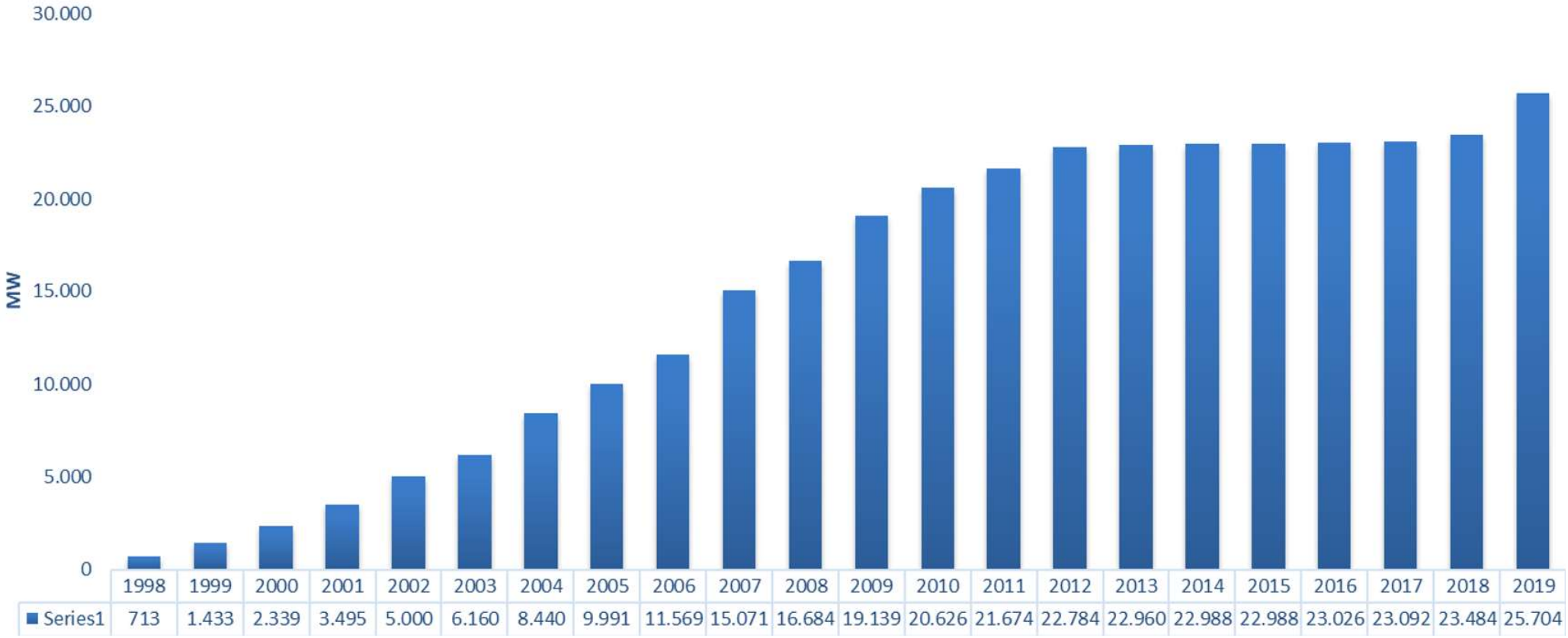
RURAL LANDSCAPES

New energy sources





Potencia eólica instalada (MW) en España



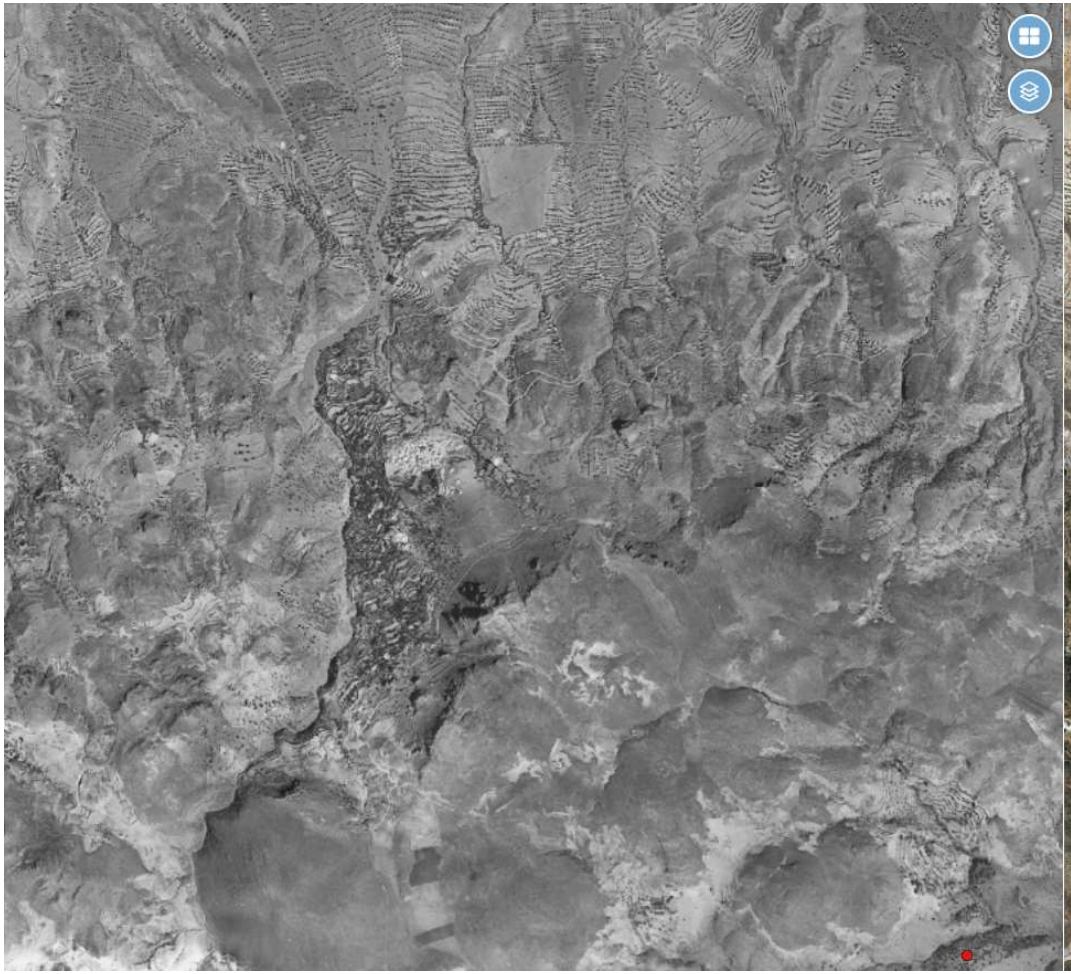
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Series1	713	1.433	2.339	3.495	5.000	6.160	8.440	9.991	11.569	15.071	16.684	19.139	20.626	21.674	22.784	22.960	22.988	22.988	23.026	23.092	23.484	25.704

