



Water reuse experiences in Catalonia

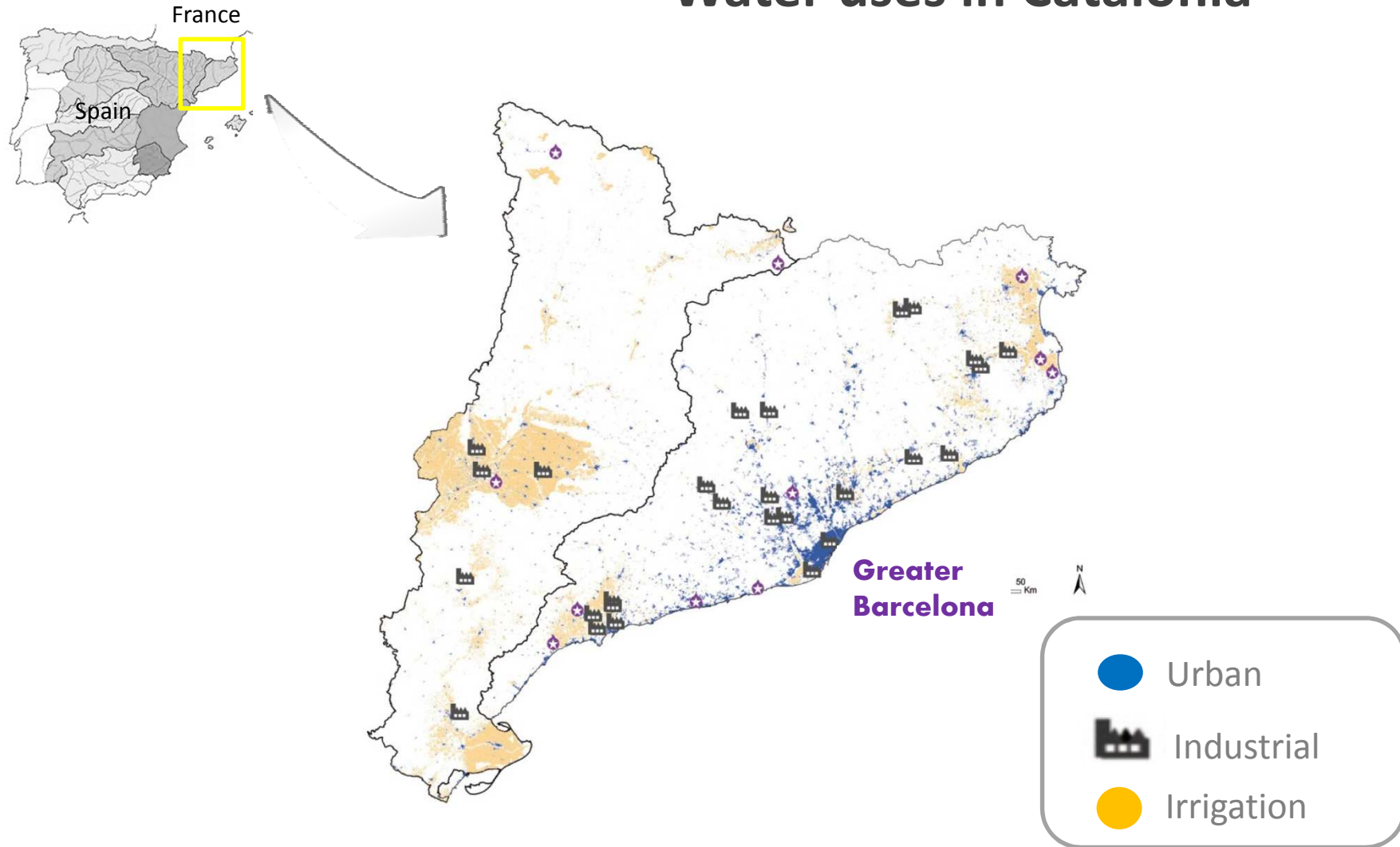
Water Reuse Conference
DEMOWARE

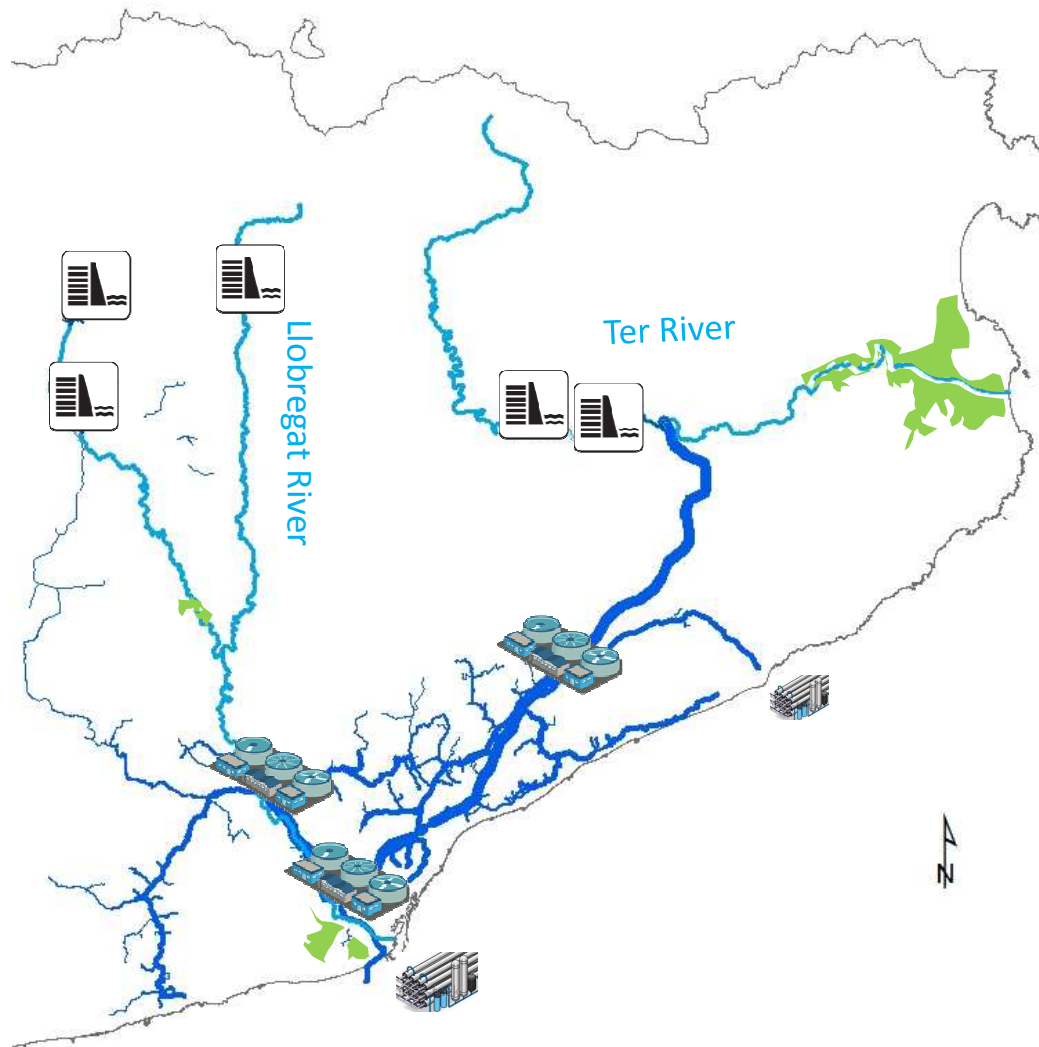
Barcelona, 13-14 th June 2016

Jordi Molist
Director of Water Supply
Catalan Water Agency

