



Water scarcity, droughts and climate change in Mediterranean region: The case of Spain



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MINISTERIO
DE MEDIO AMBIENTE
Y MEDIO RURAL Y MARINO

Introduction



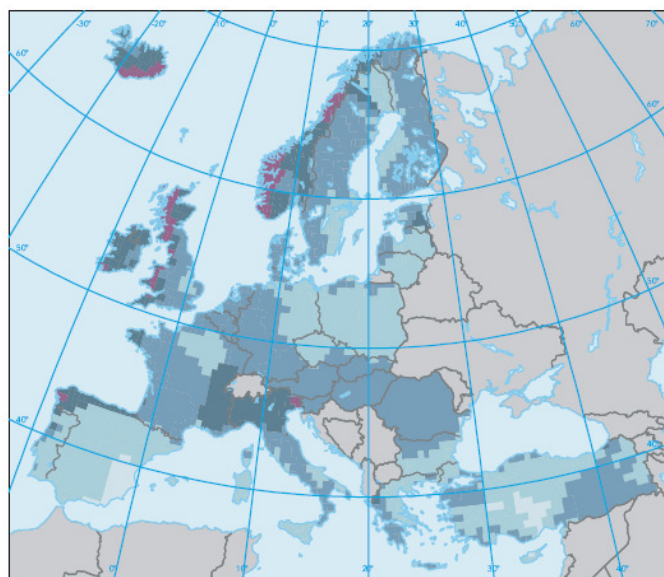


- **The Mediterranean is one of the most affected regions by water scarcity, droughts and climate change, with immediately visible impacts:**
 - **North Africa**
 - **Middle East**
 - **Southeastern Europe**
 - **Mediterranean countries of the EU**





Water stress in European Union

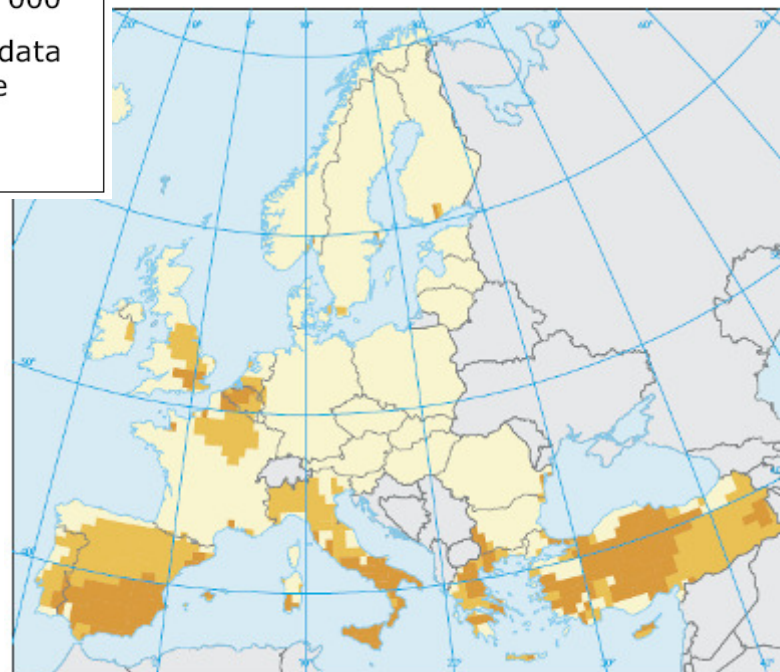


Water availability

(mm/a)

- 0-100
- 101-250
- 251-500
- 501-1 000
- 1 001-3 000
- Outside data coverage

Current water availability



Water exploitation index (%) around year 2030

- 0-20 (low water stress)
- 20-40 (medium water stress)
- > 40 (severe water stress)
- Outside data coverage

Water exploitation index (expected for 2030)