RURAL LANDSCAPES

Wind Farm La Noguera

Turrillas, Málaga

AMERICAN FLIGHT
1956



PNOA
2022

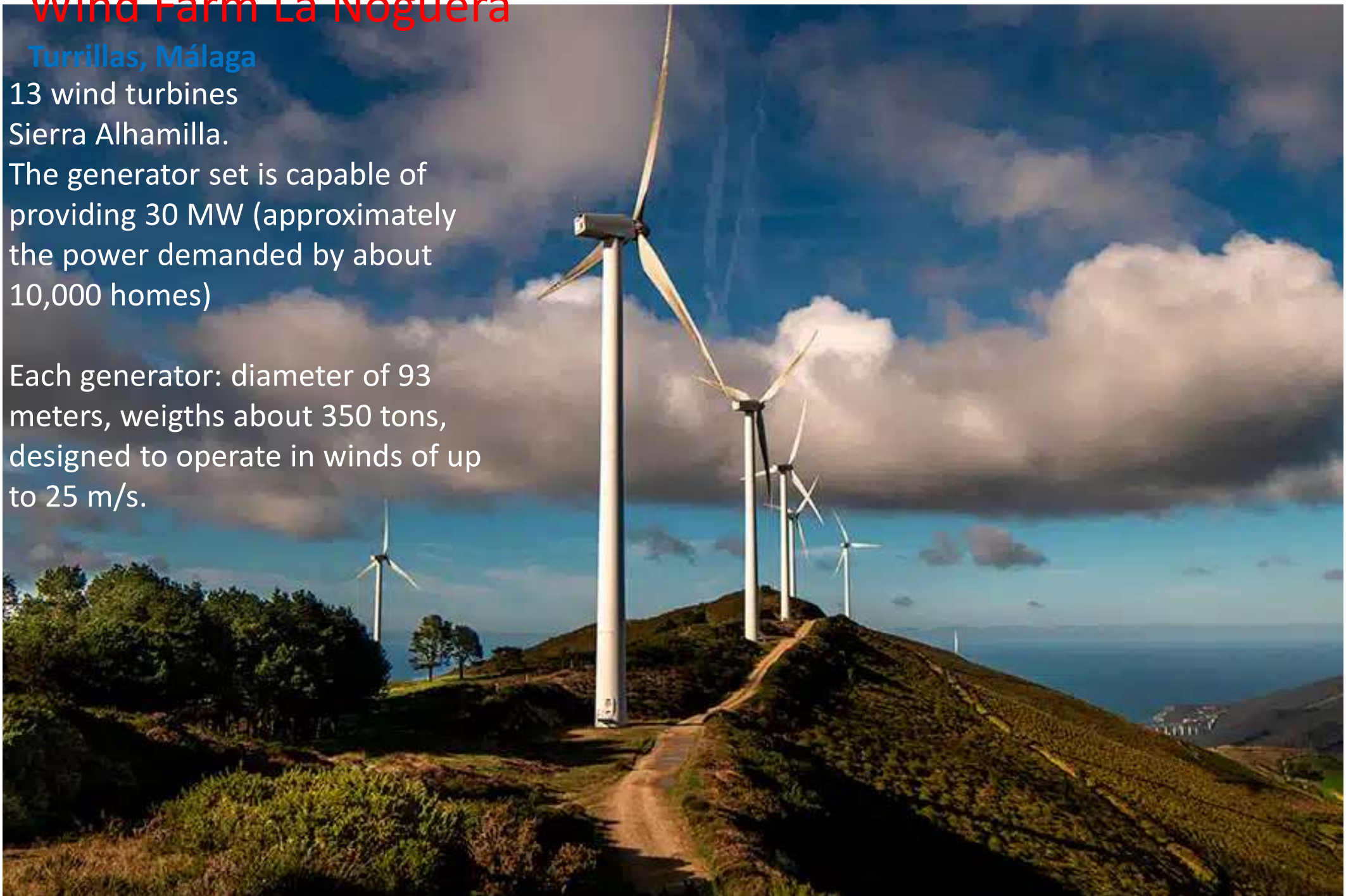
RURAL LANDSCAPES

Wind Farm La Noguera

Turrillas, Málaga

13 wind turbines
Sierra Alhamilla.
The generator set is capable of providing 30 MW (approximately the power demanded by about 10,000 homes)

Each generator: diameter of 93 meters, weigths about 350 tons, designed to operate in winds of up to 25 m/s.



❑ ADVANTAGES

- Renewable and clean energy.
- Uses areas not suitable for livestock or agriculture.
- Cheap: the costs basically come down to the development of wind farms and the processes that go into it. In addition, maintenance is practically zero.
- Safe: does not produce toxic waste (nuclear plants).

❑ DISADVANTAGES

- Dependence on the weather (wind): its supply can be discontinuous (high winds can cause damage and reduce production).
- Environmental impact: animal as bats and birds use to hit and die; moreover, visually alters the natural landscapes.
- Although it is a cheap energy, building a wind farm is expensive.