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AMBIENTE

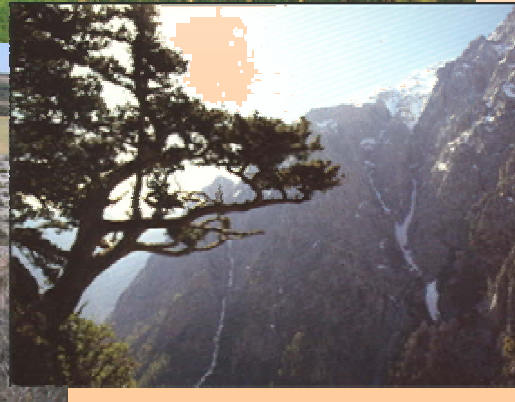
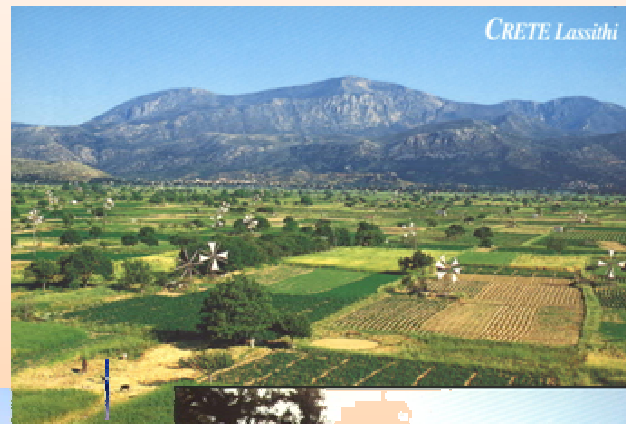
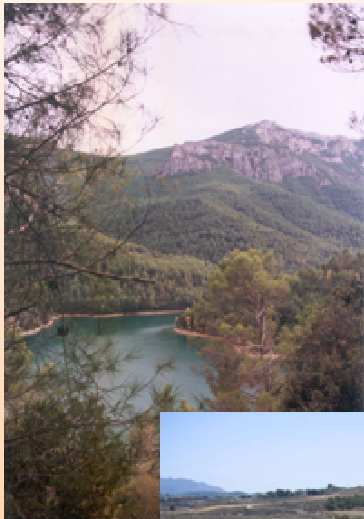
CONFEDERACIÓN  
HIDROGRÁFICA  
DEL SEGURA



# SEGURA-CRETE

## TWINNING PROJECT BETWEEN THE RIVER BASIN ORGANISATIONS

IN AGREEMENT WITH THE TWINBASIN<sup>xn</sup> PROJECT LEADED BY REMOC



**Mario A. Urrea Mallebrera**  
**Segura River Basin authority**  
**Marinos Kritsotakis**  
**Crete Water Directorate**

# SEGURA-CRETE

## TWINNING PROJECT BETWEEN THE RIVER BASIN ORGANISATIONS

The project has been selected within the framework of the "Global change and ecosystems" priority of the 6<sup>th</sup> Framework Program for European Research

The official launch of the project will take place on Sunday 25 January 2004, during INBO General Assembly in the Martinique (French Antilles).

REMOC Meeting (Marrakech. Maroc May 2005) Segura – Crete  
Decision to join in a twinbasin project

