

# **MAKING RIVERS MORE RESILIENT TO CLIMATE CHANGE: RESTORING NATIVE VEGETATION AND REMOVING OBSTACLES**

Emilio Real Llanderal  
Belén Piñol Gómez

*Hydrographic Confederation of the Júcar River Basin*

## INDEX

- 1 Compliance with environmental objectives**
- 2 Problem description**
- 3 Inter-administrative coordination**
- 4 Case studies**
- 5 Collaboration of different social agents**

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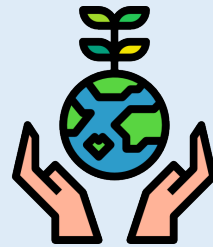
# RESTORING LONGITUDINAL CONNECTIVITY & NATIVE VEGETATION

## Water Framework Directive (WFD)

- good status of water bodies

## EU Diversity Strategy 2030

- 25.000 km connected rivers



## Restore longitudinal connectivity

**AMBER:** more than 1 million barriers!

## Restore native vegetation

Spanish National Strategy for River Restoration







COMPLIANCE WITH ENVIRONMENTAL OBJECTIVES

PROBLEM DESCRIPTION

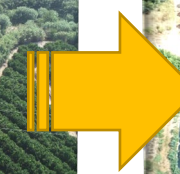
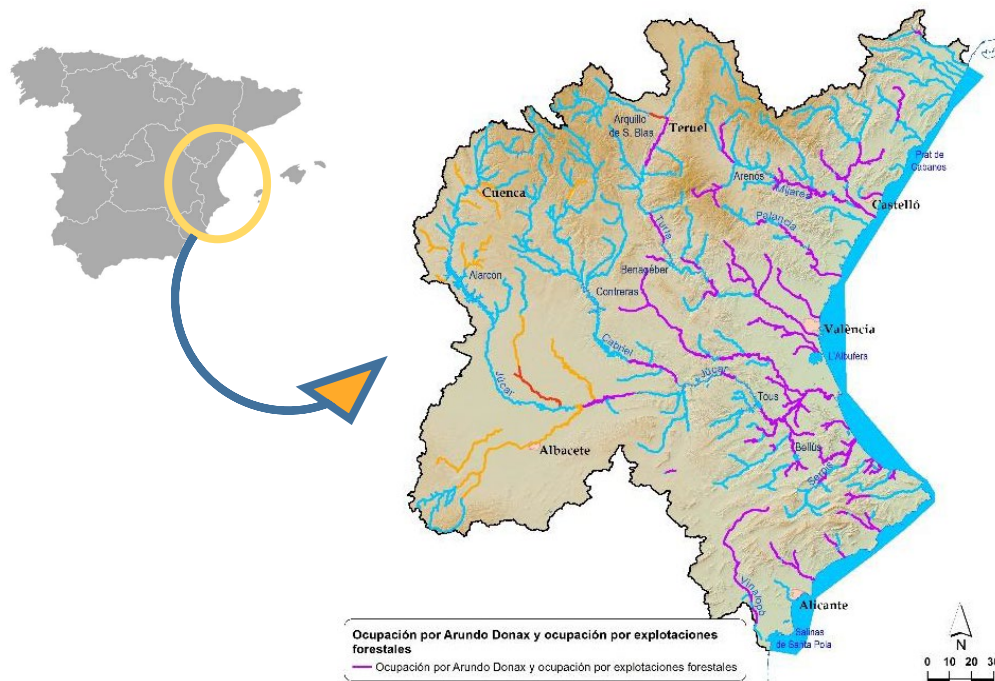
INTER-ADMINISTRATIVE COORDINATION

