GOBIERNO DE ESPAÑA
MINISTERIO DE MEDIO AMBIENTE Y MEDIO RURAL Y MARINO
CONFEDERACIÓN HIDROGRÁFICA DEL SEGURA

DROUGHT MANAGEMENT IN SEGURA RIVER BASIN. 2005-2009

Oporto, 29 September 2011

MARIO A. URREA MALLEBRERA
HEAD OF THE PLANNING OFFICE
SEGURA RIVER BASIN AUTHORITY

1. Characterization

1. Characterization- Dry Spain Characteristics

Europe

Spain

	Surface (km^2)	Average rainfall (mm)	PET (mm)	Natural Resources (hm^3/year)	Ratio per inhabitant
Segura RB	18.870 (3.7%)	365	827	803 (0,7%)	442 m^3/hab/año
Spain	506.474	711	842	111.186	2.460 m^3/hab/año

Source: Digital Book of Water /SRB Report 2008

1. Characterization- Segura River Basin, key figures

POPULATION Year 2009	1,969,370 (> 2,500,000 in summer)
TOTAL LENGHT OF CHANNEL NETWORK (Km)	1,470
IRRIGATION SURFACE (ha)	269,029
SOURCES OF WATER RESOURCES (Hm^3)	Surface waters : 640, Groundwater: 220 Reutilization:110, Desalination: 40, TAJO-SEGURA WATER TRANSFER: 540

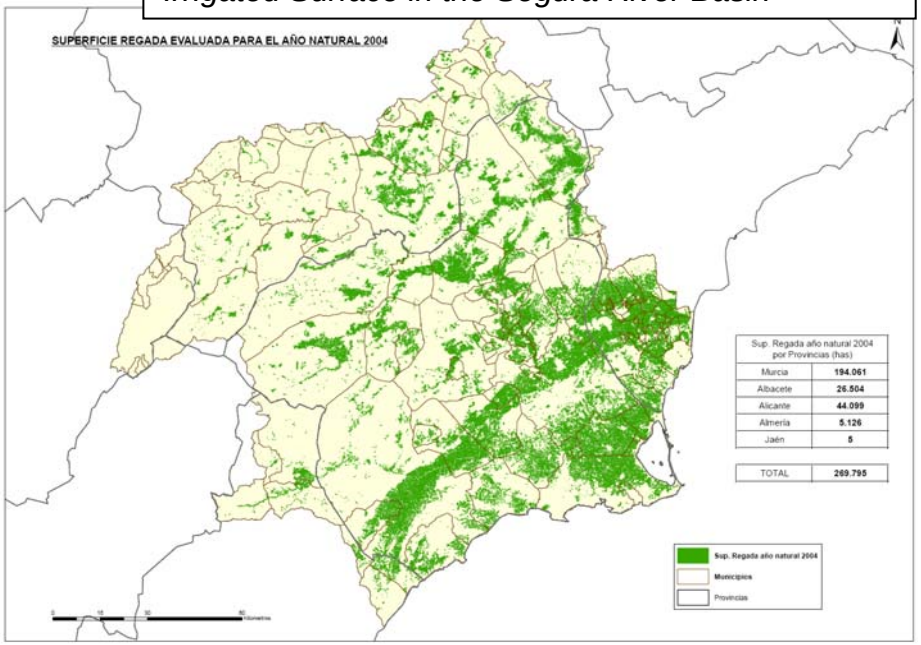
• **AGRICULTURE**: high productivity (average value production of 1.93 €/m^3 and a net margin of 0,72 €/m^3) but intensely water-consuming (it accounts for the **80% of the demand** in the basin, 1.662 hm^3/año)

• Reuse and Desalination

• High Pressure on resources.

