



REPUBLIC OF CYPRUS

Ministry of Agriculture, Rural Development and Environment



WATER DEVELOPMENT  
DEPARTMENT



Science and Management  
of Intermittent Rivers  
and Ephemeral Streams

# HYDROMORPHOLOGICAL RESTORATION OF INTERMITTENT RIVERS IN CYPRUS



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# What is river restoration?

River restoration refers to a large variety of ecological, physical, spatial and management measures and practices.

These are aimed at **restoring the natural state and functioning** of any degraded river system, in support of biodiversity, flood management, landscape development and recreation.

This practically means:

- Restoration of flows
- Restoration of stream morphology
- Reclamation of river floodplain
- Removal of barriers
- Removal of alien/invasive species
- Re-introduction of native species – Restoration of natural vegetation
- Enhancement of habitats/microhabitats creation



**Restore as close as possible  
to natural conditions**



# Why rivers need to be restored?

## Drivers and pressures

Illegal **dumping**

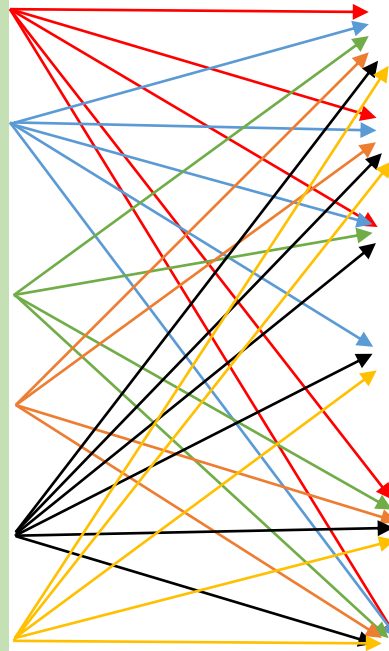
**Narrowing** and **straightening** of the river channel

**Changes** in river morphology

**Loss** of river continuity

Creation of **artificial surfaces**

**Changes** in flow status due to water abstraction



## Impact

Degradation of river **habitats**

Loss of **biodiversity**

**Flood** risks

Reduction of the **purification capacity** of the river

Reduction of **groundwater infiltration**

Disruption of **fluvial dynamics**

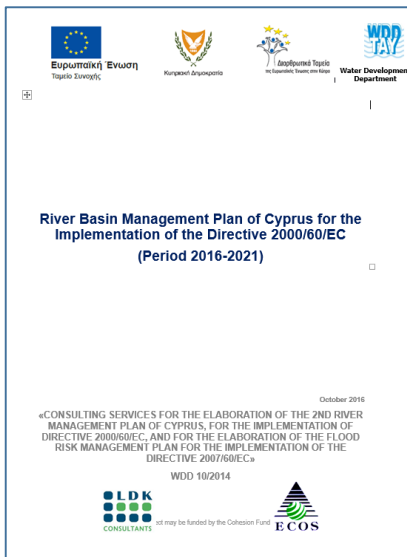
**Simplification of the riverine system and functioning at all levels**



# River restoration in Cyprus

## European Directive – Water Framework Directive 2000/60/EC

“Member States shall protect, enhance and restore all bodies of surface water .... with the aim of **achieving good surface water status** by 2015”



