

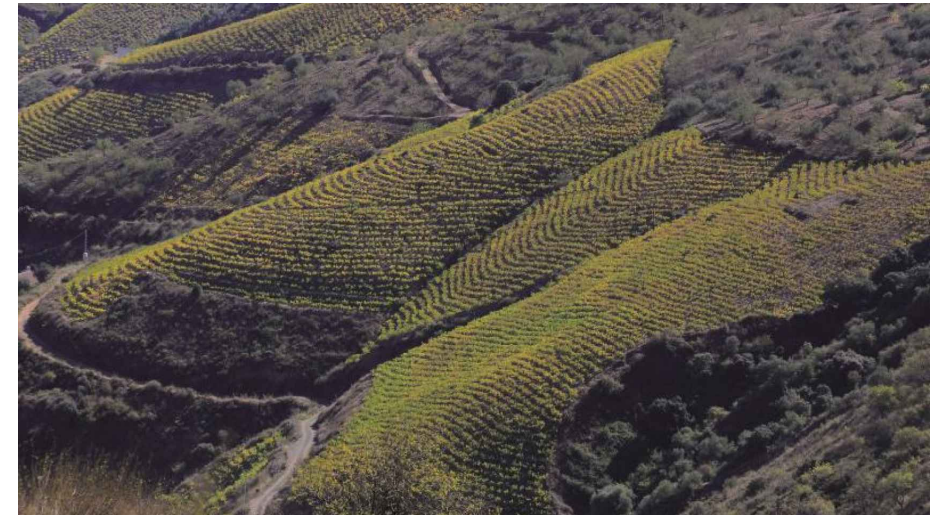


Axarquía (ES) Living Lab

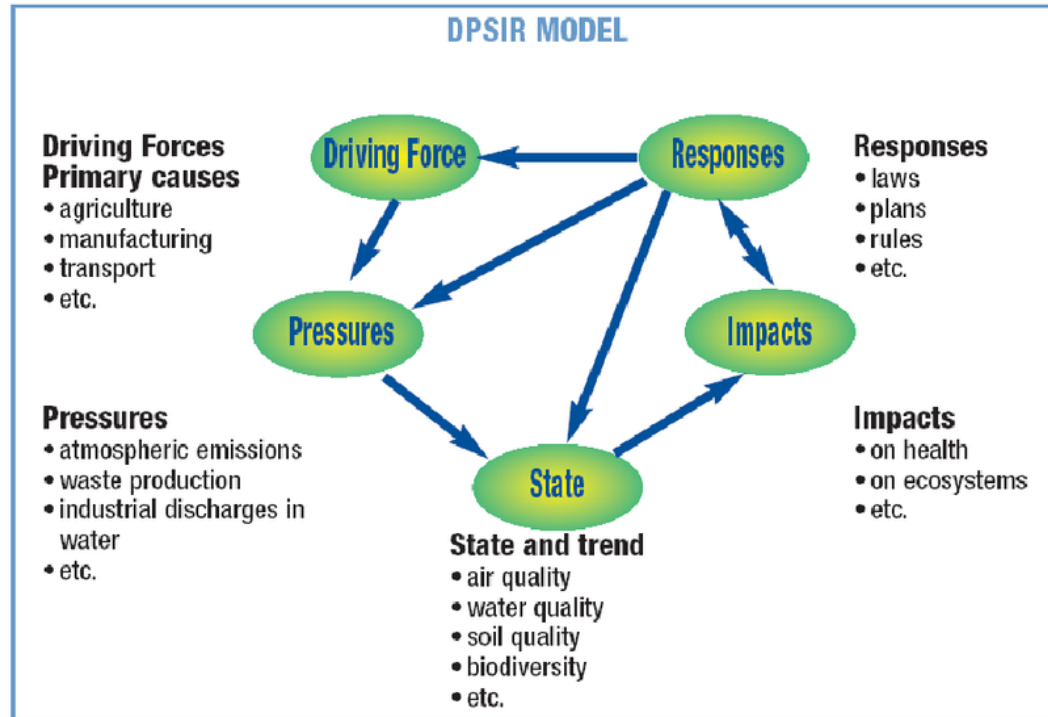
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Axarquía



