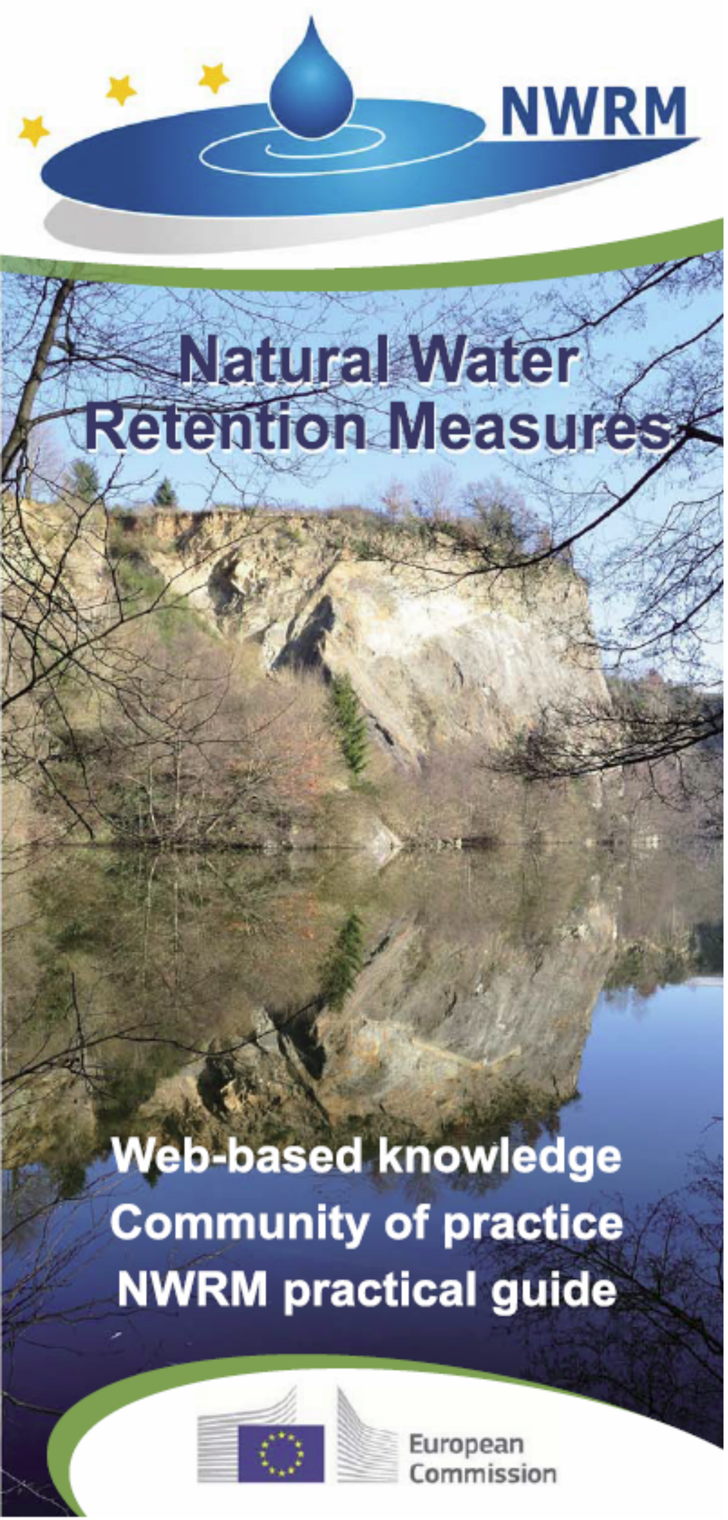

Pilot Project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures in River basin management

Service contract n°ENV.D.1/SER/2013/0010

Socio-economic aspects of NWRMs Implementation & Some Governance Dimensions

Some Take-Away Messages

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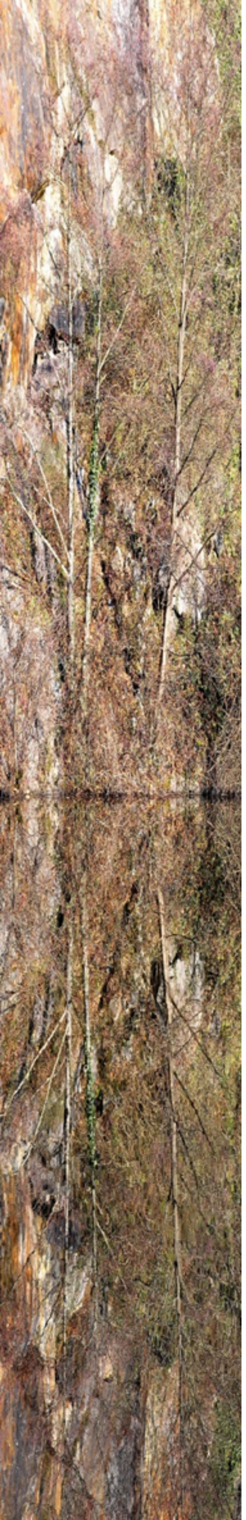