CASE STUDIES

PURSUE OF SOCIAL CONCENSUS

# RESTORING NATIVE VEGETATION

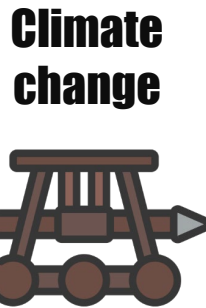
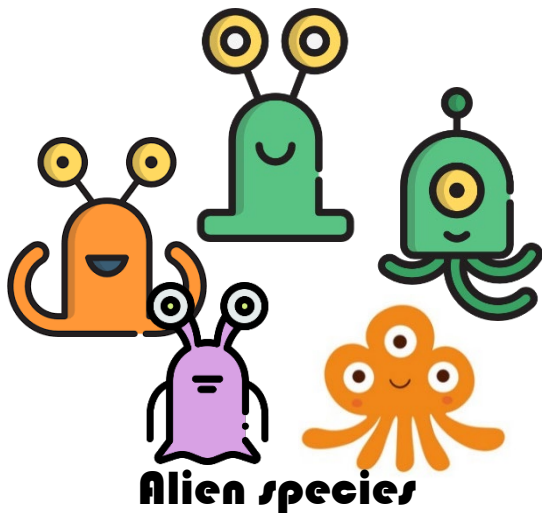
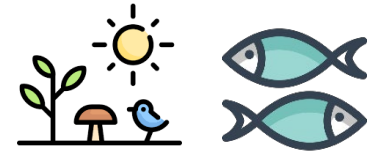
## Spanish National Strategy for River Restoration



# CLIMATE CHANGE

## ● Ecosystem protection is challenged by climate change

- ☀ Enhances alien species
- ☀ Droughts & Floods: more often & extreme → unmanaged obstacles can worsen impacts!
- ☀ Higher risk of wildfire: higher temperatures, dryer soil





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## RIVER OBSTACLES

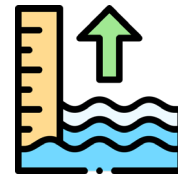
- **Barrier to fish migration**



- **Decrease of the water quality**



- **If poorly managed → higher risk of floods**



- **Many of them are abandoned → no maintenance**

- **Improper use of the infrastructures → risk to population**



## Arundo donax: the giant cane invasion


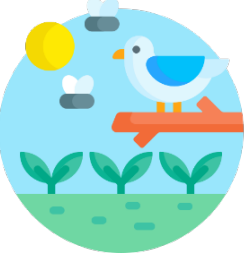



- **Wall effect increases impact of floods**
- **Cane avalanche causes destruction**



## RESTORING NATIVE VEGETATION



### Arundo donax invasion

- Loss of biodiversity 
- Low quality habitat for fauna 
- Fire prone plant 
- Higher water consumption 
- Not interesting for herbivores 

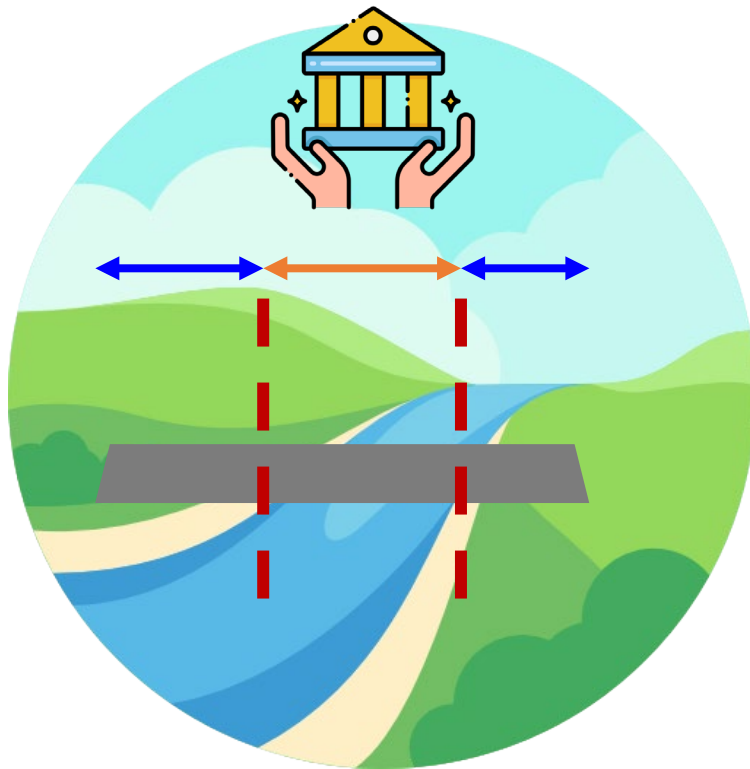
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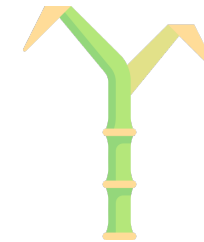
# HERITAGE AUTHORITY