July 2005 subscription of the twinning project



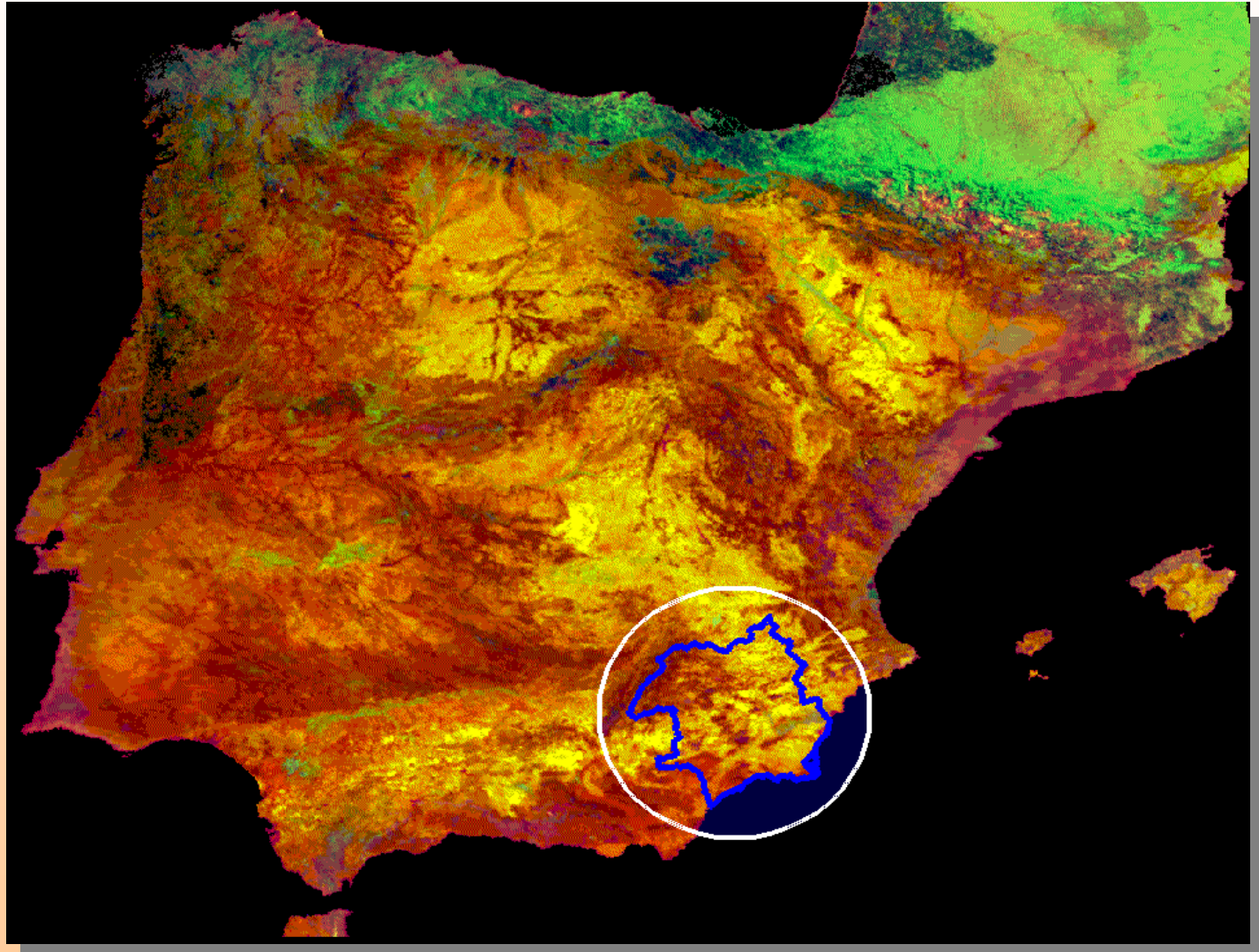
# SEGURA-CRETE

## TWINNING PROJECT BETWEEN THE RIVER BASIN ORGANISATIONS

- July 2005 subscription of the twinning project.
- September-October 2005. Preparation of the mission Segura.
- 14 – 18 November 2005. Mission Segura
- January 2006. Report C2T9 M1M2 finished. (In the web)
- March-April 2006. Preparation of the mission Crete.
- 21-27 may 2006. Mission Crete.
- July 2006. Report C2T9 M3M4 finished. (In the web)



# Segura RBD in Spain





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# SPANISH RBD's

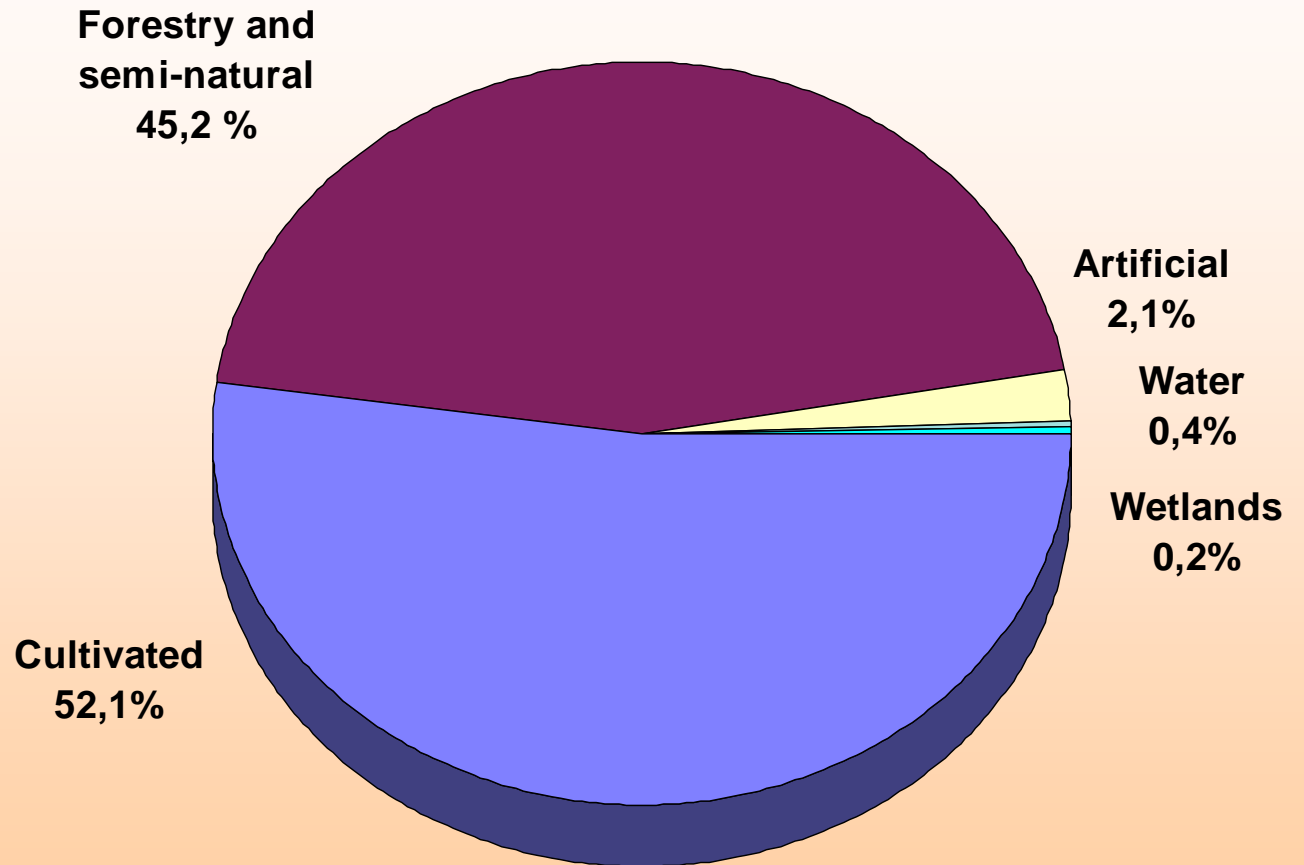




## BASIC PARAMETERS OF THE SEGURA BASIN

<u>Total surface</u>	<u>18.871 km<sup>2</sup></u>
<u>Average temperature range</u>	<u>10-18° C</u>
<u>Maximum temperature</u>	<u>45° C</u>
<u>Precipitation range</u>	<u>200-1000 mm.</u>
<u>Average precipitation</u>	<u>365 mm.</u>
<u>Evapotranspiración potential range</u>	<u>600-950 mm.</u>
<u>Average potential evapotranspiration</u>	<u>827 mm.</u>
<u>Altitude range</u>	<u>0 – 2.100 m</u>
<u>Total population</u>	<u>1.790.450 people</u>
<u>Mean population density</u>	<u>95 people/km<sup>2</sup></u>

