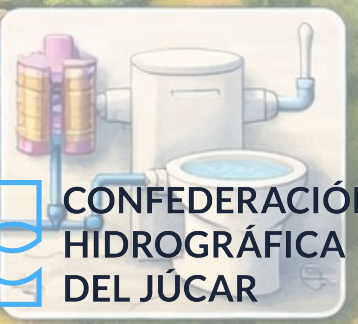
Mainstreaming of Non-Conventional Resources in Water Mix

Session 5 – Non-Conventional Resources

Circular water economy for basin resilience: diversifying the “water mix” with non-conventional resources



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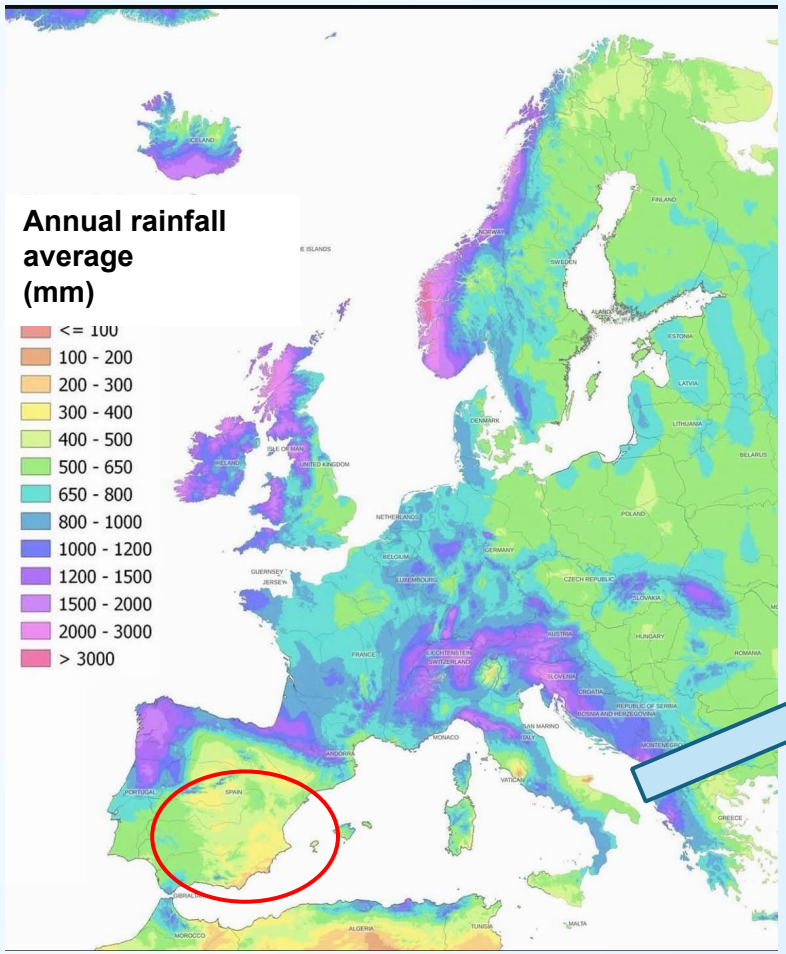
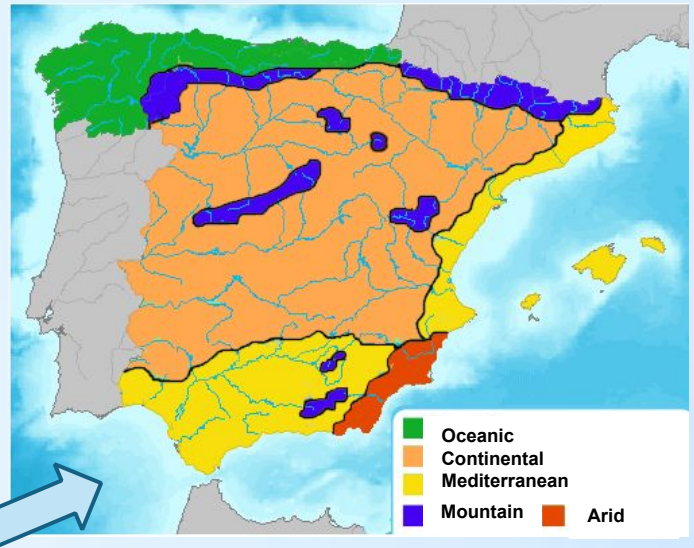
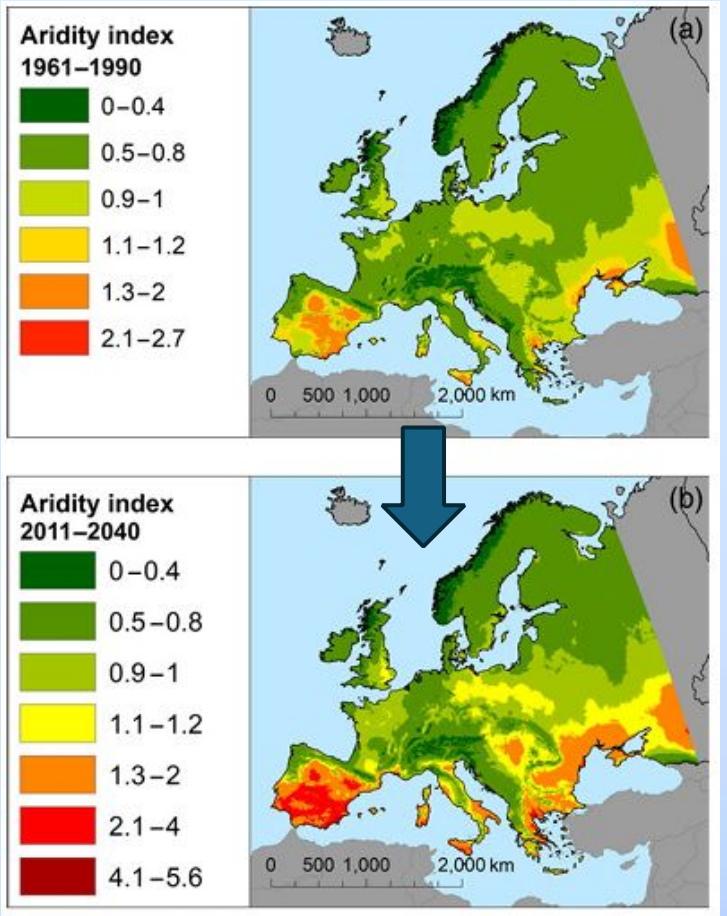
Water scarcity in Spain