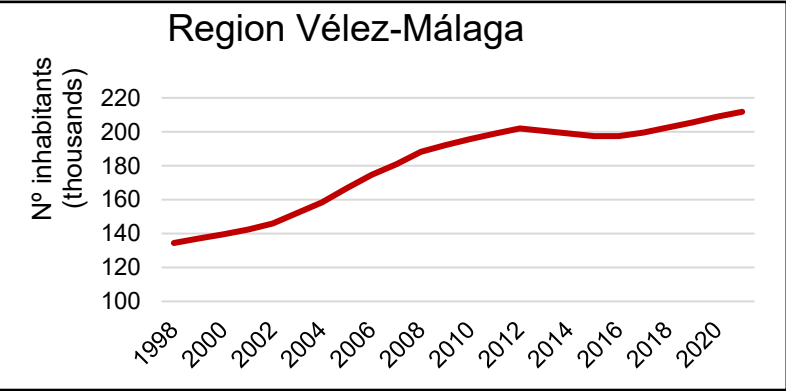
DPSIR Framework and WFD



- **DPSIR** (drivers, pressures, state, impact, and response model of intervention) is a causal framework used to describe the interactions between society and the environment
- The Driver-Pressure-State-Impact-Response framework was developed by the **European Environment Agency (EEA)** in 1999.
- It is recommended DPSIR framework for Art 5 '**Analysis of economic uses of water**' (D,P,S) and '**scenarios for PoM**' and the design of '**cost effectiveness analyses**' of measures (responses)

Drivers

Population



Evolution of the population of the region Velez-Malaga (INE)

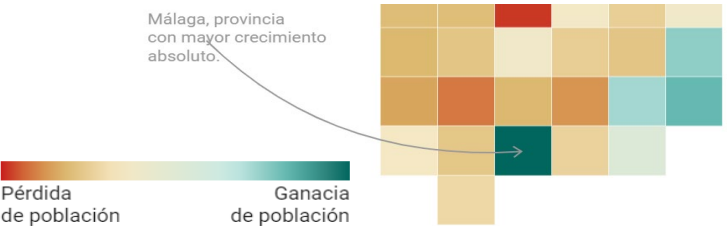
SUR

NURIA TRIGUERO / ENCARNI HINOJOSA
MÁLAGA
Jueves, 21 abril 2022, 12:54

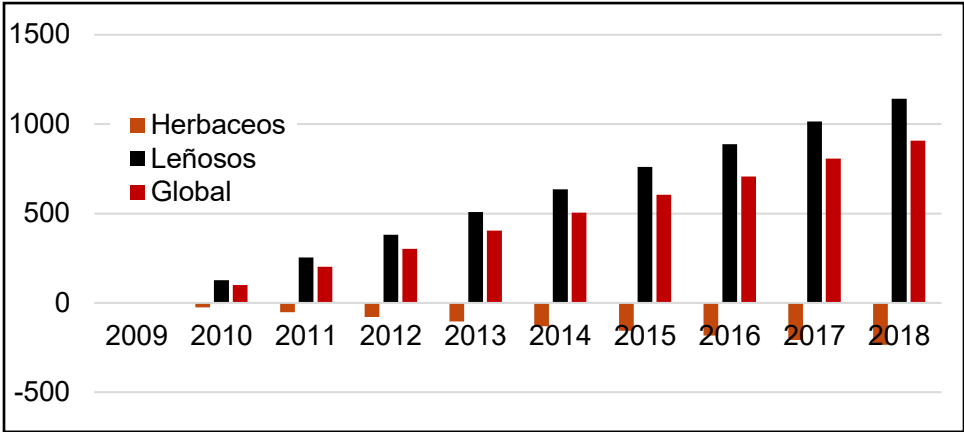
Málaga encabeza el crecimiento de población en España por segundo año consecutivo

La provincia suma 20.652 habitantes en 2021 y rebasa por primera vez la cota de los 1.700.000

Málaga, provincia con mayor crecimiento absoluto.



Agrarian



Evolution of arable/woody areas INE (ha).

