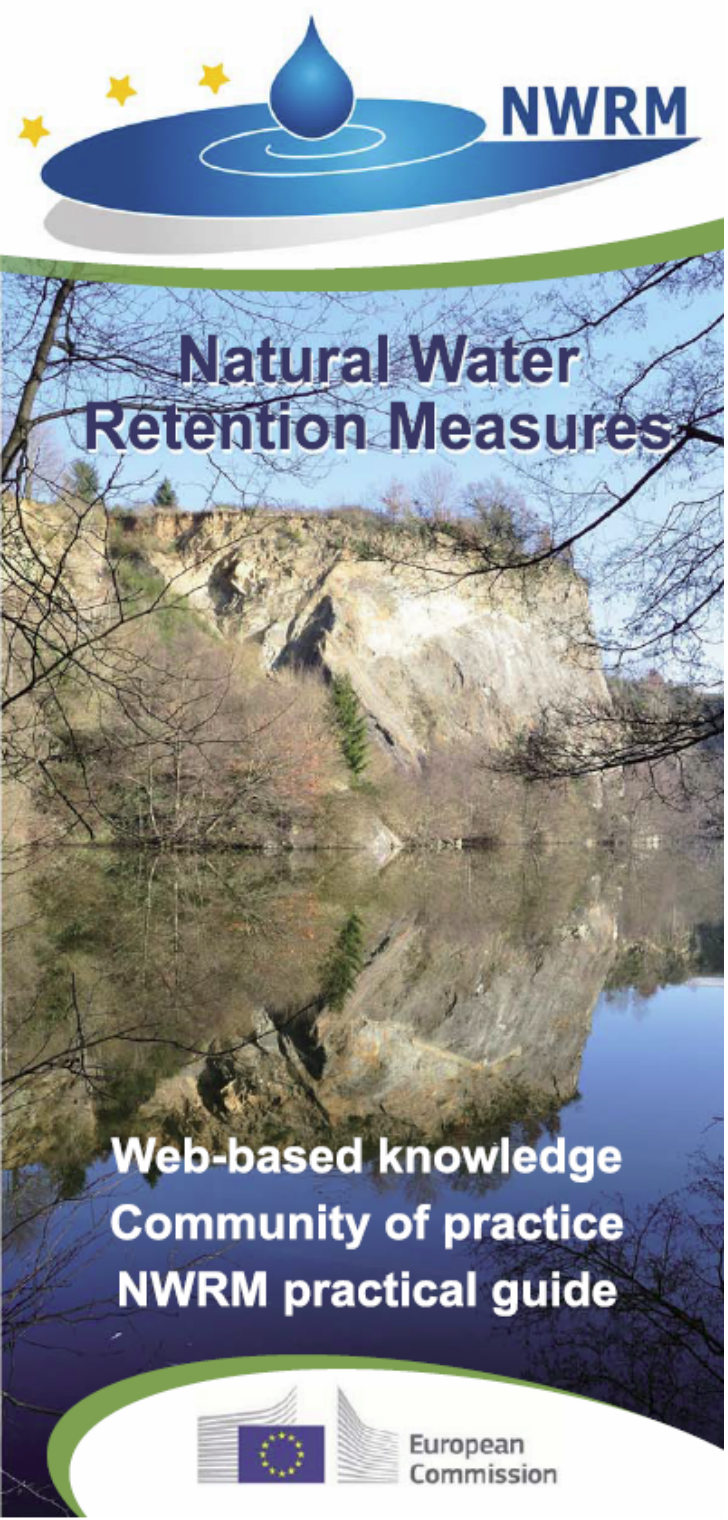


Pilot Project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures in River basin management

