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Recent developments on drought management planning in Europe and Spain

Recenti sviluppi dei piani di gestione della siccità in Europa e in Spagna

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by invitation of UniAcque SERVIZIO IDRICO INTEGRATO

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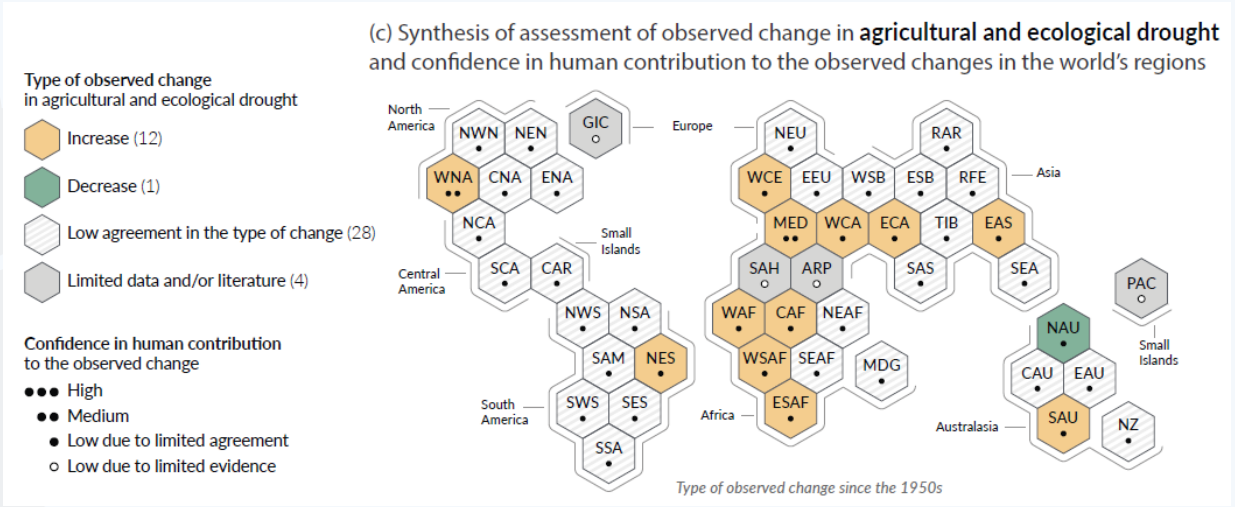
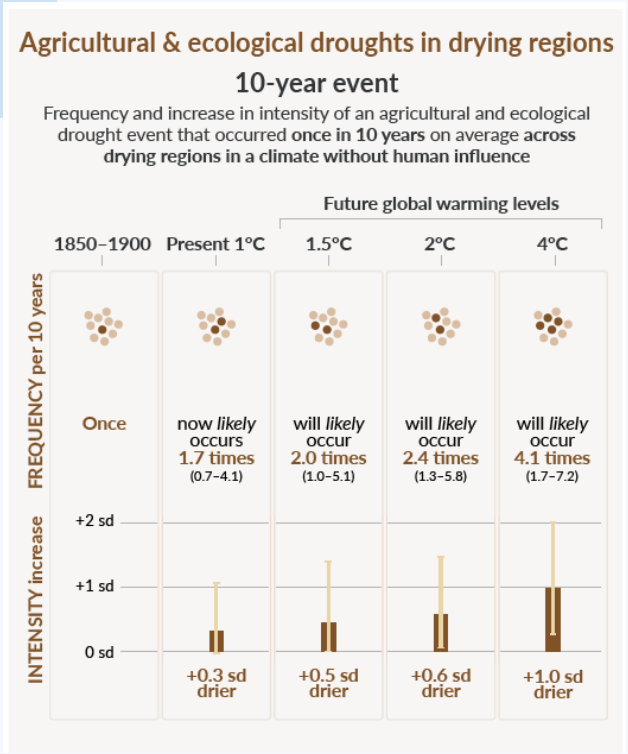
IPCC perspectives for the Mediterranean and Western - Central Europe