SUR

Jueves, 13 enero 2022

La falta de rentabilidad es cada vez más acuciante en el campo malagueño

Aunque hay varios sectores agrarios que facturan más que otras campañas, el elevado aumento de algunos costes hace que el balance sea en muchos casos negativo



Pressures (1/2)

Urban

Water

Axarquía per capita: 322 L/h·d

Spain average: 160 L/h·d

SUR



EUGENIO CABEZAS

Lunes, 27 septiembre 2021, 14:21

Vélez-Málaga aprueba la revisión de su PGOU, con 10.000 nuevas viviendas

El Ayuntamiento asegura que el nuevo texto «obedece a un modelo de ciudad que crece hacia el norte, es más habitable y sostenible, favorece el turismo, ofrece seguridad jurídica a los inversores y considera clave la participación ciudadana»



Agrarian

Irrigated (ha)	1999	2009	2020
Avocado / Mango	4.161	5.315	9.498
Citrus	460	460	438
Almonds / Nuts	26	26	34
Olive*	52	441	747
Vineyard*	0	0	3
Other trees	2	59	212
Various non-tree	572	572	2.400
Irrigated area	5.273	6.873	13.332

Land value (per ha)

Rainfed		Irrigated	
Pastures	5.206	Herbaceous	28.245
Herbaceous	10.705	Citrus	42.842
Olive	27.065	Subtropicals	109.607

Land prices (EUR/ha) 2021. Junta de Andalucía.

Pressures (2/2)

Water Hydrological Plan

Resources (hm ³)	Surface.	GW.	Reuse.	Desaliniz. / Transfer	Total
1998 ⁽¹⁾	25	57	0	0	82
2015 ⁽²⁾	45	39	0	0	85
Today ⁽²⁾	47 ^(*)	45	19	0	93
2030 ⁽²⁾	50	39	20	25	102
Demand (hm ³)	Urban ⁽³⁾	Agrarian ⁽⁴⁾	Others	Total	Deficit
1998	19	73	-	92	-10
2015	24	76	1	101	-16
Today	24	78	1	103	-11

(1) P.H. Cuencas Sur; (2) PH Cuencas Mediterráneas Andaluzas, and own;

(3) Urban includes industrial use; (4) Water rights

(*) Average

Water Use (estimated)

Water demand vs.methodology	(hm ³)
Hydrological plan (water rights)	78
Standard dose (farmers' typical)	94
Irrigation needs –FAO- (maxim. yield)	111

(*) Own estimation

Water 'Gap'=-27

Long term alternatives:

- Deficit irrigation
- Overpumping

State

Soil



Water

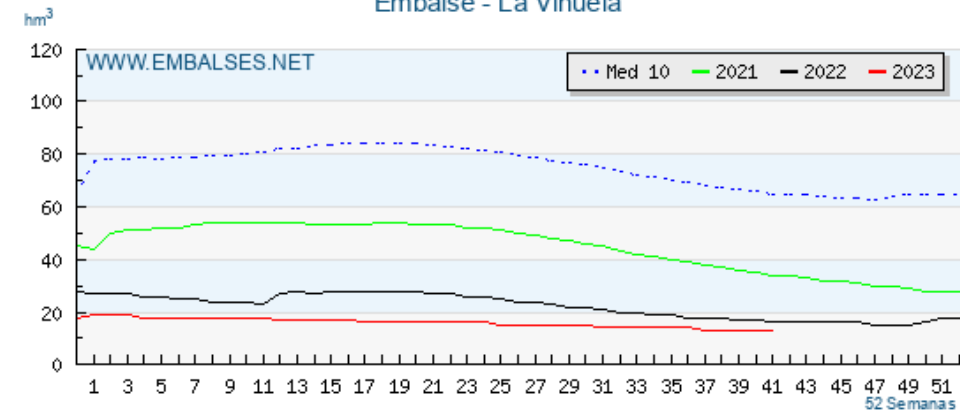
EL PAÍS

El milagro económico que seca el pantano de La Viñuela

Mientras el embalse del que bebe la Axarquía malagueña se muere, una investigación del Seprona ha destapado el uso masivo e irregular de agua en los cultivos tropicales de aguacate y mango

