

NBS in the domain of water reuse to increase available water resources

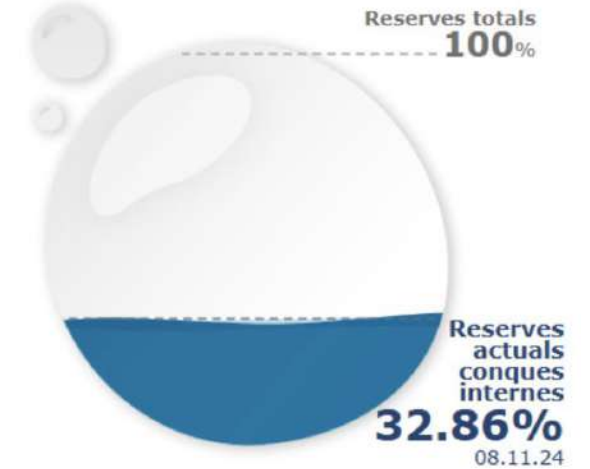
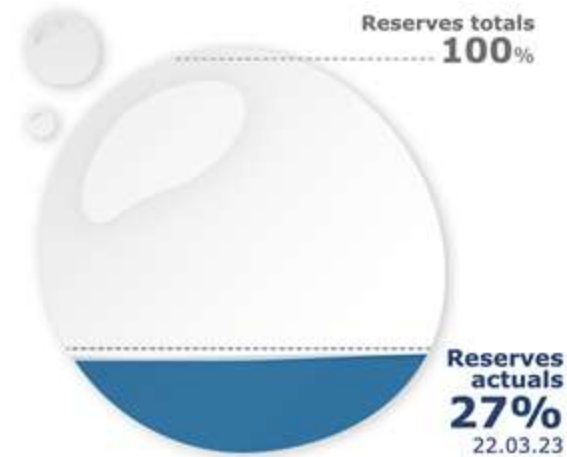
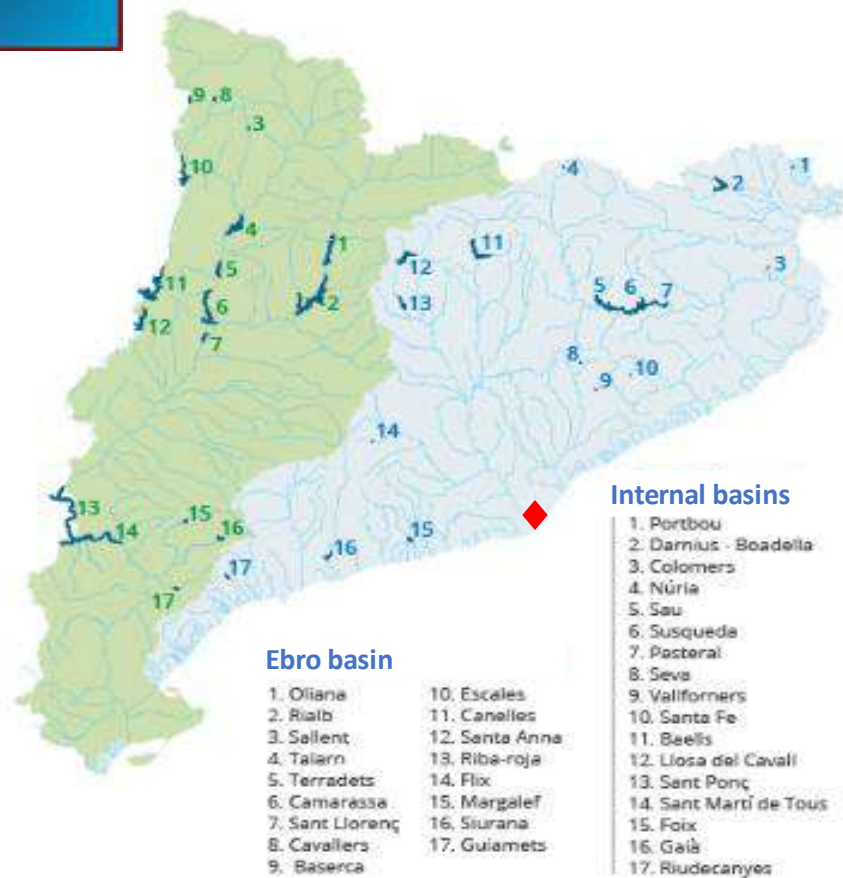
Joan Garcia