In some Spanish regions the WEI+ is already very high, and climate change will worsen the situation.



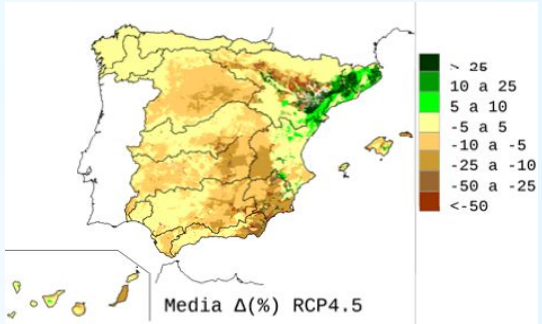


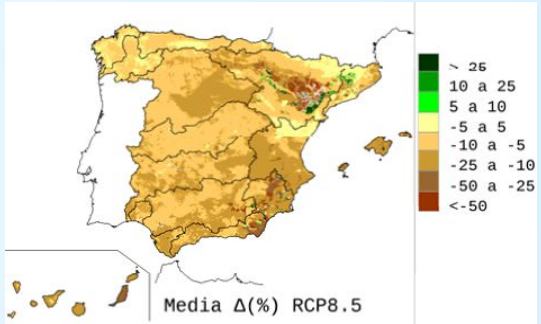


Impact of Climate Change on water resources

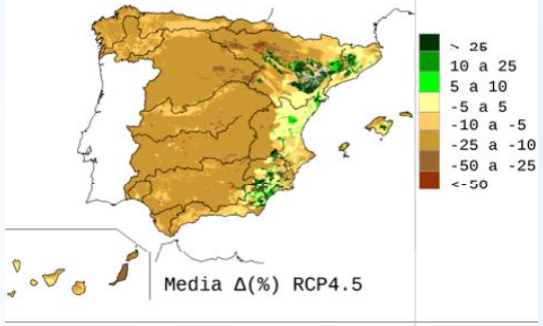
Average Run-off decrease

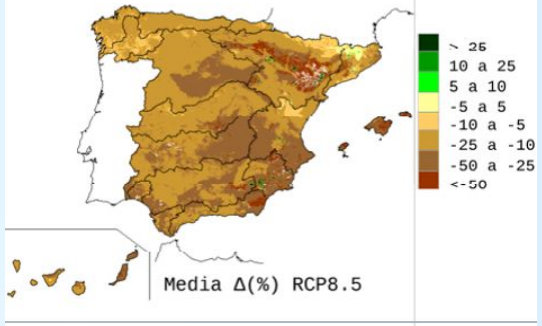
2010 - 2040



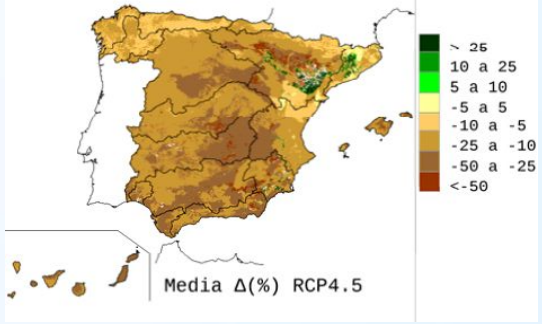


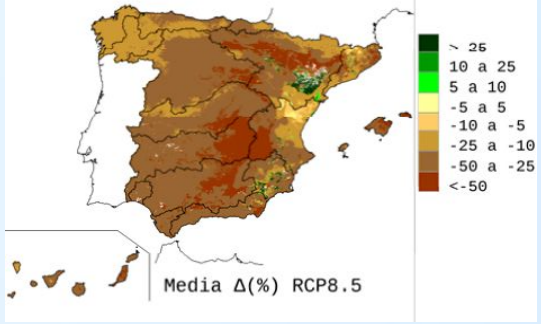
2040 - 2070





2070 - 2100

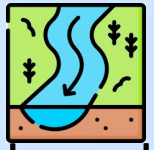




Decrease of rainfall

Increase of potential ET

15-40 % Decrease in Runoff



Increase in the frequency of droughts

Source: CEDEX (2017). Assessment of the Impact of Climate Change on Water Resources and Droughts in Spain.

NCR: Quick Outlook

Region	Total NCW (hm3/yr)	% of total	Desalination	Water Reuse
Global	≈ 100,000	1 %	95,000	5,000
South America	≈ 400	< 0,1%	250	150
Brazil	≈ 60	< 0,1%	0	60
EU	≈ 2,500	0,4 %	1,500	1,000
Spain	≈ 1,000	3 %	500	500

Only 10% of total wastewater

- NCR are still marginal globally but **strategically essential** in water stressed regions
- Desalination dominates worldwide NCR with 95% production
- **Water reuse** is growing fast but remains **underused**
- Spain is the European leader in NCR
- NCR is **key for climate adaptation**
- **Scaling up** requires energy efficiency, investment and public aceptance, especially for reuse

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NCR: Desalination and Reused Water

Advantages

- ✔ Constant **availability**
- ✔ Reduce pressure on natural resources
- ✔ Essential in **arid regions**: coastal & drought-prone areas
- ✔ Promote **circular use**
- ✔ Technological improvements

Disadvantages

- ✘ High **energy** demand
- ✘ High **operational costs**
- ✘ Geographical limitations
- ✘ Technical complexity
