

# NWRM: an ecosystemic approach

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CEDEX



# Overview

1. Must NWRM be based on an ecosystemic approach?
2. Different ecosystemic approaches to NWRM
3. Some examples
4. Conclusions and recommendations

# 1. Must NWRM be based on an ecosystemic approach?

Yes, they should. But why?

- only ecosystem-based measures will sustainably fulfill the expected goals in the **medium** and **long** term
- **complexity** of river systems make artificial measures prone to **failure**
- non-working measures can be an **obstacle** for **future** planning and management
- **inefficient measures** can promote (social, economic and environmental) unexpected **inconveniences**
- uncertainties and knowledge gaps in river functioning recommend a **cautious approach**, as close as possible to the **natural river dynamics**

## 2. Different ecosystemic approaches to NWRM

NWRM would restore ecosystems...But how?

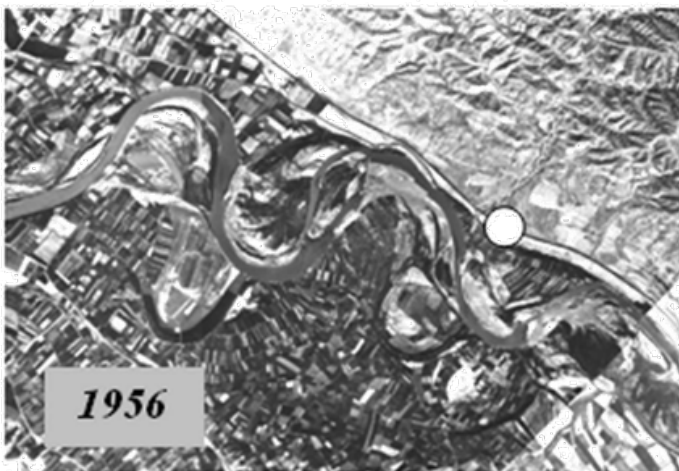
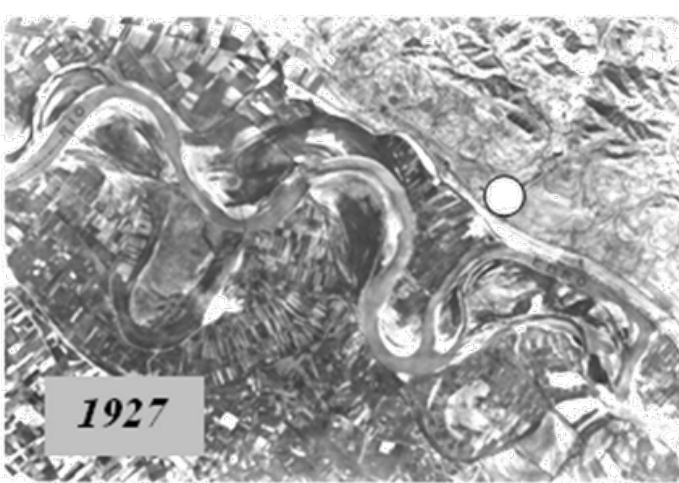
Potential approaches of restoration initiatives to promote NWRM:

- historical range of variability
- reference image
- maximization of biodiversity
- recovery of valued species
- recovery of lost ecosystem processes
- ecosystem services framework

...And what do each of them offer?



## i. Historical range of variability



Static vs. dynamic reaches - in static vs. dynamic watersheds:  
how we should restore?