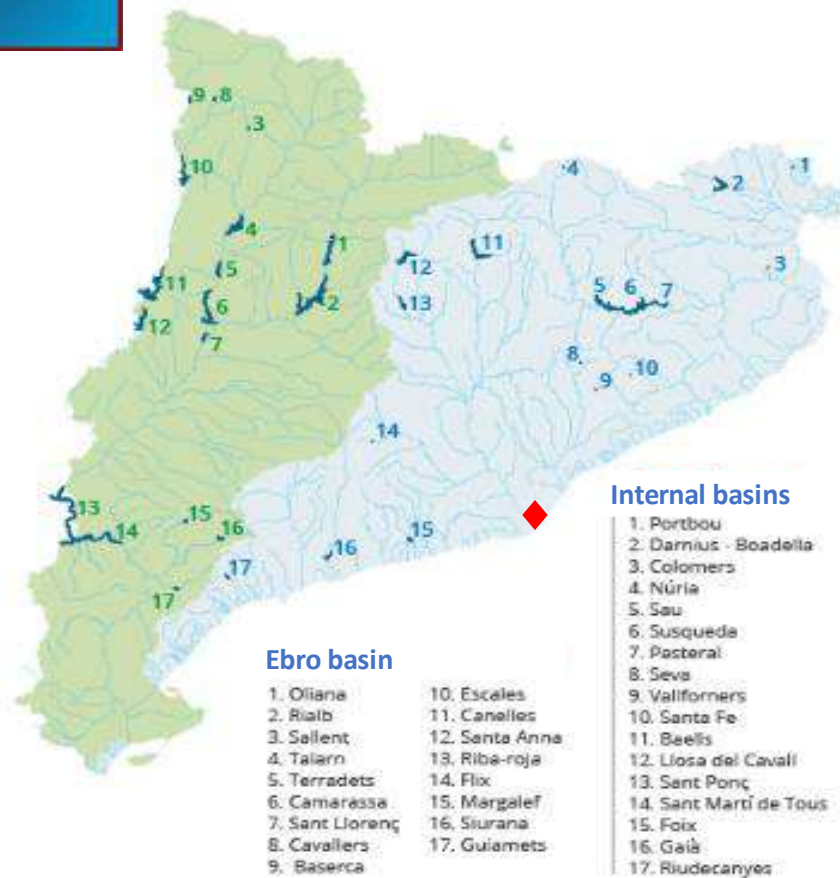
UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Group of Environmental Engineering
and Microbiology

Water scarcity is a recurring feature of the Mediterranean region, but its frequency has been exacerbated by the effects of climate change



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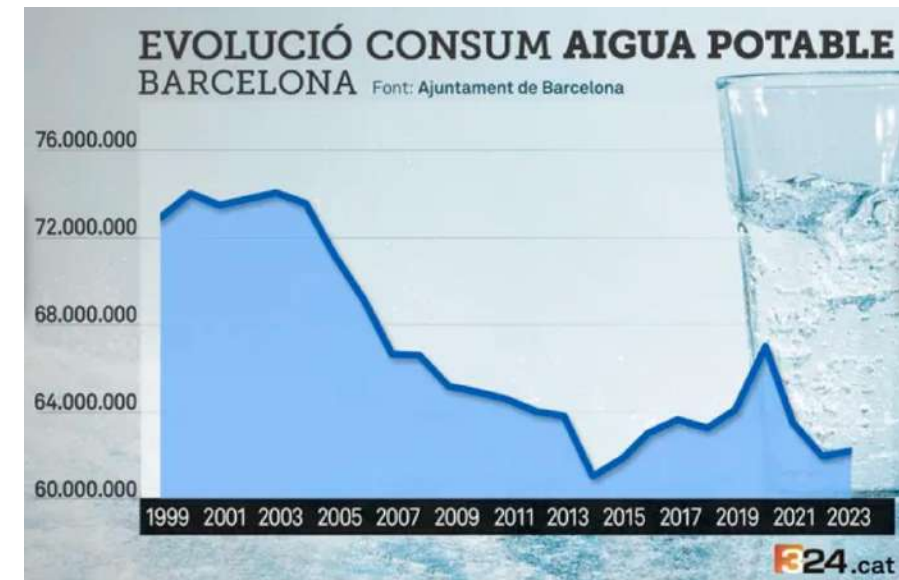
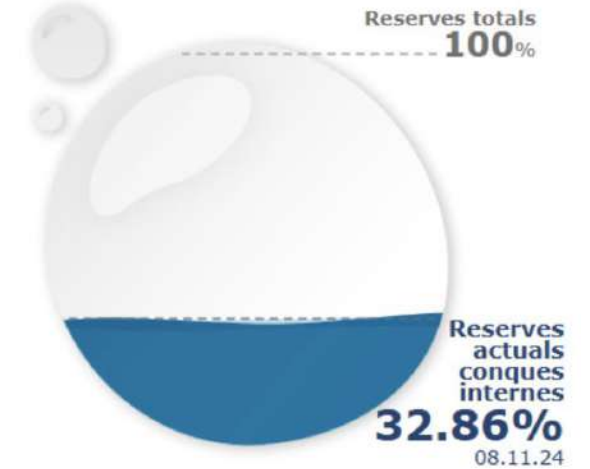
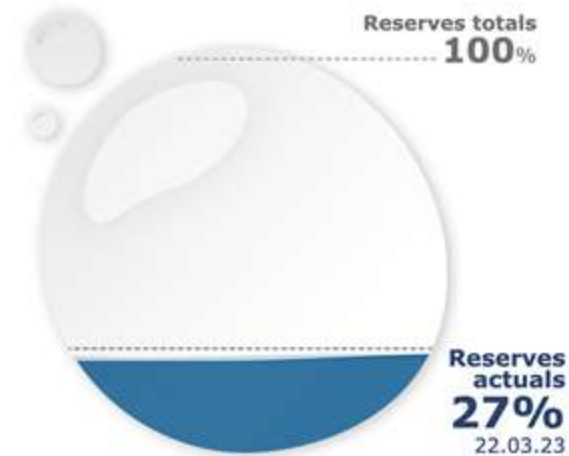