# LAND USE



**Total net irrigated surface.**

**269.029 hectares**

**Protected natural areas (Natura 2000).**

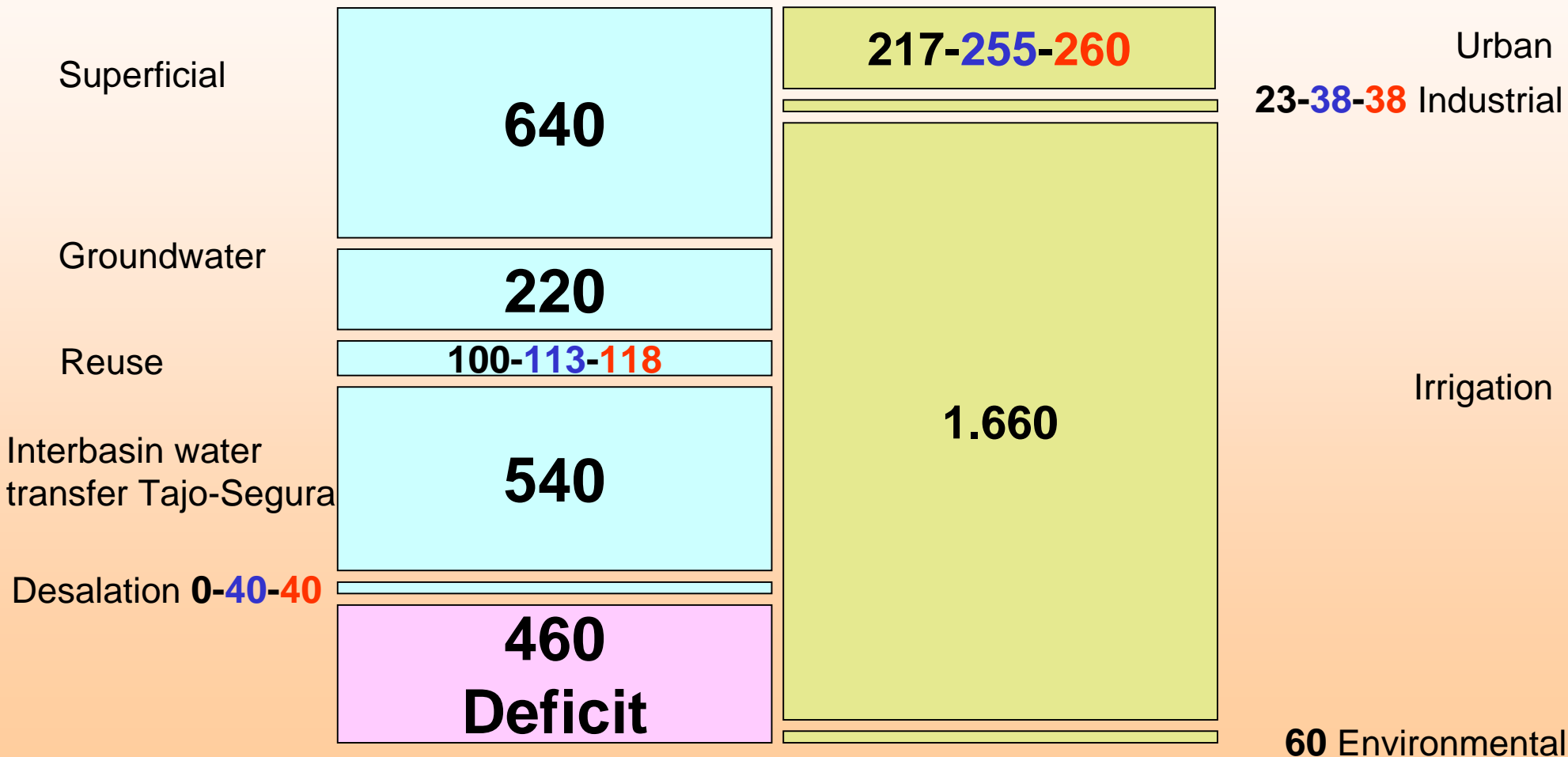
**More than 900.000 hectares**



# BALANCE (hm<sup>3</sup>)

## Resources

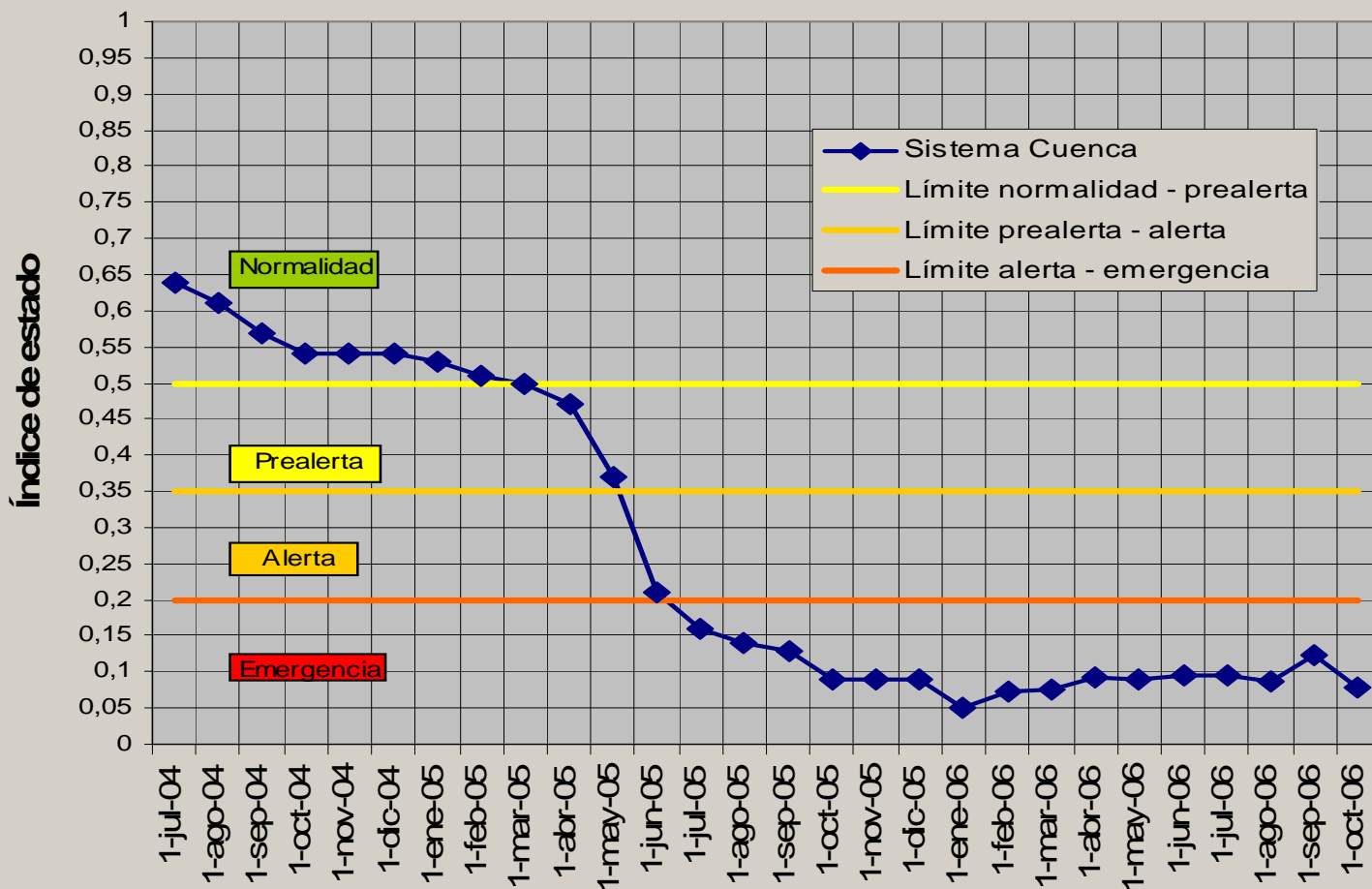
## Demands





# DRAUGHT INDICATOR

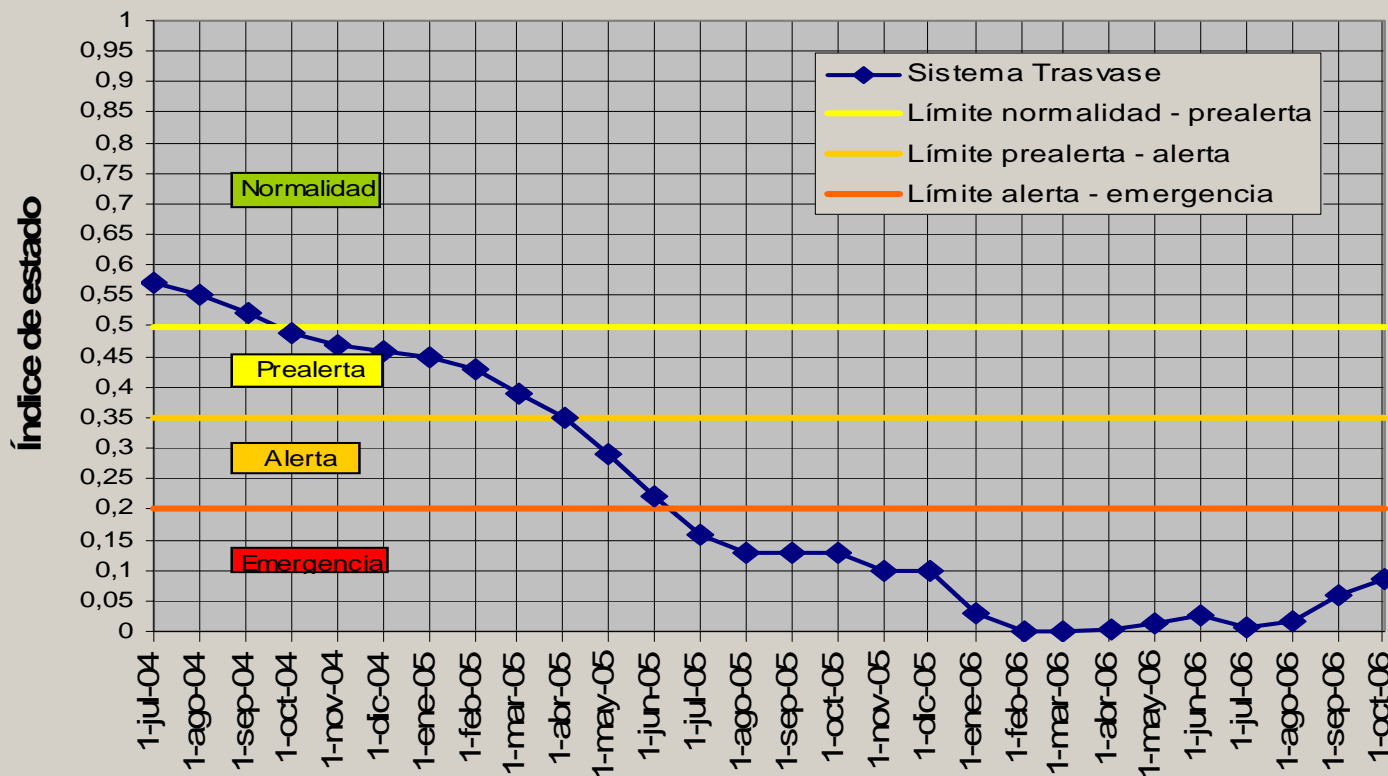
## Evolución del Índice de Estado del Sistema Cuenca





# DRAUGHT INDICATOR

## Evolución del Índice de Estado del Sistema Trasvase





## Objectives of the missions

- Knowledge about the implementation of the Water Framework Directive (WFD):
- Draught and flood prevention: plans and programmes
- Groundwater (exploitation and protection)
- Automated Telemetric Network monitoring groundwater parameters.( quality & quantity)
- Other monitoring networks.
- Administrative framework (Organisation of the River basin authority)



## Activities of the misión in Crete

- Institutional framework
- Water infrastructures use in the south area of Herakleion
- Ground water resources in the south east of Crete
- Water management in the western of Crete
- Implementation of the WFD in Greece. Ecological status
- Ground water monitoring networks
- Tools used for an IWRM in Crete island
- Visit to the Hellenic Centre for marine Research



## **View point: Administrative framework.**

The Regional Water Directorate of Crete is a new structure with a direct dependence from the central Greek Government and the Segura RBA is an older (1903) and bigger structure with a high degree of autonomy in different aspects and specifically in the application of the IWRMS.