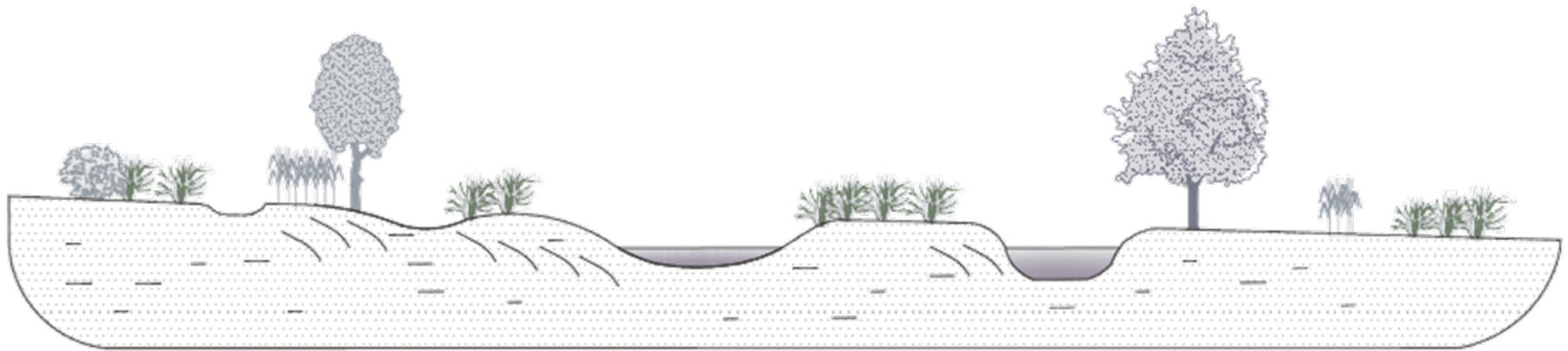
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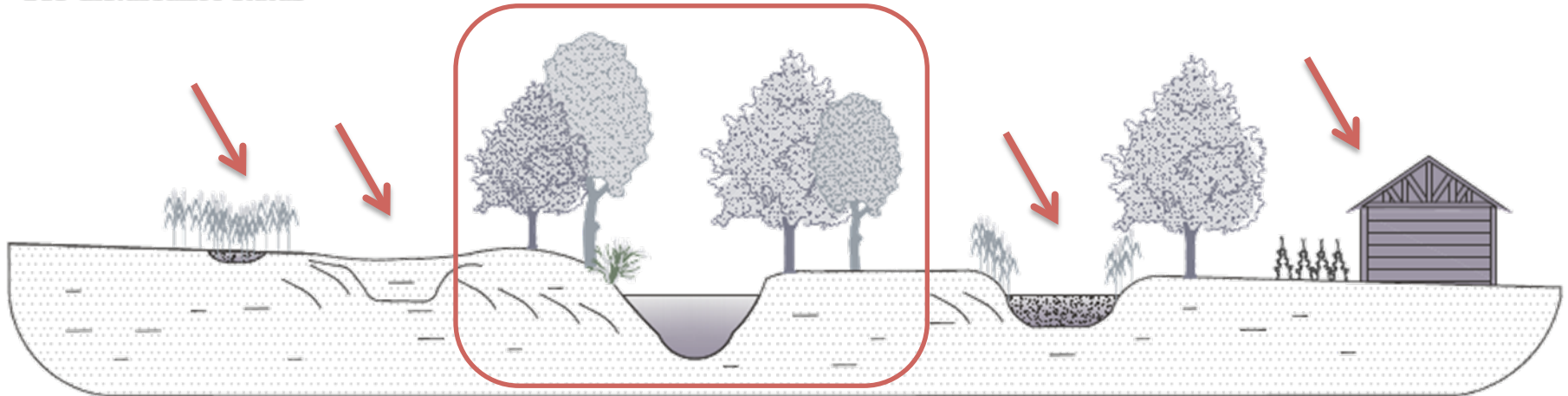
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## ii. Reference image



Pre-disturbance status



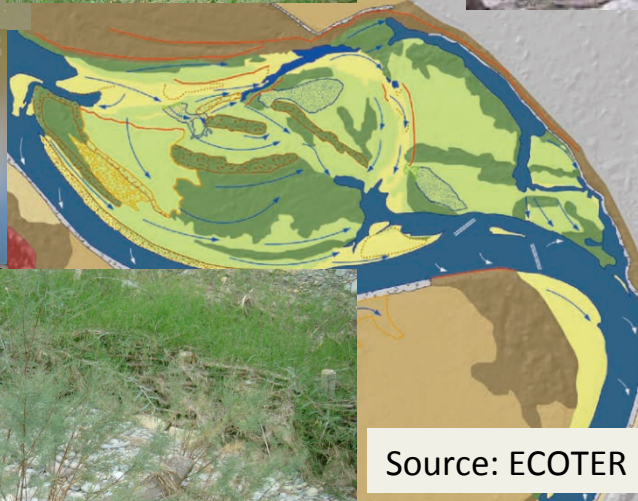
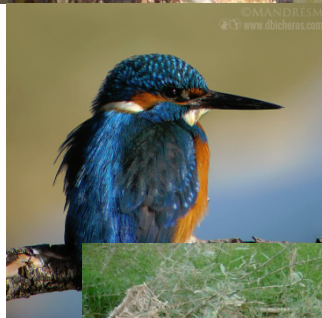
Post-disturbance status

Pseudo-adjustments or valid references?