- Both **Mediterranean and Western and Central Europe** are characterized as **prone to drying** because of observed increase in agricultural and ecological drought (abnormal soil moisture deficit).
- Unprecedented **worsening** can be expected. Changes in the **intensity** (median up to equal standard deviation in warmer scenario) and **frequency** (up to 4 times) of meteorological droughts.

ipcc The Intergovernmental Panel on Climate Change

WORKING GROUP I	The physical science basis
WORKING GROUP II	Impacts, adaptation and vulnerability
WORKING GROUP III	Mitigation of climate change





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Spanish Drought Management System

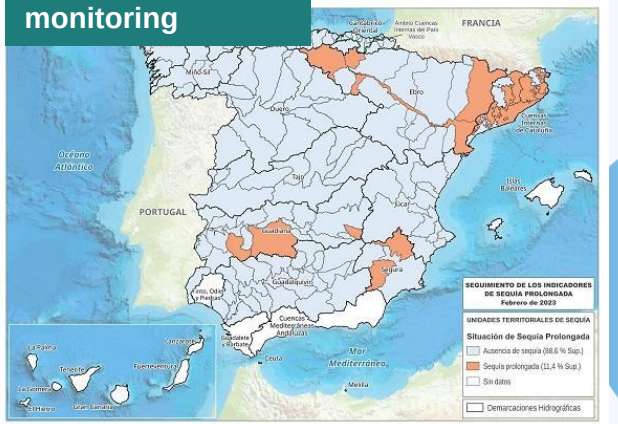
The Law 10/2001 of 5 July 2001 on the National Hydrological Plan: introduced obligations on public agents regarding the development of drought management tools:

- **Special Drought plans** (*Planes Especiales de Sequía*, DMPs) with the rules for the operation of the hydraulic systems and the measures to be applied in relation to the use of the public water domain.
- Public administrations responsible for urban supply systems attending a population equal to or above 20,000 inhabitants must have an **Emergency Plan** for drought situations.
- Global **system of hydrological indicators** to serve for the formal declaration of drought situations.

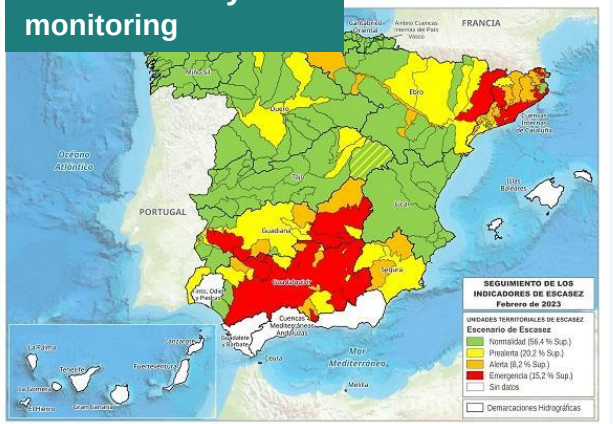
Reports summarizing the situation at the national level are published monthly including the values of the standardized indicators defined in DMPs.

https://www.miteco.gob.es/es/agua/temas/observatorio-nacional-de-la-sequia/informes-mapas-seguimiento/

Drought monitoring



Water scarcity monitoring



IMPORTANT NOTE: Structural water scarcity (permanent water imbalance) must be tackled by the Programme of Measures of the River Basin Management Plans. The DMP consists of management measures, never structural interventions (civil works).

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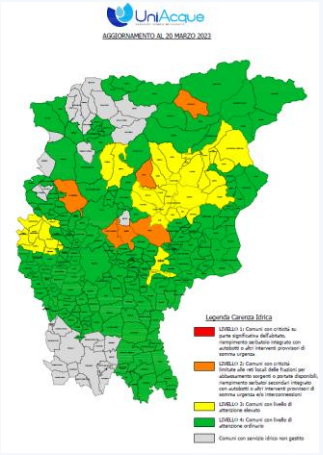
Spanish Drought Management Plans

- Third generation of intercommunity basins DMPs published for public consultation from 31st March 2023:
  https://www.miteco.gob.es/es/agua/temas/observatorio-nacional-de-la-sequia/planificacion-gestion-sequias/

- Based on a clear distinction of indicators and measures for.
  - **Temporary water scarcity**: non-continuous shortage that temporarily but significantly constrains water supply
  - **Prolonged drought**: drought caused by exceptional circumstances or circumstances that could not have been reasonably foreseen.