1. The need to go beyond project appraisal

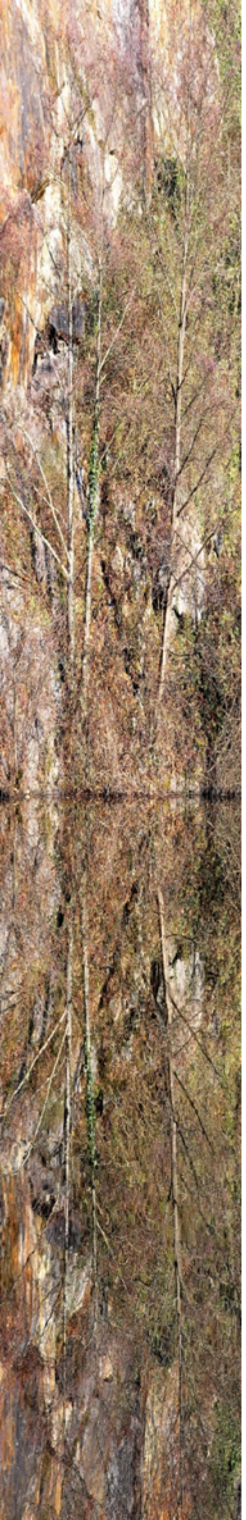
NWRMs are good themselves because they serve to restore the environment and thus biophysical flows of ecosystems services it delivers.

But…

Self-evidence of advantages tends to ignore the opportunity cost of the resources implied and the existence of alternatives that may serve the same purpose.

Besides its rationality for Nature restoration NWRMs need to be judged against its potential contribution to other objectives as stated in the WFD, FD, Biodiversity, Climate Change Strategy, Drought and Scarcity Strategy, CAP…).

Properly designed and implemented NWRMs represent opportunities that need to be adapted for the purposes of water management.



2. Success stories: sometimes purely financial reasons are good enough

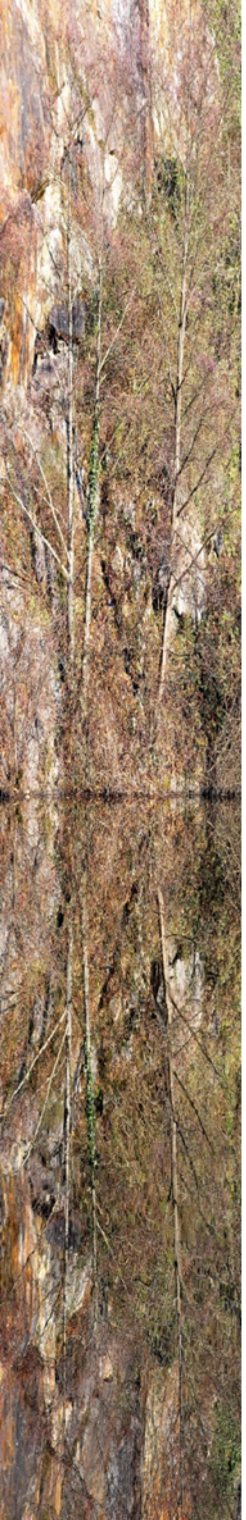
NWRMs might be cost-effective alternatives to attain particular objectives such as improving the status of water bodies, mitigating flood risks, etc.

Example: Stormwater control (The NYC Green Infrastructure Plan, 2012)

“By using green infrastructure technology to keep stormwater out of our sewers, we can reduce sewer overflows and promote the sustainability policies that will make New York greener and greater – and save taxpayers money, too” Bloomberg.

The argument needs to be built by showing the cost advantages over the (traditional) best available alternative. It works because the financial argument can prevail:

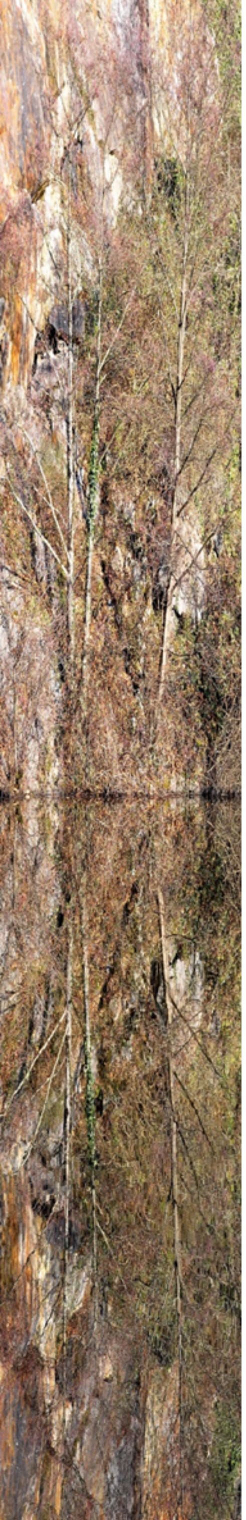
In exchange, DEC has eliminated approximately $1.4 billion in grey infrastructure projects, and agreed to defer another $2 billion in additional grey infrastructure that had been proposed, providing DEP with the necessary time to build and monitor green infrastructure projects.