Source: Magdaleno *et al.*, 2012



### iii. Maximization of biodiversity



## How possible in pressured sites?



## iv. Recovery of valued species



Restoration of Aragón River –  
European mink (*Mustela lutreola*)



Restoration of Negro River - Giant European freshwater  
pearl mussel (*Margaritifera auricularia*)

Single- or multi-species approach?

## v. Recovery of lost ecosystem processes



Floodplain reconnection in Aragón River. Source: Elena Díaz



Aquifer recharge in Segovia (Spain).  
Source: DINA-MAR project



## vi. Ecosystem services processes



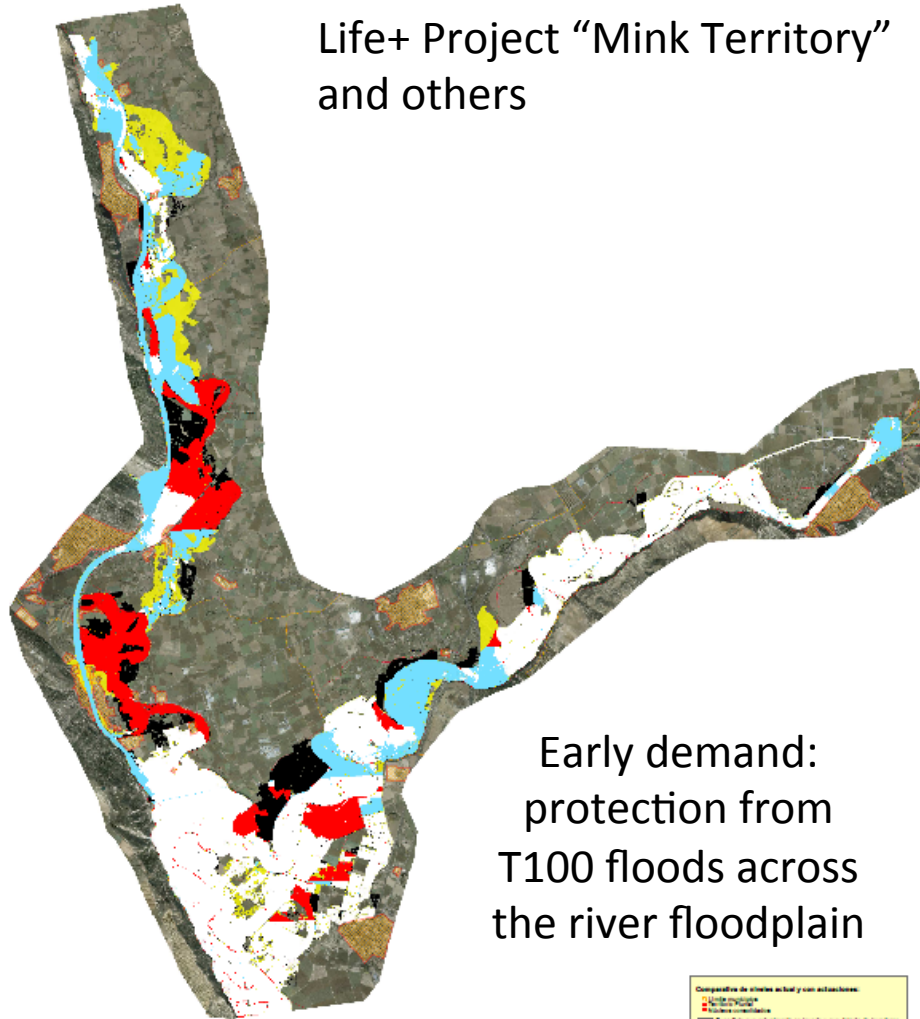
Constructed wetlands for biodiversity and tertiary treatment of urban/ industrial wastewater (Congost River, Barcelona)