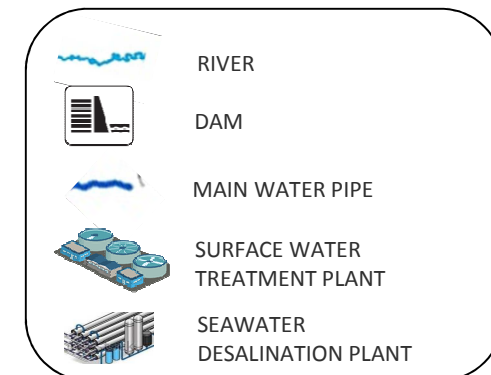


Water uses in Catalonia

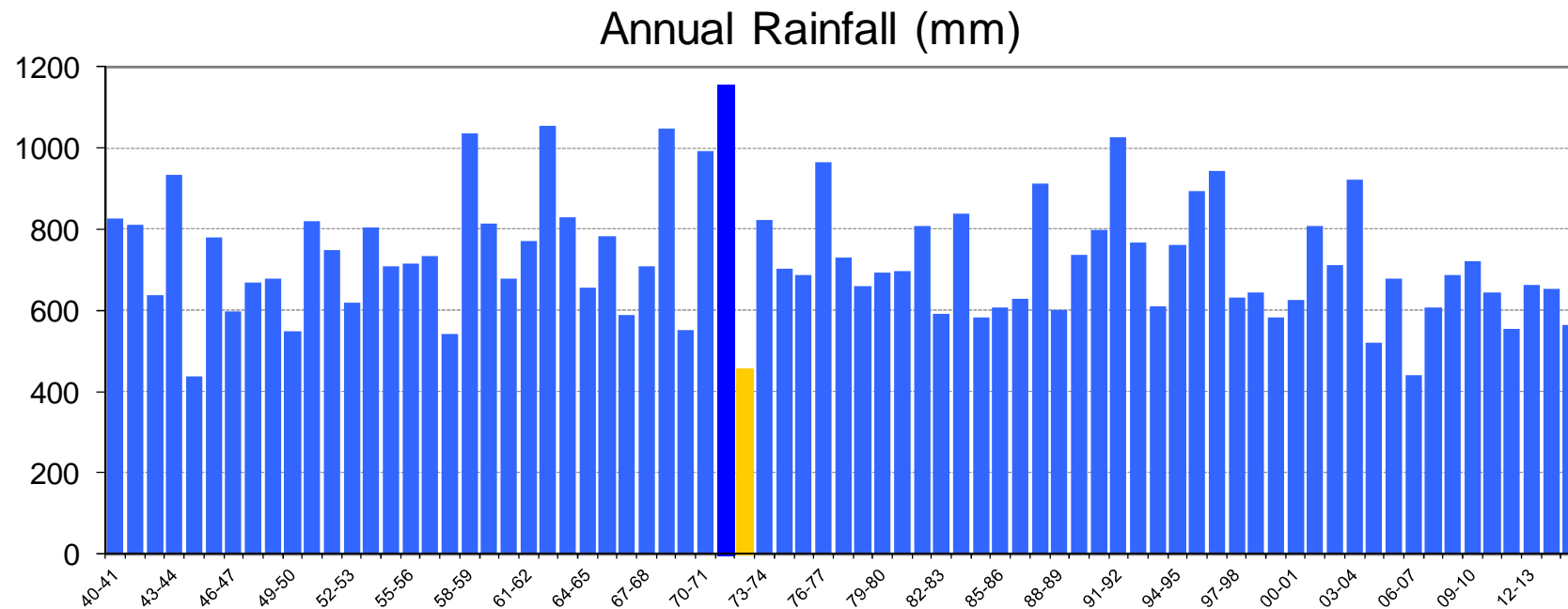




Greater Barcelona Water Supply depends basically on surface water, with groundwater and desalinated seawater as a reinforcement.