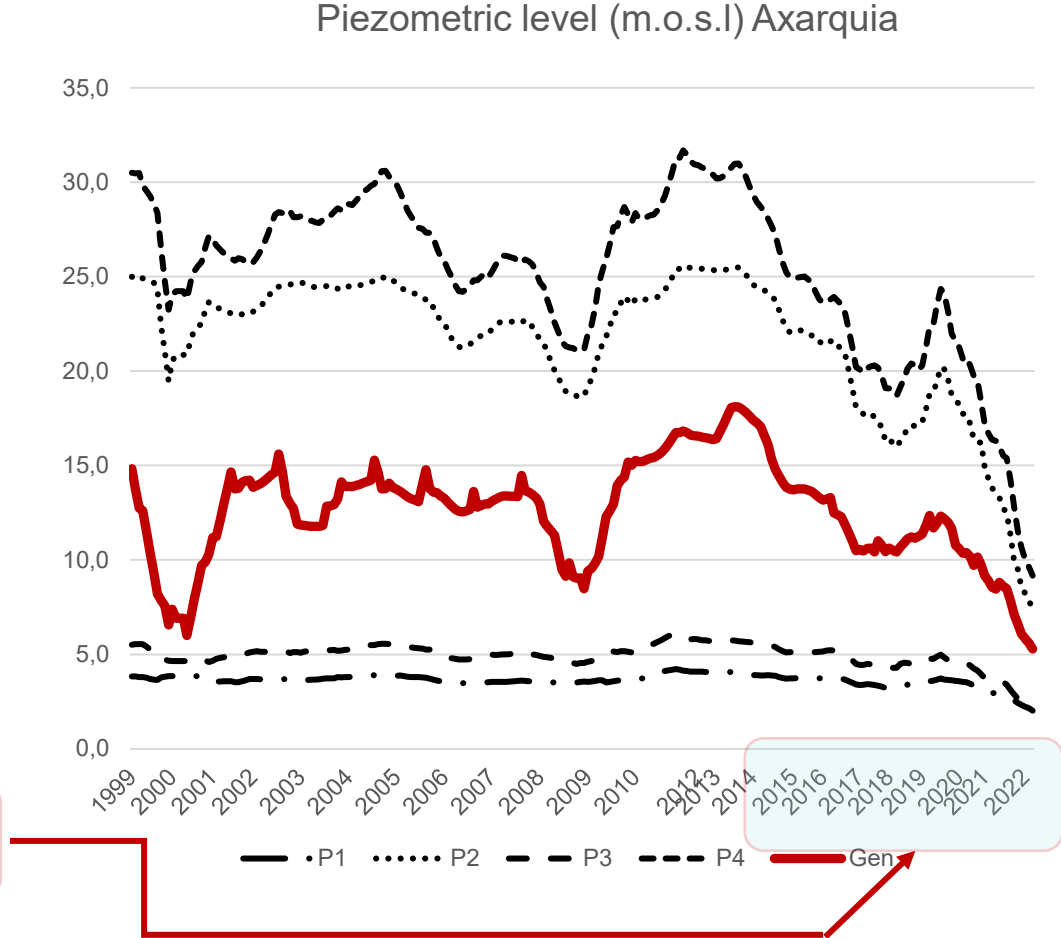
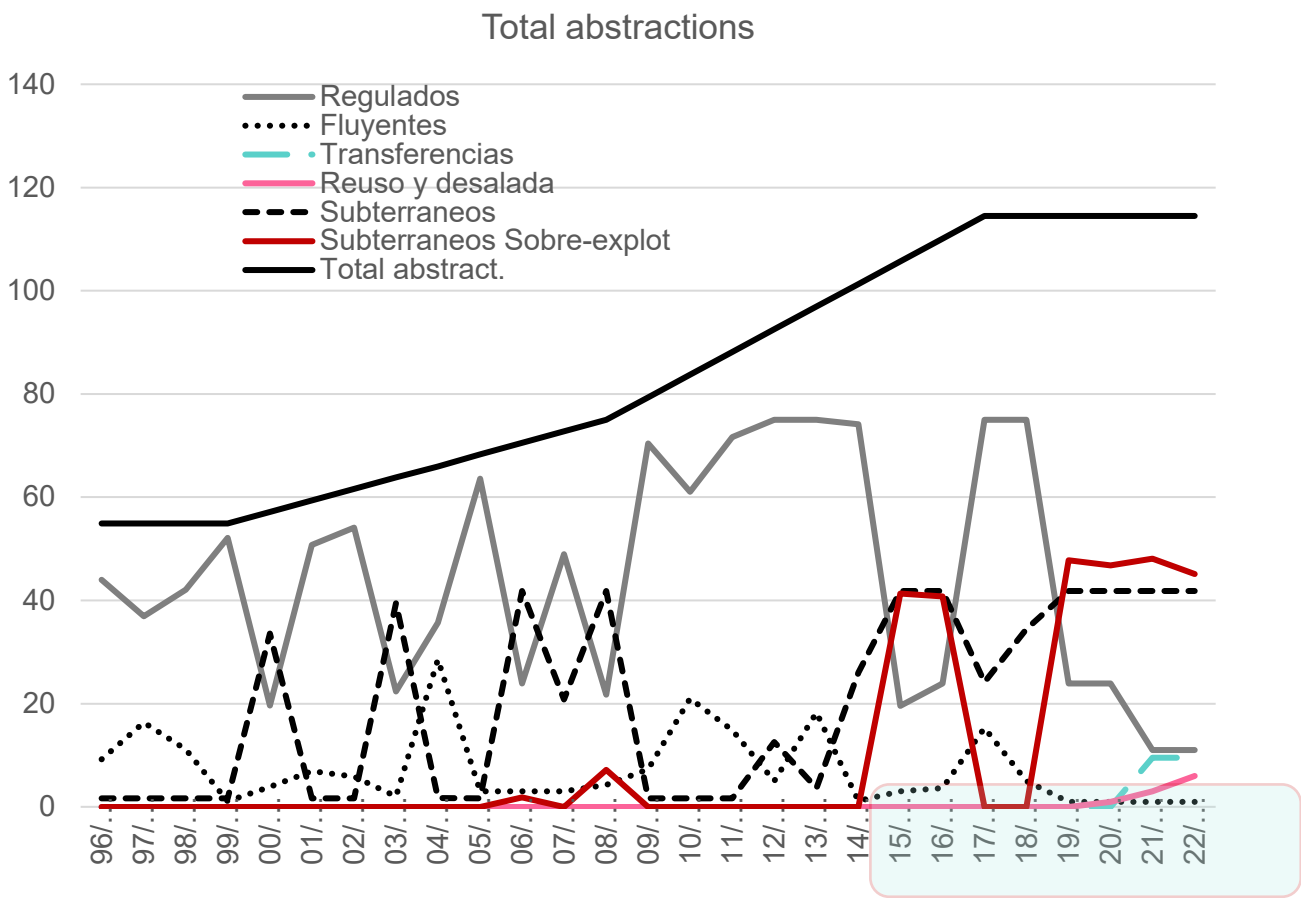