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

Economic evidence of benefits of NWRM

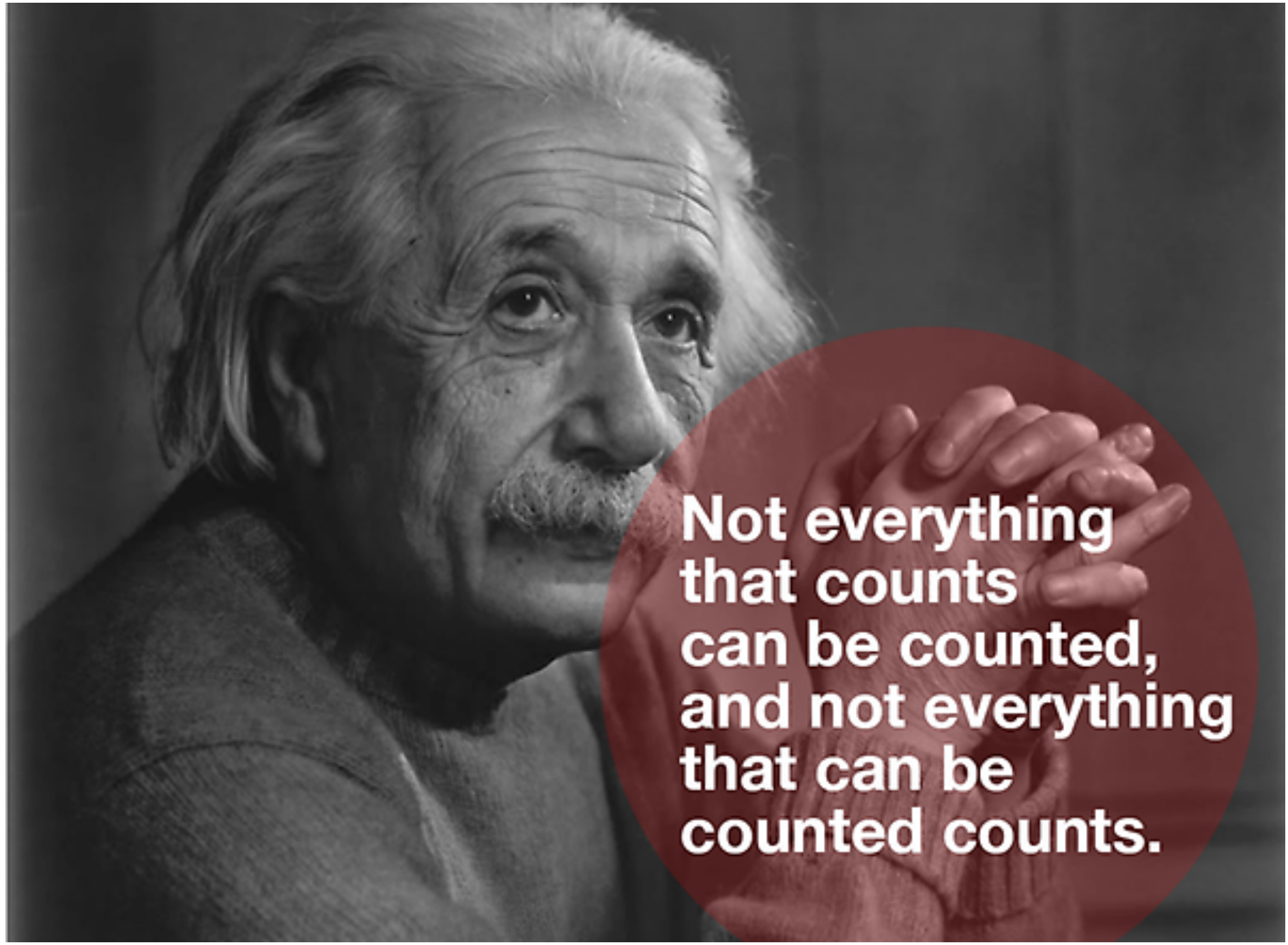
Gonzalo Delacámara

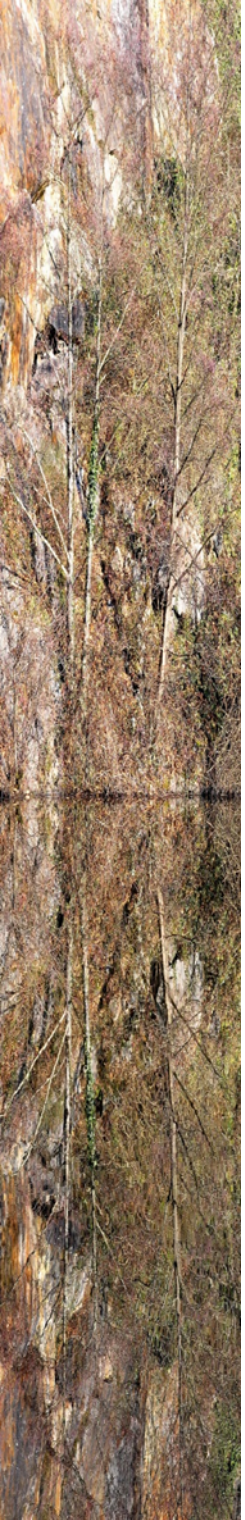
institute IMDEA water

NWRM Mediterranean Workshop // Turin (Italy), September 11th-12th, 2014

Office International de l'Eau

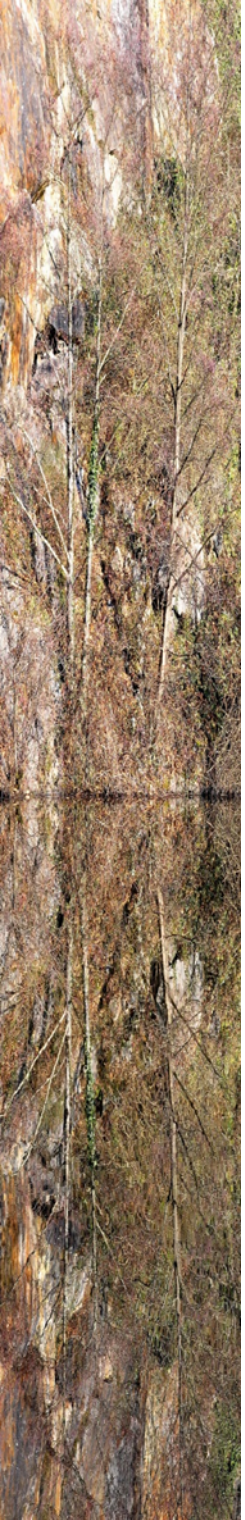
ACTeon environment


Not everything
that counts
can be counted,
and not everything
that can be
counted counts.