Ebro basin

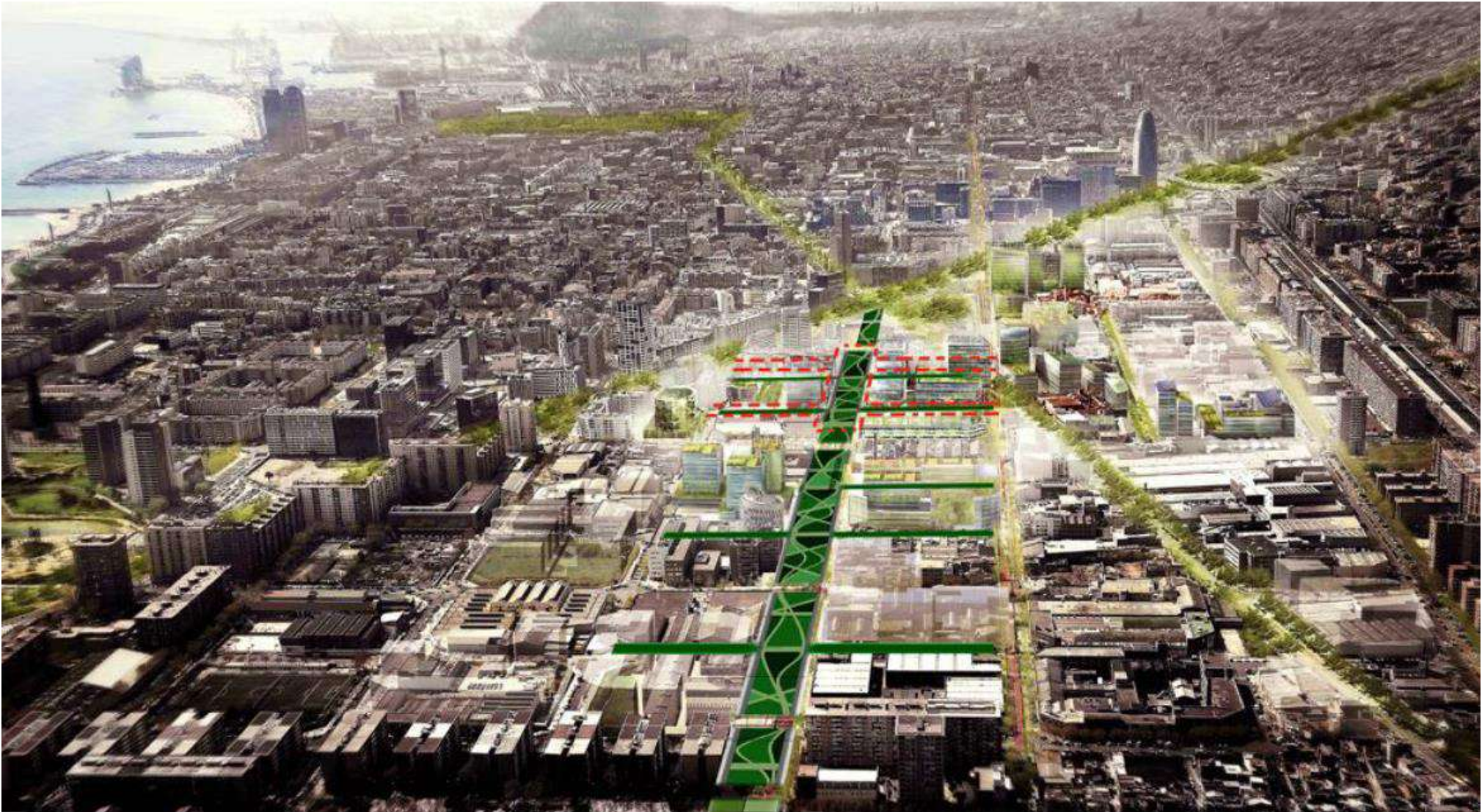
1. Oliana
2. Rialb
3. Sallent
4. Talarn
5. Terradets
6. Camarassa
7. Sant Llorenç
8. Cavallers
9. Baserca
10. Escalés
11. Canelles
12. Santa Anna
13. Ribà-roja
14. Flix
15. Mergalef
16. Siurana
17. Guàrdies

Internal basins

1. Portbou
2. Darnius - Boadella
3. Colomers
4. Núria
5. Sau
6. Susqueda
7. Pastoral
8. Seva
9. Vallforners
10. Santa Fe
11. Beilis
12. Llosa del Cavall
13. Sant Ponç
14. Sant Martí de Tous
15. Foix
16. Gaià
17. Riudecanyes



Many people speak about Nature-Based Solutions exclusively thinking in urban environments