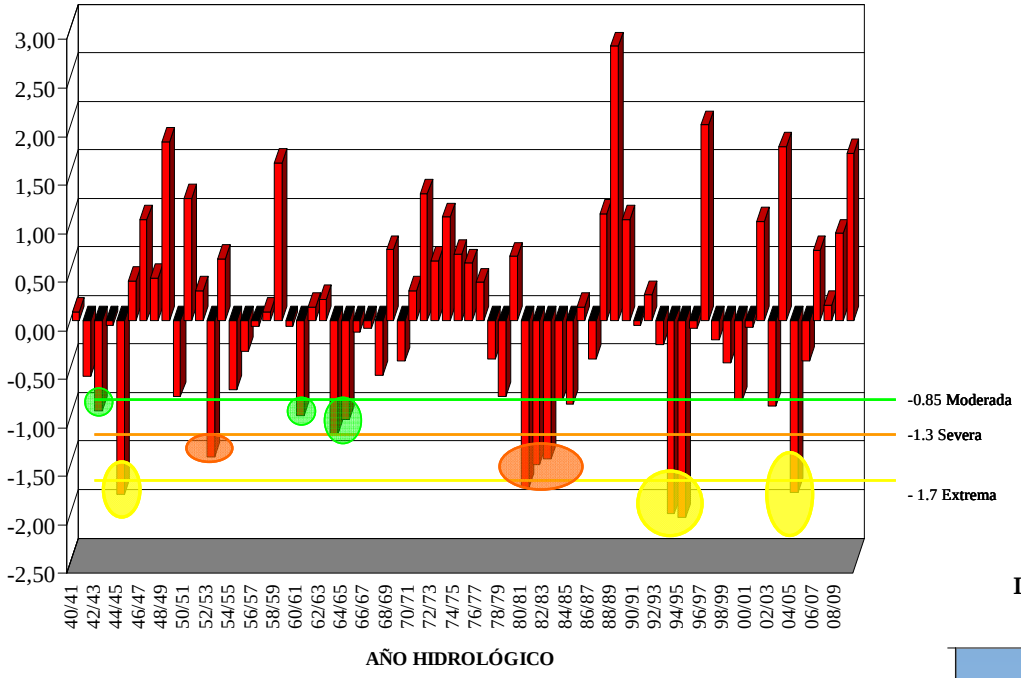
• Water Scarcity & Droughts

Irrigated Surface in the Segura River Basin

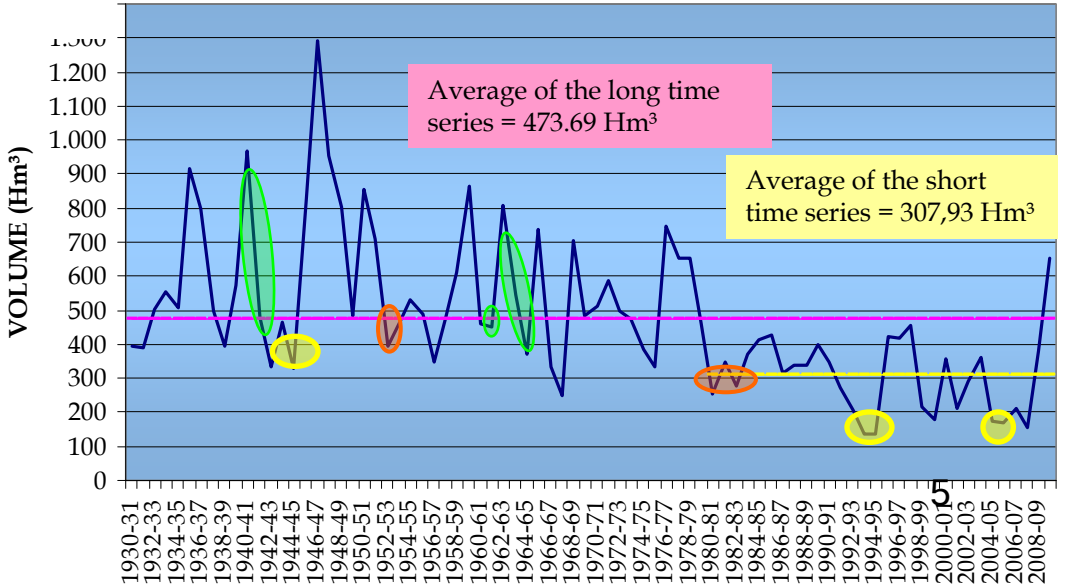


1. Characterization: Segura RB-Water Scarcity and Droughts

SPI EN LA DHS DESDE EL AÑO HIDROLÓGICO 1940/41 HASTA 2009/10



INTERANNUAL ACCUMULATED RUNOFF BETWEEN SEPTEMBER 1931 AND SEPTEMBER 2010



2. Drought Management

2. Drought Management

LEGAL BACKGROUND

Drought Management Plans Origin: the *National Hydrological Plan Law*, released in 2001.

Drought Management Plans for all Spanish River Basins were endorsed in march, 2007.

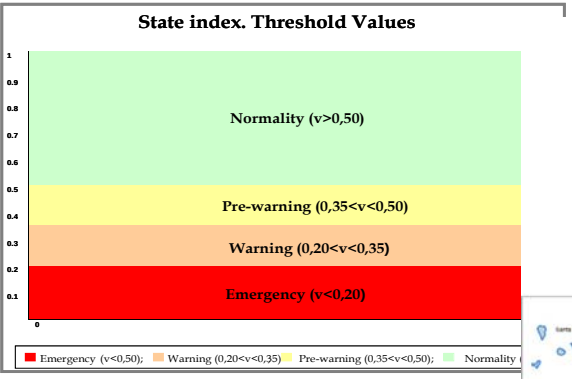
MAIN OBJECTIVES of Drought Management Plans:
• *¿When?*: It is very important because taking measures in advance is much more efficient than facing the drought effects.
• *¿How?*: A sequence of measures activation should be established according to state of indicators, natural resources and expected drought evolution.
• *¿Who are the ones responsible for drought management?:* Responsibility for the establishment, execution and monitoring of defined measures, as well as the coordination with stakeholders, should be assigned.