Variable rainfall (Mediterranean Climate)



RESERVOIRS STORAGE

Evolució de les reserves al conjunt d'embassaments del Ter - Llobregat (hm^3) respecte l'actual consigna d'Alerta



In 2006-08, a severe two-years drought put Barcelona water supply at the stake (very near to a declaration of Emergency).



WATER SUPPLY DIVERSIFICATION ESTRATEGY

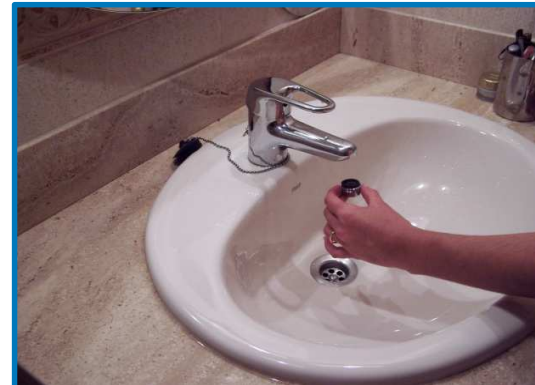
SW DESALINATION



GW RECOVERY

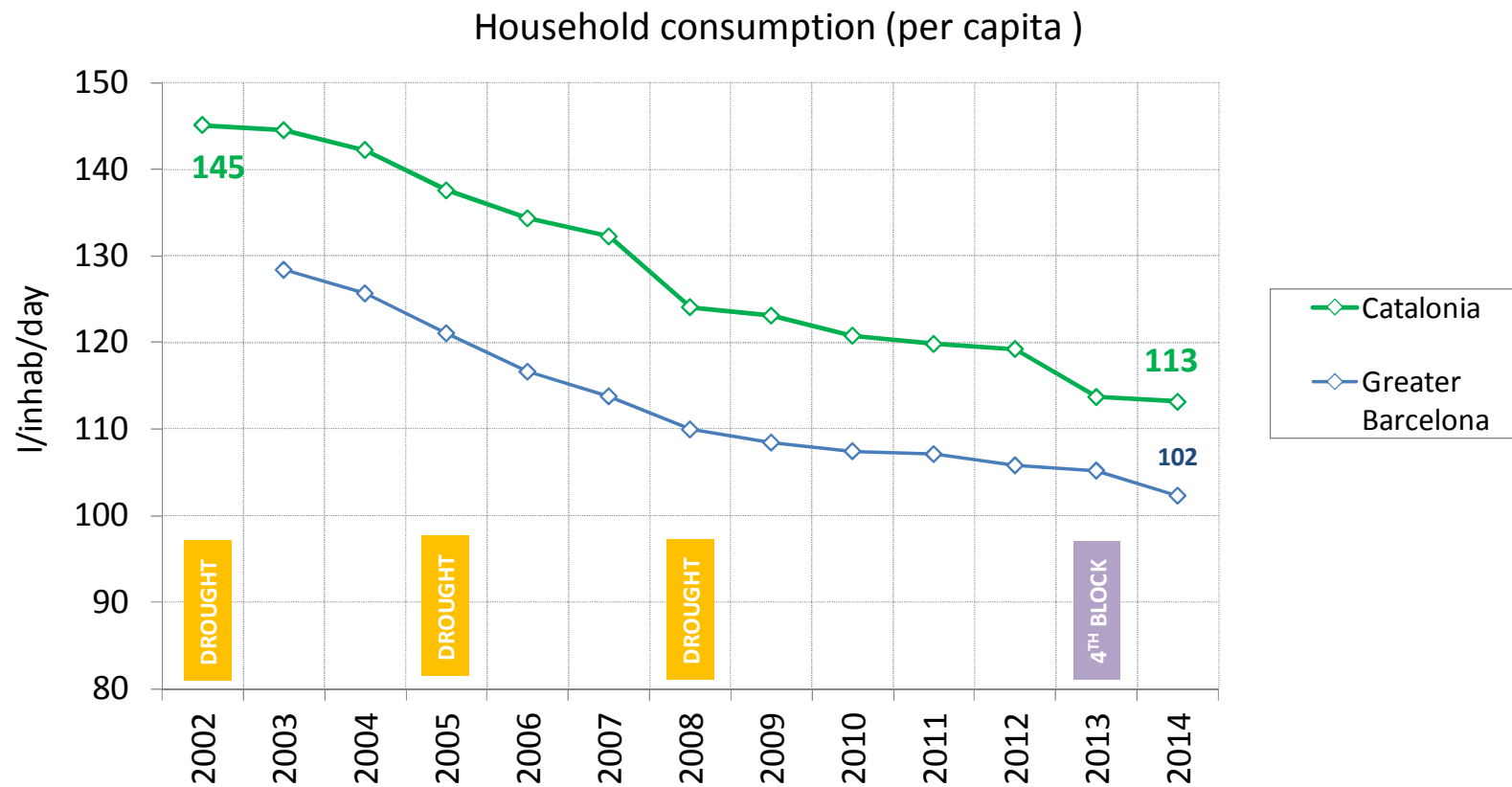


WATER REUSE



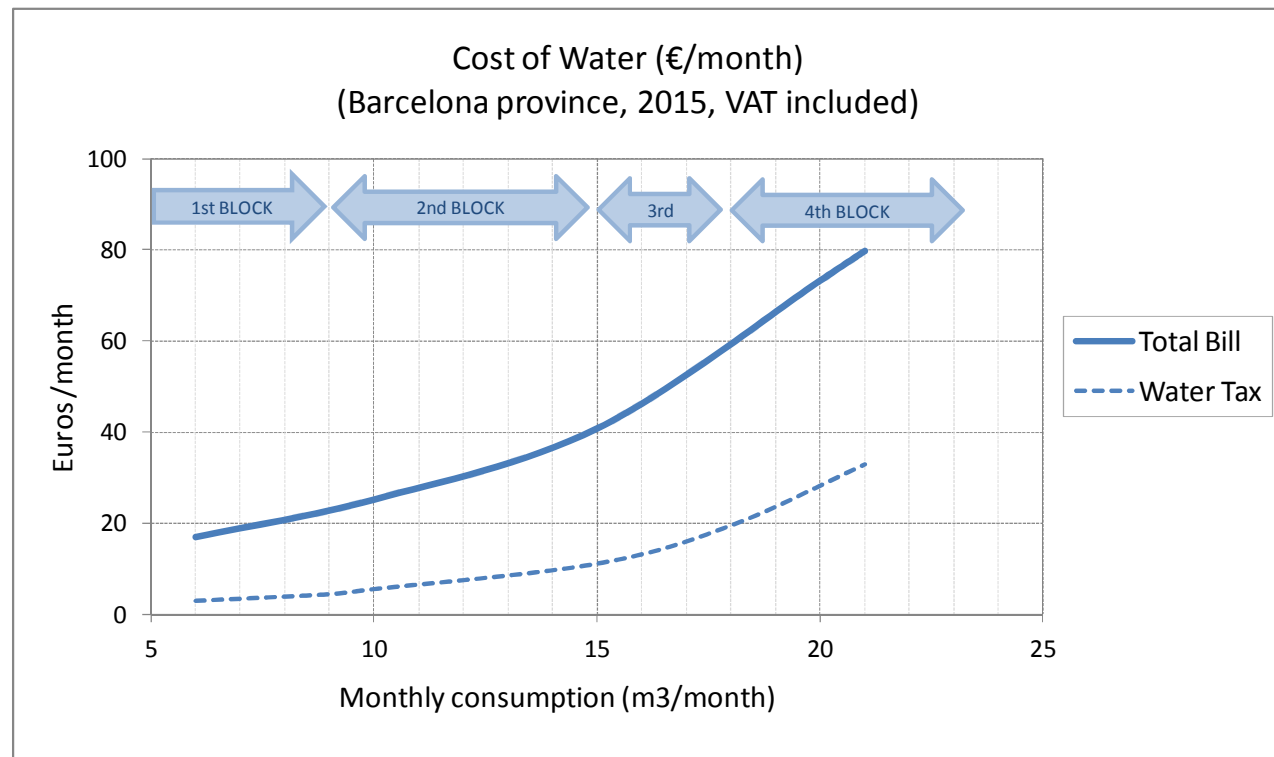
CONSERVATION

WATER CONSERVATION: THE EFFECT OF DROUGHTS... AND PRICES



PRICE STRUCTURES ARE VERY PROGRESSIVE

In 2012 a fourth block was introduced in the Water Tax, for consumptions over 200 l/inhab/day



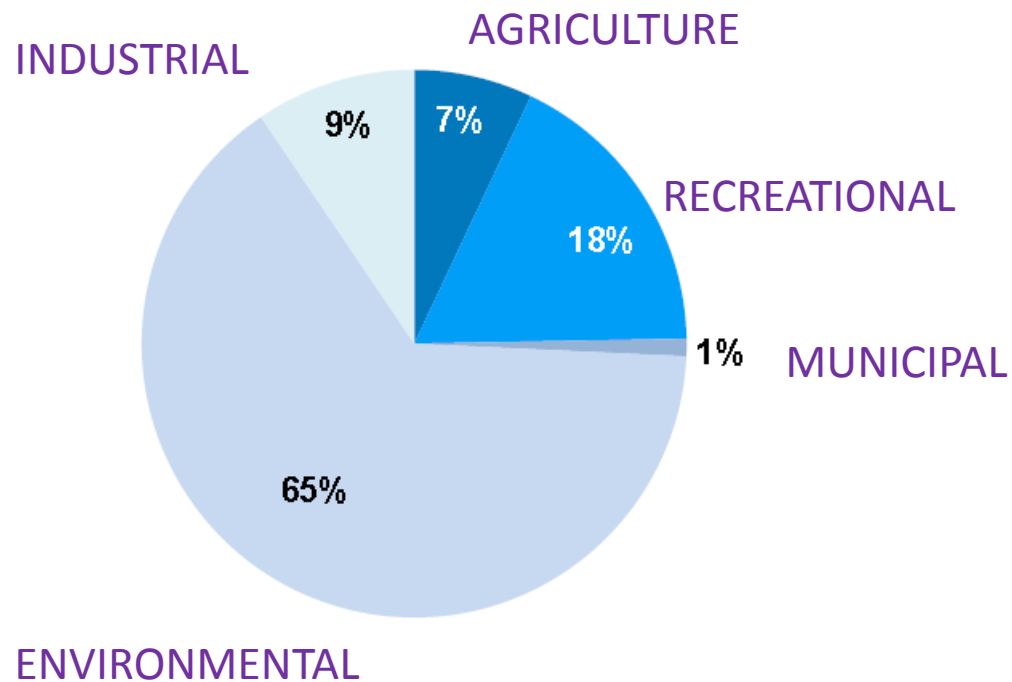
AVERAGE 2,70 €/m³ (VAT incl.)