**Which administration owns the heritage protection competence?**



## ENVIRONMENT AUTHORITY

- **Compliance with forestry regulations**
- **Fire prevention**
- **Prevention of the spread of invasive alien species**
- **Protection of native flora and fauna**



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## RIVER CONNECTIVITY: Weir demolition

**BEFORE**



**DURING**





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# RIVER CONNECTIVITY: Weir demolition

**BEFORE**



**AFTER**





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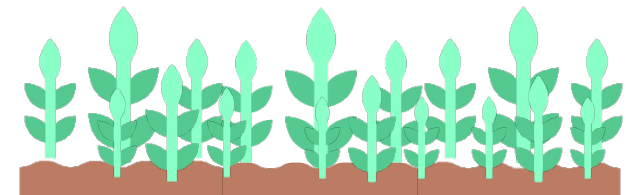
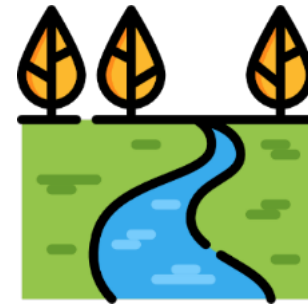
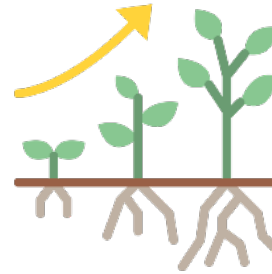
## RIVER CONNECTIVITY: Fish scale





## WHY IS ARUNDO DONAX SO HARD TO KILL?

- **Exotic invasive specie (EEI)**
- **Great adaptation capacity:** types of soils, frosts, droughts
- **Very high growth rate**
  - Roots can outreach up to 4 m/year
  - Rivers work like a transport way
- **Monospecific colony trend**
  - High density of the root system & cane around 20t/ha



## Inefficient techniques: Clearing the cane

- **Hydro-illogical: why gardening when nature can do the hard work?**
- **High cost**
- **Frequent and repetitive works**



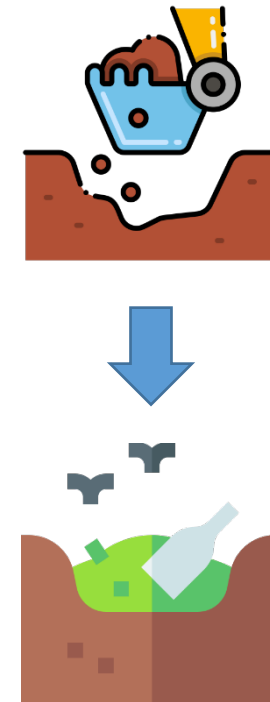


## Inefficient techniques: HERBICIDES & BURNING



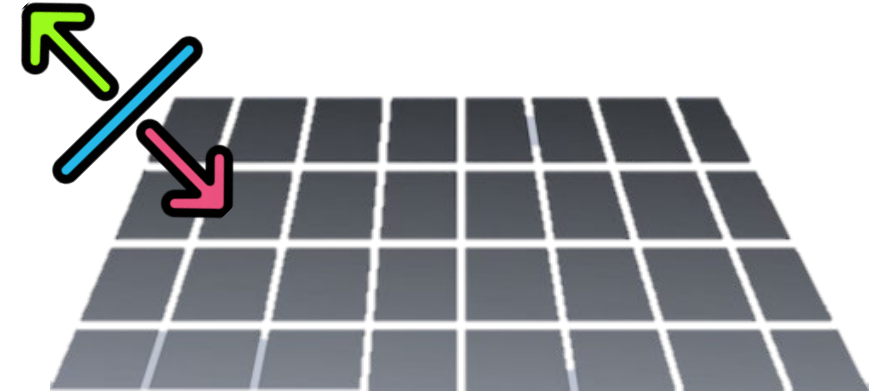
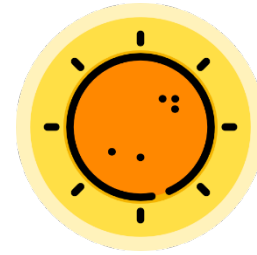
## Efficient techniques: ROOTSTOCK DIG