Embalse - La Viñuela



Currently, some municipalities such as Comares need around 250,000 litres of water are poured daily into the town's reservoirs, which arrive from Benamargosa in tanker trucks.

Impact: Groundwater overabstractions



Own estimation, based on 'standard water use' and estimated crop area (2022)

Est. Overabstraction = Piezometric impact (measured)

Responses

Demand reduction

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Abril 2022.

La Junta insta a 14 municipios de la Axarquía a reducir su «excesivo» consumo de agua

El delegado de Agricultura advierte a la empresa pública Axarquía que ya llevan gastado el 70% de lo asignado del embalse de La Viñuela hasta el 30 de septiembre



SUR



EUGENIO CABEZAS
Jueves, 23 junio 2022,

«He arrancado 600 aguacates porque no tengo agua para regarlos», Francisco Ruiz, agricultor de Vélez-Málaga

Este vecino opta por sacrificar dos hectáreas de su finca de nueve



Supply augmentation

AGRICULTURA

La Junta invierte 26 millones de euros para que los agricultores de la Axarquía dispongan de 19 hm³ de aguas regeneradas

El decreto de sequía aprobado en 2021 incluye mejoras en la EDAR Peñón del Cuervo, su conexión con la depuradora de Rincón de la Victoria y las conducciones con las infraestructuras de riego.

SUR



26

La Axarquía empieza a usar agua reciclada para regar los cultivos de subtropicales

Las comunidades del sur del Guaro, que suman 2.500 agricultores y 2.700 hectáreas, ya disponen de entre cuatro y seis hectómetros cúbicos procedentes de la depuradora de Vélez-Málaga



La Junta transfiere agua desde la Costa del Sol Occidental a la Axarquía para garantizar el abastecimiento de la población

MEDIO AMBIENTE

La Junta inicia los trámites para una desaladora en Vélez-Málaga

La empresa Acciona solicita la concesión de 25 hectómetros cúbicos para consumo y riego