Linear Park
Barcelona

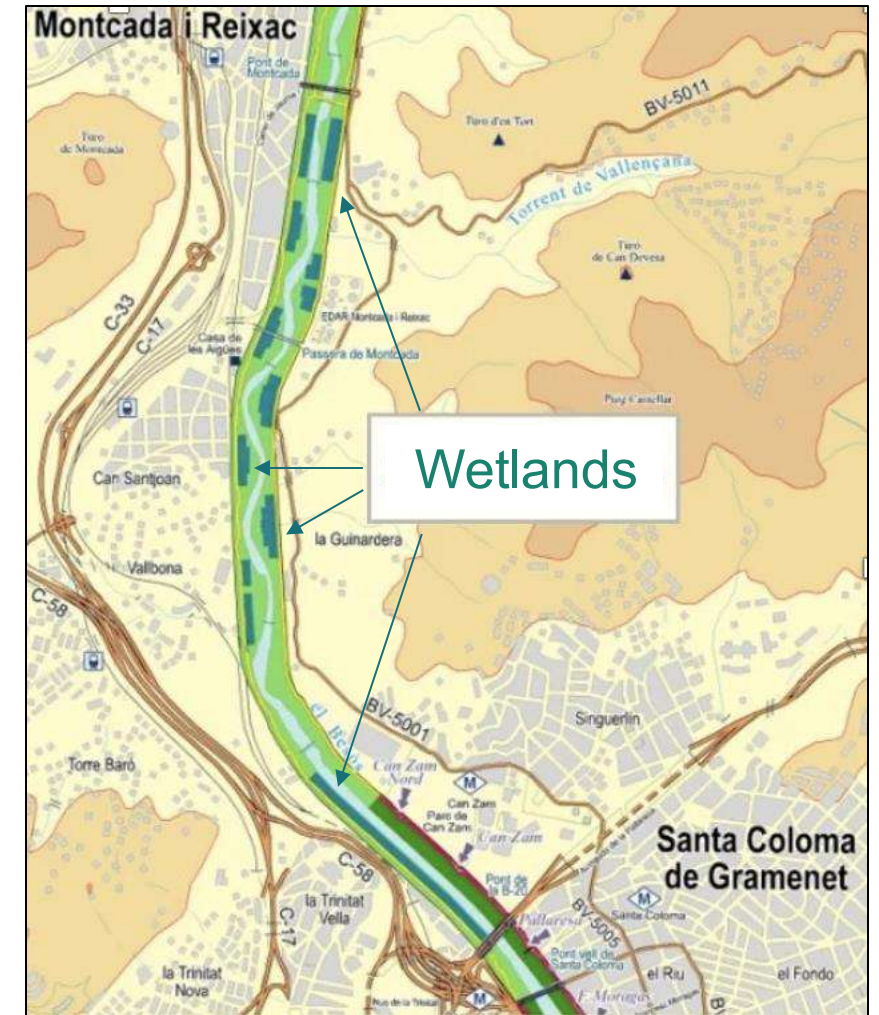
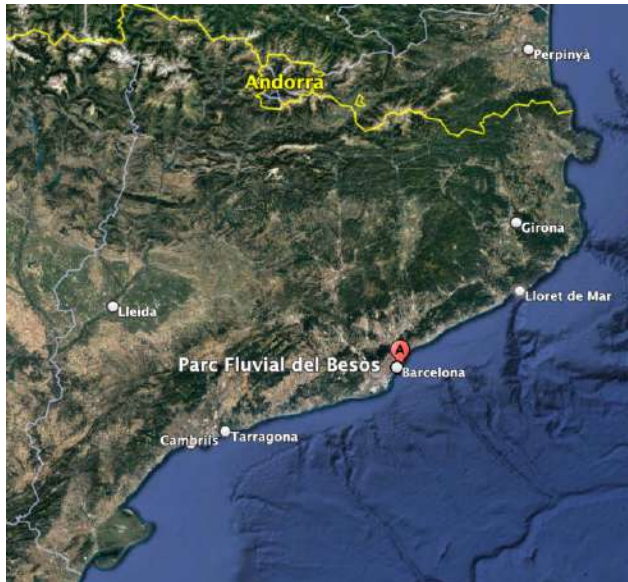
Many people speak about Nature-Based Solutions exclusively thinking in urban environments



Source: R. Soto
IMU

Subsurface flow wetlands can be used for the improvement of the environmental quality