Source: European Environment Agency, 2005





Water scarcity



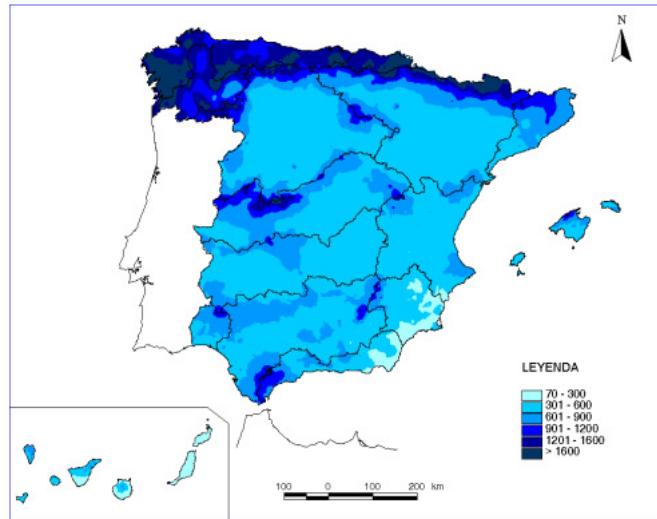


- **Water scarcity means that water demands exceeds the available water resources under sustainable conditions**
- **Water is a scarce resource in some areas of Spain**
 - High irregularity in time and space
 - Limited water resource: conflicting water demands