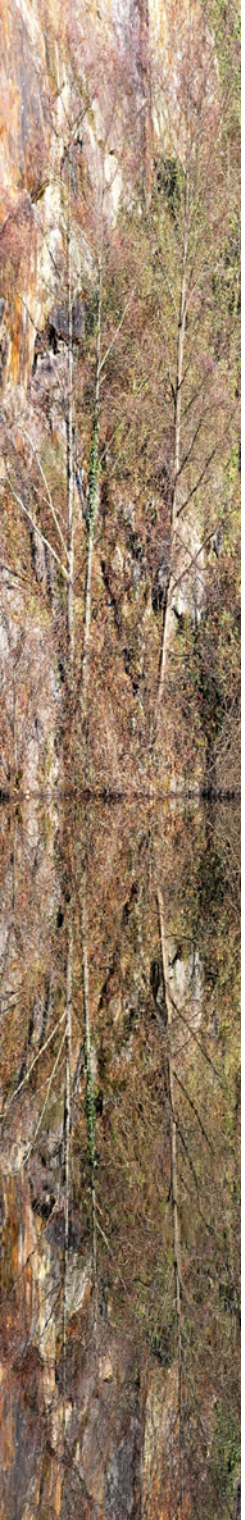
Confluence of Arga and Aragón rivers, Navarre (Northern Spain).

Source: Magdaleno, F., 2014. River and floodplain restoration – natural water retention for combined outcomes (CEDEX). Presentation NWRM Mediterranean Workshop, Madrid, January 28th-29th, 2014.



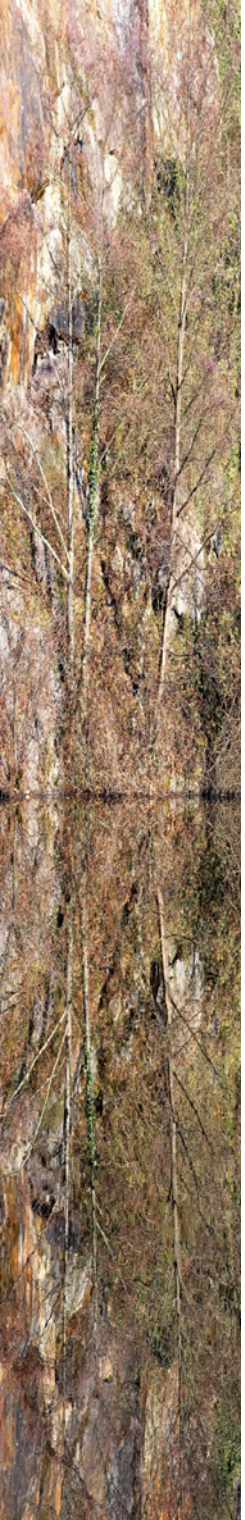
Overflow of the Arga river in the riverine towns of Villada and Burlada in January 2013 (Greater Pamplona, Navarre, Spain)

Source: www.diariodenavarra.es; 16/01/2013.
http://www.diariodenavarra.es/noticias/navarra/pamplona_comarca/2013/01/16/las_inundaciones_alteran_vida_normal_comarca_pamplona_104160_1002.html



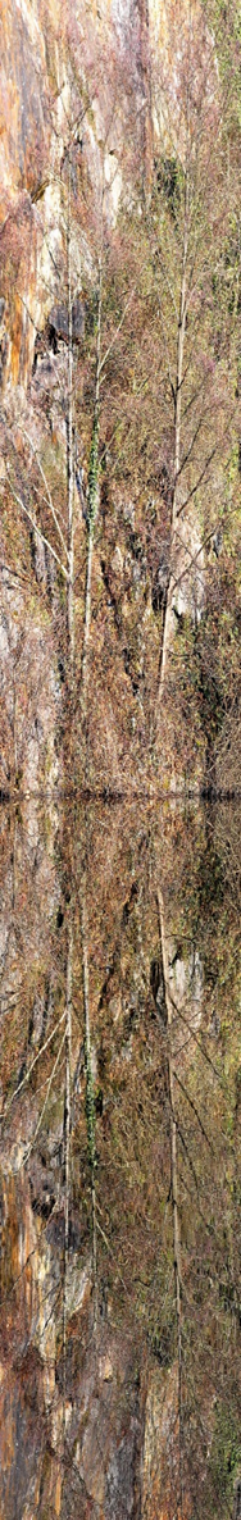
National motorway N-113 flooded due to the overflow of Arga river in June 2013. Navarre (Spain)