New challenge: costs other than pure financial ones may be more relevant in most of the cases

- ✓ **Non-recurring and recurring costs for regulators:** these are associated with the set-up, administration and enforcement and monitoring of a new measure or a change in policy;
- ✓ **Cost savings:** avoided water provision costs, avoided remediation costs (dredging, pest control, invasive species removal,...).
- ✓ **Non-water environmental costs/benefits** these include change in habitat, landscape, emissions to air, noise, etc. that may result from changes in land use (e.g. due to changes in agricultural practices or forestry).
- ✓ **Wider economic effects:** any knock-on effects that are passed on or through to other sectors, organizations, etc. This includes the effects on producers and consumers in related market that are not captured by the estimation of direct non-recurring costs and recurring costs.

RPA (2004). CEA and Developing a Methodology to Assess Disproportionate Costs. Final report for DEFRA, WAG, SE and DoENI.



Not to forget: What makes a NWRM special is not the ends pursued but the means used

A working example > Would recharging an aquifer with treated wastewater at a cost of 1 €/m^3 be a good option in an agricultural area where water productivity averages only 0.2 €/m^3?

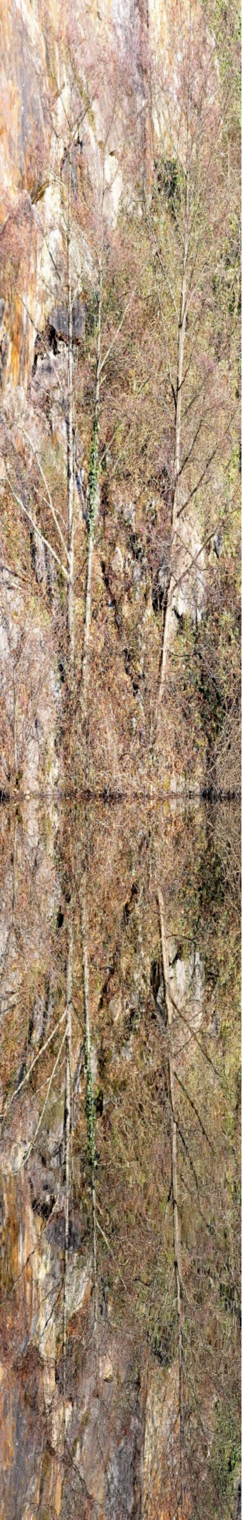
A LAST (Land Application System with a forest Mass). Besides water injection it obtains the following co-benefits:
(e.g. Carrion de los Céspedes, small village in Salamanca, western Spain)

- Savings in wastewater treatment (0,30-0,60 €/m^3)
- Wood production (0,04 to 0,10 €/m^3)
- Carbon fixation (6,3 tons/Ha)
- Landscape, and other recreation amenities.

The answer might also be ‘yes’ even if water is treated and injected directly in the aquifer. In that case the answer will lay in the unique character of the method. E.g. Seawater Injection Barrier Recharge with reclaimed water at Llobregat Delta aquifer (Spain).

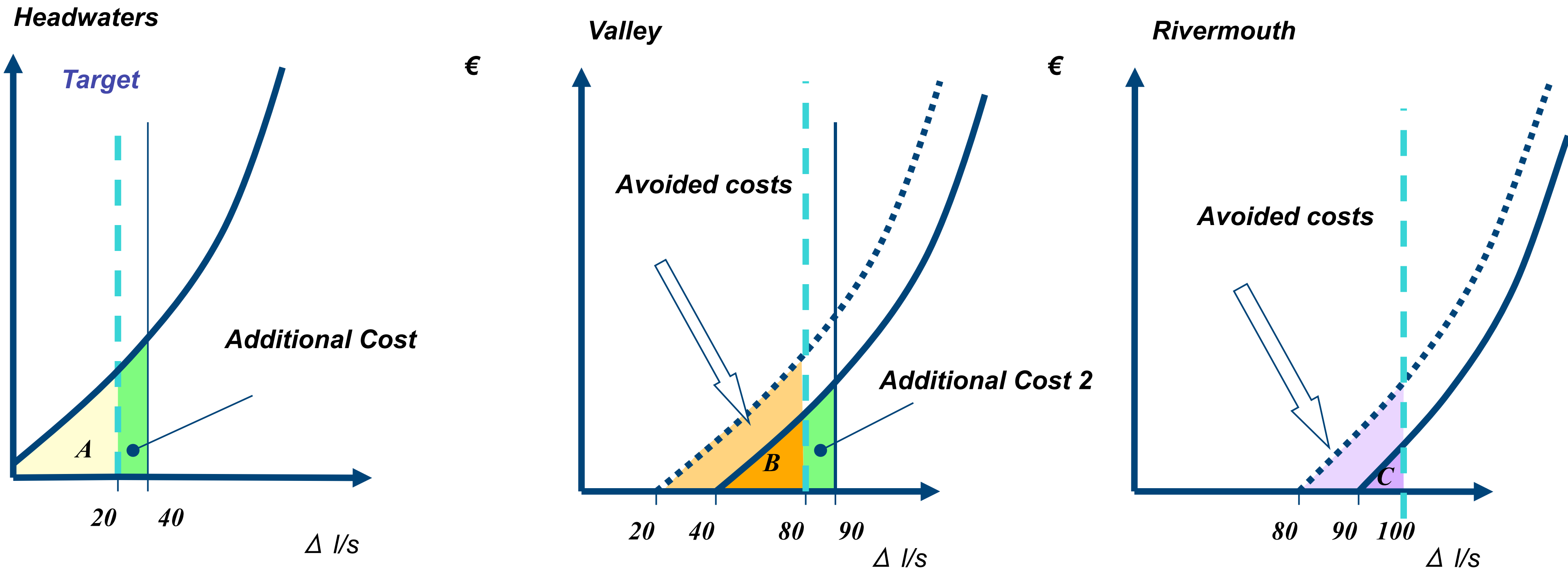
The benefits that might justify NWRMs are context-specific (no one size fits all)