- ✘ **Regulatory and social barriers**

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Desalination: strengths and weaknesses

Technological improvement

Resilience against Scarcity, droughts, and climate change.

Potential uses: urban, agriculture, industry, environment, “Plan B”

Production costs:

Today: **0,5 – 1,00 €/m3**

- Much greater than regulated surface water : 0,1-0,2 €/m3
- Similar as pumped groundwater
- 0,0010 €/lit. (≈ 1000 times cheaper than bottled water)

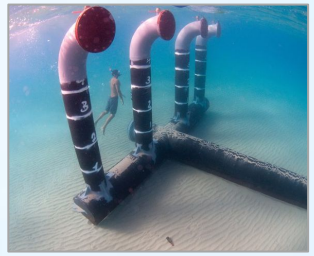
Desalination: strengths and weaknesses

High **energy consumption**:

Today: 2,5 to 3 kWh to produce 1 m3 of desalinated water (household equivalent to fridge consumption)

90% reduction in 50 years □ energy recovery in membranes, close evaporation systems and use of renewable energies

Environmental impact and toxicity of discharges:



From every 100 L of seawater (35 gr/lt), 45 liters of desalinated water and 55 liters of brine (65-70 gr/lt) are obtained.

Just a few meters from the brine discharge point, the **concentrate is indistinguishable from seawater** in terms of salinity and water quality

Desalination: takeaways

- **Integrated planning and management**, capable of ensuring a fair distribution of costs and benefits
- Complementary **alternative in water mix**
- Achieved very **competitive production costs**
- Minimal environmental impact
- Very appropriate in combination with the use of **renewable energies**
- In **water stress regions**, desalination is a highly advisable alternative – often the only one – to achieve **water security**

Desalination plant in Javea, Spain

- Coastal city with highest precipitation in water basin
- Area with lack of natural groundwater
- Low resilience to water scarcity during dry summer
- Supplies water for urban use during touristic season