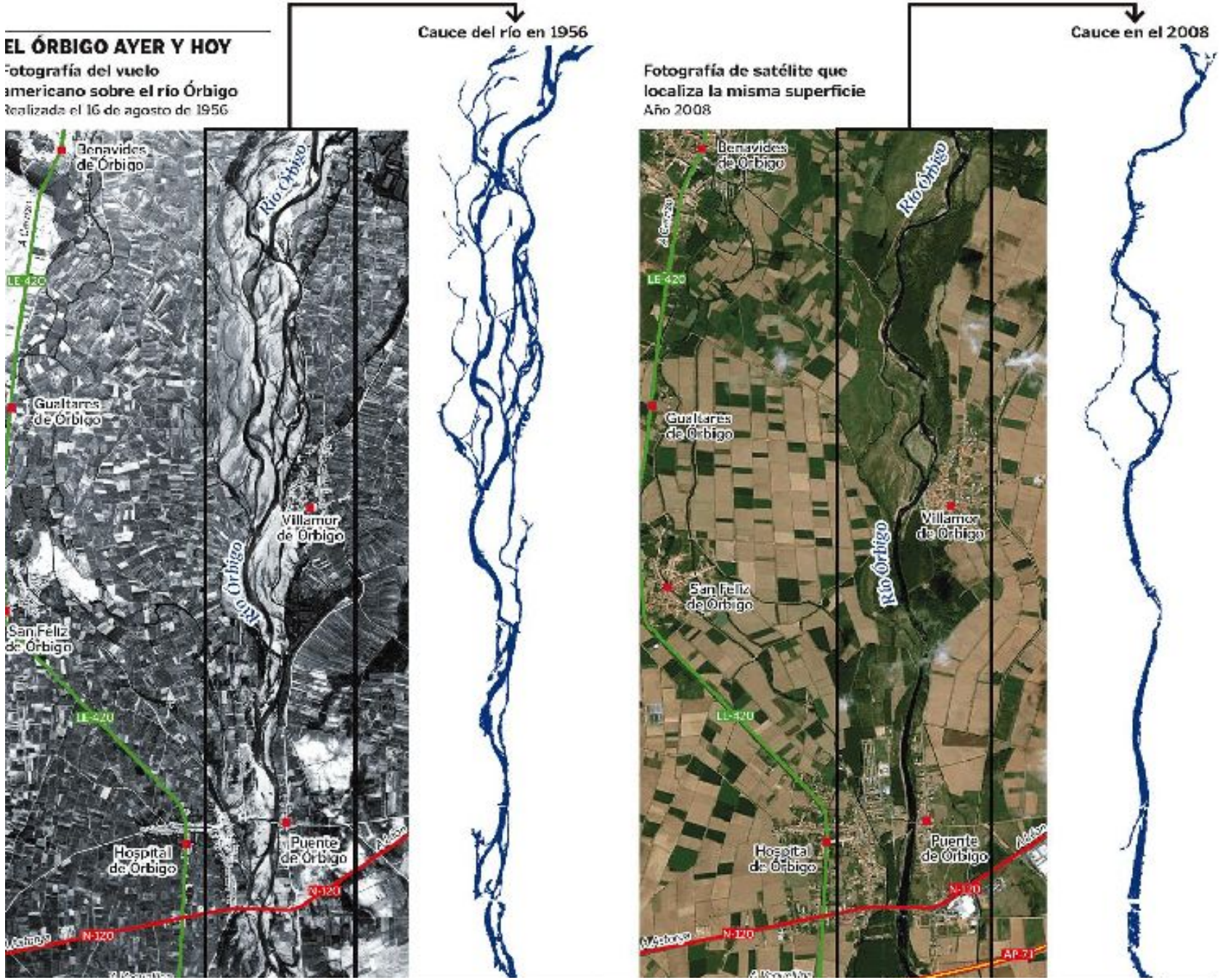
Source: www.lainformacion.com; Monday, 10/06/13 - http://noticias.lainformacion.com/medio-ambiente/rios/la-carretera-n-133-pamplona-madrid-cortada-en-castejon-por-las-inundaciones_hCU4EPd05G1eDVCgpgAGd4/



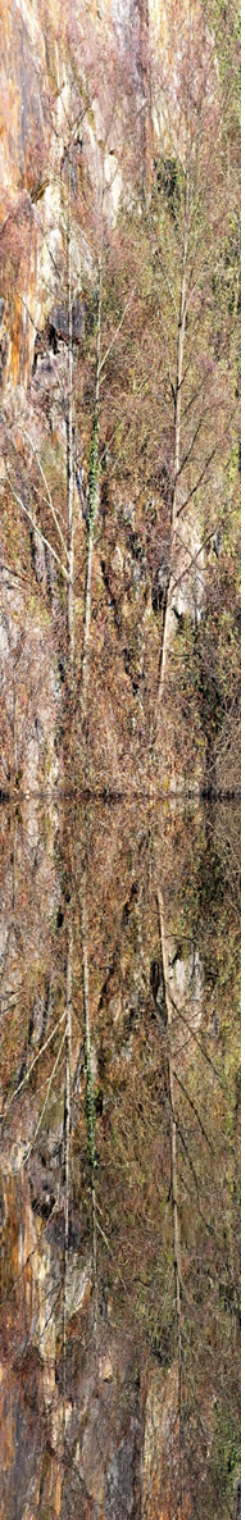
Overflow of Arga river in Pamplona (June 2013. Navarre, Northern Spain)

www.lainformacion.com; Sunday, 09/06/13 - http://noticias.lainformacion.com/catastrofes-y-accidentes/inundaciones/el-ayuntamiento-de-pamplona-mantiene-el-nivel-de-alerta-por-las-inundaciones_5H6V18cyyhulxYIOwnSjK2/





Órbigo river channel in 1956 and 2008. Effects of channelization and alteration of the river hydromorphology.
Source: Duero River Basin Authority (Confederación Hidrográfica del Duero, CHD).