In Spain the concept of the RBD introduced by the WFD is very old. Yet in 1927 the Confederaciones Hidrográficas were created to manage the basins of the main rivers.

In 1985, the National Water Act and latest modifications introduces the obligation of made an integrated water resources management using all the water allowable (Groundwater, superficial, desalination, treated waste water, etc..)

## **View point: Administrative framework.**

This National Water Act also introduces both the concept of the Basin Hydrological Plan and the National Hydrological Plan.

The Segura River Hydrological Plan was approved in July 1998 and includes:

- All the necessary studies about the basin characteristics (resources, demands, projections in the time,.....).
- A schedule of investments
- A economic and financial evaluation.

The National Hydrological Plan was approved in July 2001 and has received several modifications and improvements.

Both includes the IWRM as one of the purposes to arise.

## View point: Administrative framework.

- The Greek local administrations (municipalities) plays an important role in the creation and the management of water resources, bigger than in Spain.
- The structure of the investment projects around the application of the WFD, water resources and agriculture are similar than in Spain except in the own funds that are inexistent in Greece.





# MINISTRY OF ENVIRONMENT

GENERAL SECRETARY FOR THE TERRITORY AND BIODIVERSITY

GENERAL SECRETARY FOR POLLUTION AND CLIMATE CHANGE

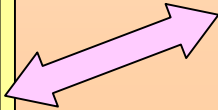
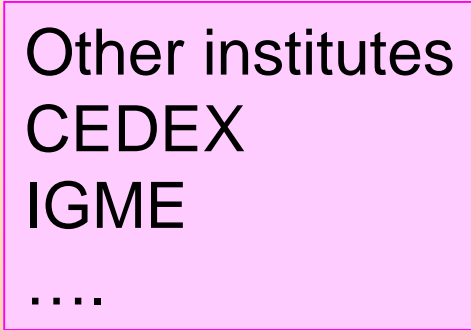
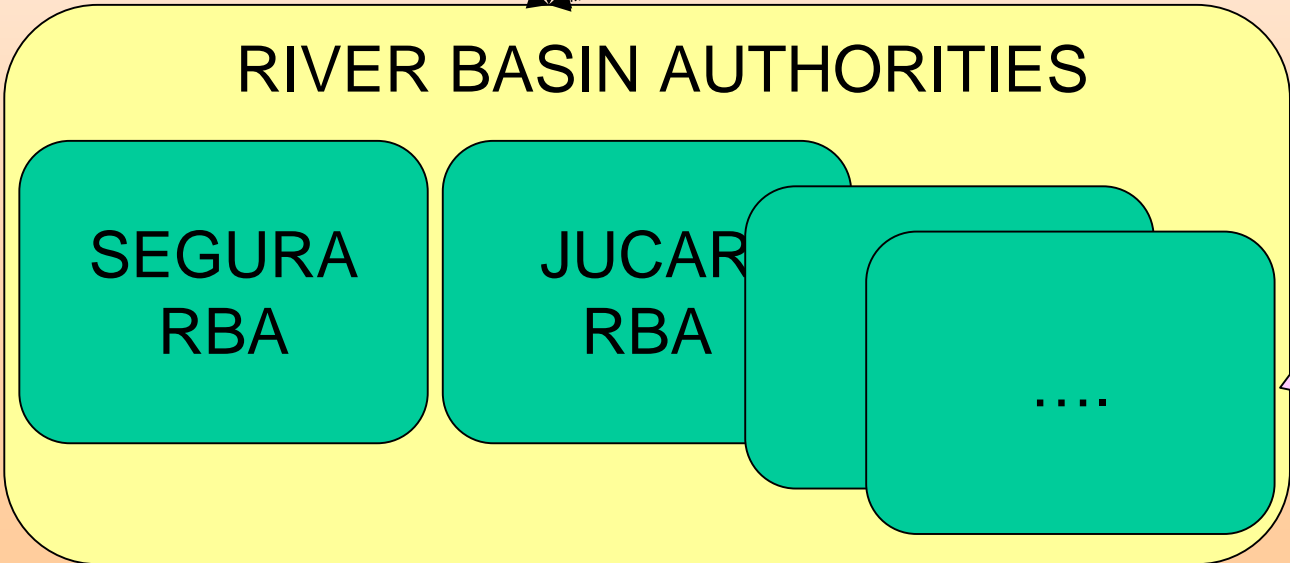
COASTAL GENERAL DIRECTION