La Opinión

Vélez Málaga | 08-08-22 | 21:14

SEQUÍA

Vélez-Málaga reivindica ante la Junta la urgencia de la desaladora

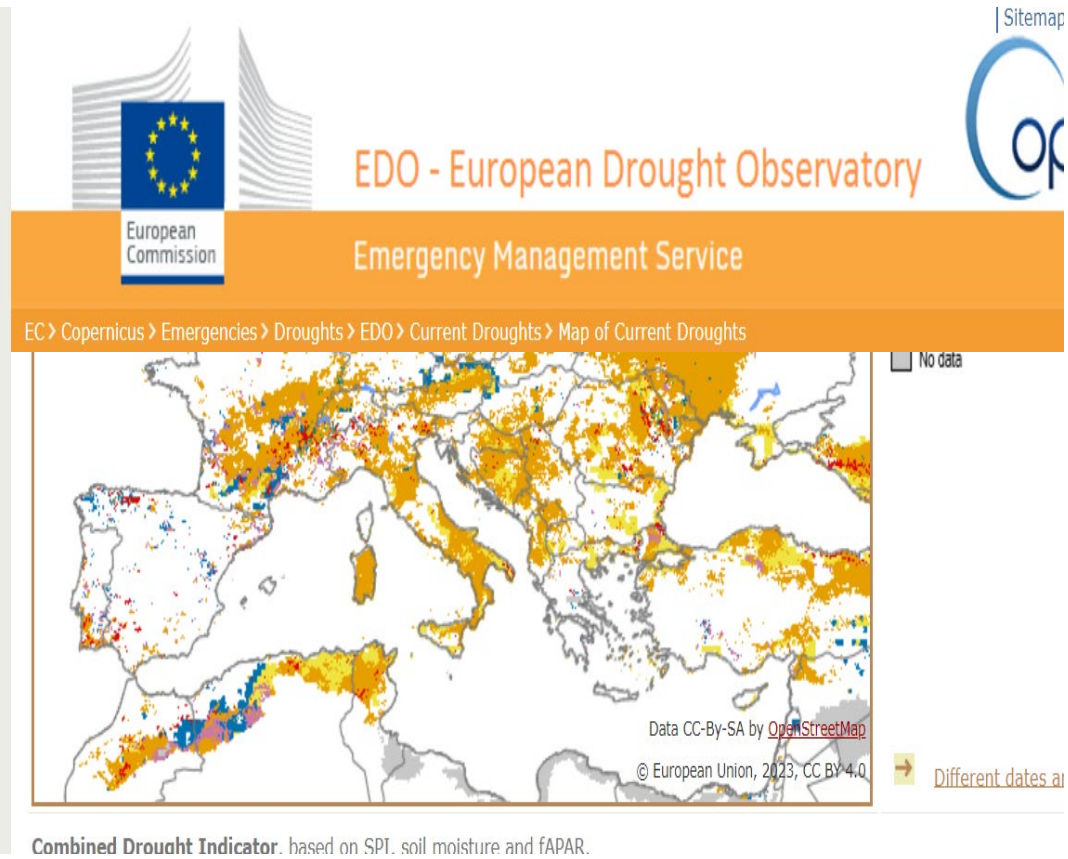
Pide que sea declarada de utilidad pública ante la sequía extrema para garantizar el consumo y el riego - El proyecto asciende a 645 millones de euros