Temporary water scarcity				
Phenomenon	Reduction of available water resources that endangers the meeting of water demands for socio-economic uses and the environment.			
Effects	Variety of socio-economic and environmental impacts, due to limitations in the availability of water: sectoral financial losses, higher food and energy prices, effects on human health and welfare, in the aquatic and terrestrial ecosystems.			
Variables	Volumes of water stored, inlets to reservoirs, discharge at gauging stations, snowpack, groundwater table.			
Objectives of the DMP	Progressive establishment of measures to avoid or delay the most severe phases of water scarcity. Mitigation of negative consequences on socio-economic uses and the environment.			
Standard Index	**1.00 - 0.50**	**0.50 - 0.30**	**0.30 - 0.15**	**0.15 - 0.00**
Scenarios	**Normality**	**Pre-alert (moderate scarcity)**	**Alert (severe scarcity)**	**Emergency (critical scarcity)**
Actions and measures	Planning. Control. Monitoring.		Water saving measures. Increased surveillance. Operating rules. Management of strategic resources. Restrictions.	

Prolonged drought		
Phenomenon	Decrease in precipitation that significantly reduces soil moisture and water inputs (regardless of water demand and water management).	
Effects	Potentially, significant decrease in runoff and impairment of water quality.	
Variables	Cumulative rainfall and water inflows (if close-to-natural regime).	
Objectives of the DMP	Establishing the natural conditions for an eventual deterioration of water status resulting from low flows due to drought.	
Standard Index	1.00 - 0.30	0.30 - 0.00
Scenarios	**No prolonged drought**	**Prolonged drought**
Actions and measures	Control and monitoring.	Possible eligibility for exemption from meeting WFD environmental objectives (if properly justified). Possible application of less-stringent ecological flow regime.