GOBIERNO DE ESPAÑA
MINISTERIO DE MEDIO AMBIENTE Y MEDIO RURAL Y MARINO
CONFEDERACIÓN HIDROGRÁFICA DEL SEGURA

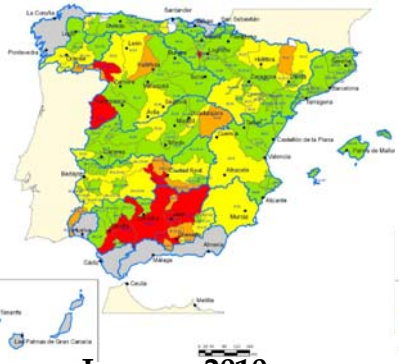
2. Drought Management- INDICATORS

SOURCE: http://www.marm.es

DROUGHT ACTION PLANS-DROUGHT INDICATORS

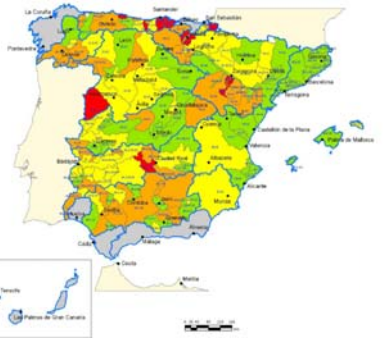


January 2009



April 2009

July 2009



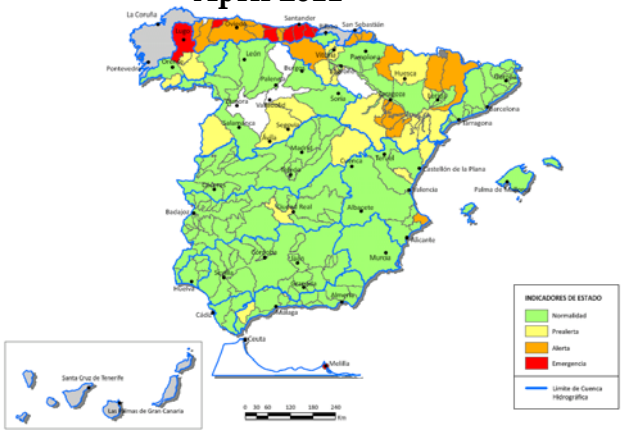
January 2010

April 2010

July 2010

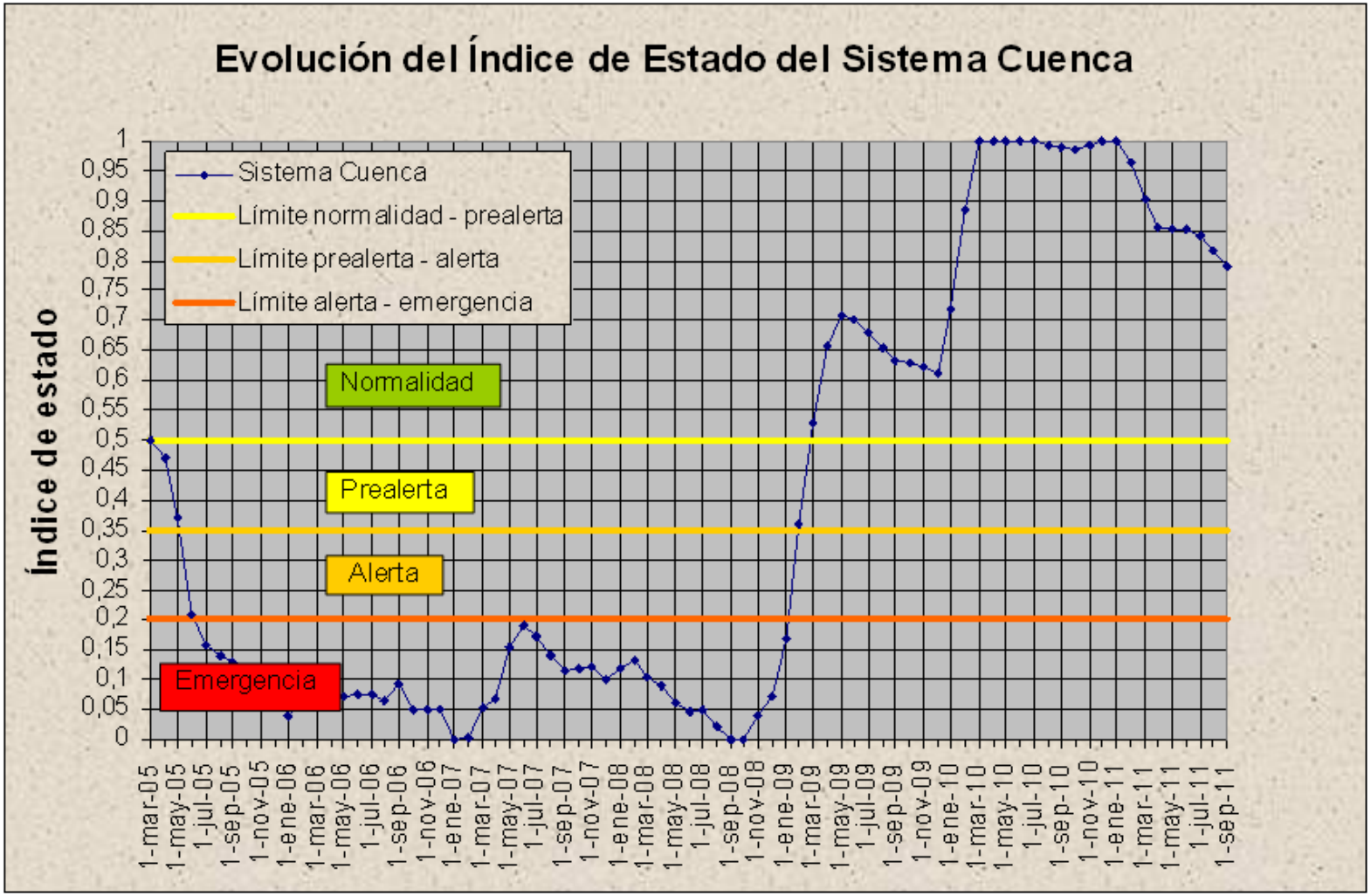
January 2011

April 2011



July 2011

2. Drought Management- Segura River Basin Drought Indicator



Updated information can be checked at:
https://www.chsegura.es/chs_en/cuenca/sequias/gestion/index.html

