

EURO-INBO

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The Drought Management in Spain in a climate change context

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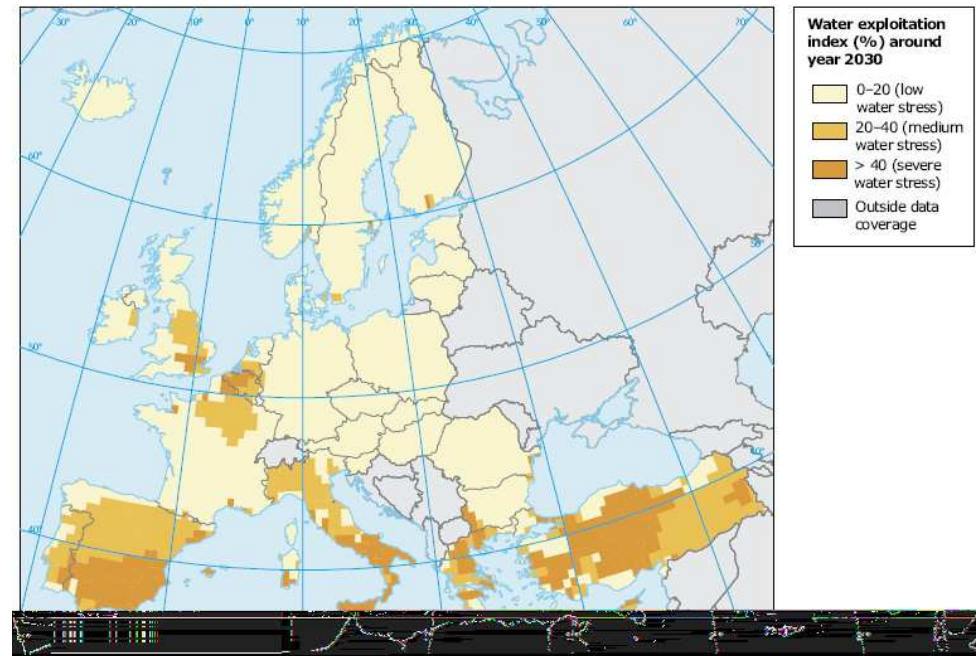


- Spain in the European context : droughts and Climate Change
- Drought management in Spain
- Experience gained during 2005-2008 drought in Spain



Introduction

Impacts produced by droughts can be exacerbated in regions with imbalances between resources and water demands.