Fluvial Park of Besòs River



Source: M. Vila,
DIBA

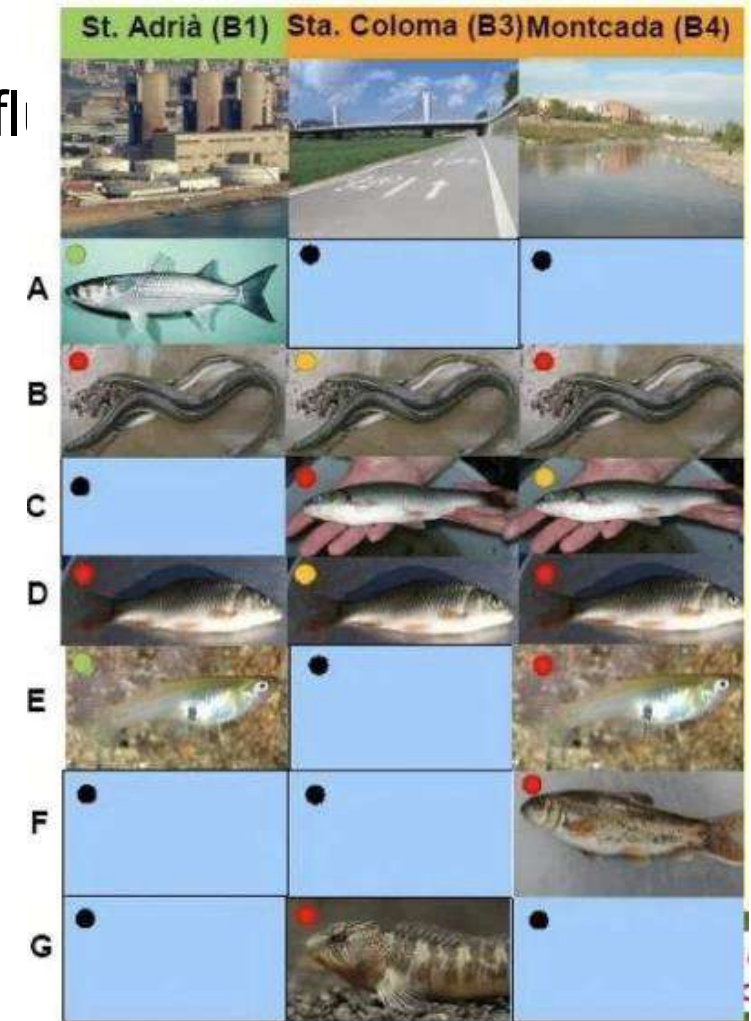
What are the properties and the benefits of the Besòs River Fluvial Park wetlands?

Properties

- Constructed in 2004
- Inside 3.7 km of river bed, secondary effluent
- Surface: 7.7 ha (60 cells)
- Flow: 15,000 m³/d
- <5 mg TSS/L, <50 mg COD/L

Benefits

- Environmental restoration
- Increase in biodiversity
- Landscape improvement
- Water quality improvement
- Increase in water resources amount

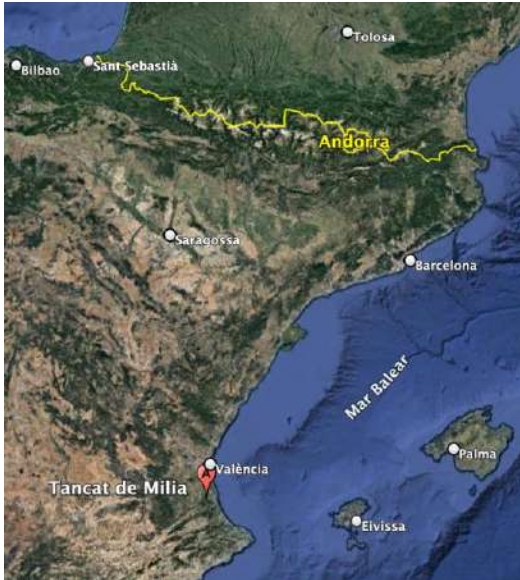


Source: M. Vila,
DIBA



A subsurface-surface flow wetland for environmental quality improvement

Tancat de Milia wetland



- ① Subsurface flow zone, 4.5 ha, 18 cells
- ② Surface flow zone, 18 ha, 6 cells
- ③ Artificial lake, 10 ha

Source: F. Juan
Acuamed

What are the properties and the benefits of the Tancat de Milia wetland?

Properties

- Constructed in 2011, Investment 5.5 M€, operation 110m/year
- Inside old rice fields, secondary effluent
- Surface: 33 ha
- Flow: 1,500 up to 4,500 m³/day
- Efficiency→ N: 40-60%, P: 40-70%