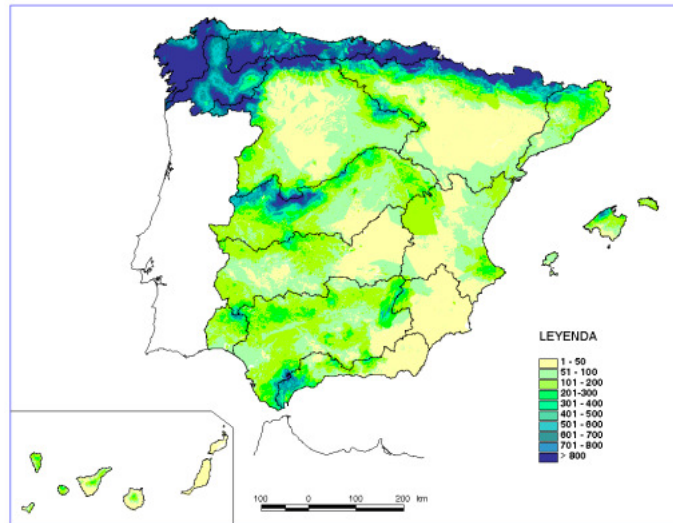




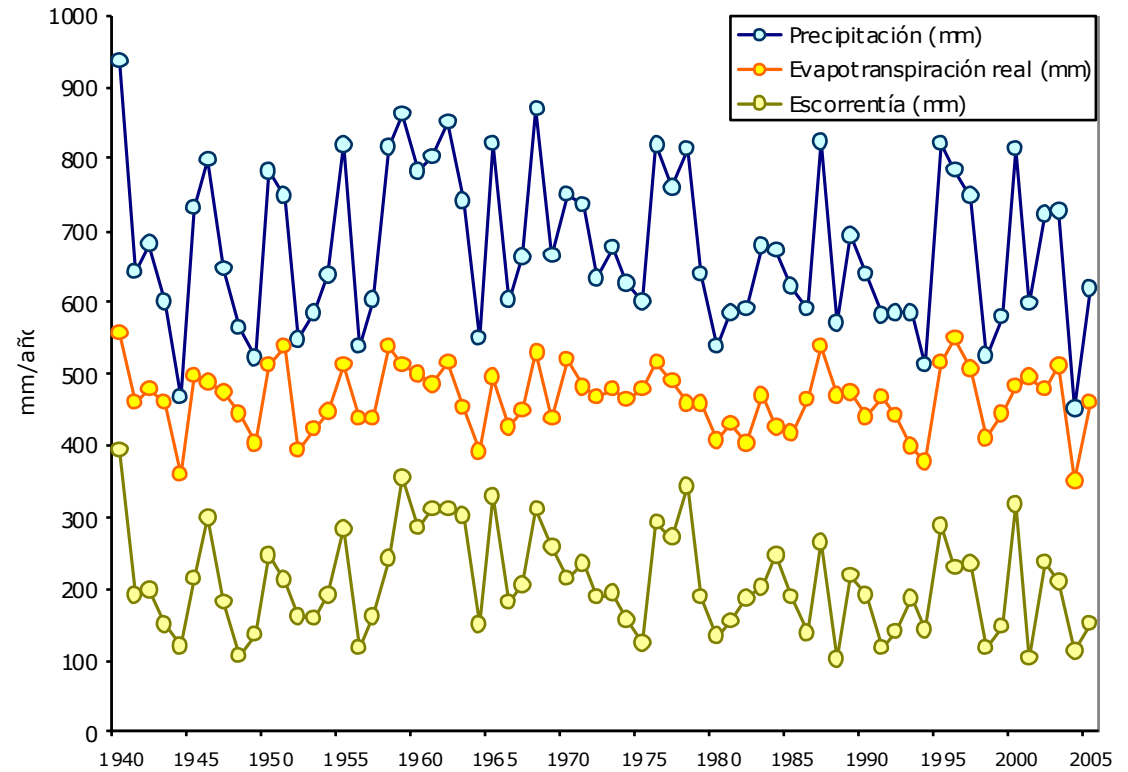
Irregular hydrological regimes in Spain



Mean annual precipitation (mm)



Mean annual runoff (mm)



Precipitation, actual evapotranspiration and runoff in Spain in mm (period 1940-2005)





Measures to fight water scarcity

Main measures to fight water scarcity in Spain:

- Development of water supply infrastructures
- Metering programmes of water abstractions
- Water savings and water-efficient technologies
- Joint management of surface water and groundwater
- Use of non-conventional water resources: waste water reuse and desalination





Droughts





Drought management in Spain: traditionally as an emergency situation

Spanish Water Law (TRLA), in article 58, foresees in extraordinary drought situation the adoption, by the Government, of necessary measures to overcome these situations, related to the use of the public water domain.





Law 10/2001, July 5, of the Hydrological Water Plan, establishes the bases for the drought planned management.

Article 27. Drought management

Section 1. The Ministry of Environment, for dependent river basins, in order to minimize environmental, economic and social impacts of eventual drought situations, will establish a global hydrologic indicator system that will allow foreseeing these situations, and will serve as general reference for river basin authorities for the formal declaration of emergency situations and eventual drought. This declaration will imply the entry into force of Drought Management Plans (DMP).

Section 2. Basin Organizations will develop Drought Management Plans (DMP) for alert situations and eventual drought (exploitation rules and measures)





Entities in charge: River Basin Authorities

Objective: minimize environmental, social and economic impacts of drought situations

Contents: includes diagnosis of situation (historical droughts, vulnerability of basin), indicators system (precipitation, river inflows in natural regime, stored volume in surface reservoirs, water levels in aquifers), programme of measures to be applied in each drought phase according to the drought status, management and follow-up system.

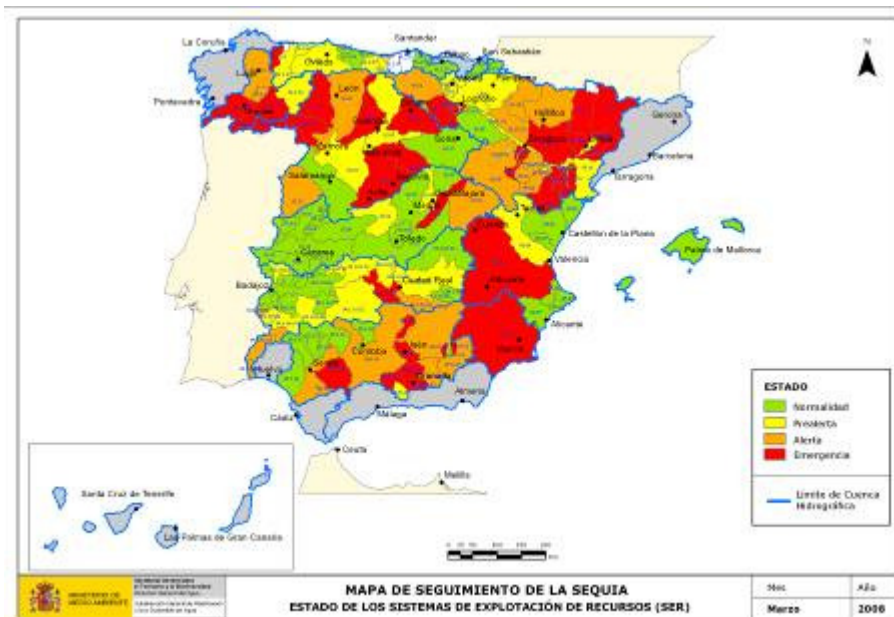
Approval: River Basin Drought Management Plans were approved by Ministerial Order in March 2007