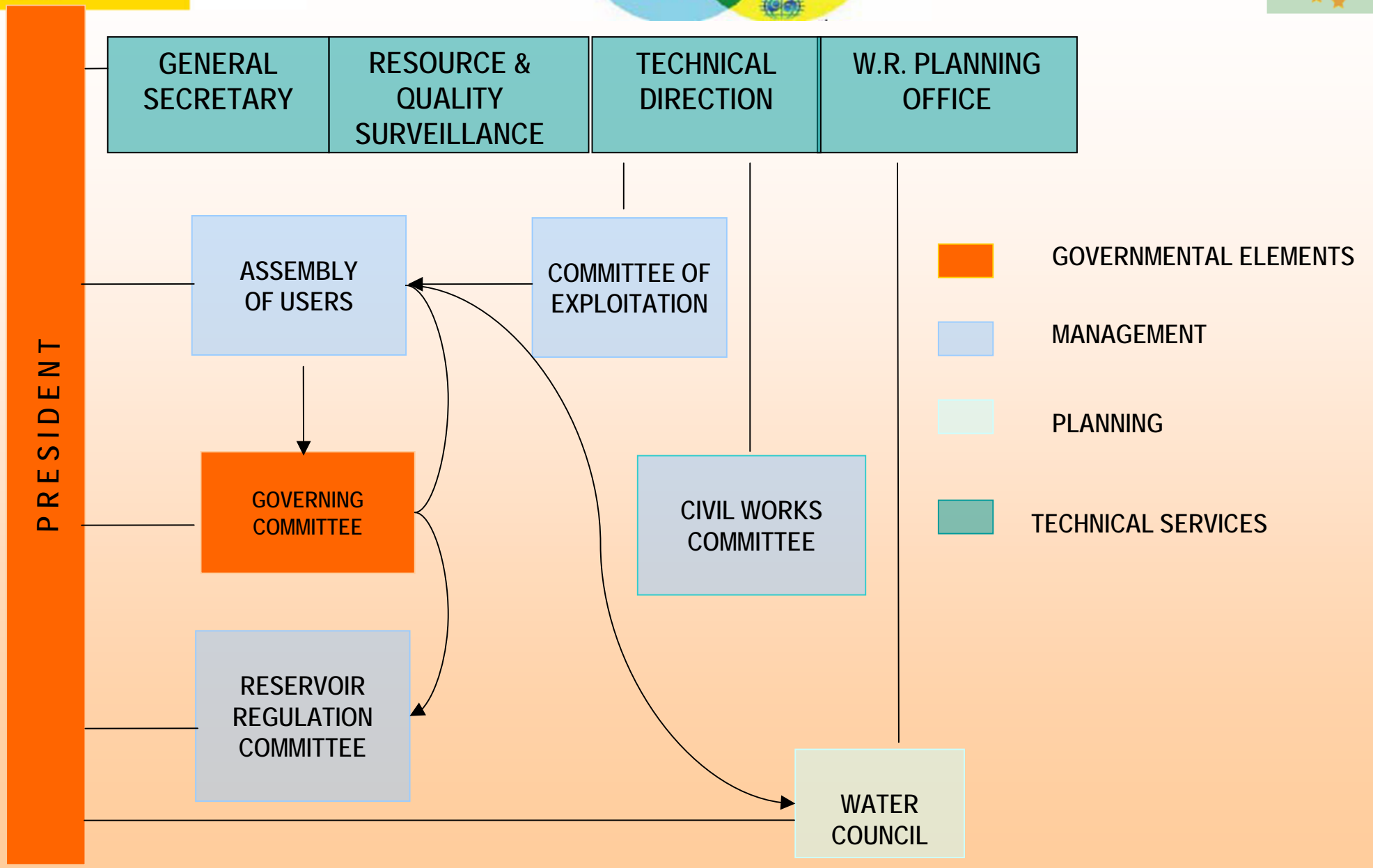
WATER GENERAL DIRECTION

BIODIVERSITY GENERAL DIRECTION

QUALITY GENERAL DIRECTION

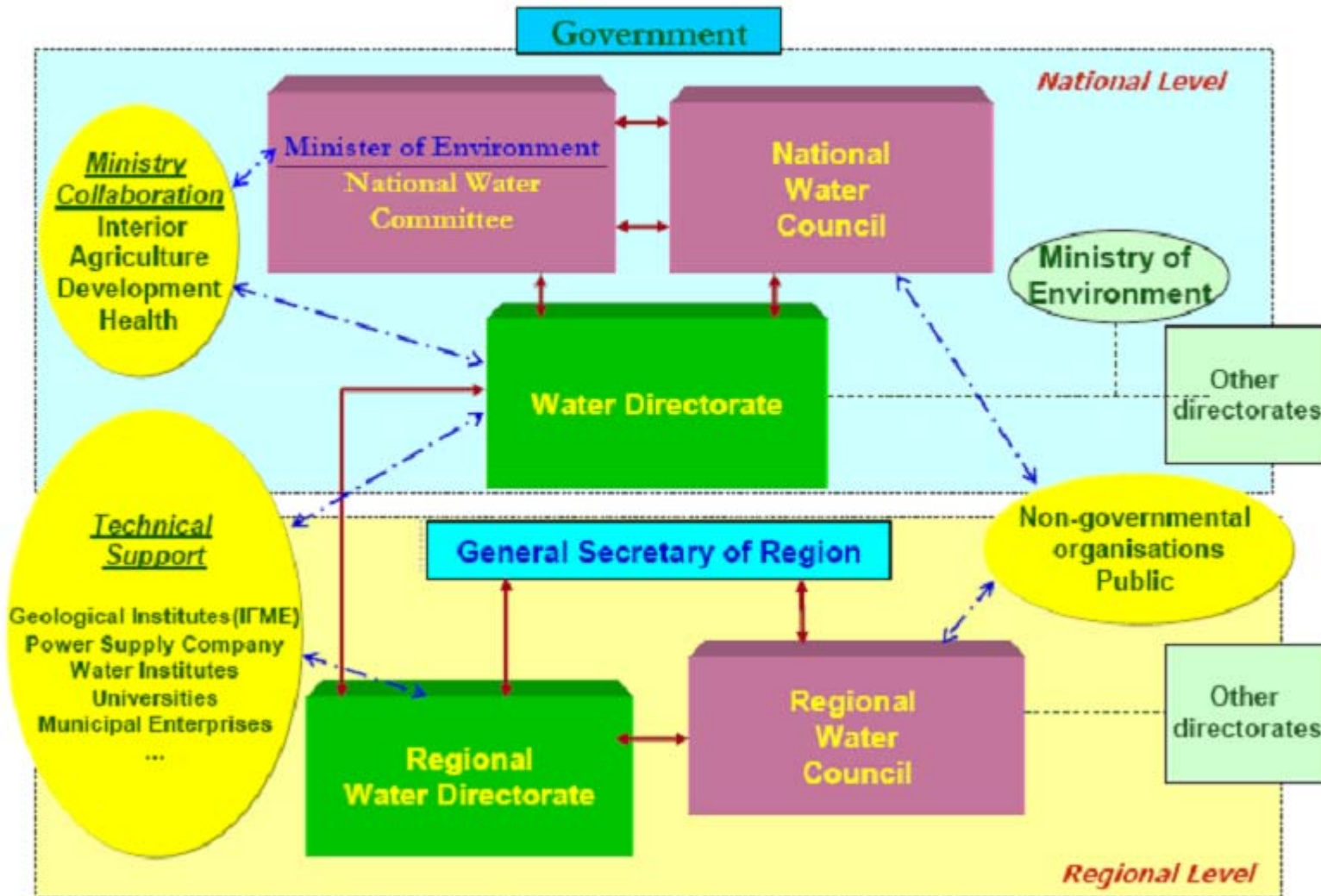
METEOROLOGICAL NATIONAL INSTITUTE