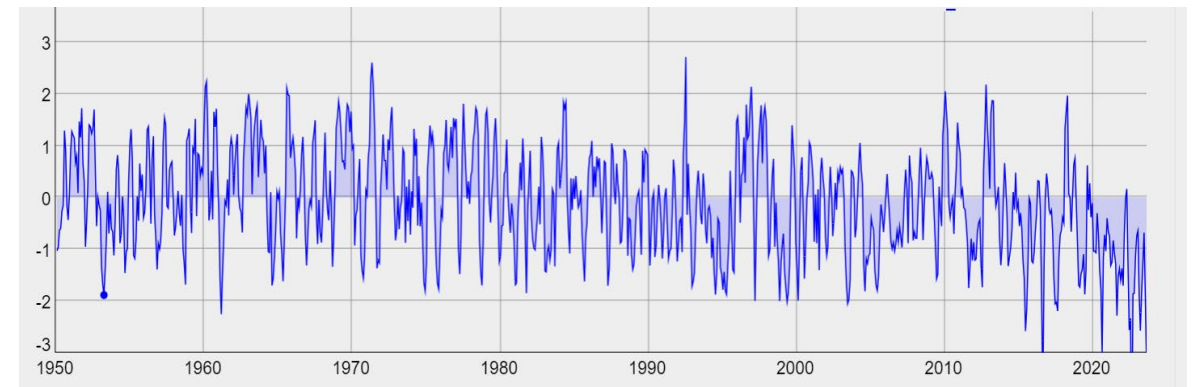
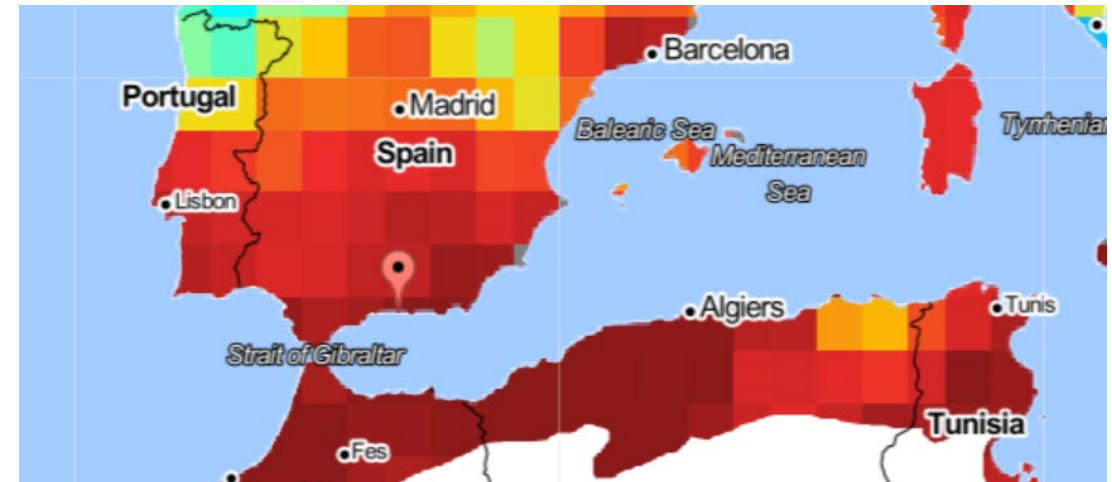
**From global to local.
Two comments**