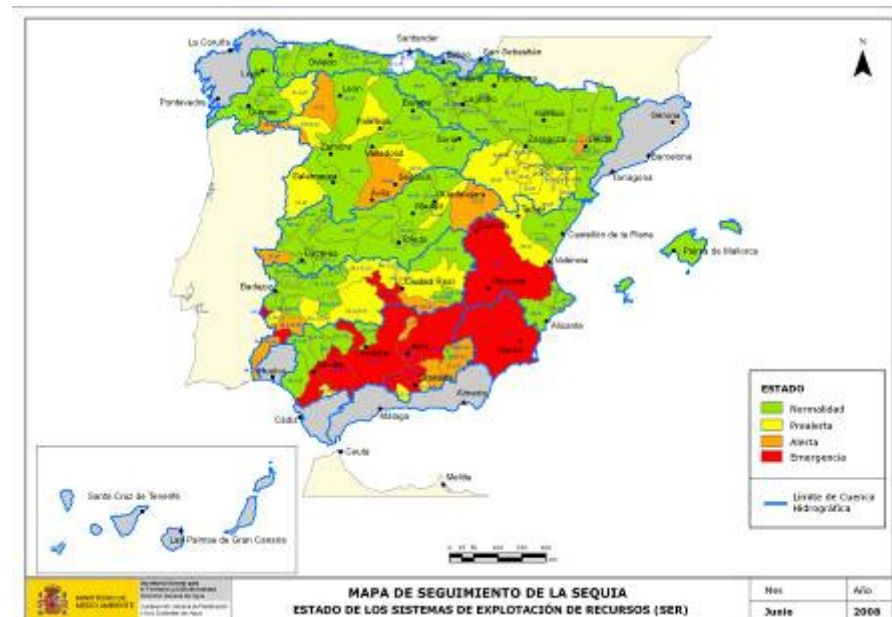


Global hydrological indicator system

- Global hydrological indicator system has been developed
- Drought maps being developed since December 2005 and published in the web page of Spanish Ministry of Environment, Rural and Marine Affairs.



march 2008



june 2008





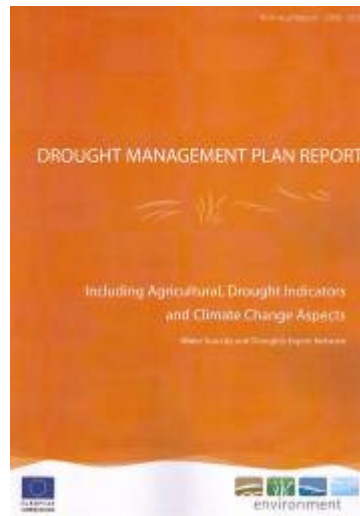
Example of measure included in DMPs: Drought wells and environmental control (specific groundwater level network)





Water Scarcity and Droughts in CIS: Spanish role

- Leading jointly with France and Italy the **WS&D Expert Network** of CIS
- Leading the development of the **Drought Management Plans Report**, endorsed by EU Water Directors on November 2007