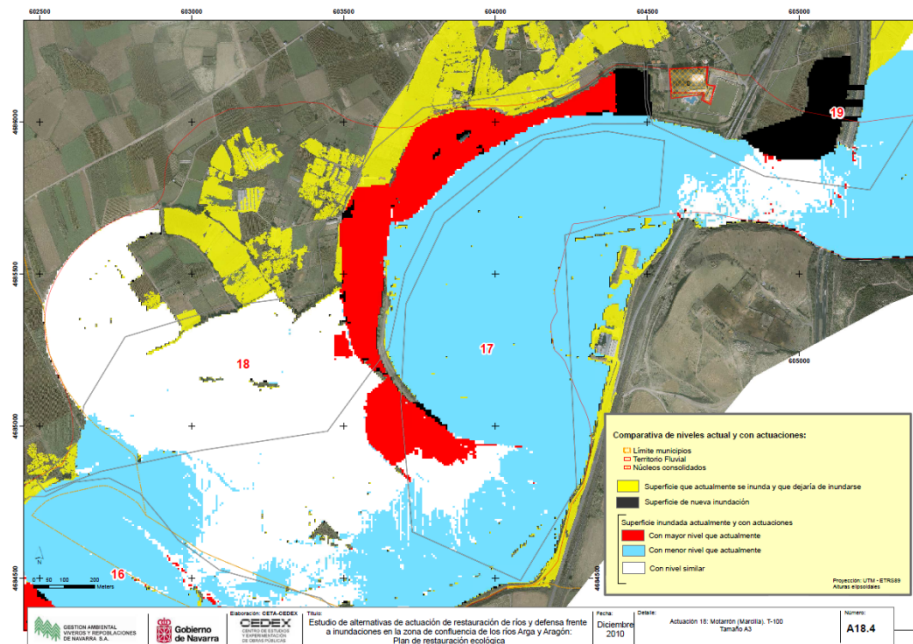
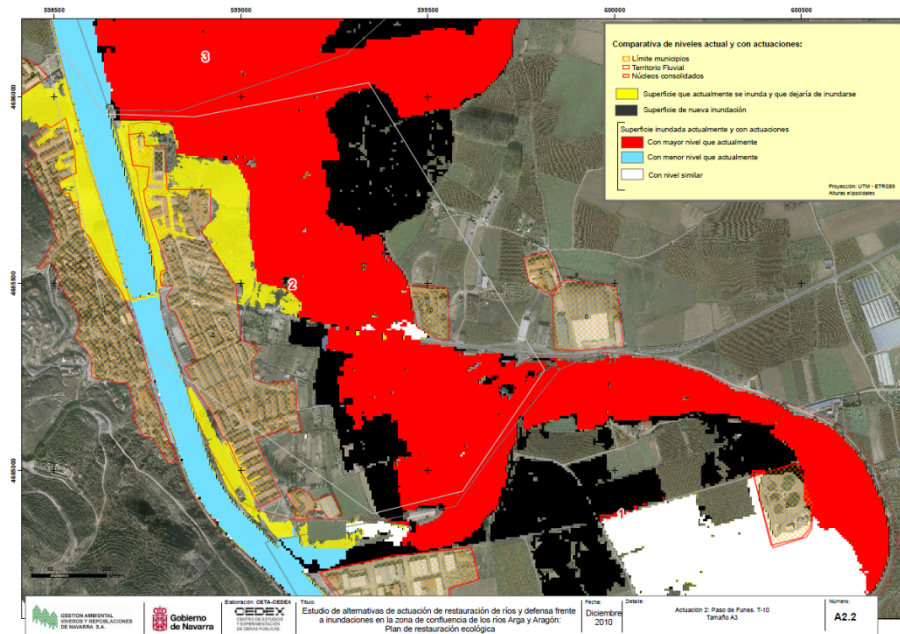
# 3. Some examples

Life+ Project “Mink Territory” and others



Early demand:  
protection from  
T100 floods across  
the river floodplain

Source: Government of Navarre



### 3. Some examples

Restoration of >10 ha of specific  
habitat for european minks

Natural



Created



Construction of wetlands for habitat of endangered species and improvement of water cycles (retention, infiltration, etc.)