42 RECLAMATION PLANTS FOR WATER REUSE

Although many of them working only during droughts

25,3 hm³ reused in 2014

54,1 hm³ reused in 2008 (*drought*)

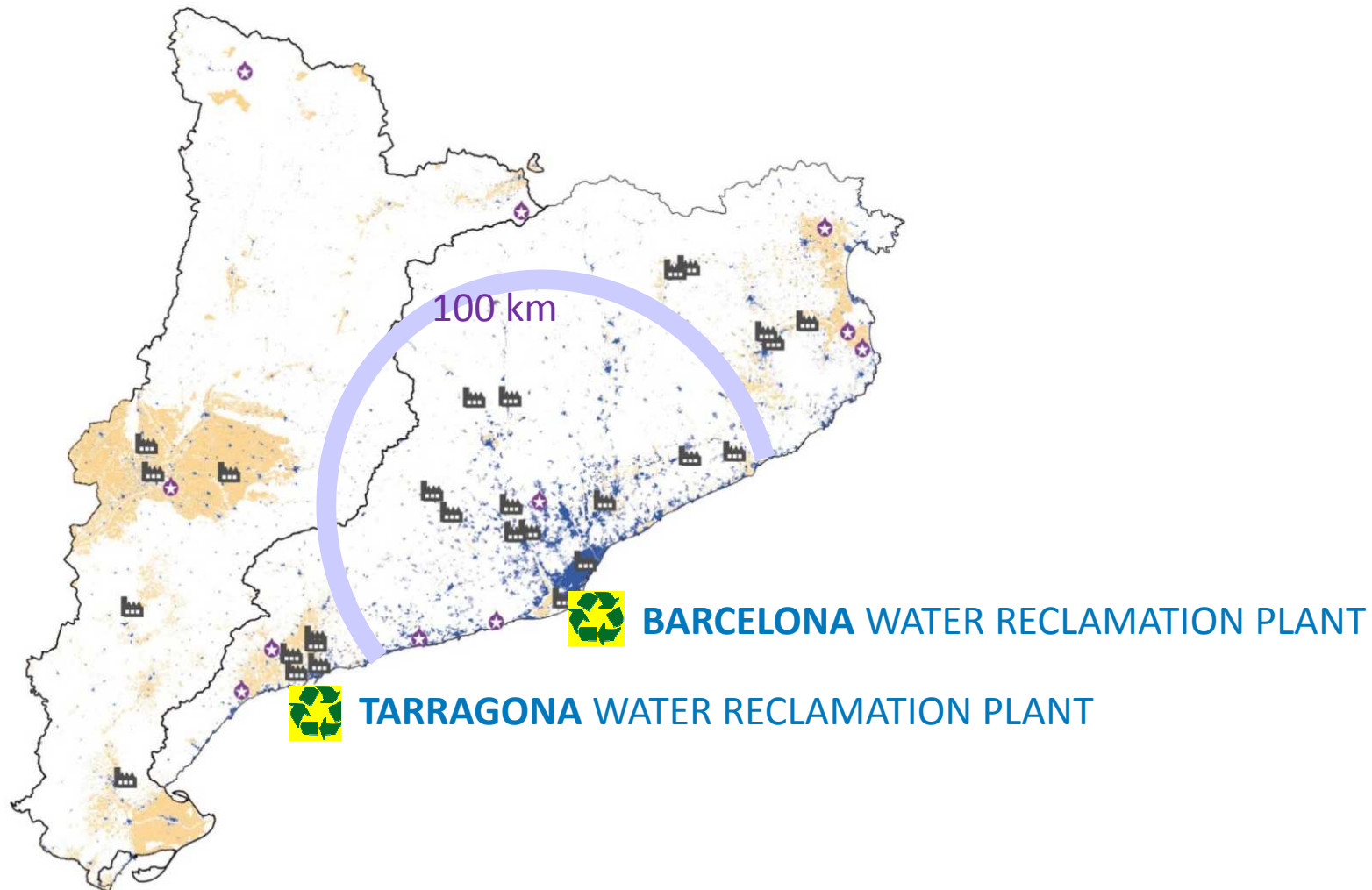


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BARCELONA WATER RECLAMATION PLANT



River augmentation upstream of the DWTP (in case of severe drought)