Sanz, J.; Miguel. A. Bustamante, I. Tomás, A. and Goy, J. (2014) Technical Financial and Location Criteria for the Design of Land Application System Treatments. Environmental earth Sciences. Vol. 71.1:13-21.
•Villar, A. Bustamante, I. Gómez, C.M. and Miguel, A. (2011) Land Application Systems and its Assessment on Financial and Economic Criteria: The Experience of CENTA in Southern Spain. IMDEA.
•Ortuño, F.; Molinero, J. ; Garrido, T. and & Custodio (2011) Seawater Injection Barrier Recharge with reclaimed water at Llobregat Delta aquifer (Spain). 8th IWA INTERNATIONAL CONFERENCE ON WATER RECLAMATION & REUSE. Barcelona, Spain. 26-29 September 2011



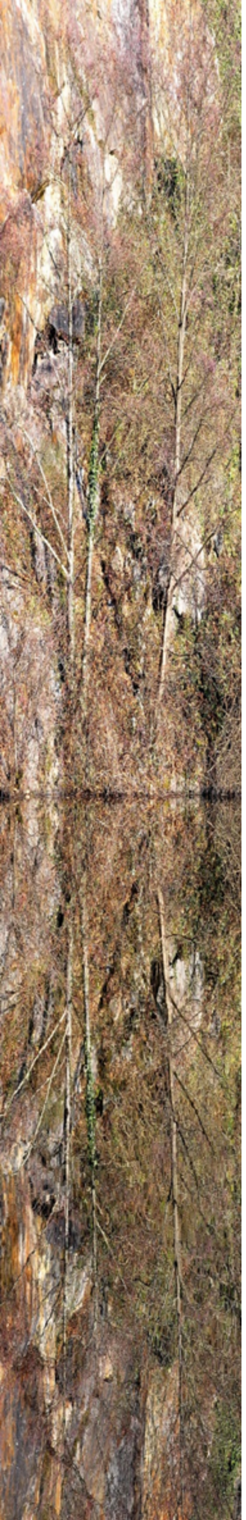
NWRM cost advantages are better captured within integrated PoMs

The Building of a least-cost PoMs to increase water flows in the Cidacos River Basin



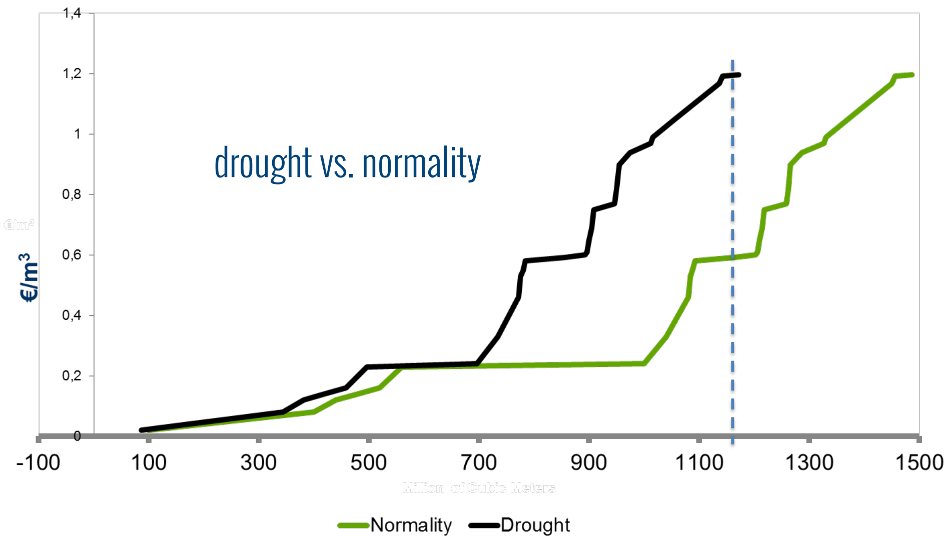
The water-related benefits of NWRMs might consist in the avoided costs of reaching the GES/GEP in the interconnected water bodies.