River Basin Management Plans

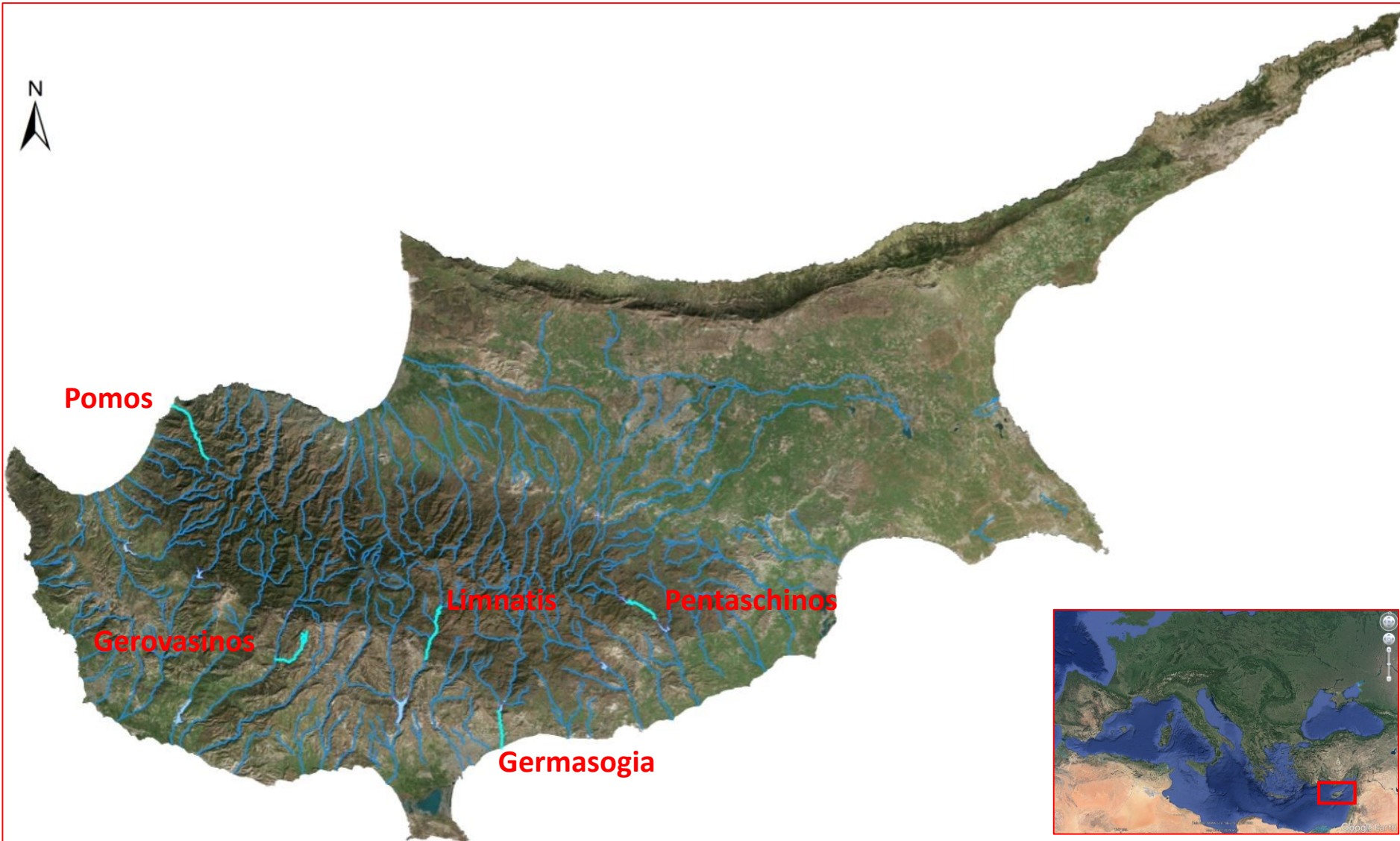


Program of Measures

To Do List
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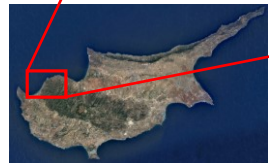
# River restoration in Cyprus










## Pomos river (12/2013)

- Small rural HM intermittent stream
- Typical Mediterranean intermittent stream
- Impacted by u/s small dam construction, water abstraction, sediment retention, habitat degradation and illegal dumping





## Major restoration actions

- Removal of damped material 
- Widening of the river channel 
- Removal of alien invasive species 
- Introduction of suitable local species 
- Promoting the creation of microhabitats 







# Consultation with authorities and locals



## River boundaries delimitation



## Removal of alien species and preserving indigenous species



**Removal of dumped material and widening of the river corridor**



**Un-even banks and terraces**



**Detailed labor work**



## Marking and digging of planting holes



## Planting and installation of watering system



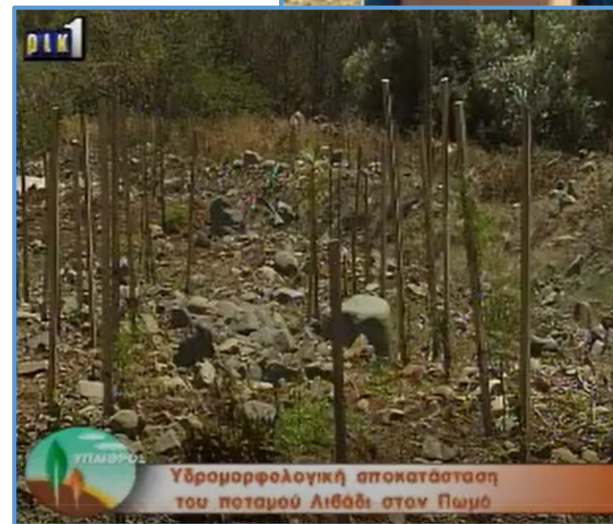
### Φυτεύσεις που πραγματοποιήθηκαν τον Νοέμβριο του 2013

Είδος	Αριθμός δενδρυλλίων
Λυγαριές ( <i>Vitex agnus-castus</i> )	200
Χαρουπιές ( <i>Ceratonia siliqua</i> )	30
Ροδοδάφνες ( <i>Nerium oleander</i> )	220
Πλάτανοι ( <i>Platanus orientalis</i> )	50
Μέρικοι ( <i>Tamarix smyrnensis</i> )	25
Στερατζιές ( <i>Styrax officinalis</i> )	30
Ιτιές ( <i>Salix alba</i> )	10
Σχοινιές ( <i>Pistacia lentiscus</i> )	80
Μερσινιές ( <i>Myrtus communis</i> )	45
Δάφνες ( <i>Laurus nobilis</i> )	30
Τρεμιθιές ( <i>Pistacia terebinthus</i> )	25
Ζιζιφιές ( <i>Ziziphus lotus</i> )	26
<b>Σύνολο</b>	<b>771</b>