2. Drought Management- MEASURES

Several measures are defined in the Drought Management Plans of the river basins. Some of them are listed below:

- Weekly monitoring System
- New desalination plants were constructed
- **Operation of the well strategic network**
- Emergency investments in new infrastructures to increase water resources or to improve demand management.
- Water rights transfer, using water transfer infrastructure (up to70 hm3/year)
- Restrictions to irrigation supply, up to 50%
- Improving installations and networks to reduce water losses.
- Modernization of irrigation systems
- Economic measures to compensate farmers for water supply restrictions.
- Administrative measures, including a drought decree to improve water resource management

3. IMPACTS

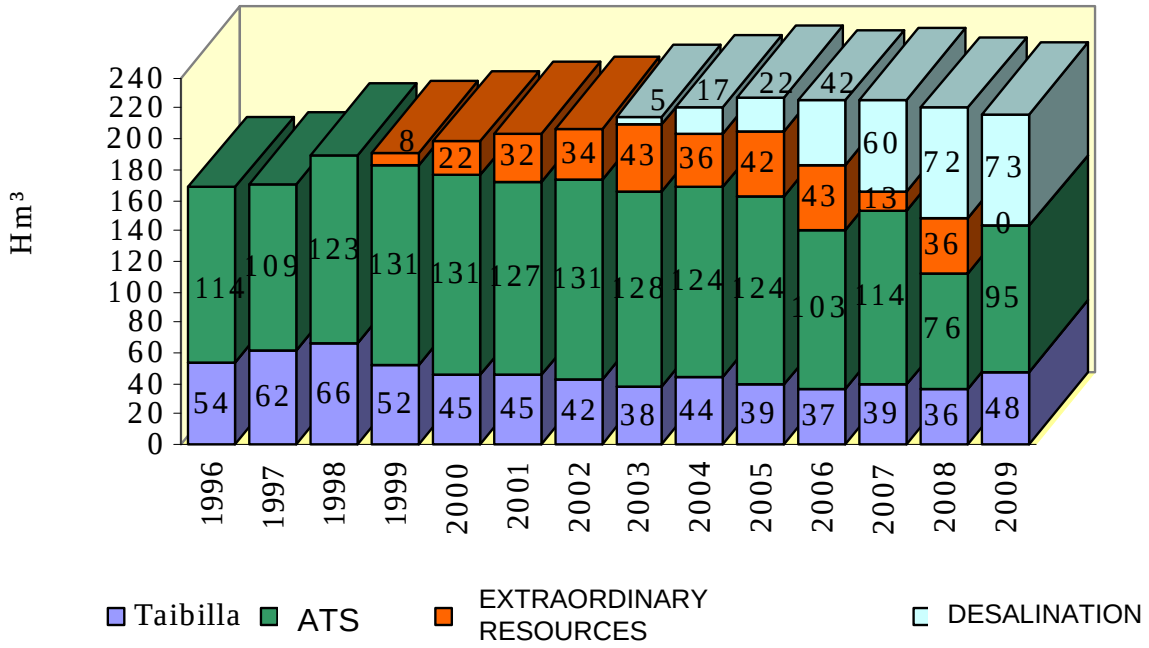
-URBAN WATER SUPPLY

- ENVIRONMENTAL CONSUMING DEMAND

- IRRIGATIÓN. SOCIO-ECONOMIC AFFECTIONS

DESALINATION

RESOURCES

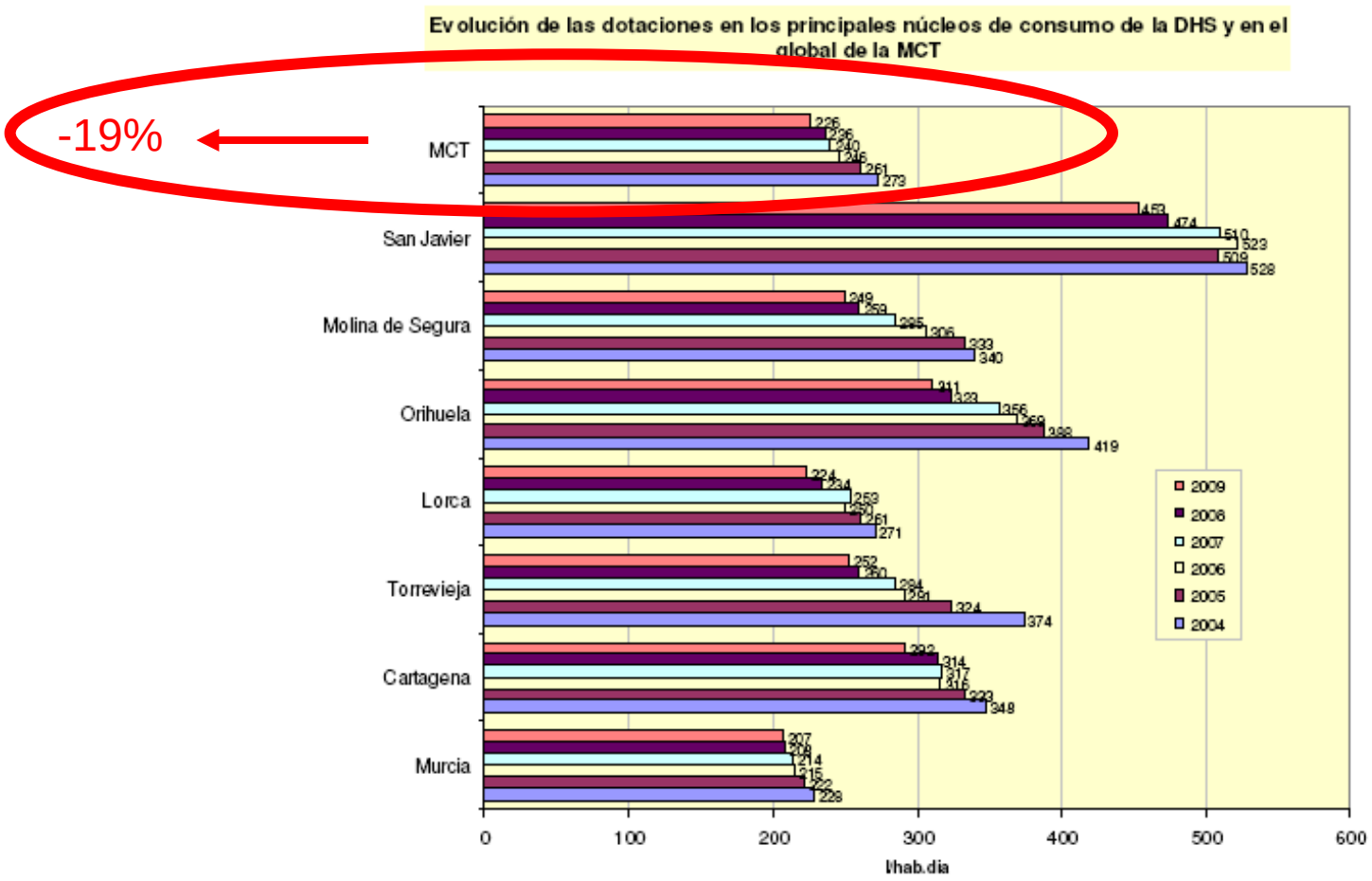


Mancomunidad canales Taibilla. Drinking Water

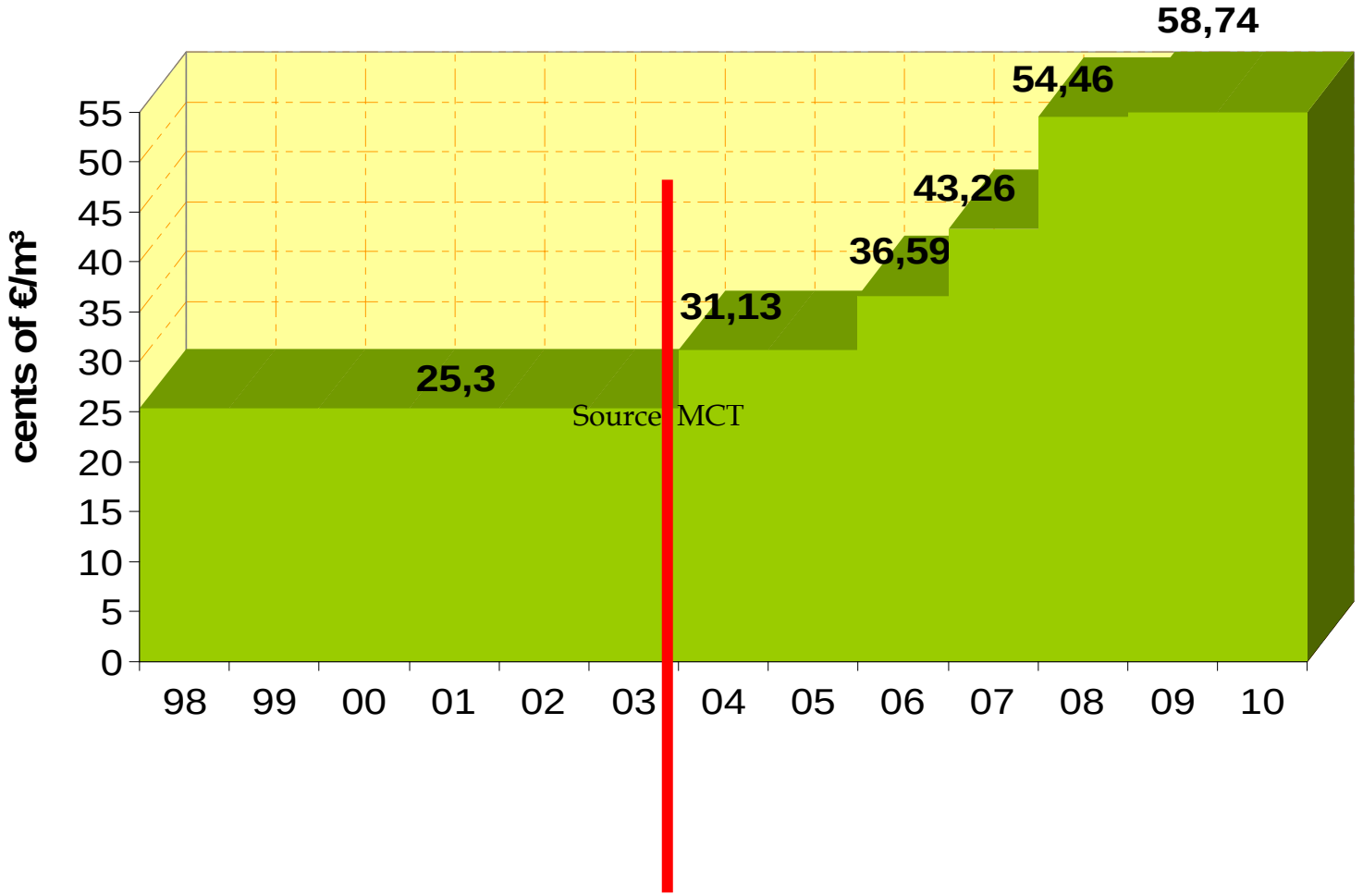
URBAN WATER SUPPLY

- NO RESTRICTIONS
- INCREASING THE OFFER OF RESOURCES

Figura 6. Evolución de las dotaciones en la DHS durante el periodo 2005-2009.



URBAN WATER SUPPLY RATE (no IVA)