Poplar crops in the Órbigo River Basin (Castille and León, Spain)

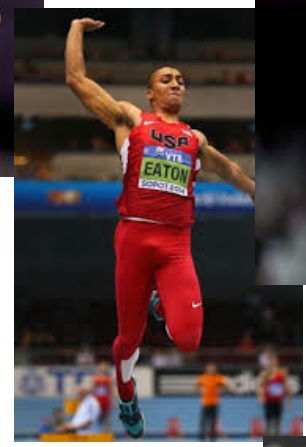
Source: Rodríguez I., Santillán J.I., Huertas R., Ortega L., 2012. The Órbigo River Restoration Project and its implications in flood risk prevention. (WGF Thematic Workshop: Stakeholder Involvement in Flood Risk Management. 17, 18 April, 2012. Bucharest-Romania. Session 4: Working with institutional stakeholders and other sectors, in particular in land use)

Poplar crops are compatible with flooding episodes. Órbigo River Basin (Castille and León, Spain)

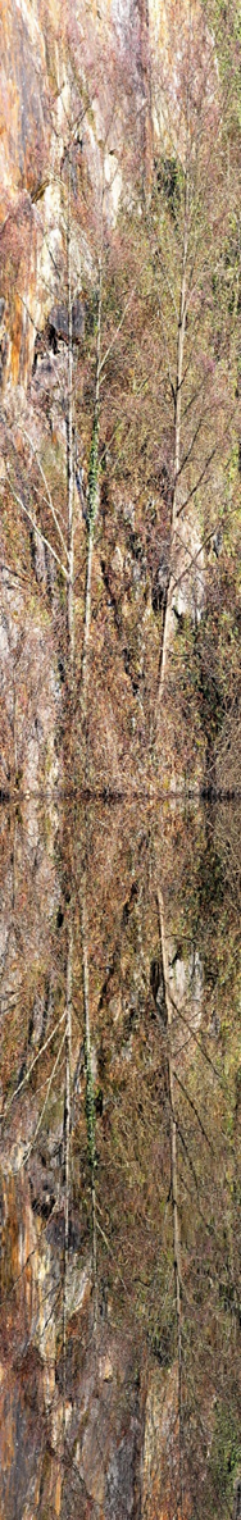
Source: Duero River Basin Authority (Confederación Hidrográfica del Duero, CHD), 2013. River Órbigo Restoration Project.

Why do NWRM hardly ever seem to be cost-effective…

… even when they are? (Ashton Eaton vs. Usain Bolt, a parable by Carlos M. Gómez)

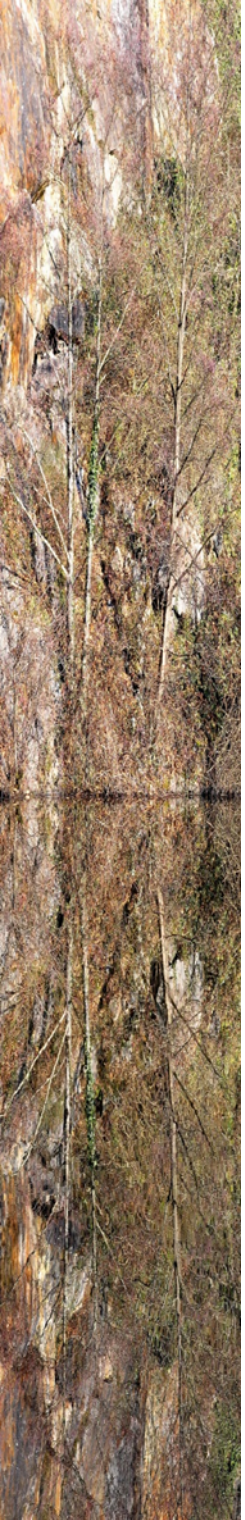


Bottom line // a fair comparison between a specialist and a multipurpose measure should be based on more than one criterion.



Does a NWRM help if your baby is crying? Are NWRM to blame when the soup cools down?

- Catchment scale is of paramount importance – individual measures may have little effect; it is rather the cumulative effect of (a set of) measures that is relevant when factoring in economic benefits.
- Challenges: when it comes to assess not only the performance & effectiveness of NWRM but also their contribution to welfare, benefits are often widespread – quite often interventions in one place (i.e. upstream) may generate benefits elsewhere (i.e. downstream). Cost-effectiveness is a matter of choosing the right system boundaries rather than merely a monetary question.
- This also has implications in terms of relevant (direct & indirect) benefits: NWRM provide multiple benefits way beyond water retention. Water retention indeed is an ancillary benefit of measures (also) serving other purposes. If some benefits are overlooked, NWRM would not seem cost-effective (i.e. lack of incentives for engagement).
- Valuing benefits is a challenging issue – currently evidence on effectiveness mostly refers to design conditions, not actual performance (this is a main drawback for economic valuation).



The need to go beyond (financial) project appraisal

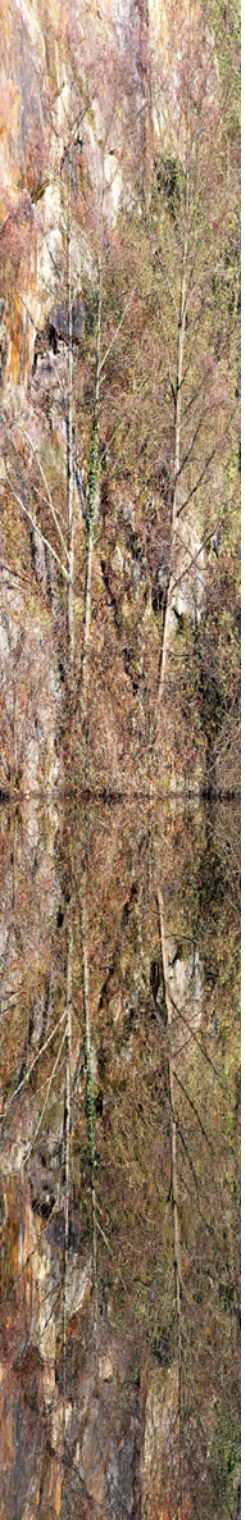
- Avoiding self-indulgence – NWRMs are good in themselves because they serve to restore aquatic ecosystems and thus the biophysical flows of ecosystems services they deliver.