### 3. Some examples

Restoration of >10 ha of specific  
habitat for european minks

Natural



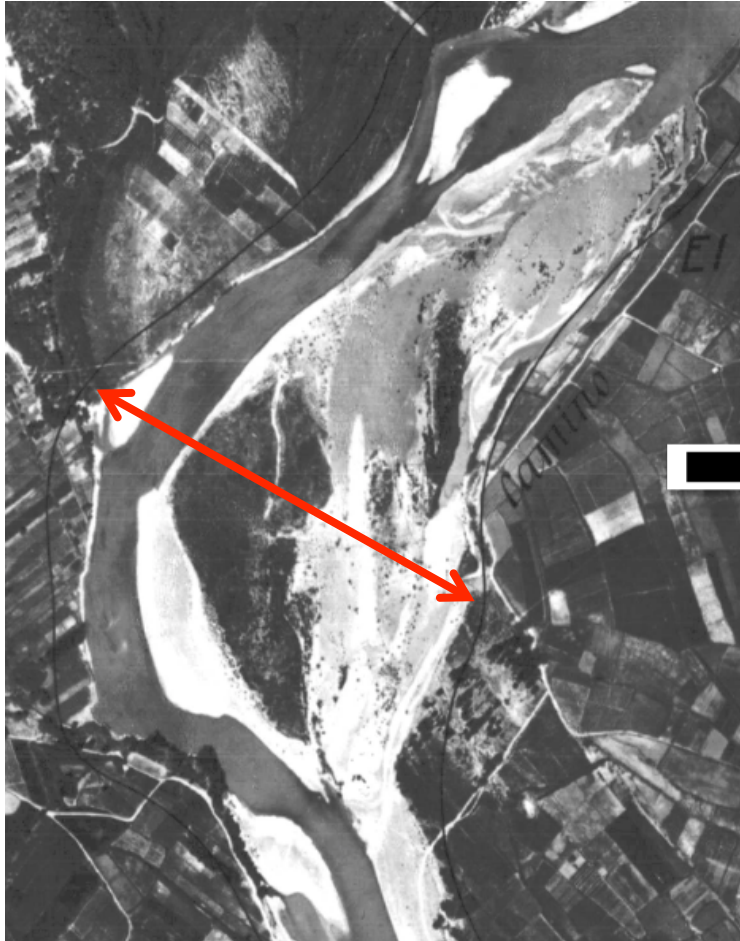
Created



Reintroduction/maintenance of LWD for habitat, water and sediment trap, improved trophic connections, etc.

### 3. Some examples

Natural



Recovery of >100 ha of river territory

Created



Connectivity improvement for habitat, flood amelioration, better W/D ratio, infiltration, reduction of erosion and encroachment



### 3. Some examples



Removal of >6km of artificial levees

Connectivity improvement for habitat, flood amelioration, better W/D ratio, infiltration, reduction of erosion and encroachment



### 3. Some examples



Connectivity improvement for habitat,  
flood amelioration, better W/D ratio,  
infiltration, reduction of erosion and  
encroachment



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### 3. Some examples

Restoration of 230 ha of  
priority habitats

Created

Natural



Diversity, low density and opportunity of plantations: role of vegetation in water retention and habitat dynamics



### 3. Some examples

Natural



Created



(Standing) Dead trees for habitat, improved hydromorphology, refuge, etc.



### 3. Some examples

Natural



Created



Biological removal of stumps to avoid loss of quality of riparian soils (and infiltration), enhance trophic network...and also social interest!



### 3. Some examples



And why not ecosystem-based NWRMs for public spaces?



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# 3. Some examples

...But, of course, we need to monitor and learn more and more from nature!!



INFORME DE ENSAYO			
Muestra:	2013 1606	F. Informe:	01/06/2013
Id:	T-29332	Hora:	16:23
Fecha:	24/05/2013	F. Ensayo:	24/05/2013 a 01/06/2013
Plante:	4875 GANASA		
	Análisis de suelos - Mendigorría		

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A Nº: 2013/2654

## SUELOS. ENSAYOS QUÍMICOS.

### DATOS DE LA MUESTRA

MUESTRA / LOCALIZACIÓN DE LA MUESTRA: Suelos y sedimentos según su referencia: S254

TOMA DE MUESTRAS PUNTUAL REALIZADA POR: El peticionario

CONDICIONES DE ENTREGA / RECOGIDA DE LA MUESTRA: Entregando en recipiente plástico

### RESULTADOS DE LOS ENSAYOS QUÍMICOS

PARÁMETRO	MÉTODO DE ENSAYO	UNIDADES	RESULTADO
ARENAS	Tamizado en seco	%	22,3
LIMOS	Sedimentación discontinua	%	58,6
ARCILLAS	Sedimentación discontinua	%	19,1



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## 4. Conclusions and recommendations

- Ecosystemic approach can be applied from very different perspectives, but should always be inherent to NWRMs
- NWRMs, ESS, LSS, EOs-WFD/FRD/BHD can be intermingled and optimized through ecosystem-based procedures
- Design of measures must target long-lasting solutions for multi-pressured and changing systems
- Discuss outcomes of alternatives, one different solution for each site and condition





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