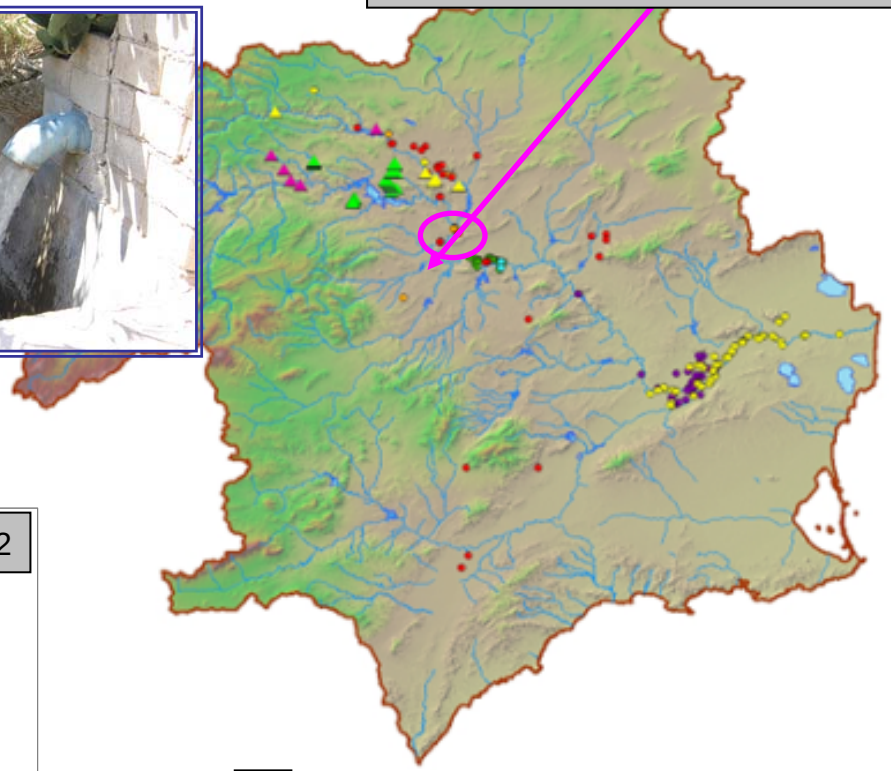


Source: Schema of Important Issues

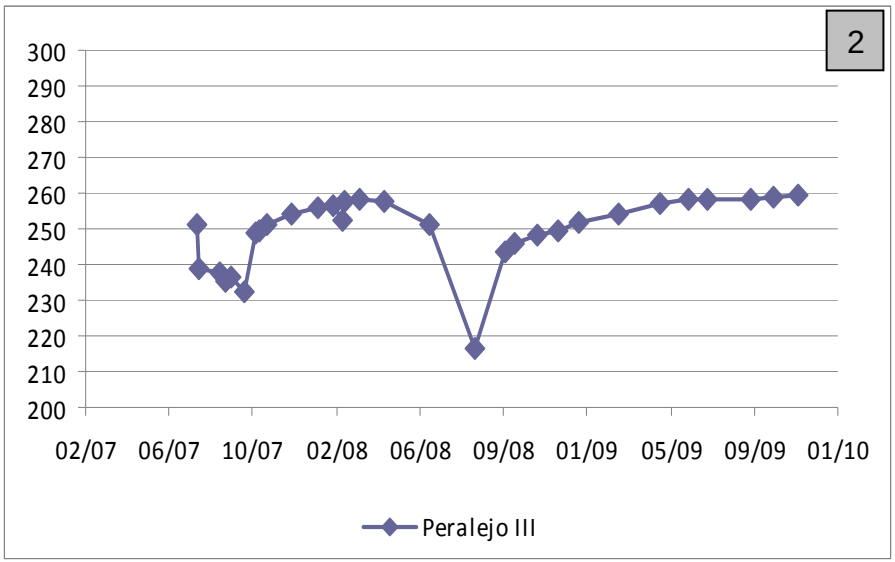
2. Drought Management- MEASURES

WELL STRATEGIC NETWORK

Peralejos Wells:
- 1. Abstraction
- 2. Water level in wells



2

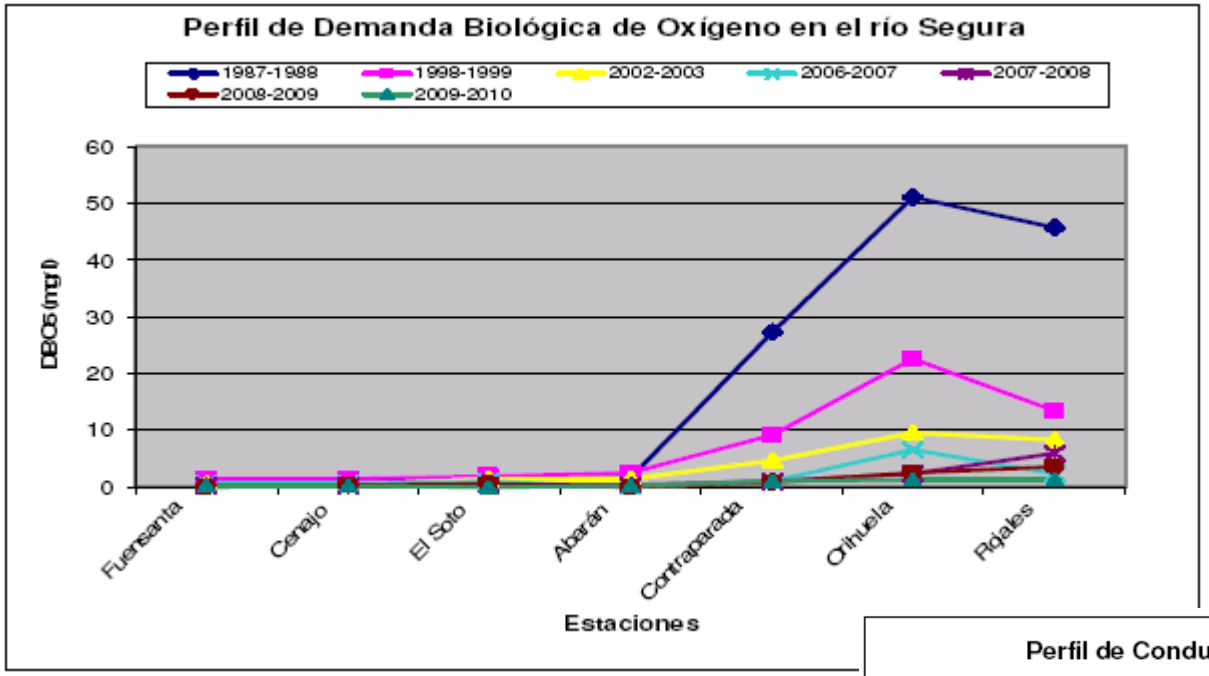


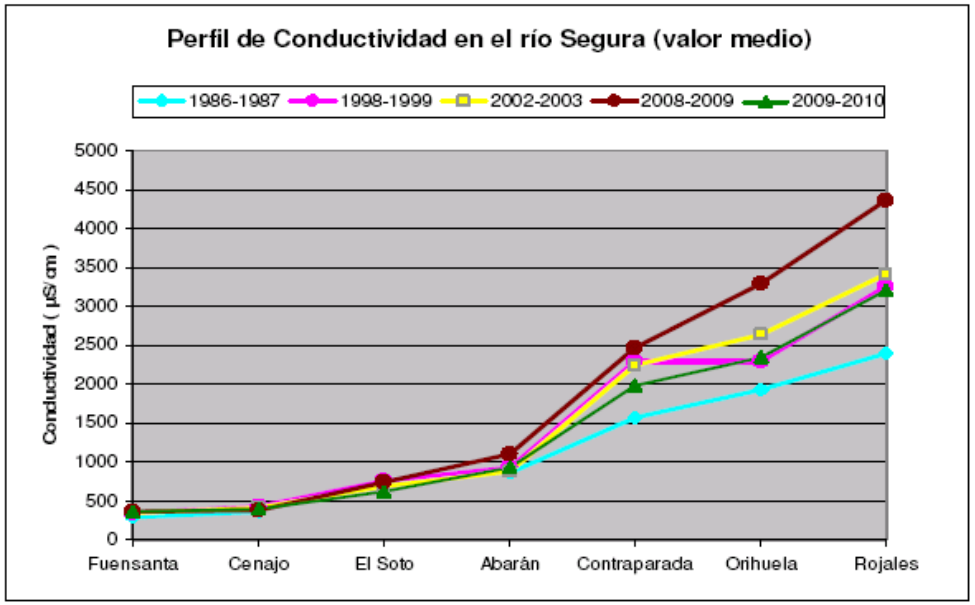
1

AÑOS HIDROLÓGICOS			
	2006-2007	2007-2008	2008-2009
Sondeo	**Volumen m³**	**Volumen m³**	**Volumen m³**
Peralejo 1	1.135.642 m³	1.875.917 m³	0
Peralejo 2	1.162.145 m³	1.849.093 m³	0
Peralejo 3	686.700 m³	1.295.705 m³	0
Peralejo 4	863.856 m³	1.233.288 m³	0
Total	**3.848.342 m³**	**6.254.003 m³**	**0**

Fuente: Comisaría de Aguas- Confederación Hidrográfica del Segura

ENVIRONMENTAL CONSUMING DEMAND





IRRIGATION. SOCIO-ECONOMIC AFFECTIONS

Tabla 38. Comparación entre la sequía actual con la de los años 93-95, para la producción de regadío, en la región de Murcia.

		MEDIA PERIODO SIN SEQUÍA (1990-92)	MEDIA PERIODO CON SEQUÍA (1993-94)	Δ (%)	MEDIA PERIODO SIN SEQUÍA (2002-2004)	MEDIA PERIODO CON SEQUÍA (2005-2009)	Δ (%)
REGADÍO	**SUPERFICIE** (Ha)	156.383	141.664	-9,4%	149.452	142.714	-4,5%
	RENDIMIENTO PRODUCTIVO (T/Ha) (*)	15,97	14,84	-7,1%	17,90	16,71	-6,6%
	PRODUCCIÓN (T)	2.497.608	2.102.322	-15,8%	2.674.587	2.384.884	-10,8%