- Dig 0,5-1 m deep to remove the rootstock
- Complementary to covering technique
- Bury rootstock or placed it under the covering
- Avoid root scattering during soil transportation



## Efficient techniques: TEMPORARY COVERING

- Temporary opaque covering > 18 months
- Innovation: use of new biodegradable materials





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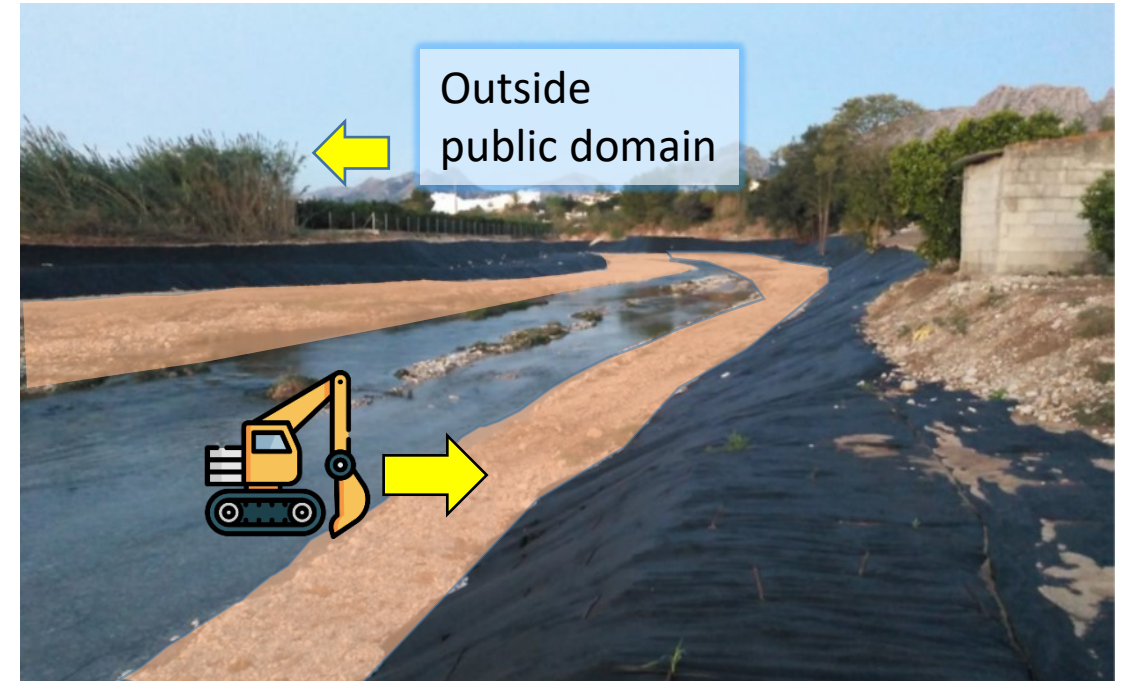
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# GIRONA RIVER RESTORATION