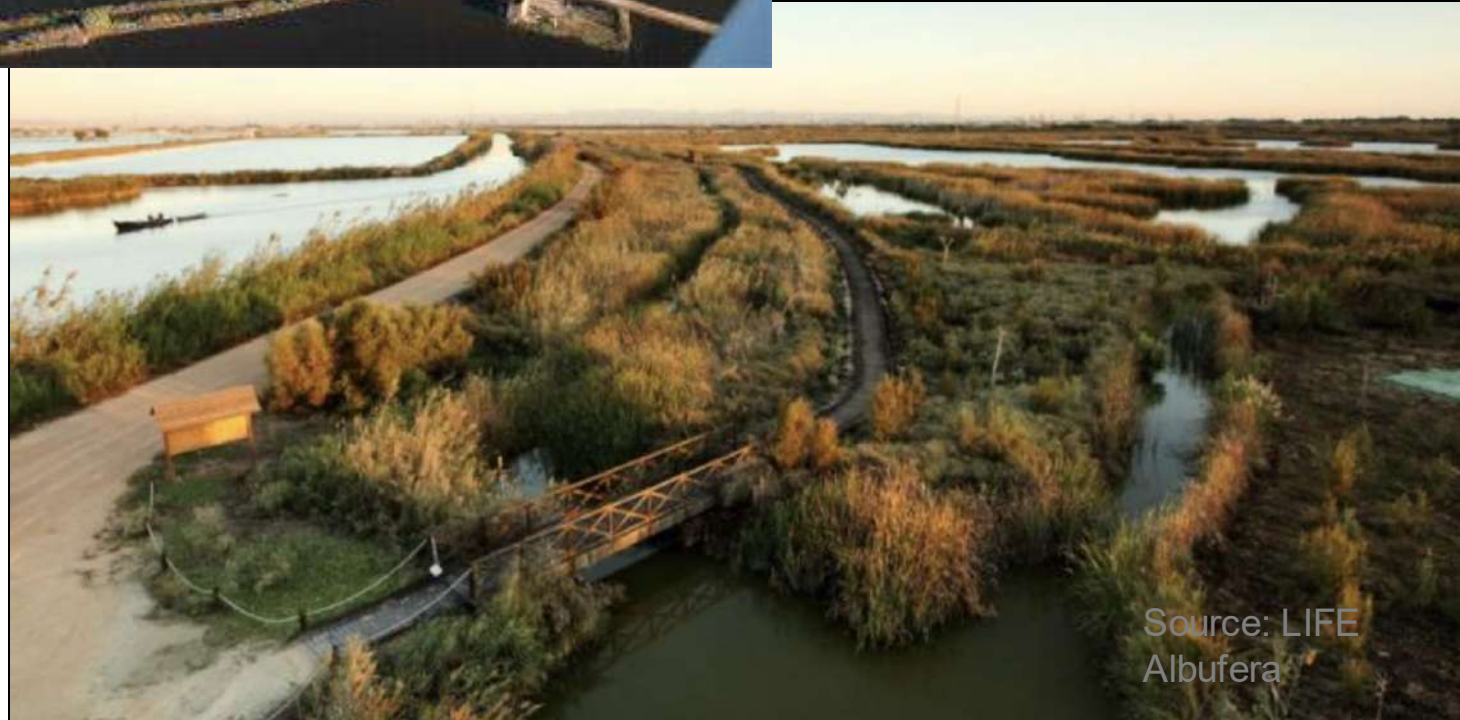
Benefits

- Water quality improvement (nutrients)
- Environmental restoration



Tancat de
Milia wetland

Tancat de
l'Illa wetland



Source: LIFE
Albufera

Environmental restoration in Can Cabanyes Park (Granollers) and creation of a wetland

Can Cabanyes Park Granollers



The water reuse system in Granollers

Different restoration actions
started in 2002

Wetland operation

2004

Reclaimed water network
with storage tanks

Reuse is started

2010-15

2010

Start operation

Reclamation plant
constructed in 2008

2020

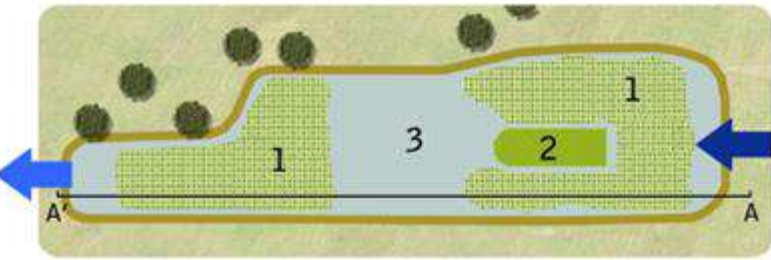
Truck connection

Water storage tanks provided
with pipes and valves



The wetland in Granollers

Plan view



1. Shallow planted zones
2. Island
3. Deep unplanted zones

Effluent

Influent

Section view



2003



2006

The wetland in Granollers: a changing system



2015



2019

What are the properties and the benefits of the wetland of Can Cabanyes?

Properties

- Constructed in 2002-03, Investment 72 m€
- Secondary effluent
- Surface: 1 ha
- Flow: 300 m³/d
- <2 logs CFU/100 mL (*E. coli*)
- <15 mg TSS/L, <60 mg COD/L, <10 mg N/L