Organisation of Common Implementation Strategy 2007-2009





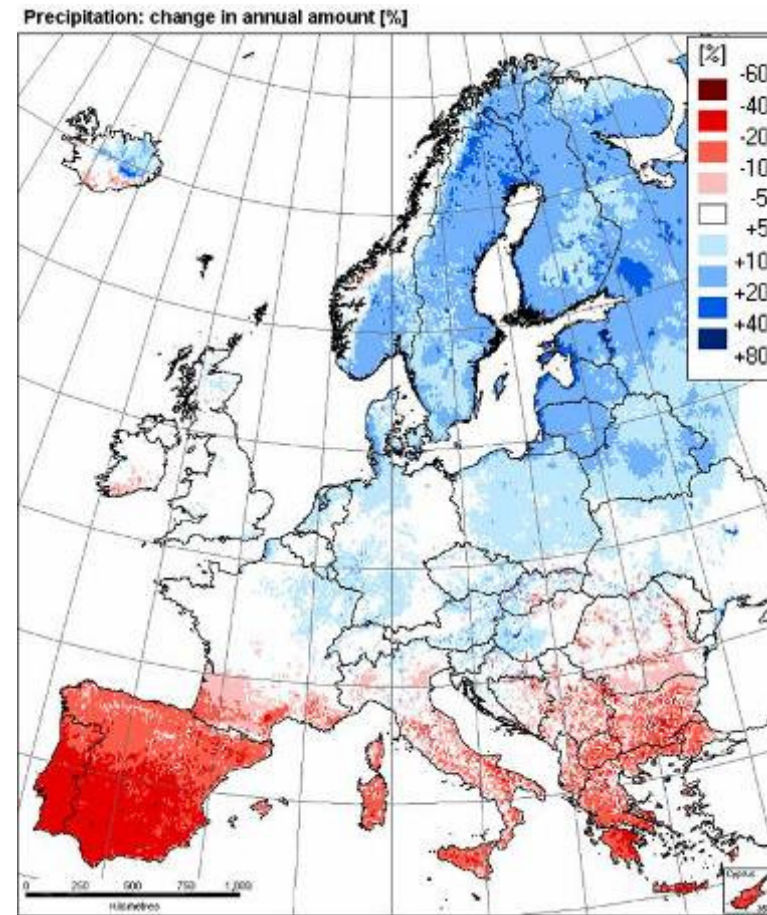
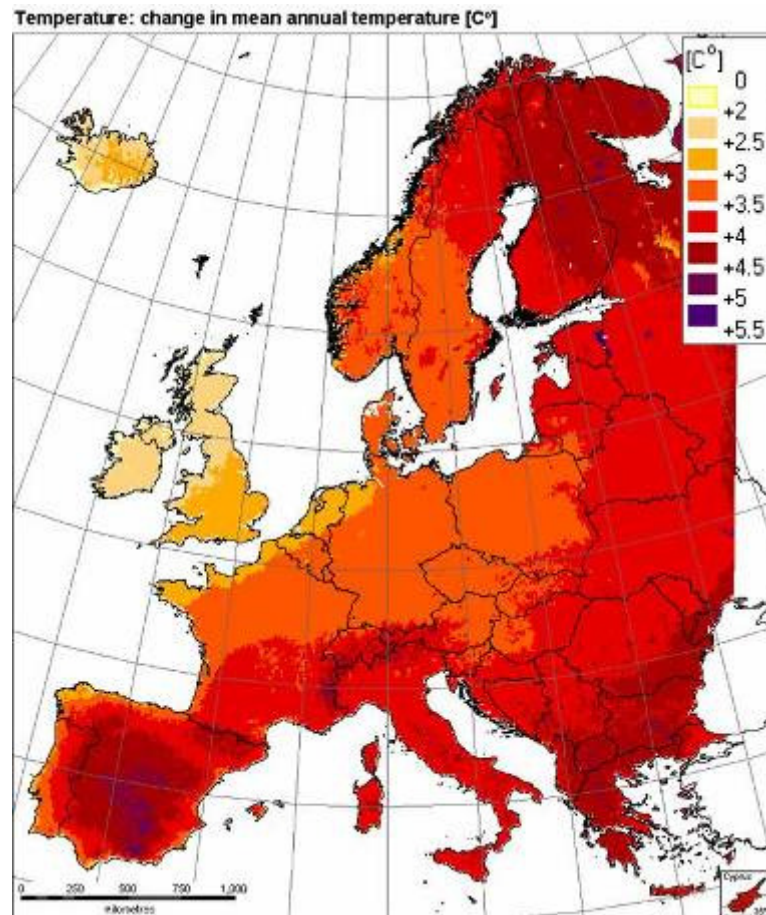
Climate change