# Public awareness – Dissemination actions



On-site boards



TV programs



Local and international conferences



**2013**



**2017**



**2019**



2013



2019



2013



2019





2013



2013



2019



2013



2019



2013



2019



# Other restoration actions

Yermasoyia river



**Restoring longitudinal connectivity**

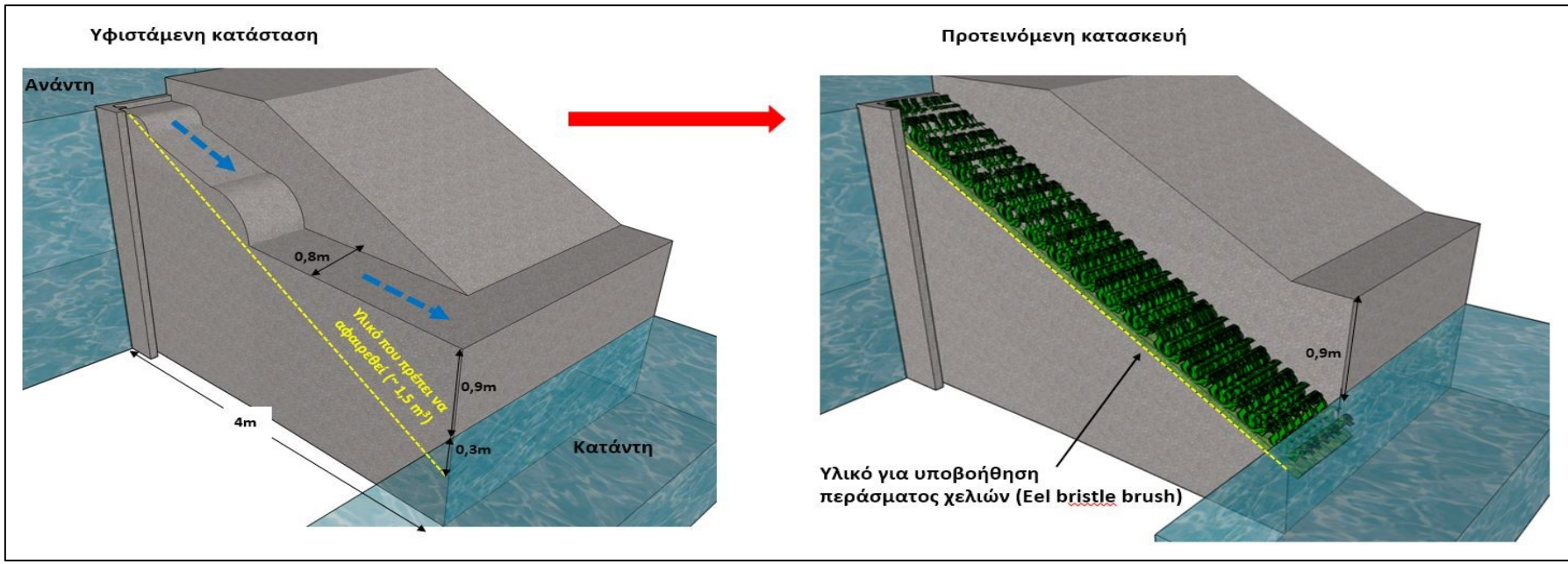


# Creating suitable habitats for endangered species

Yermasoyia river



# Creating suitable habitats for endangered species



Yerovasinos river



**Reconnecting tributaries**



Yerovasinios river



**Reconnecting the river corridor**





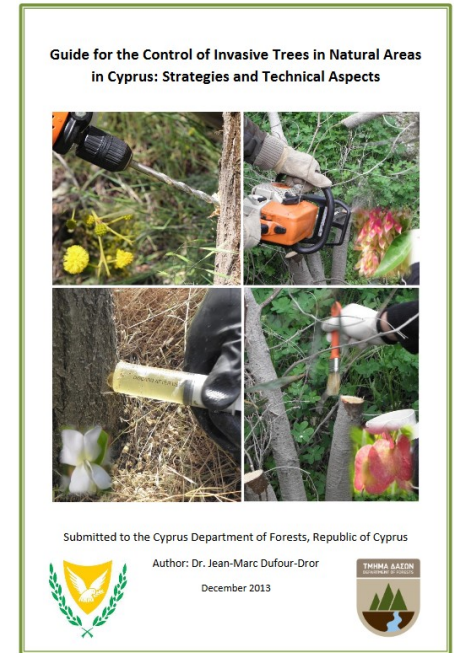
Pentascinos river



**Promoting natural heritage and leisure**

# Critical aspects/ Lessons learned / recommendations for managers for a successful restoration project

1. MONEY
2. Yearly maintenance of plantations (at least 4-5 years)
  - Removal of weeds
  - Replenishment of losses
  - Removal of persistent invasive species
  - Inspection and repairing of watering system
  - Watering
3. Expect losses – Flood events, unsuccessful plantations, modification of morphology
4. Inform, Engage and Commit local communities
5. Some invasive species are very difficult to eradicate – know your “enemy”.
6. Invest wisely – Cost and benefit.





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# Thank you

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