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 rationale for restoration (and emulation of natural functions) NWRM need to be **judged against its potential contribution to other objectives** as stated in the WFD, FD, EU 2020 Biodiversity Strategy, Climate Change Adaptation Strategy, CAP reform…).

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



It's (almost) all about incentives

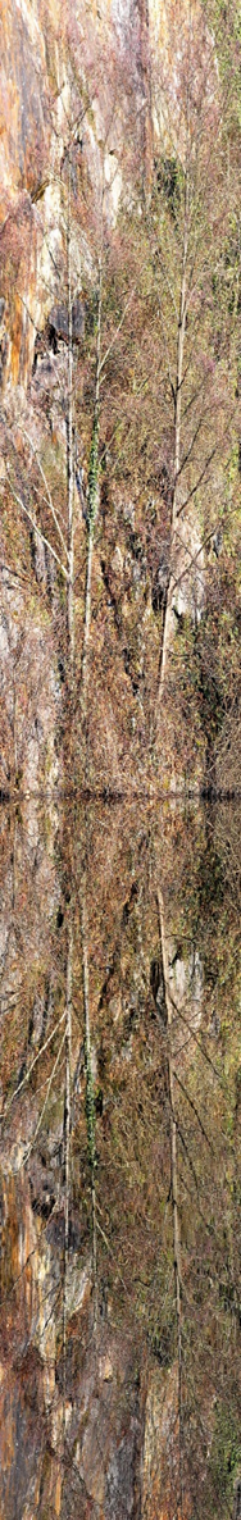
- Prevailing incentives favour the maintenance of the *status quo* (in semi-arid water scarce areas in the Mediterranean, **incentives to retain water** are weaker than in relatively water abundant areas).

- A NWRM might be rational from an overall cost-benefit perspective but still non-appealing for those in charge of implementing it. Voluntary acceptance, in forestry and agriculture, requires **properly designed economic incentives** - The CAP reform (CAP pillar 1: greening but also RDP) can be one example (more: ESIF // partnership agreements; CCA & DRR; R&TD and innovation funds; LIFE; EIB).

- If NWRM's benefits are not public goods (non-rival and non-excludable) **how could beneficiaries pay for them?**

- The cost-recovery issue: if in addition to water management, NWRM serve many other purposes **how should these measures be financed?**