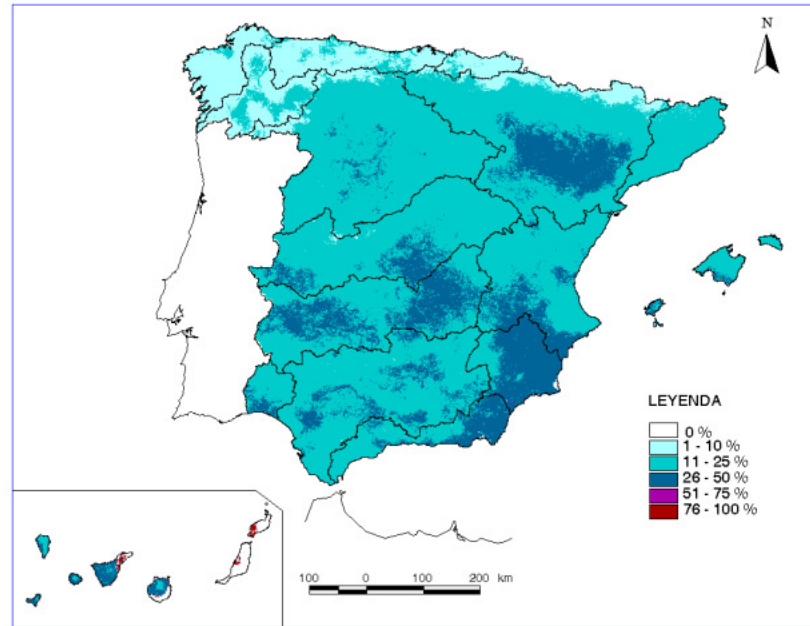
Impact of Climate Change

EC Green Paper. A2 scenarios. Climatic changes foreseen for 2071-2100

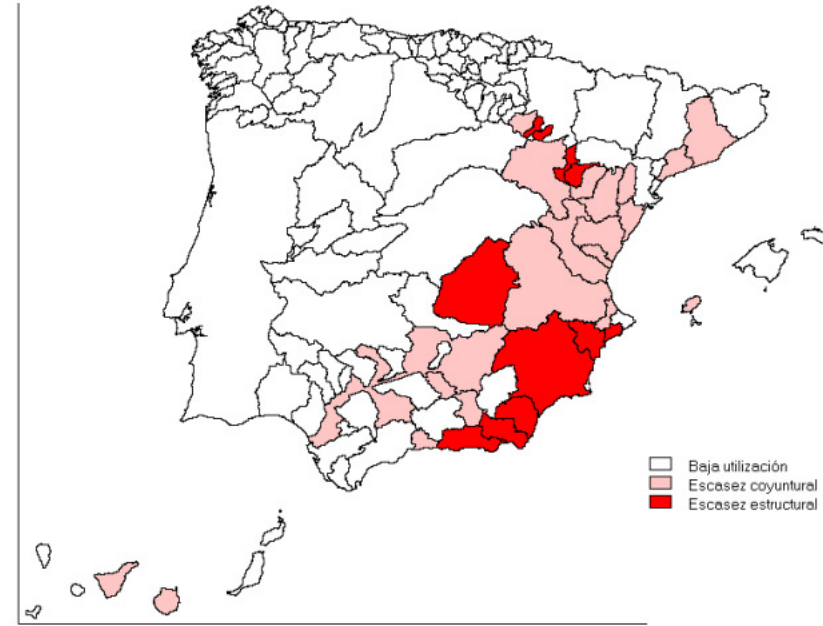


Change in mean annual temperature and precipitation





Impact on runoff reduction for a decrease of 5% in mean annual precipitation and an increase of 1°C in mean annual temperature (year 2030)