# New Institutional Structure (as of Dec. 2003)





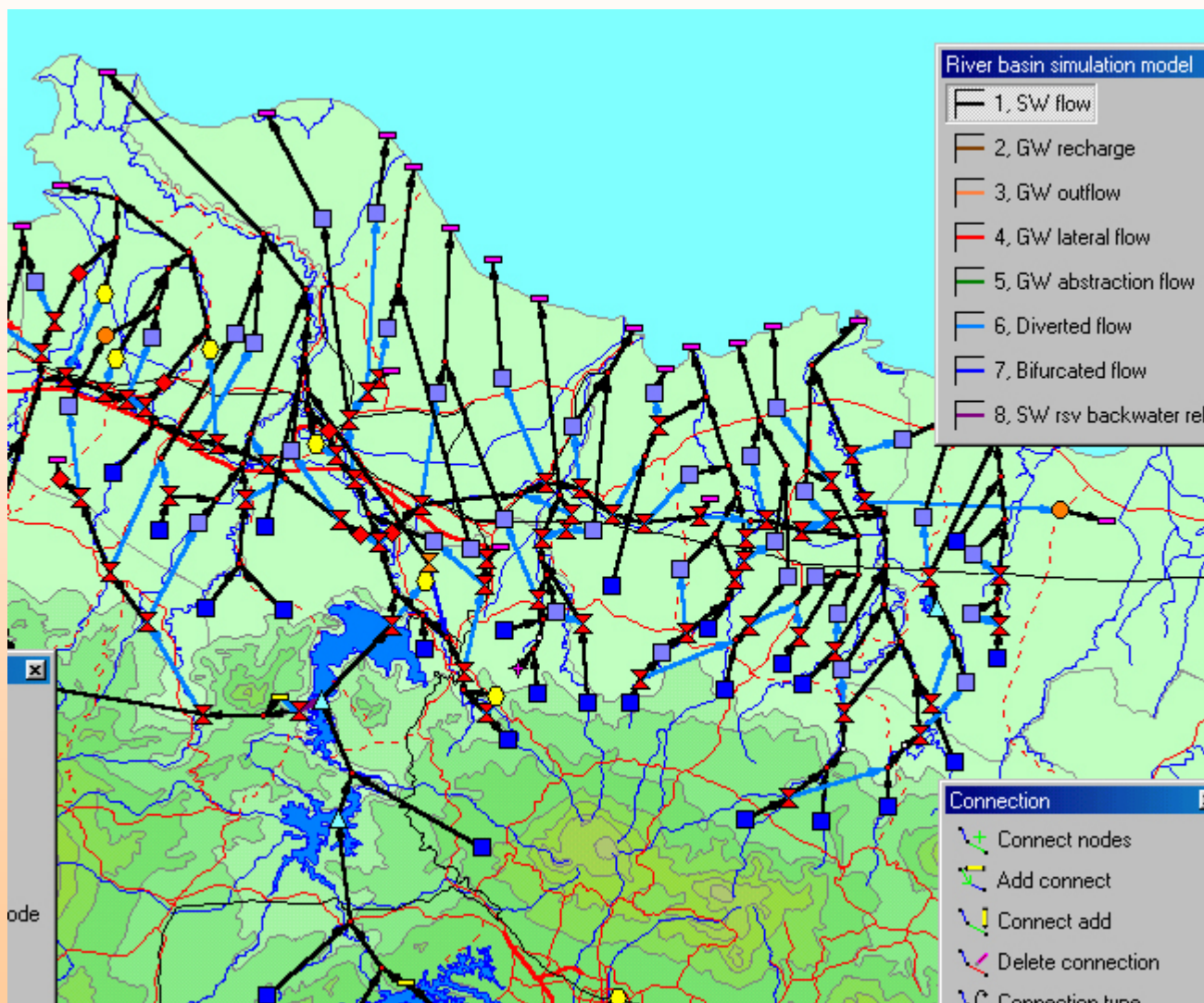
## View point: IWRM tools

The degree of technology use in both water administrations for the IWRM are similar, but the tools are different.