https://www.uniacque.bg.it/lazienda/comunicazione/eventi/Emergenza-idrica-2023/

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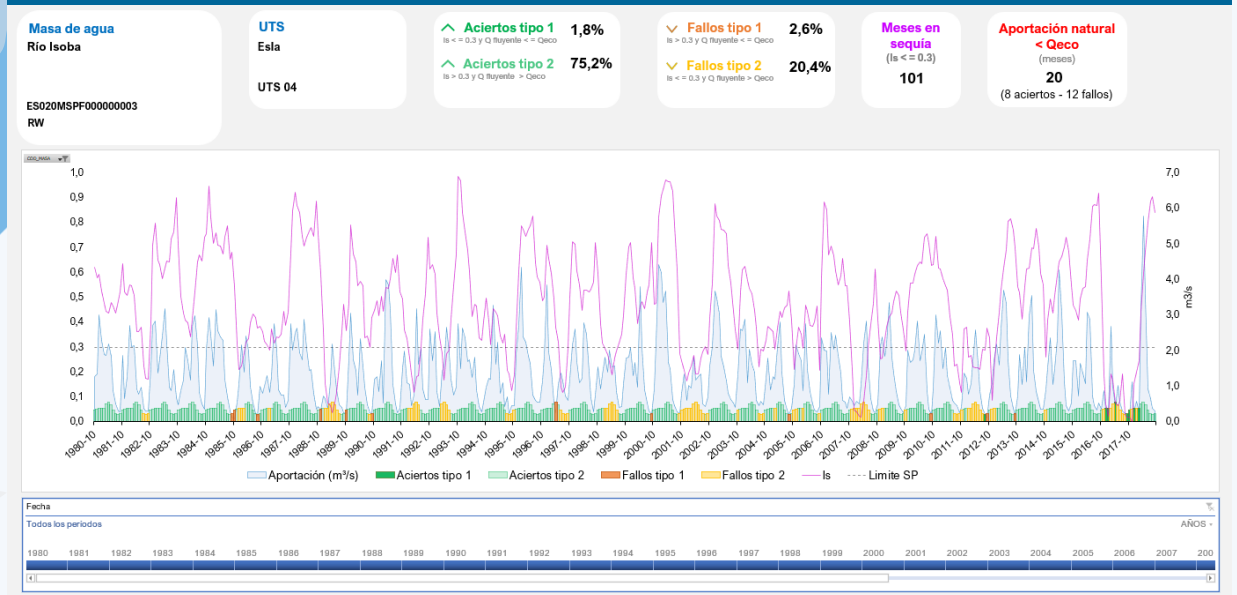
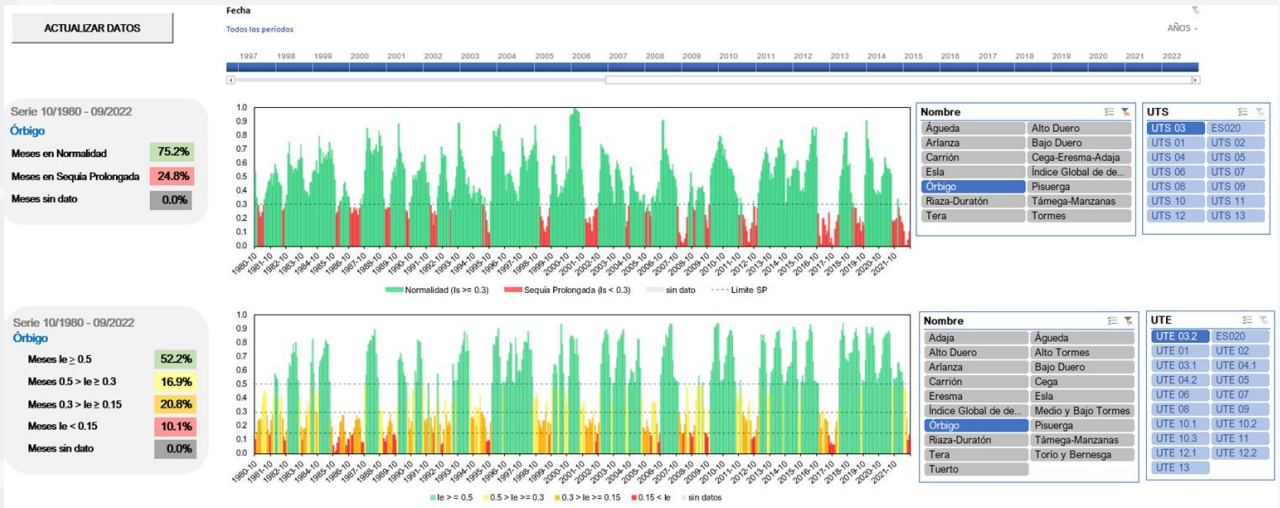
Spanish Drought Management Plans: Mandatory contents





Mandatory contents of a DMP

- Description of the River Basin District.
- Territorial units for the analysis of prolonged drought and water scarcity.
- Water needs and sources per unit.
- Record of historical droughts.
- Consideration of climate change.
- System of indicators of prolonged drought and short-term shortages.
- Diagnostic procedure.
- Actions to be applied in scenarios of prolonged drought.
- Measures to be applied in scenarios of temporary water scarcity.
- Administrative organisation and public information measures.
- Criteria for impact assessment and post-drought reports.
- Strategic environmental assessment.
- Emergency plans for water supplies above 20,000 inhabitants.
- Monitoring and review of the DMP.

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Emergency Plans in urban supply systems

Guidance documents produced in recent years:

Methodological guide for the participatory preparation of drought risk management plans in small and medium-sized towns (FNCA, 2018)

Guide for the preparation of emergency plans for drought situations in urban supply systems (AEAS, 2019).

It is complemented by a free water resources management software tool (GESPLEM).