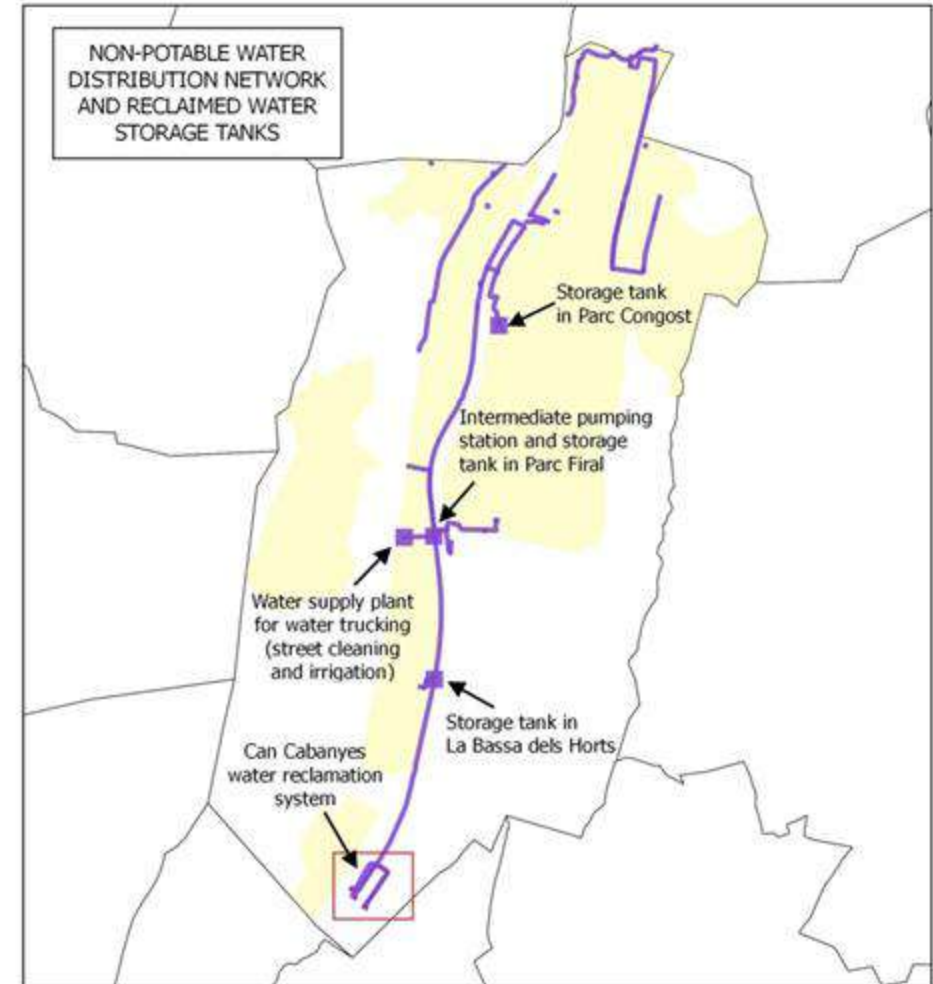
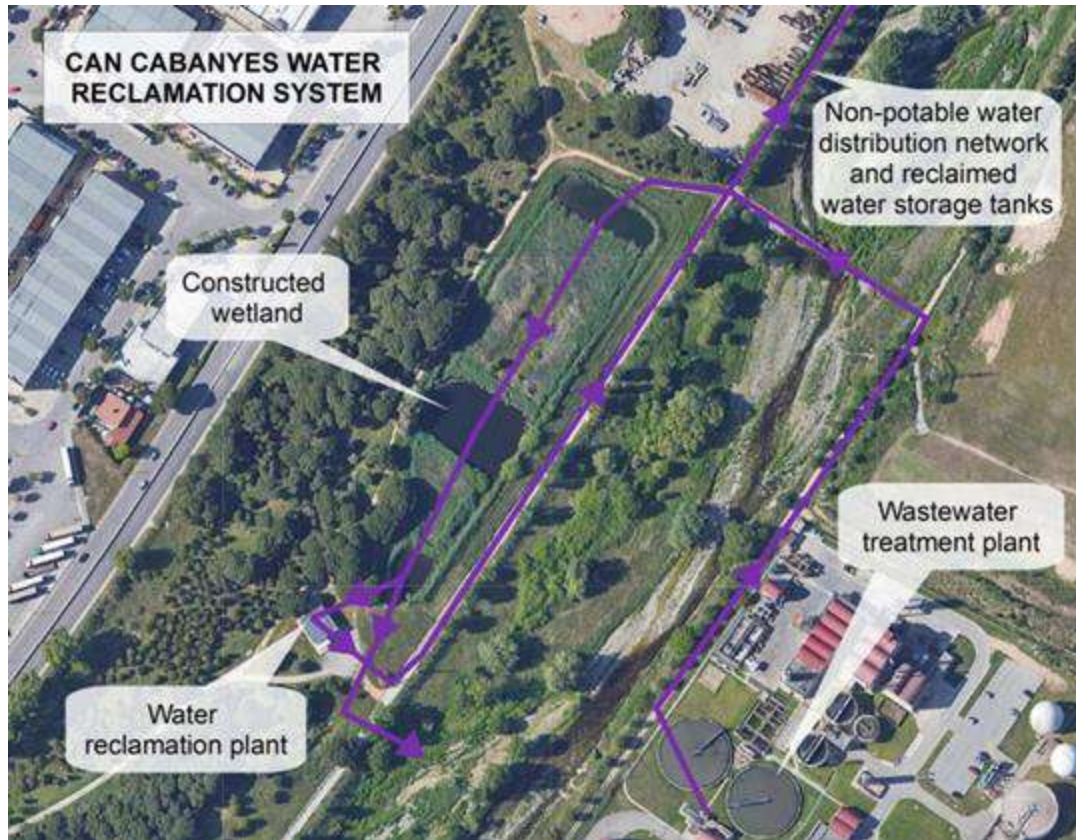
Benefits

- Environmental quality
- Increase in biodiversity
- Water quality improvement (microbiology)
- Increase in water resources
- Gardening, street cleaning