- Source: WATECO Guidelines. The Cidacos RBMP

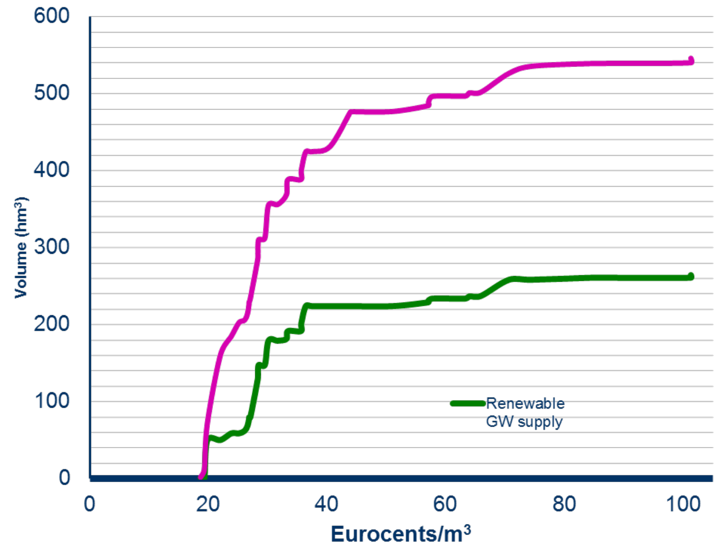


A note of caution: Incomplete cost-effectiveness analysis can lead to biased comparisons against a wider application of NWRMs

✓ Retaining water underground might not be a competitive water supply.



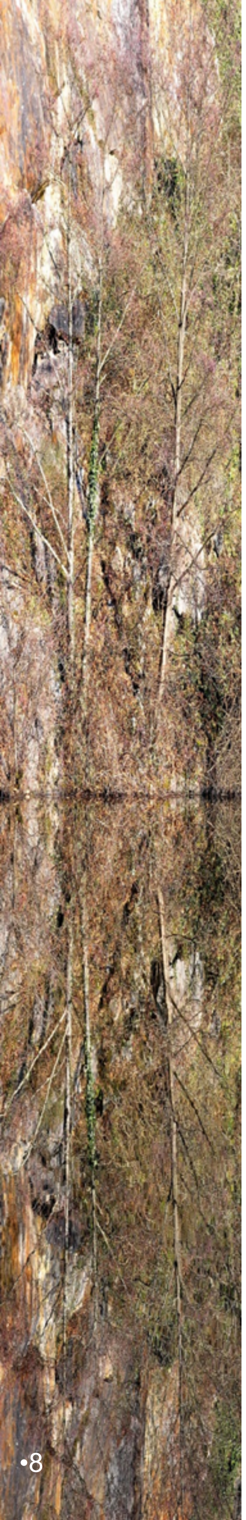
The Water Supply Curve in the Segura River Basin district (SE Spain) Source: EPI Water Project



Groundwater supply in the Segura River Basin district (SE Spain) Source: EPI Water Project

✓ But it might be a good option to increase water security (as far as it serve to halt degradation processes)

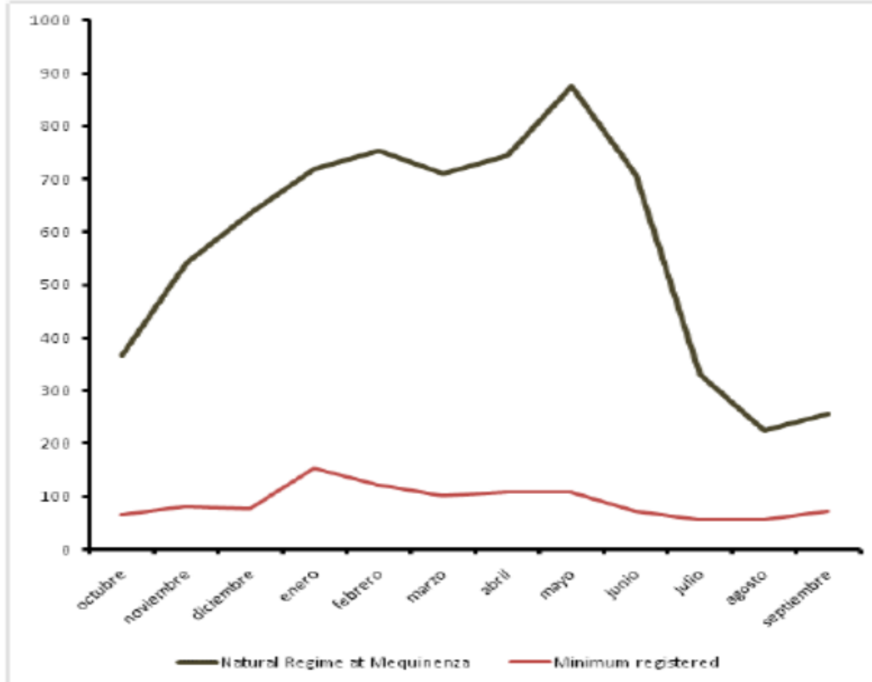
Sound methods to compare water quantity and water security are still required



Making it happen: aligning incentives

✧**The change in the river morphology reduced flood frequency and magnitude, also reduced sediment load and altered the river's ecology.**