1) Current EU “drought indicator” is NOT WORKING

EU SPI

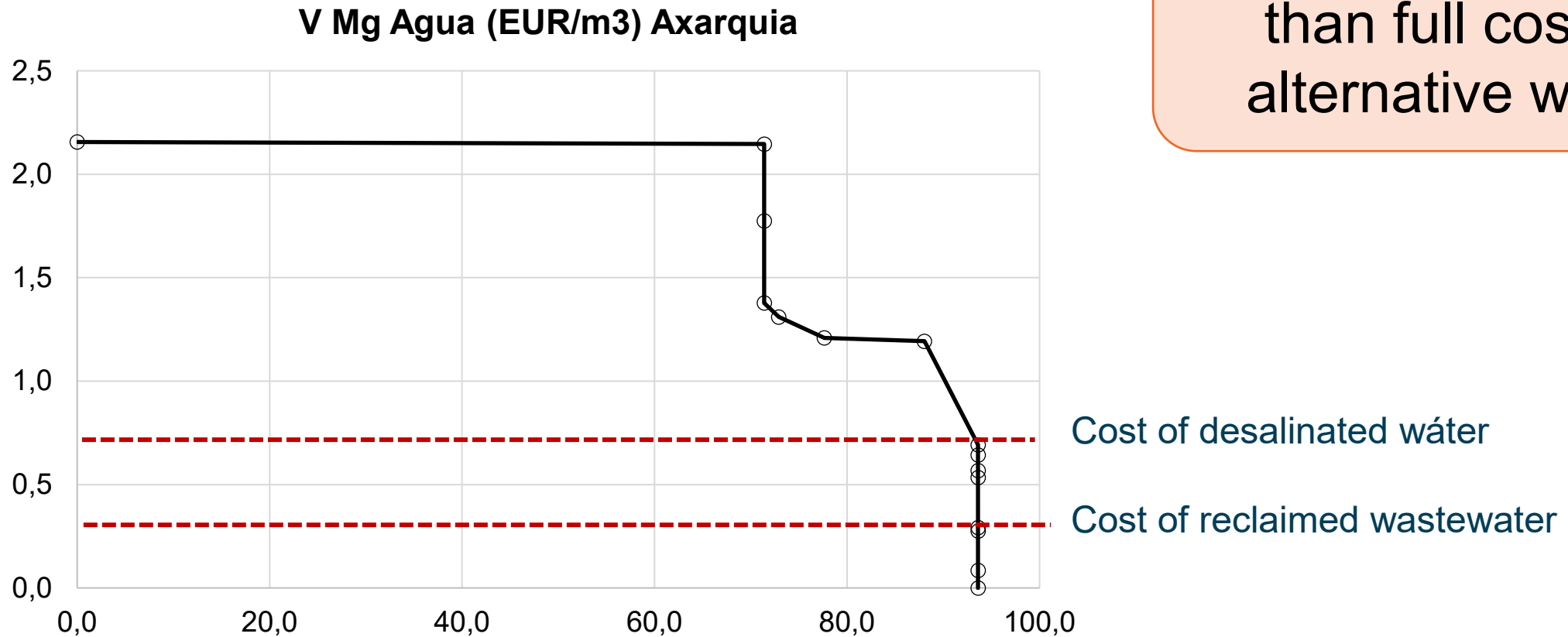


SPEI



2) Water pricing will not work

Water value is higher than full cost of alternative water





GOVAQUA reserach questions and living lab

GOVAQUA research agenda in Axarquia Living Lab

- **How to implement cost recovery of reused water?**
- **How to guarantee wastewater quality?**
- **How to manage water allocation?**
- **How to improve GW abstraction monitoring**
- **How to control the pressures to expand irrigated area and water abstractions?**
- **How to integrate desalination plant in the system?**
- **How to match reused and sealination water production (all year round) with water use (seasonal)?**

GOVAQUA research agenda in Axarquia Living Lab

1. Cost Recovery for Reused Water

- Implement pricing mechanisms that reflect the actual cost of treating and distributing reused water.
- Consider user fees, tariffs, or subsidies to encourage responsible water use and fund water reuse infrastructure.

2. Guaranteeing Wastewater Quality

- Invest in advanced wastewater treatment technologies to ensure high-quality treated water.
- Implement stringent regulations and monitoring programs to enforce wastewater quality standards.
- Invest and engage local industries and the public to reduce contaminants in wastewater at the source.

3. Managing Water Allocation

- Develop a comprehensive water allocation plan that considers the needs of various stakeholders, including agriculture, industry, and domestic users.
- Use a combination of legal, regulatory, and market-based mechanisms to allocate water rights and encourage efficient use.
- Include 'water supply guarantee' as a relevant management characteristic.

GOVAQUA research agenda in Axarquia Living Lab

4. Improving Groundwater Abstraction Monitoring

- Monitoring technologies such as remote sensing, IoT sensors, and satellite imagery to track groundwater levels and quality.
- Establish a robust groundwater monitoring network and regularly update data.

5. Controlling Pressures to Expand Irrigated Areas and Water Abstractions:

- Empower current users to restrict the expansion of irrigated areas.
- Monitor and enforce regulations to prevent over-extraction of water resources.

6. Integrating Desalination Plants into the System:

- Integrate desalinated water into the overall water supply system, ensuring it complements other sources (Israeli model, desalinated water for urban users and urban wastewater as second use)

GOVAQUA research agenda in Axarquia Living Lab

7. Matching Reused and Desalination Water Production with Water Use:

- Develop a dynamic water management plan that can adapt to seasonal fluctuations in water demand.
- Use reservoir and GW recharge to store surplus water.
- Ensuring cost recovery for the 'banked water'

8. Promoting Water Efficiency and Conservation

- Encourage water-efficient technologies and practices in agriculture, industry, and households.

9. Collaboration and Stakeholder Engagement

- Engage with all relevant stakeholders in the planning and implementation of water management strategies.
- Foster cooperation among neighbouring regions or countries sharing water resources.

Axarquía (ES): A Case Study of Water Crisis Caused by Scarcity, Drought, High Demand and example of Innovative Governance Solution.

[Additional info www.govaqua.fi](http://www.govaqua.fi)

Thank you for your attention



Co-funded by
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