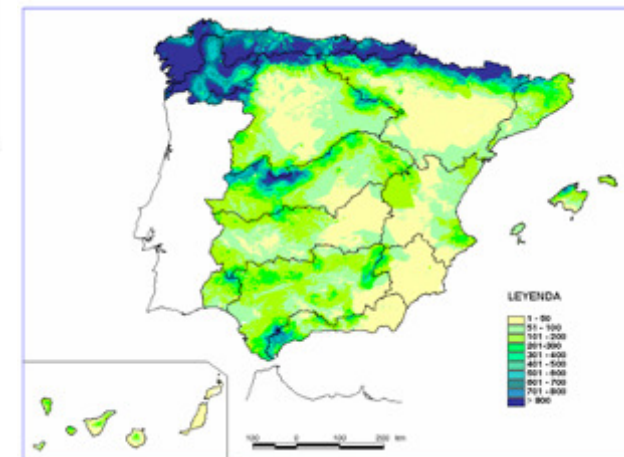
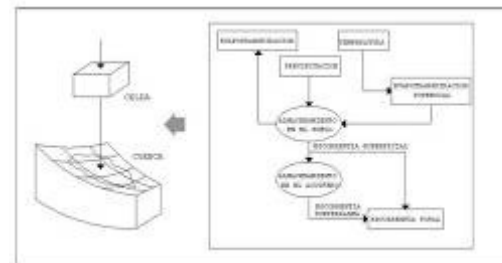
Vulnerability: water scarcity risk in water resource systems

Source: White Paper on Water in Spain, MMA (2000)





- National Adaptation Plan on Climate Change. Aim: Integration of adaptation to climate change into the planning strategy of the different socio-economic sectors in Spain
- Water resources sector: assessment of impacts on natural resources, water demands, available resources and ecological status





- First River Basin Planning cycle (year 2009): a Climate-Check of Programme of Measures will be carried out in EU Member States.
- Royal Decree, RD 907/2007 regarding River Basin Management Plan Regulations was approved in July 2007
 - Mandatory to consider the effects of climate change on water resources in the development of plans



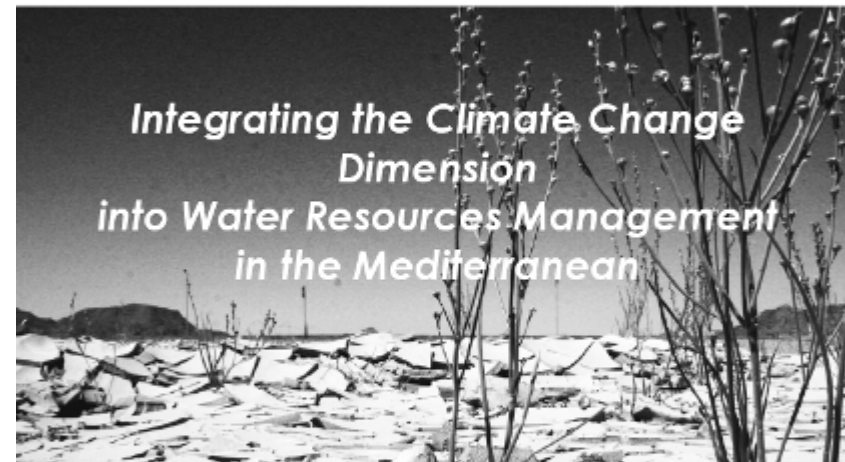


Climate Change in Mediterranean Region

A report entitled “Integrating the Climate Change Dimension into Water Resources Management in the Mediterranean” was presented by Greece, Morocco and Spain as contribution of the MED EUWI Secretariat in the Euro-Mediterranean Water Director meeting held in Athens, Greece, 21-22 July 2008.

THEME PAPER

DRAFT v. 5 July 2008



prepared by Morocco, Spain and Greece
with the contribution of the MED EUWI Secretariat

in view of the
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29 October 2008 - Amman, Jordan