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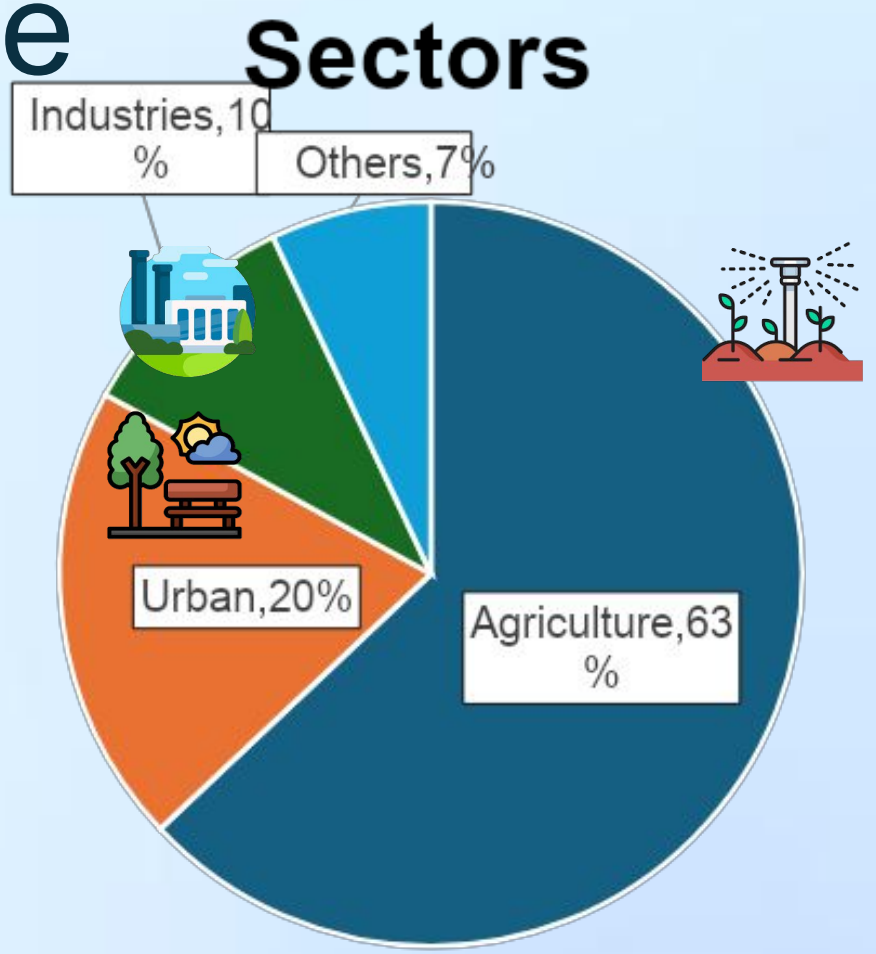
NCR: Water reuse

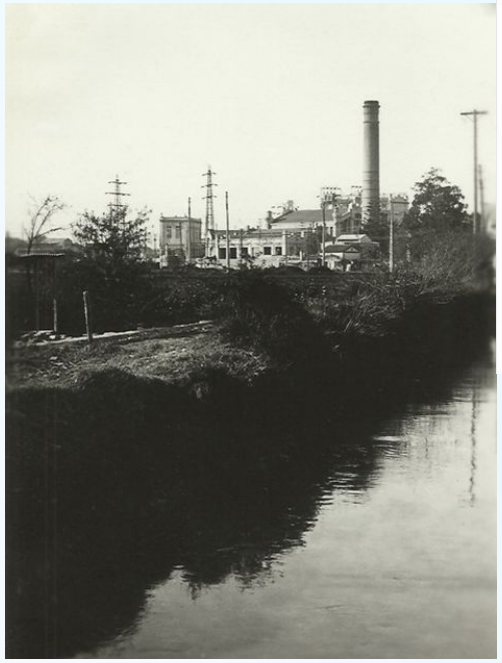
- **Challenges:** social reluctance and administrative hurdles.
  - New laws to increase social trust (risk management, responsibility)
- **Advantages:** reliability during droughts, resilience against climate change, competitiveness in agricultural sector
- **Environmental protections** reducing WWTP and factory pollutant discharge, reduce impact on natural reserves

NCR: Water reuse



Accelerated tendency: +50% volume reuse water in las 15 years)

Water Reuse: Golden Irrigation Canal, Spain



- Water Reuse from Pinedo **WWTP** (biggest in the region)
- Reuse of **22 hm3/yr** (68% total output)
- **Turn sewage pollutants into fertilizers**
- Use for rice paddles with economic and ecological importance
- **Strategic advantage:** stopped relying harvest with rainfall

Thank you for your attention

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