	RENDIMIENTO ECONÓMICO (€ / Ha)	5.701	5.476	-3,9%	7.695	6.899	-10,3%
	VALOR DE PRODUCCIÓN (M€ de 2002)	891,61	775,80	-13,0%	1.150,10	984,60	-14,4%
INVERNADERO	**SUPERFICIE** (Ha)	3.691	4.325	17,2%	6.183	5.694	-7,9%
	RENDIMIENTO PRODUCTIVO (T/Ha) (*)	157,47	144,48	-8,3%	85,99	87,34	1,6%
	PRODUCCIÓN (T)	581.285	624.790	7,5%	531.701	497.269	-6,5%
	RENDIMIENTO ECONÓMICO (€ / Ha)	59.903	55.370	-7,6%	41.065	36.070	-12,2%
	VALOR DE PRODUCCIÓN (M€ de 2002)	221,12	239,45	8,3%	253,92	205,37	-19,1%
TOTAL	**SUPERFICIE** (Ha)	160.074	145.989	-8,8%	155.635	148.408	-4,6%
	RENDIMIENTO PRODUCTIVO (T/Ha) (*)	19,23	18,68	-2,9%	20,60	19,42	-5,7%
	PRODUCCIÓN (T)	3.078.893	2.727.112	-11,4%	3.206.288	2.882.153	-10,1%
	RENDIMIENTO ECONÓMICO (€ / Ha)	4.623	5.204	12,6%	9.021	8.018	-11,1%
	VALOR DE PRODUCCIÓN (M€ de 2002)	740,05	759,78	2,7%	1.404,02	1.189,98	-15,2%

Urgent and Emergency Works Investment

The investment effort undertaken during the last drought period has provided additional water resources in a critical water scarcity moment.

TYPE OF WORKS/HIDROLOGIC YEAR	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	Total (M€)
Desalination Plants (M€)	243,50	6,04	0,00	0,00	1,25	250,79
BES (M€)	0,00	16,00	8,00	8,95	6,10	39,05
Urban supply (M€)	26,50	6,50	2,39	0,00	8,98	44,37
Water Transfer Infrastructures maintenance (M€)	0,00	5,70	3,90	4,00	3,73	17,33
Irrigation infrastructures (M€)	21,00	0,00	7,59	1,32	5,81	35,72
Others (M€)	6,80	7,80	0,00	0,00	4,59	19,19
Total (M€)	**297,80**	**42,04**	**21,88**	**14,27**	**30,46**	**406,46**

Investment

4. CONCLUSIONS

1. The Special Action Plan in situations of alert and temporary drought (PES) is the main tool for effective management.

2. Development of new drought Indicators in the future or improve actual drought Indicators are essential in the PES evolution.

3. As a result of climatic changes, the situation of the river basins will be aggravated with water scarcity or drought (increased frequency and intensity).

4. A major investment effort will be needed in the field of water management plans for improved drought management. (Request economic funds from EU.)

5. Water scarcity and Drought management could be undertaken in an integrated management framework, which will exceed their own geographical limits (PAC, etc…) and all under the principles of the Water Framework Directive (WFD).

River Basin Authority

THANKS FOR YOUR ATTENTION

For further information, please visit: http://www.chsegura.es