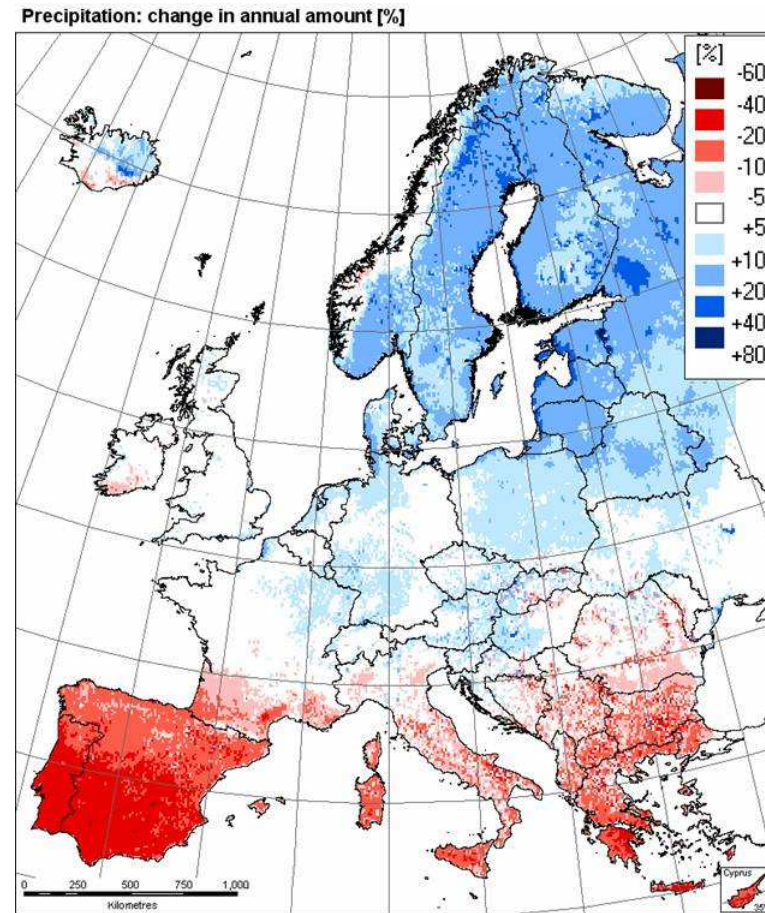
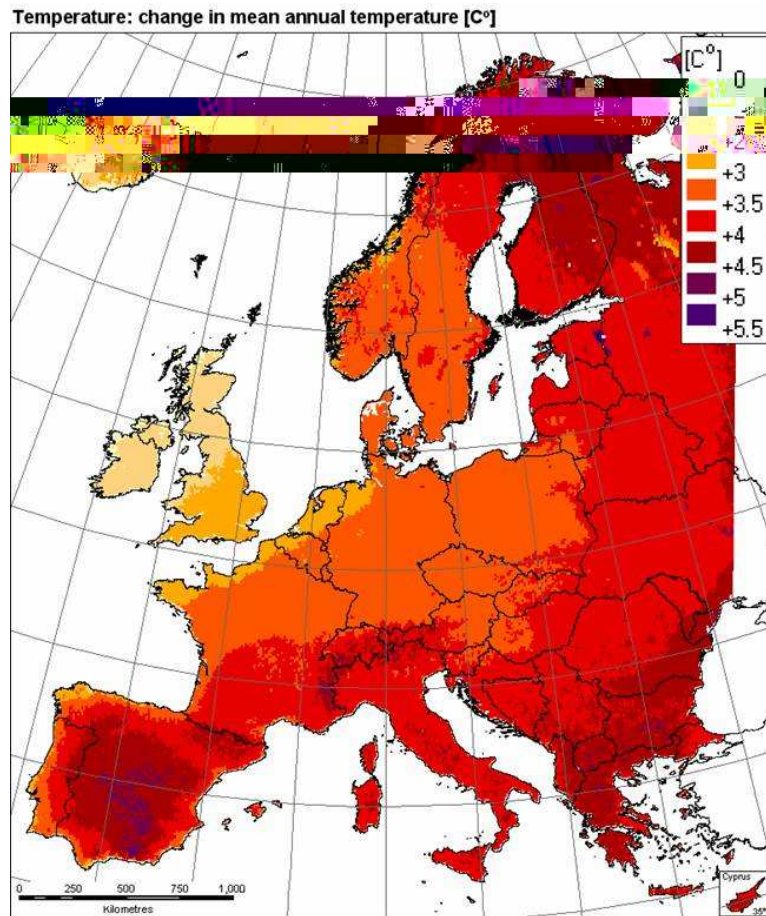