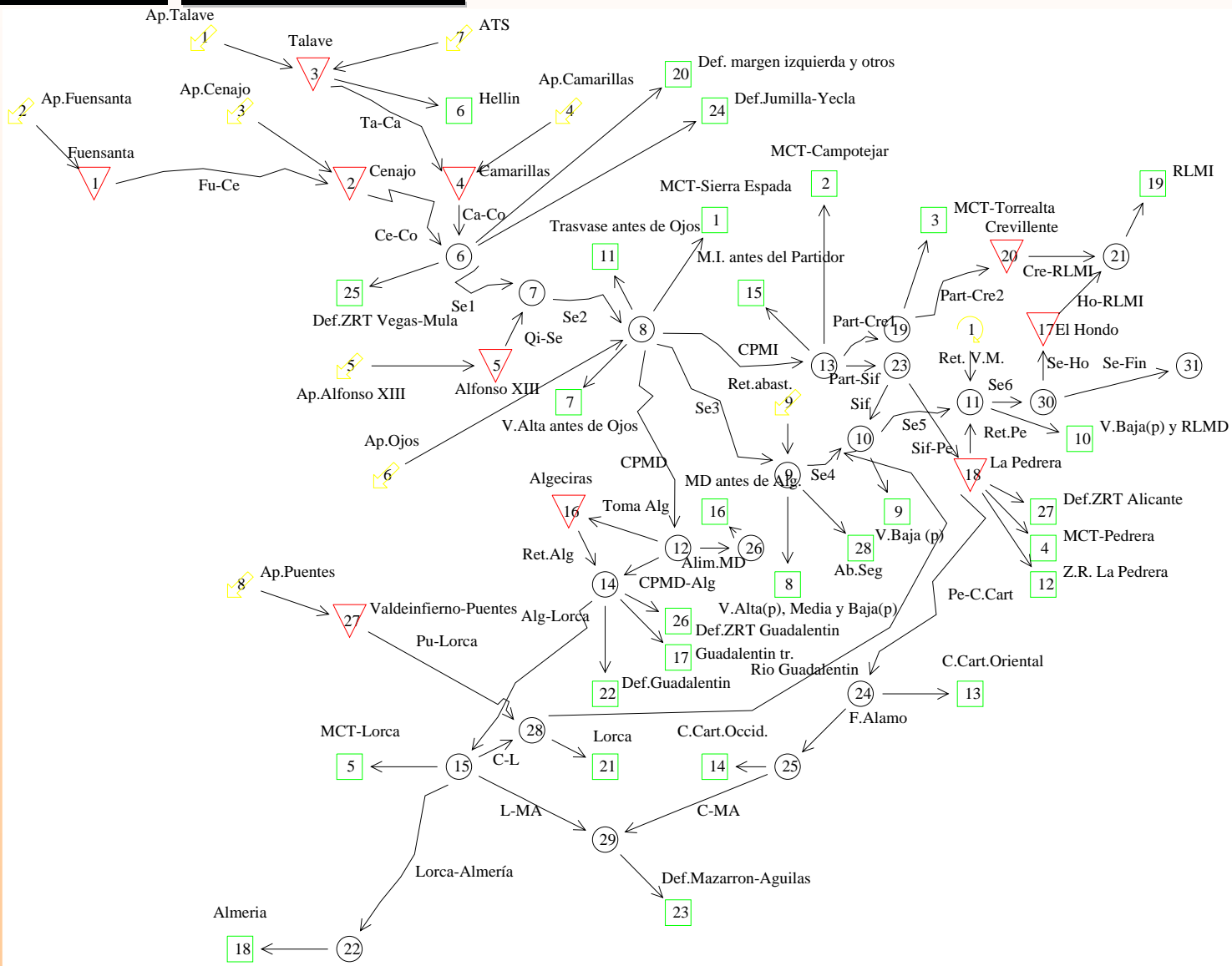
- In Crete the experts of the Water Authority are using commercial products from Delft Hydraulics (Ribasim and Hymos).
- In Spain we use products from Polytechnic University of Valencia (SSD-Aquatool, Simges-Simwin.....)
- The application of that advanced tools allows a detailed simulation of the RBD and several analysis of the different elements in the system to perform an IWRM.
- The Gis tools are similar than used in the Segura RBD.



## View point: IWRM tools



# View point: IWRM tools





## **View point: Solutions for an IWRM in an area without surficial resources**

- In Crete Island, a territory without permanent rivers the different authorities have applied different solutions used to ensure an enough amount of water resources trying to avoid the overexploitation of aquifers and salt intrusion.
- During the visit we know solutions like the interception system for the Malaura Brackish Spring and the Bramiana reservoir that allows the interannual groundwater resources management in a territory without surficial resources and a lot of wells managed by the local authorities and organisations.



## View point: Solutions for an IWRM in an area without surficial resources







## View point: Telemetric systems of groundwater resources

- In Crete are operating an on-line telemetric monitoring system who obtain meteorological information and quantitative and quality parameters of groundwater in the island.
- The technologies of communication, the sensors and the parameters registered are similar than the ones in Spain.
- The data received by the system finally are stored in the same database (HYMOS) that is used by the simulation tools (RIBASIM) used in the IWRM of the RBD of Crete. In the Segura RBD we are working in a similar integration of data in a Corporate Information System.
- The integration of the data in unique structures is an important challenge to allow a correct use of IWRM tools.



## View point: Telemetric systems



Telemetric systems in the Segura  
RBD (SAIH)



## View point: Greek biotic measure system based on macroinvertebrates

- The system is based on a specific biotic metric on macroinvertebrates and adapted for the Greek conditions (BMG) and a nutrient pollution metric using PCA.
- This methodology is suitable for classify rivers and ephemeral streams according to the WFD and can be adapted to other similar areas in EU than the south east RBD's in Spain.



## View point: Greek biotic Measure system based on macroinvertebrates



A river in the  
Segura RBD

A river in Crete

## Evaluation of the missions (I)

The project has been very interesting to both water administrations in the different aspects of the collaboration.

In the knowledge of the different administrative organisations around the water.

The degree of technology use in both water administrations for the IWRM are similar.(Telemetric networks, IWRM Tools....)

The final technical methodologies derived of the Development of a Greek biotic metric based on macro invertebrates will be very interesting to compare with the used in the SRB.



## Evaluation of the missions (II)

When we start the project we suppose that the problems in both basins are similar but there are a big difference in the resources and the demands that must to be considered:

### Total resources

- Crete. (>2000 hm<sup>3</sup> / 927 mm of annual precipitation)
- Segura RBD (<1000 hm<sup>3</sup> / 365 mm of annual precipitation)

### Total demands

- <400 hm<sup>3</sup> in Crete
- 2000 hm<sup>3</sup> in the Segura



## Evaluation of the missions (III)

The problems derived of that resources scarcity must to be solved using solutions that are not used in Crete.

Water desalination.

- Municipalities water supply.
- High efficient and competitive crops

Adequately treated waste water

- For agricultural uses
- Irrigation of golf courses

Modernization of irrigation infrastructures and techniques

Reducing losses in the networks

Reducing consumptions by hectare. (Drop systems, hydroponic crops)



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**Thanks for your attention**

**[www:chsegura.es](http://www.chsegura.es)**