Environmental river flows

Farm irrigation

Municipal uses

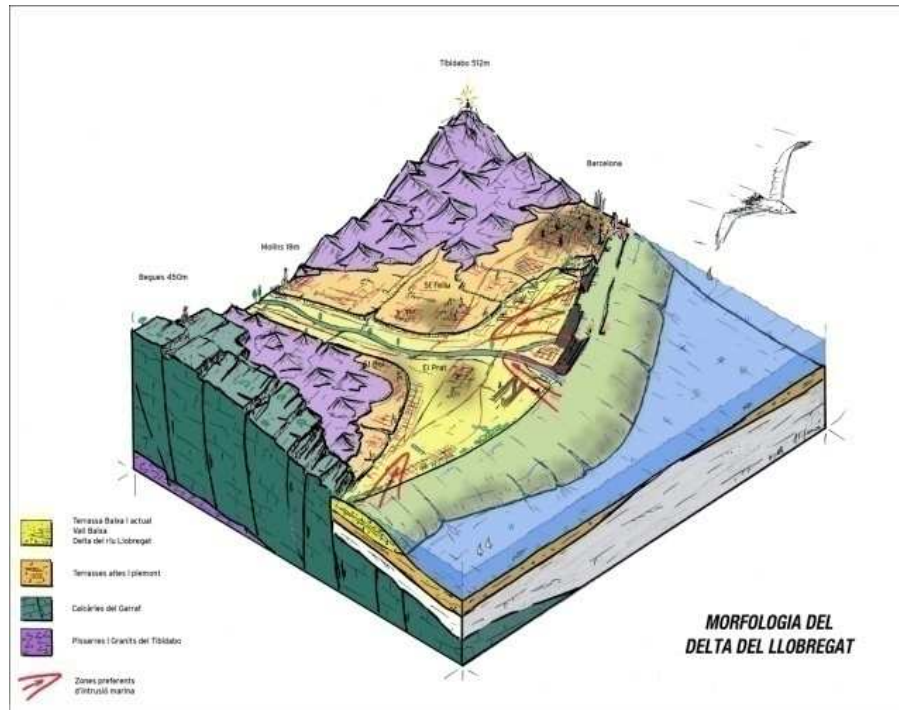
Hydraulic barrier for groundwater replenishment