Water Exploitation index in the EU (expected for 2030). Source:EEA



Impact of Climate Change

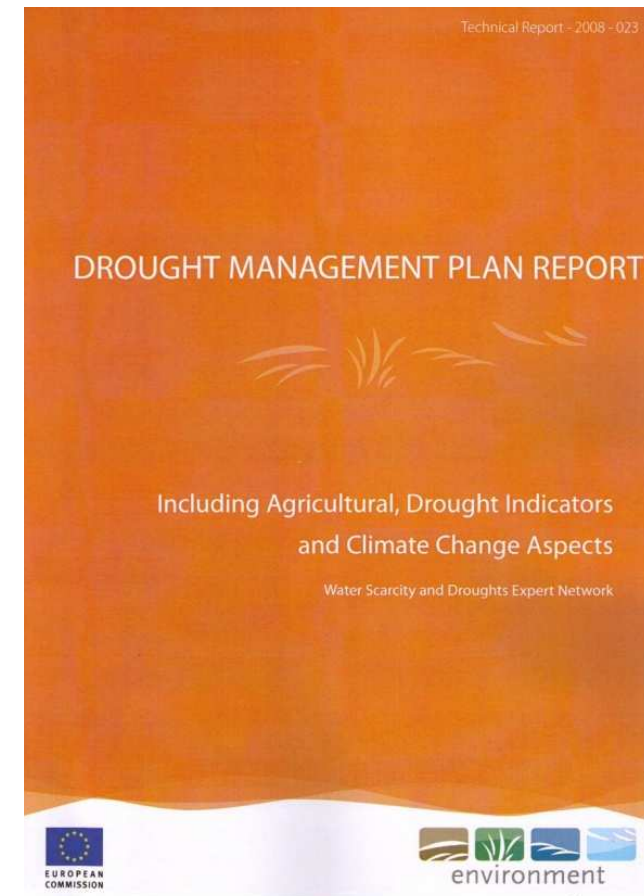
Climatic changes foreseen for 2071-2100 (A2 scenarios)



Change in mean annual temperature and precipitation. Source: EC Green Paper



- Elaboration of Drought Management Plans in the EU, supplementing River Basin Management Plans (RBMPs) (WFD article 13.5).
- DMPs must establish measures, in accordance with indicator systems, to minimize the impacts of droughts.
- DMPs must consider consequences of climate change



Drought management in Spain



- Spain has suffered important dry periods with severe impacts on water resources that explain the ancient tradition of building dams (more than 1.200 large dams).
- Traditionally, droughts have been considered as an emergency situation to be restored with extraordinary water resources and measures.



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

- The **Ministry of Environment** will establish a **global hydrologic indicator system** to foresee drought situations and to serve as general reference for the formal declaration of droughts.
- **River Basin Organizations** will develop **Drought Management Plans (DMP)**.



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

Entities in charge: River Basin Organizations

Contents: includes diagnosis of situation, hydrological indicator system, programme of measures and management and follow-up system.