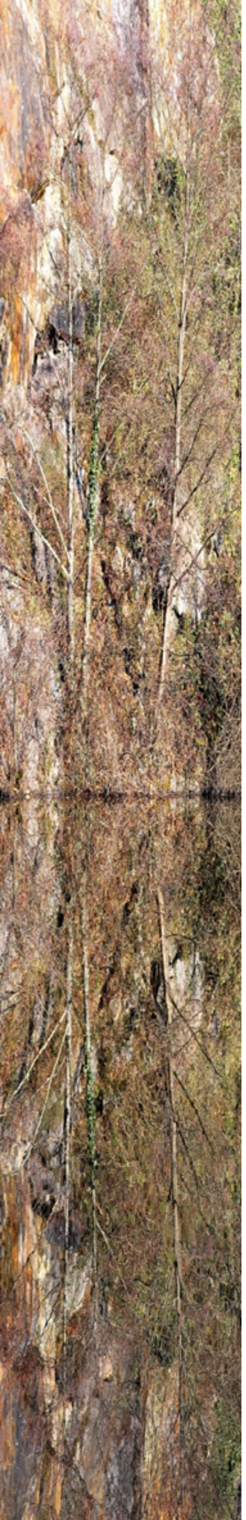
✧**All that have reduced health (infestation of black fly), navigation, salt control in the delta, banks erosion, channel incision, lack of self-depuration potential…)**



✧ **Flushing Flows (FF)** use dams that alter river systems as tools to artificially reproduce some of the functions performed in the past by the natural river regime.

✧ In 2002, the hydropower company (Endesa), the Ebro River Basin Authority, and the scientific community coordinated efforts to establish and promote a voluntary agreement to produce FF **to improve the ecological potential of the river** and control and remove the excess of macrophytes from the river channel. Two controlled floods every year (in spring and autumn): delivery of more than 30 million m^3. The duration of flushing flows (between 2002-2007) varied between 13.5 and 22 hours.

•Carlos M Gómez, C Dionisio Pérez-Blanco, Ramon J Batalla (2013)
Tradeoffs in River Restoration: Flushing Flows vs. Hydropower Generation in the Lower Ebro River, Spain. Journal of Hydrology.



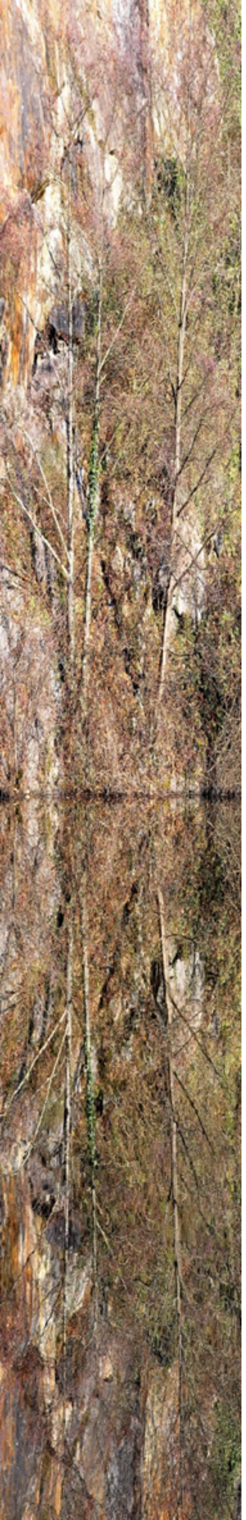
Beware false positives

As important as setting the right incentives in place it is to avoid existing incentives making NWRMs nicer than they effectively are.

A tale of two basins:

Non-conventional water sources: Why there is excess demand in Cyprus and excess supply in the Segura River Basin?

The explanation is not water scarcity but prices and allocation rules.
Does it something to see with incentives to overdraft groundwater in one place and incentives for groundwater recharge in the other.



The issue of incentives

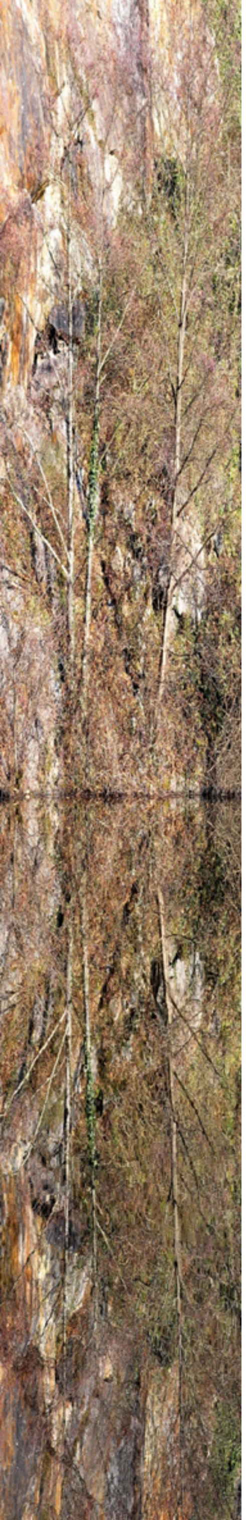
Existing incentives favour the maintenance of the status quo (in semi-arid water scarce areas existing incentives to retain water are weaker than in relatively water abundant areas)

A NWRMs might be rational from an overall cost-benefit perspective but still unattractive for those in charge of implementing it. Voluntary acceptance, in forestry and agriculture, required properly designed economic incentives. The CAP reform can be one example.

If NWRMs benefits are not public goods (non-rival and non-excludable) *how can the beneficiaries pay for them*?

The cost-recovery issue: if in addition to water management NWRMs serve many other purposes how must these measures be financed?

Can payment for environmental services be based upon public information and ex-post evaluation?