**Before**

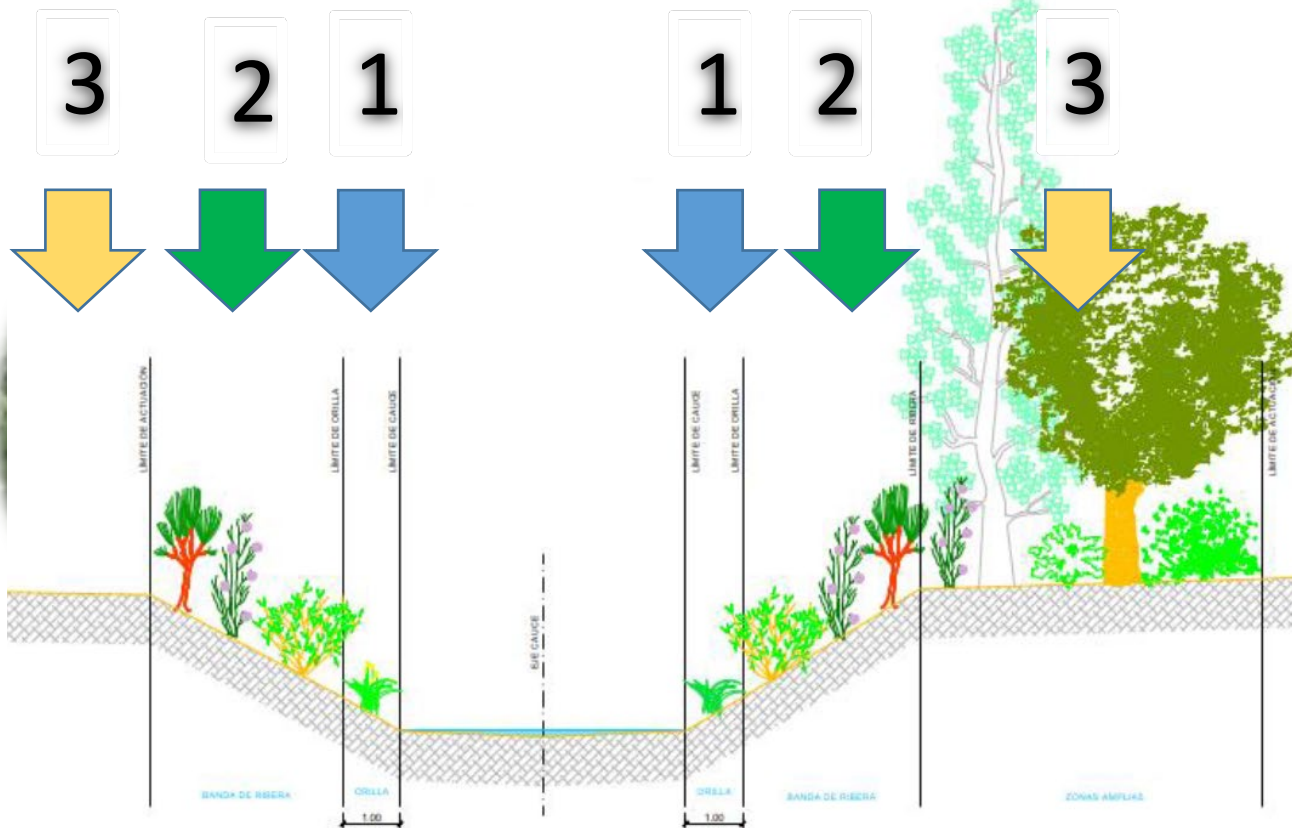


**After**





# GIRONA RIVER RESTORATION



- 1. Edge Zone:**
- 1 m wide strip
  - Aquatic plants



- 2. Riverbank Zone:**
- Within river swelling area
  - Bushes plantation



- 3. Extended Zone:**
- Outside river swelling area
  - Bushes and trees



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# COLLABORATION WITH DIFFERENT SOCIAL AGENTS



**LOCAL PEOPLE**



- Inform about the Project
- Value different points of view.
- Participation with social agents at an early stage when changes are feasible
- Inform about the decisions taken



**ECONOMIC SECTORS**



- Inform on works kick-off and milestones
- Plan ahead & clearly distinguish responsibilities



**LOCAL GOVERNMENTS**



**ENVIRONMENTAL GROUPS**





# Thank you for your attention



**River Júcar Basin Authority**

- Belén Piñol: [Belén.Pinyol@chj.es](mailto:Belén.Pinyol@chj.es)
- Emilio Real: [Emilio.Real@chj.es](mailto:Emilio.Real@chj.es)