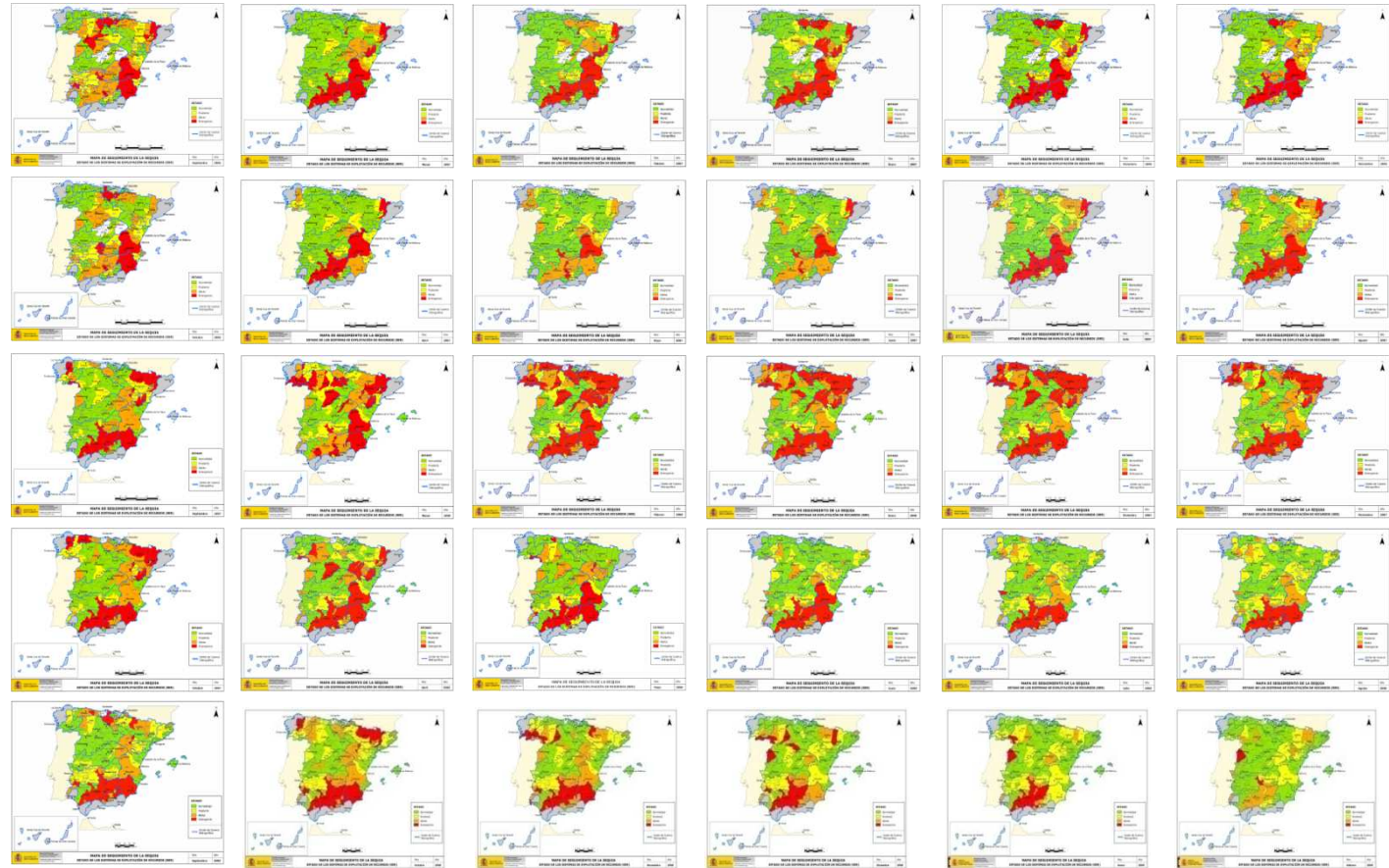
Approval: Ministerial Order in 2007



National Drought Indicator System

Objective

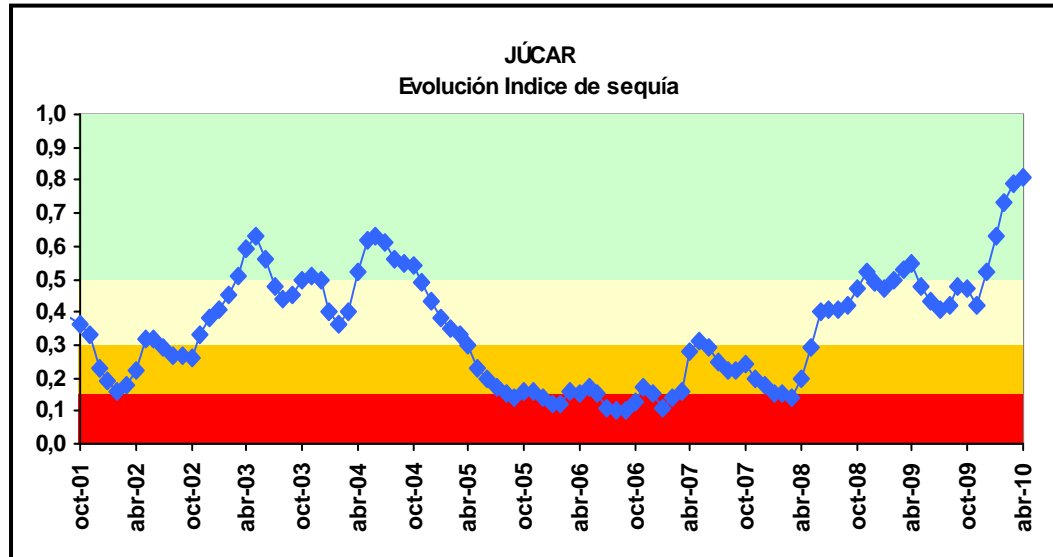
Follow-up of the status of Spanish water resource systems which will be taken into account for the formal declaration of droughts and for applying measures in river basins districts



Maps are published on a monthly base since December 2005 (web page of Ministry of Agriculture, Food and Environment)



Drought Management Plans



Drought indicator system is used to activate the measures to be applied.