Artificial wetlands

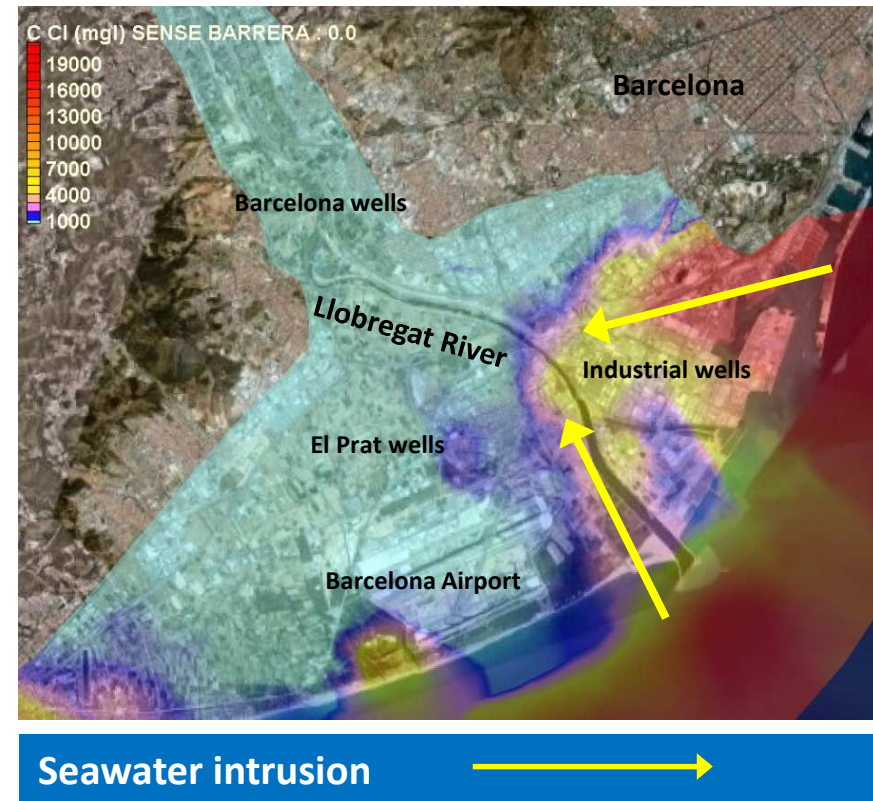


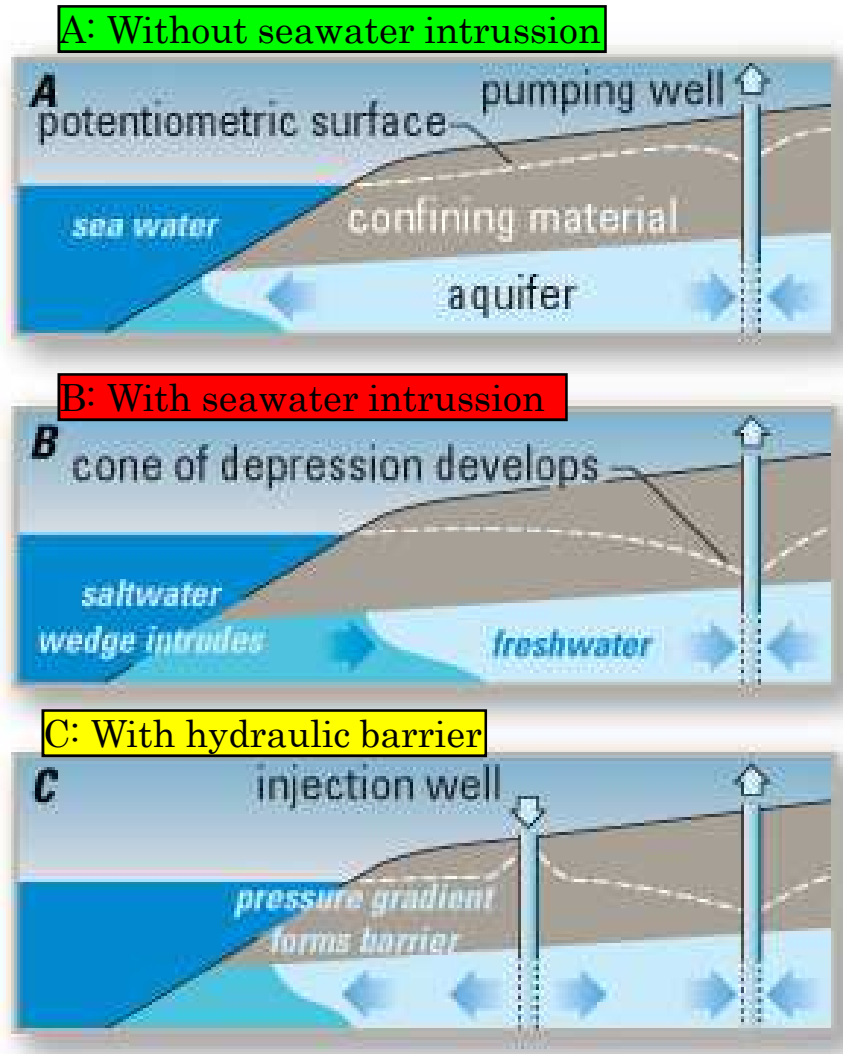
BARCELONA WATER RECLAMATION PLANT

Hydraulic barrier for groundwater replenishment



Delta del Llobregat Aquifer





(US Geological Survey, Fact Sheet 030-02)



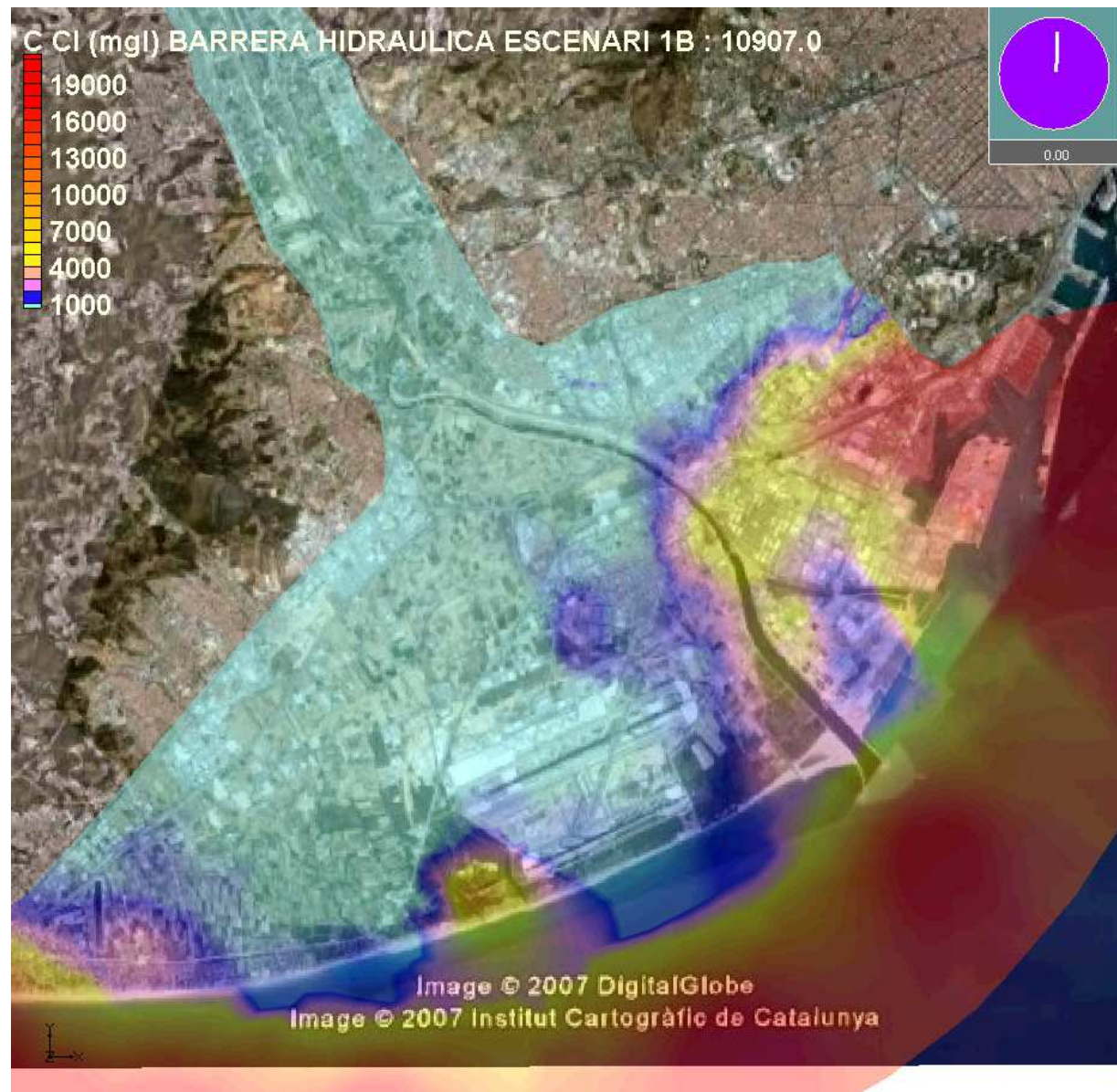
Numerical simulation of the hydraulic barrier