Tentative Index for Emergency Plan

a) Regulatory and institutional framework.

b) Set of elements and infrastructures.

c) Available resources (normality, support and emergency).

d) Demands, classified and quantified in groups by activity, use, seasonality).

e) Operating rules and areas of supply of the system.

f) Short-term shortage scenarios.

g) Areas and circumstances of greater risk.

h) Measures to deal with the risks.

i) Analysis of the coherence of the emergency plan with the DMP.

j) Economic studies on costs and ways of financing the measures.

k) Evaluation, monitoring, adaptation and dissemination *including formulas to encourage public participation*.

Some examples

Barcelona

Aquavall. Ayuntamiento de Valladolid

Consorcio de Aguas Bilbao / Bizkaia

Mancomunidad de la Comarca de Pamplona

Aguas de Cádiz

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Impacts of drought in urban supply systems

- **Primary impact**: changes in the amount –due to reduced availability–, quality (deterioration of source water, and origin of water supplies (regulated or flowing surface water, groundwater, regenerated, desalinated).
- Impact on **domestic, industrial, commercial, and institutional users**: restrictions (scheduled cut-offs, banning on irrigation or pool refilling), loss of well-being (scenic, recreational or amenity values of urban water bodies), loss of water quality (leading to expenditure on bottled water), increase in water tariffs, costs for connected industries and businesses.
- Impact on **water supply operators**:
  - **increase in costs**: higher costs of alternative water resources, deterioration of source water quality leading to higher treatment and distribution costs; investment in emergency infrastructure.
  - **decrease in revenues** due to a drop in the volume invoiced.

Status	Measure	Supply-side costs			Demand-side costs		
		Infrastructure amortization	Operation and maintenance	Other (administrative, environmental)	Revenues	Variables (energy, reactants)	Other (communication, planning, regulations)
Normality	Measure 1						
	Measure 2						
	...						
Pre-alert	Measure n						
	Measure n+1						
	...						
Alert	Measure m						
	Measure m+1						
	...						
Emergency	Measure p						
	Measure p+1						
	...						
Total							

Source: AEAS 2019

Proposed impact financial coverage

Set up a drought provision by regular tariffs, to cover extraordinary expenses and losses, considering the statistical probability of occurrence. Thus, the need for external financing, as well as overcharging the users in the critical phase.

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Final remarks

- Ognuno degli ultimi quattro decenni è stato successivamente più caldo di qualsiasi altro decennio precedente dal 1850. Preoccupazione in Europa, e in particolare nella regione del Mediterraneo, per gli attuali rischi di siccità e per la **previsione di un peggioramento della siccità** in futuro.
- Il modello spagnolo ruota attorno ai **Piani speciali di siccità del distretto idrografico**. Essi stabiliscono sistemi di soglie e indicatori (siccità e scarsità congiunturale) per ogni unità di gestione territoriale. Le soglie di aggravamento attivano un pacchetto di misure di gestione prestabilito. Gli operatori dei servizi del ciclo idrico urbano che servono una popolazione di 20.000 abitanti o più devono redigere **piani di emergenza**, coordinato con il piano distrettuale.
- In Spagna, la **soluzione degli squilibri strutturali** –quindi la programmazione di **misure di investimento** per ridurre la domanda o aumentare la disponibilità– è uno degli obiettivi dei **Piano di gestione del bacino idrografico**. Correggere questi squilibri è essenziale per **ridurre la vulnerabilità alla siccità** e per avere un margine di manovra nel prossimo periodo di siccità.
- La siccità costringe i servizi idrici urbani a ridurre i volumi erogati e/o a modificare le fonti di approvvigionamento. Questi cambiamenti hanno **un'ampia gamma di impatti sugli operatori e sugli utenti**, alcuni dei quali sono monetizzabili e altri meno (perdita di benessere pubblico, valori paesaggistici e ricreativi degli ecosistemi acquatici)..
- Il piano di emergenza può aiutare a calcolare lo **stanziamento di fondi specifici** per coprire l'impatto economico della siccità, a seconda della valutazione delle misure da adottare e della probabilità di accadimento del fenomeno.

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Grazie mille per l'attenzione!

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