TYPE OF MITIGATION MEASURES							
Indicator	1-0.5	0.5-0.4	0.4-0.3	0.3-0.2	0.2-0.15	0.15-0.1	0.1-0
Status	Normal	Pre-alert		Alert		Emergency	
Objective	Planning	Information-control		Conservation		Restriction	
Type of measure	Strategic			Tactics		Emergency	



Experience gained during 2005-2008 drought in Spain



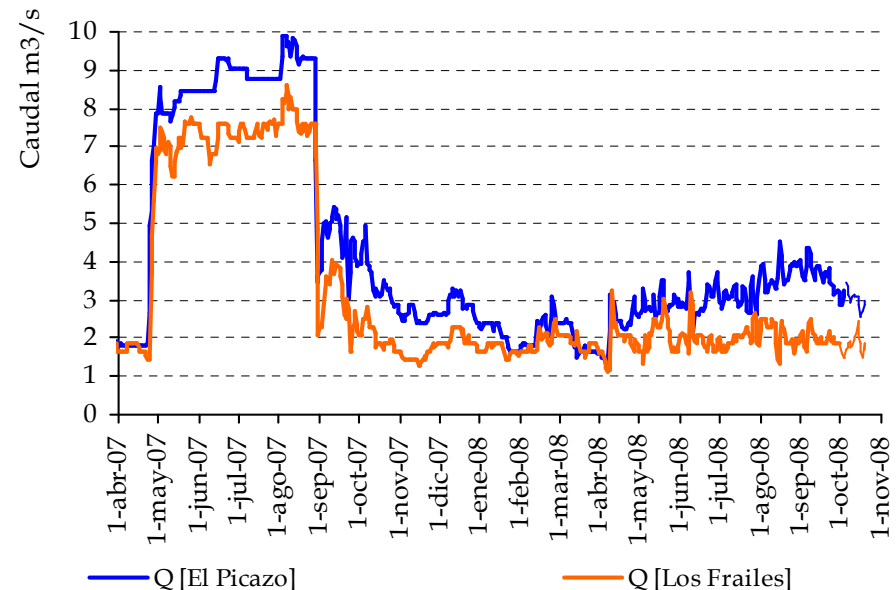
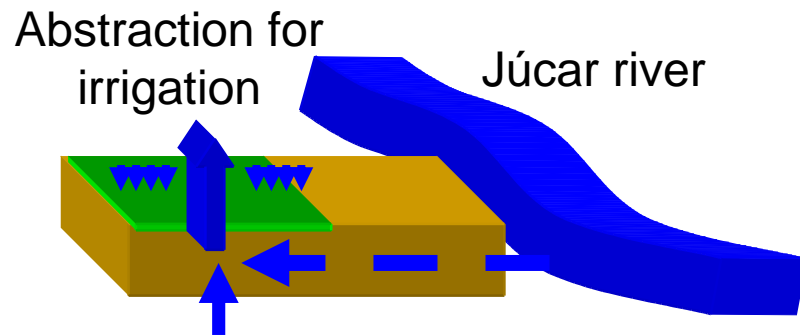
- Environmental measures
 - Control of water body status and environmental flows.
- Water use rights exchange.
 - Farmers renounced to irrigate their lands receiving an economic compensation
- Management and control measures
 - Changes in water allocations
 - Water savings and restrictions mainly in agriculture (fee exemptions)
- Investments in emergency works (charged to users):
 - New alternative resources (emergency groundwater wells, water reuse,...)
 - Improvements in the efficiency of water resources systems