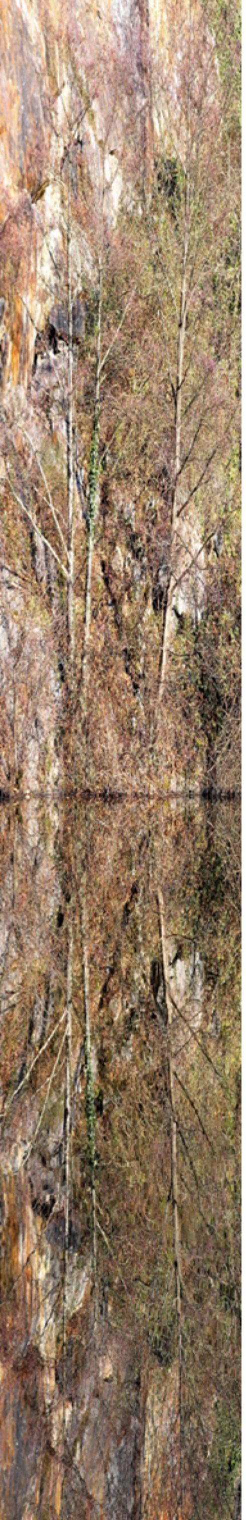
Don’t forget trade-offs

- ✓ Retaining water implies altering baseline water balances and then trade-offs between evapotranspiration, soil retention, run-off and groundwater recharge.

- ✓ Trade-offs need to be considered according to the local value of water (*water retention in semi-arid Mediterranean river basins is less effective and might increase water scarcity*)

- ✓ Changing land-use practices entails opportunity costs (*such as reduction in crop yields and surfaces, increase in production costs, etc*.).

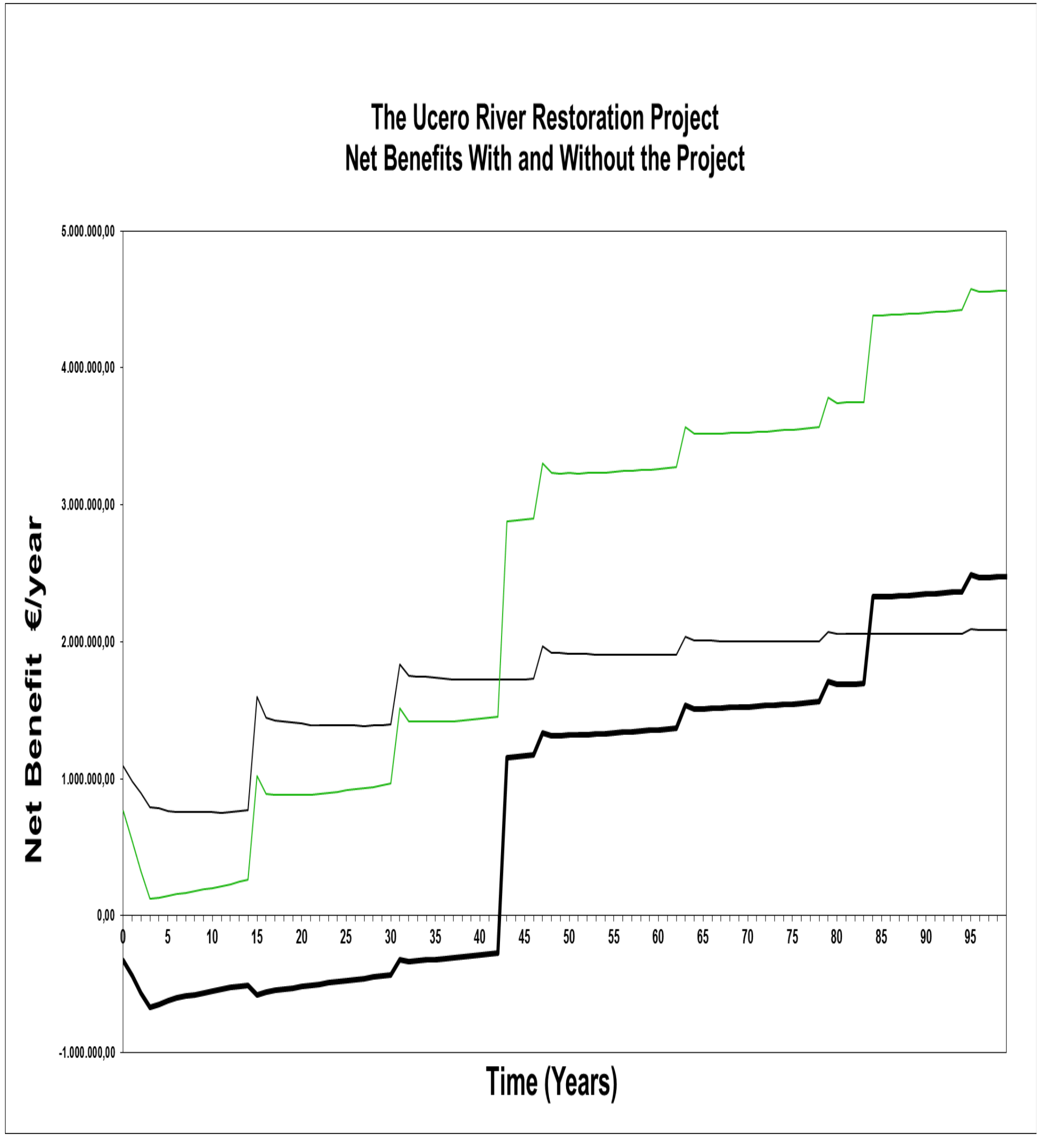
- ✓ But not only benefits are characteristic of NWRMs: particular opportunity costs might be an important issue:
  - Conservation tillage increases evapotranspiration and water use as well as pest.
  - Enhancing irrigation efficiency means less water diversion but more water depletion (and less water retention).
  - Afforestation reduce peak floods but might reduce runoff and groundwater recharge.