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

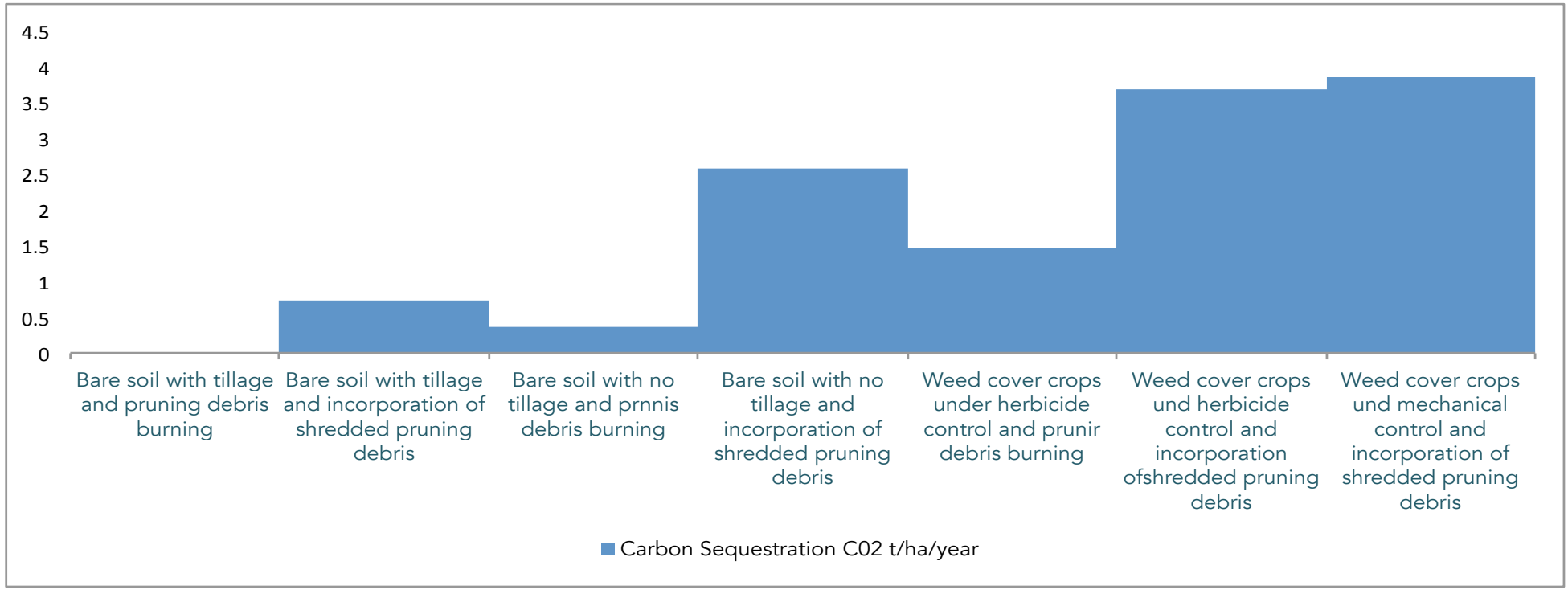


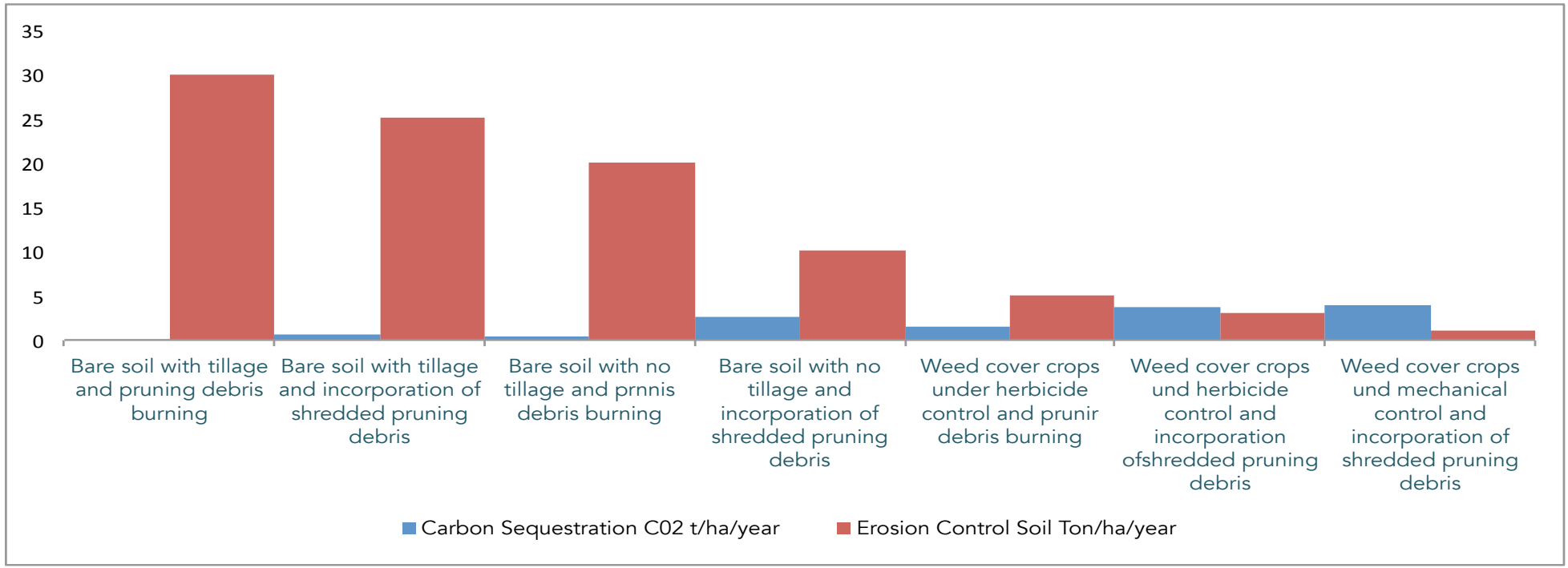
Please, bear trade-offs in mind
(critical from an economic viewpoint)