Injection capacity
15.000 m³/day

Expected injection:
5 hm³/year

Variable cost of production:
~ 0,25 €/m³

**Numerical simulation of the
chlorine concentrations in
the aquifer (2010-2040)**



BARCELONA WATER RECLAMATION PLANT

Hydraulic barrier for groundwater replenishment



BASIC RECLAMATION TREATMENT



ULTRAFILTRATION

35% to 50%



REVERSE OSMOSIS

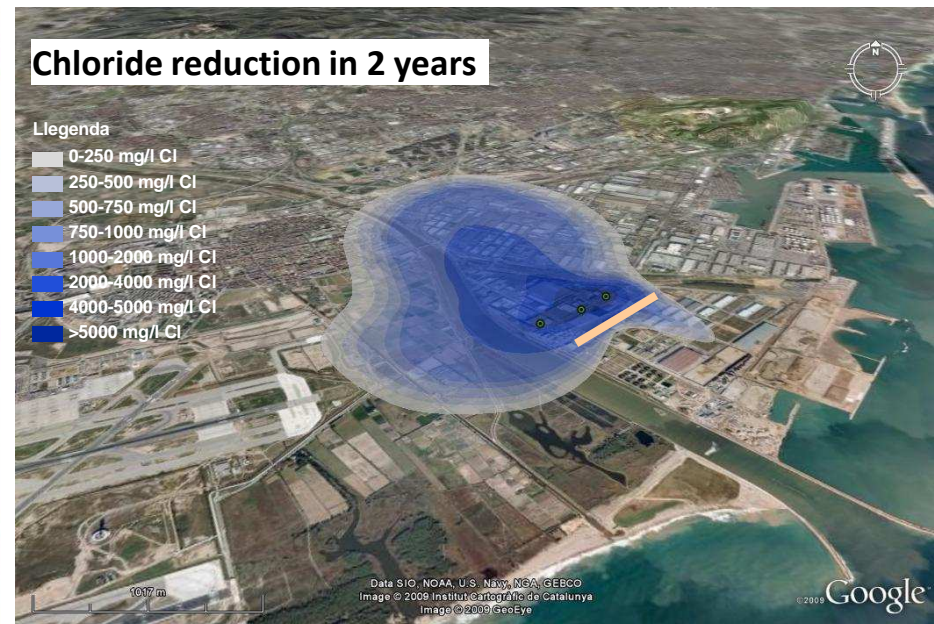
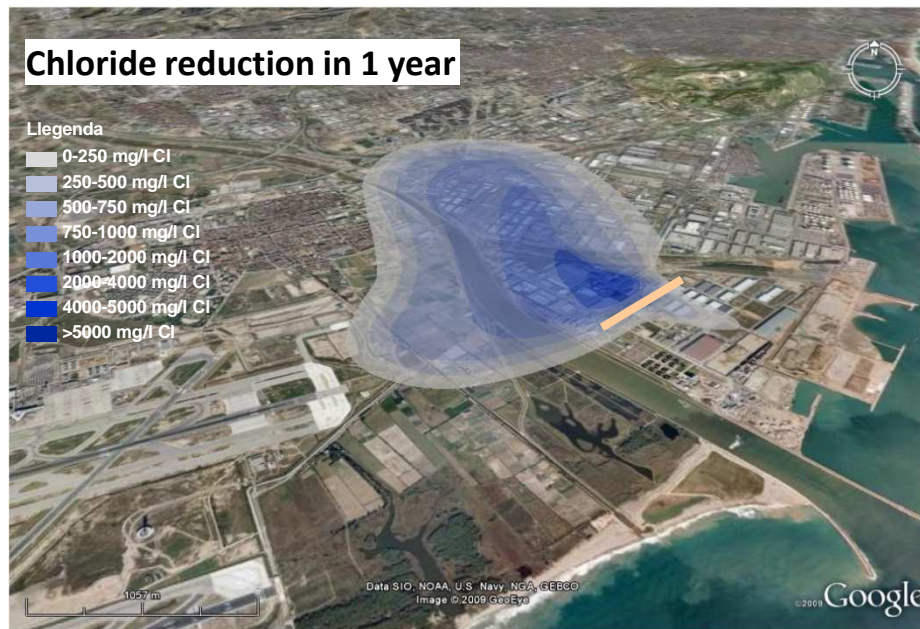


UV DISINFECTION



TO BE INJECTED

Mesured effects of the hydraulic barrier (Phase 1)



- Operated from 2007 to 2011
- It is planned to resume injection by 2017

TARRAGONA RECLAMATION PLANT FOR INDUSTRIAL REUSE



SALOU

URBAN WWTP



PETROCHEMICAL INDUSTRY

DOUBLE-PASS REV. OSMOSIS

INTENSIVE PRETREATMENT

Built in 2012. It supplies reclaimed water of very low salinity (less than $30 \mu\text{S}/\text{cm}$) to the Petrochemical industry, in substitution for drinking water.

Thank you for your attention!