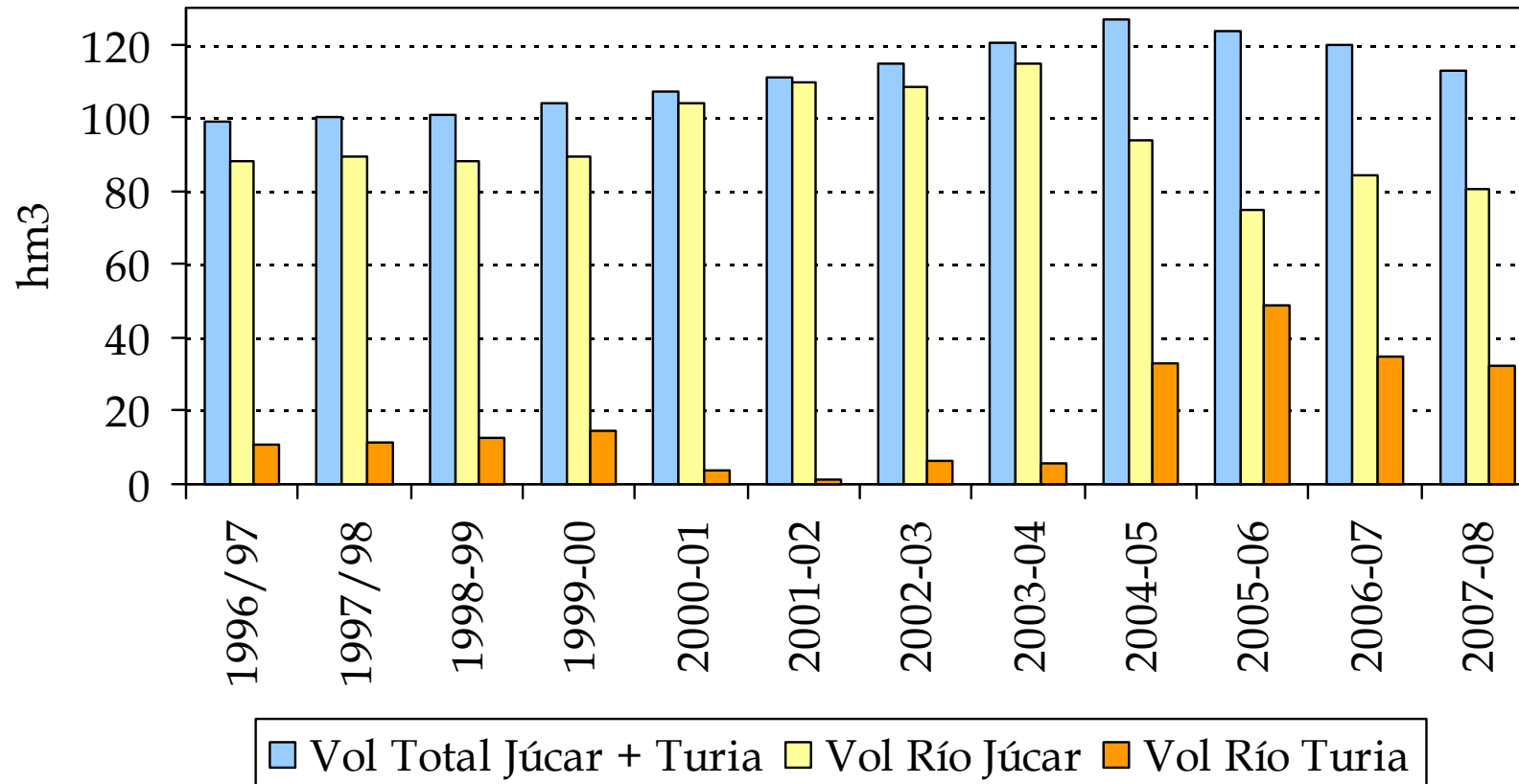
Environmental measures



Agreement for water rights acquisition between Administration and users for environmental reasons in the Júcar river