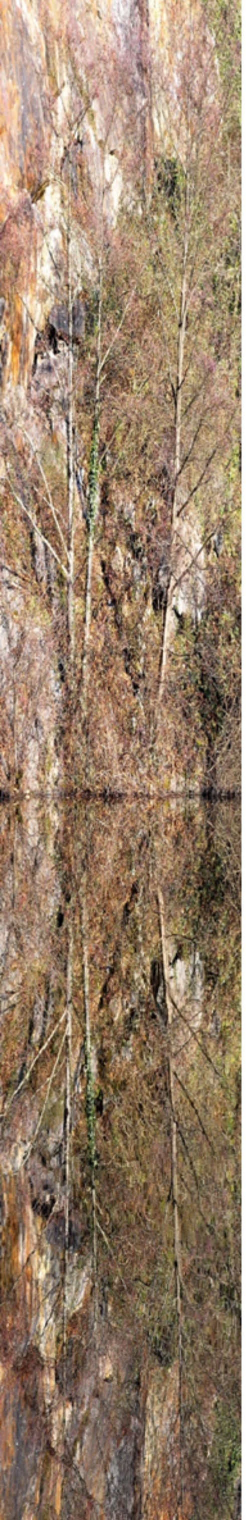
Why farmers don't take advantage of existing opportunities?

The Ucero River Restoration Project

A set of restoration measures accompanied by land-use changes to reduce flood risk in one third from traditional agriculture to optimized forestry.

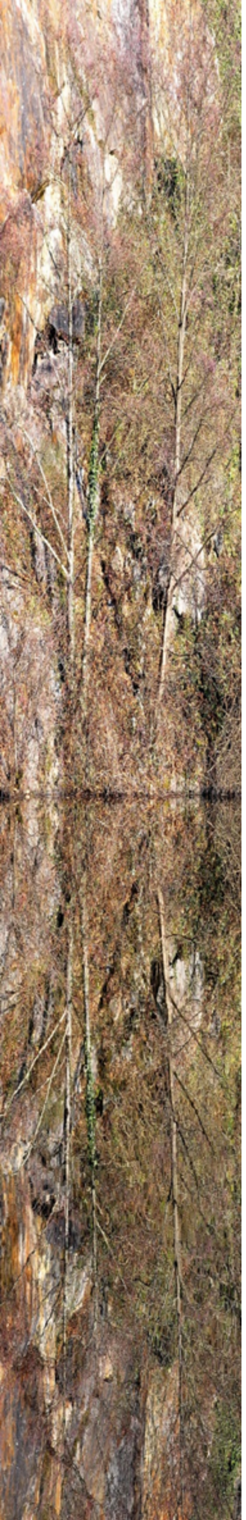


Rodríguez, I, Martínez R-*, Sánchez, F.J., Aparicio, M., Jiménez, S., López-M. G., Molina J.R., Santiago, A.,Seiz A, y Schmidt, G. **COST-BENEFIT ANALYSIS OF THE RIVER RESTORATION PROJECT OF THE UCERO RIVER (SORIA, SPAIN) WITH SPECIAL CONSIDERATION FOR THE PREVENTION OF NEGATIVE IMPACTS From FLOODs**



Institutional issues

- ✓ Implementation of NWRMs requires breaking up the institutional silos at all levels (EU, National and sub-national levels).
- ✓ Besides the purposes of water management NWRMs are outstanding opportunities for a better coordination of different sectoral policies including land planning, rural development, agricultural policy, climate change adaptation, etc…
- ✓ Cooperation between the private and the public sector, different areas are required to coordinate objectives and reduce the compliance costs through the simultaneous attainment of different policy objectives.
- ✓ Is there an institutional lock-in in water management: Do existing institutional setups and incentives favour traditional water management measures instead of innovative NWRMs?
- ✓ What changes in institutions would be required in order to allow for new innovative instruments such as payment for environmental services or performance based subsidies.



Information gaps

- ✓ Evidence on effectiveness mostly refer to design conditions.
- ✓ Few projects have been assessed in terms of its contribution to water policy objectives (many river restoration projects have also found no or minor ecological improvements (Restore Project)
- ✓ Virtually all restoration project evaluations are restricted to a few years after restoration (e.g., 3-5 years), and significant uncertainties remain surrounding the long-term effects and sustainability of restoration measures (Feld et al., 2011).
- ✓ The watershed and river network conditions must be more strongly considered, and river restoration should be done in a watershed context.