The mechanical reclamation treatment plant



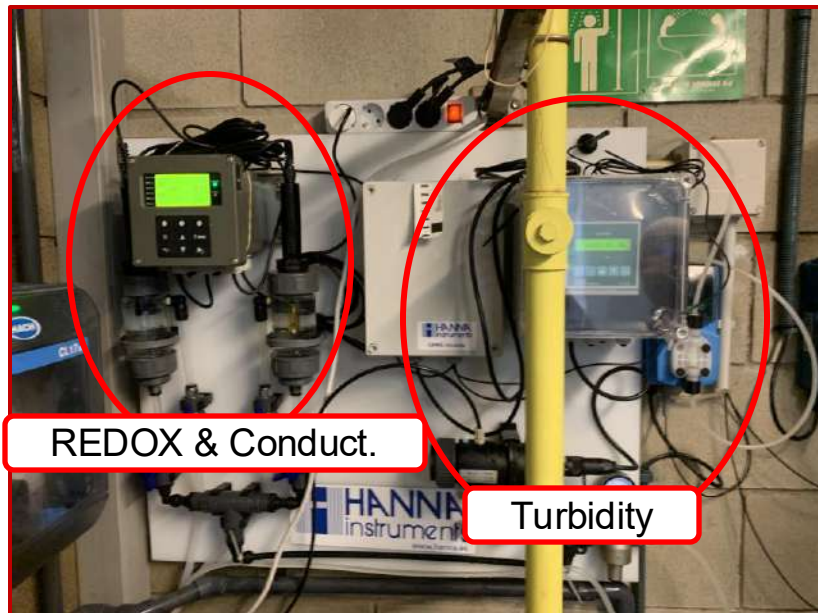
The non-potable distribution network and the storage tanks



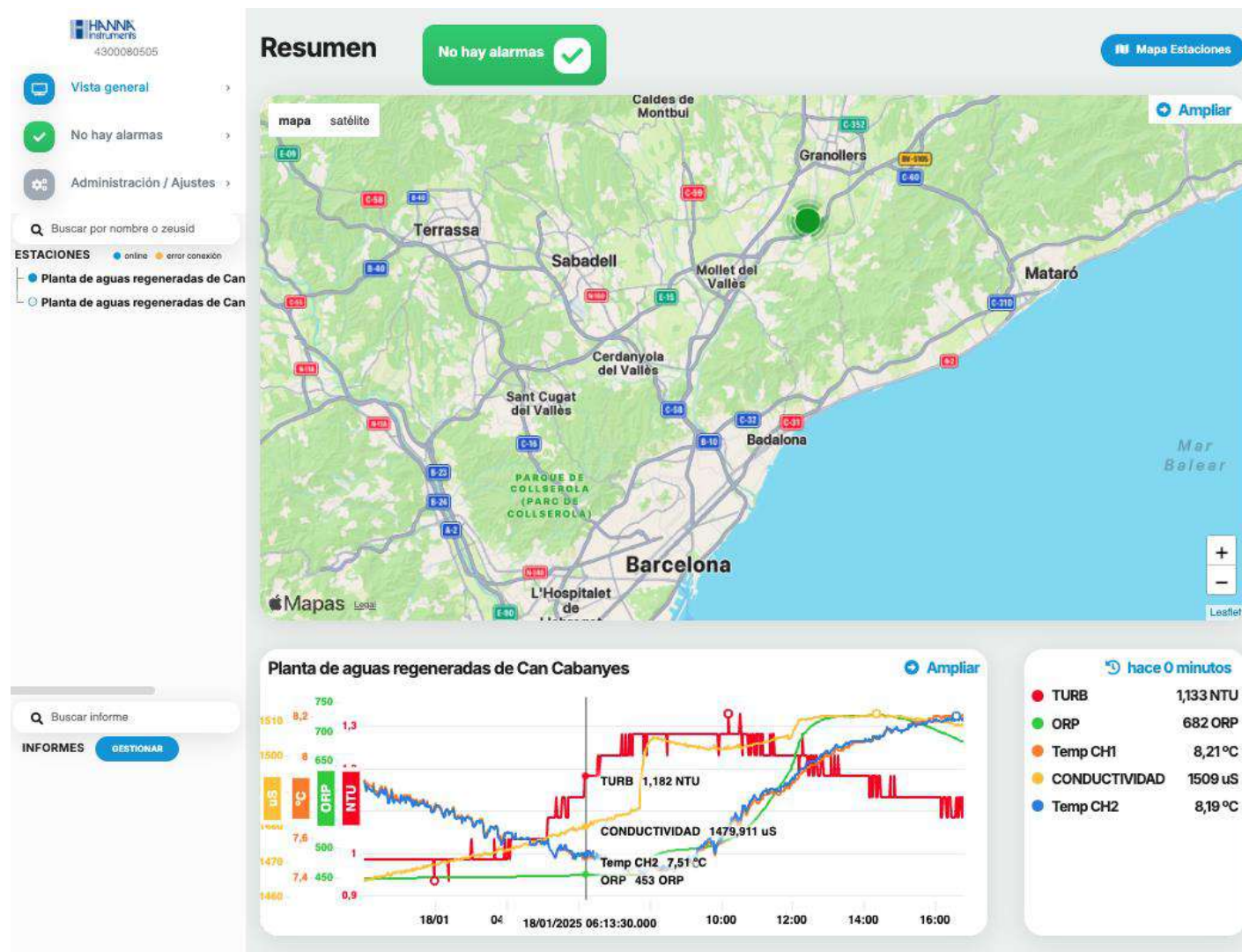
Water supply for trucks



TARGET



Online monitoring in collaboration with Granollers city council



Final Remarks

1. NBS projects in the context of water reuse have been very successful providing multiple benefits
2. Experience gained in the past 20 years has paved a solid background knowledge ensuring new projects and extrapolations to other countries/regions
3. NBS as a pre-step to reclamation plants seems to be a good strategy