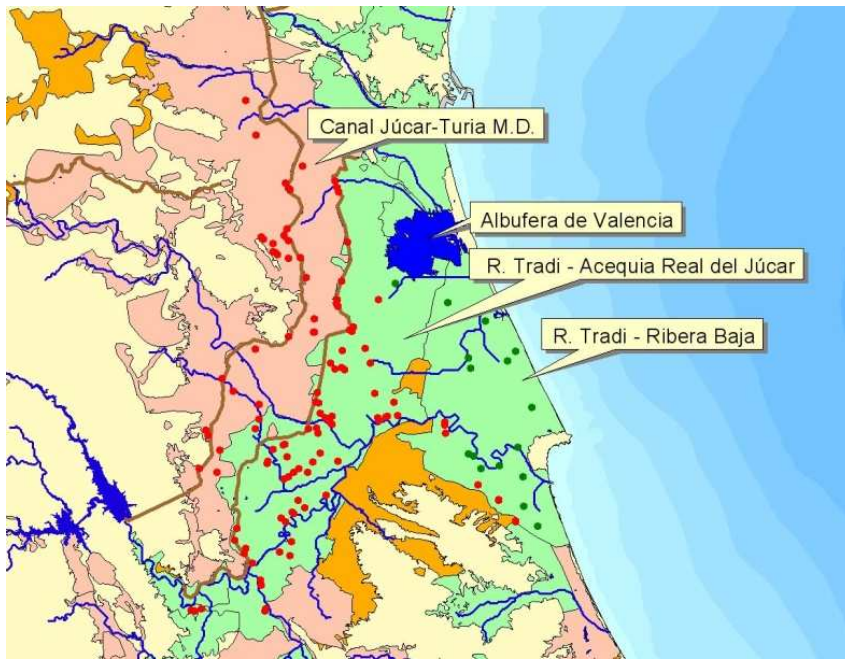
Management measures



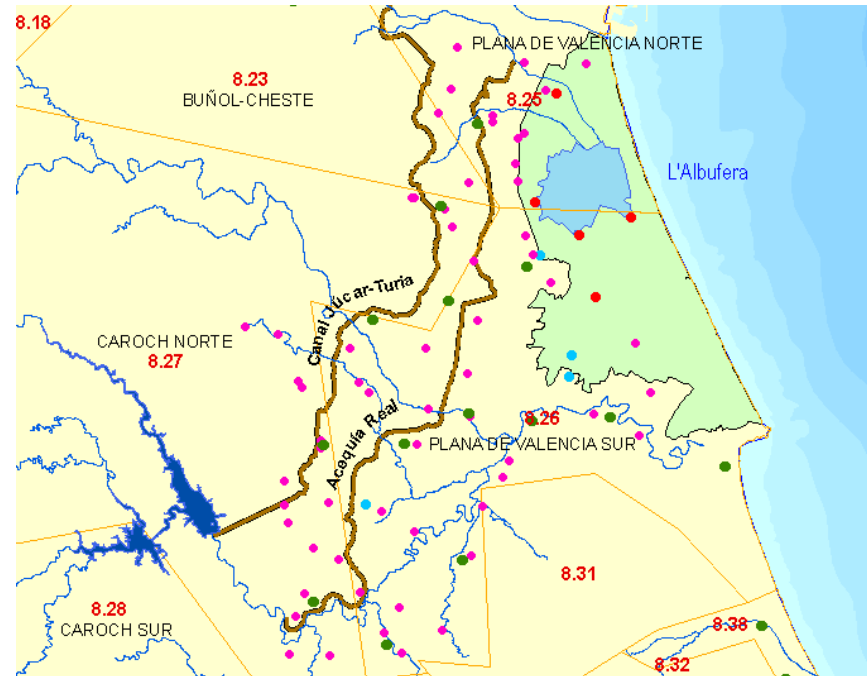
Supply for the metropolitan area of Valencia with surface water from rivers Júcar and Turia



Measures for additional resources



Drought wells for irrigation



Monitoring networks



Experience acquired

- Drought management plans have revealed as essential tools for drought management .
- Public Water Supply restrictions did not occur in spite of being a large drought cycle of 4 years.
- Improvement of water management, coordinated use of surface water and groundwater, water markets, water saves on irrigation and improving on the monitoring networks have been key elements to cope droughts.