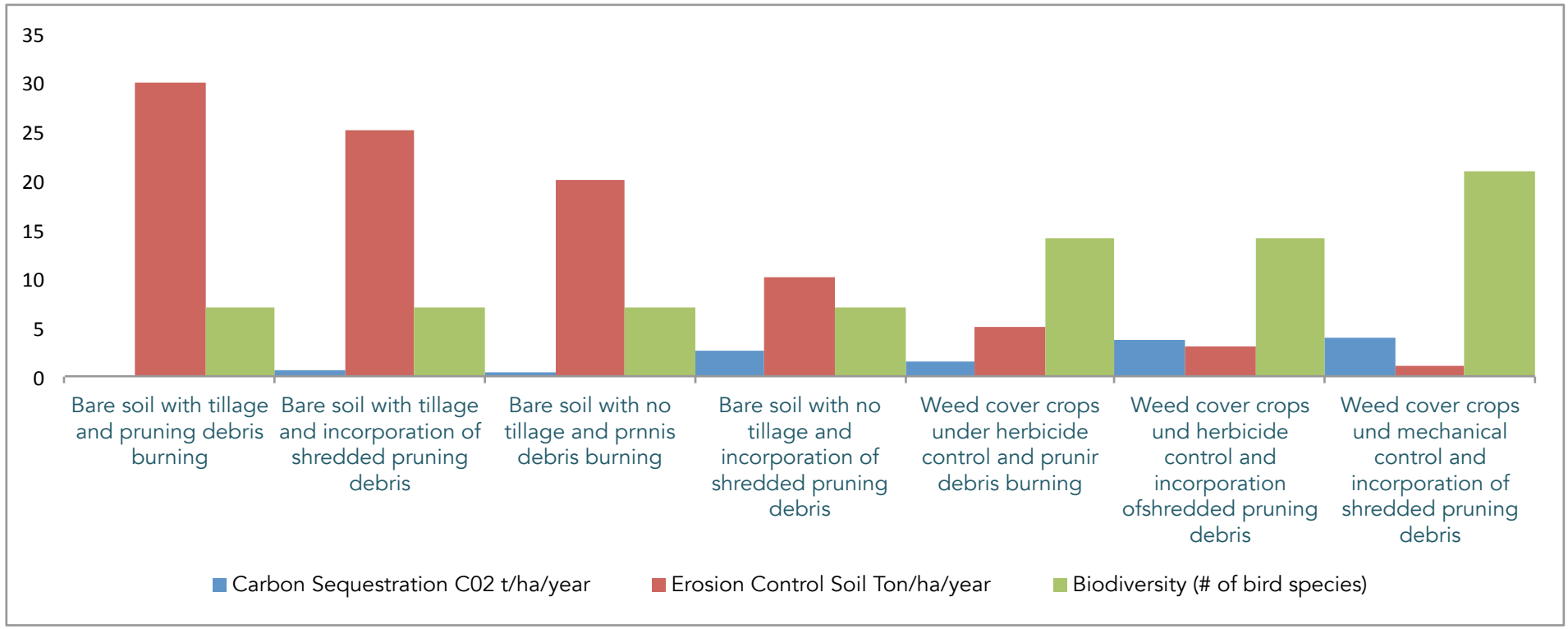
3.4 Crop practices Change in [%] from the baseline 2030 scenario For water stress change in [days per year] from				
	Fast flow [%]	Evapotrans. [%]	Groundw. recharge [%]	Water stress [d per year]
N. Scandinavia	0.0	0.0	0.0	-0.1
S. Scandinavia	-0.3	0.1	0.0	-0.5
Baltic	-1.1	0.4	-0.8	-1.4
Denmark/N.Germany	-2.5	1.0	-1.9	-3.0
Odra/Vistula	-1.1	0.6	-2.1	-2.0
Elbe to Ems	-1.2	0.7	-1.4	-2.0
Rhein to Schelde	-0.9	0.6	-0.5	-2.0
GB	-0.9	0.5	-0.7	-1.2
Irland/N.Ireland	-0.3	0.2	0.0	-0.9
France Atlantic	-2.2	1.0	-1.6	-2.6
Danube	-1.9	0.8	-2.4	-1.8
Iberia Atlantic	-1.1	0.7	-1.1	-0.9
Iberia Mediterranean	-1.4	0.6	-1.7	-0.7
France Mediterranean	-0.5	0.3	-0.3	-1.0
Po	-1.2	0.7	-0.8	-1.8
Corsica	-0.2	0.1	0.0	-0.5
Sardinia	-1.5	0.7	-0.6	-1.2
Sicily	-3.4	1.3	-2.5	-2.3
South Italy	-1.7	0.9	-0.7	-1.8
Adige/Balkan	-0.5	0.4	-0.1	-1.2
Greece/Evros	-1.8	0.8	-1.4	-0.9

1.2 Afforestation in mountainous areas Change in [%] from the baseline 2030 scenario For water stress change in [days per year] from				
Region	Fast flow [%]	Evapotrans. [%]	Groundw. recharge [%]	Water stress [d per year]
N. Scandinavia	-0.2	0.0	-0.1	1.0
S. Scandinavia	-0.5	0.2	-0.2	0.4
Baltic	-0.5	0.2	-0.6	0.6
Denmark/N.Germany	0.2	0.0	-1.3	0.4
Odra/Vistula	-0.1	0.1	-0.3	0.6
Elbe to Ems	-1.1	0.4	-0.9	0.4
Rhein to Schelde	0.0	0.0	-0.2	0.6
GB	0.4	-0.5	0.0	0.6
Irland/N.Ireland	1.5	-0.8	0.1	0.6
France Atlantic	-0.3	0.2	-0.4	0.3
Danube	-0.3	0.2	-0.4	1.2
Iberia Atlantic	-0.1	0.1	-0.3	0.4
Iberia Mediterranean	-0.4	0.2	-0.3	0.3
France Mediterranean	-1.0	1.3	-0.3	0.5
Po	0.0	0.1	-0.1	0.7
Corsica	0.9	-1.0	-0.1	2.2
Sardinia	1.2	-0.5	0.1	2.0
Sicily	0.3	-0.1	0.0	0.6
South Italy	-0.2	0.3	-0.3	0.8
Adige/Balkan	0.0	0.1	0.0	0.3
Greece/Evros	-0.2	0.1	-0.1	0.4

Source. JRC (2012) Evaluation of the effectiveness of Natural Water Retention Measures: Support to the EU Blueprint. to Safeguard Europe's Waters


4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Bare soil with tillage and pruning debris burning
Bare soil with tillage and incorporation of shredded pruning debris
Bare soil with no tillage and prnnis debris burning
Bare soil with no tillage and incorporation of shredded pruning debris
Weed cover crops under herbicide control and prunir debris burning
Weed cover crops und herbicide control and incorporation ofshredded pruning debris
Weed cover crops und mechanical control and incorporation of shredded pruning debris
Carbon Sequestration C02 t/ha/year


35
30
25
20
15
10
5
0
Bare soil with tillage and pruning debris burning
Bare soil with tillage and incorporation of shredded pruning debris
Bare soil with no tillage and prnnis debris burning
Bare soil with no tillage and incorporation of shredded pruning debris
Weed cover crops under herbicide control and prunir debris burning
Weed cover crops und herbicide control and incorporation ofshredded pruning debris
Weed cover crops und mechanical control and incorporation of shredded pruning debris
Carbon Sequestration C02 t/ha/year
Erosion Control Soil Ton/ha/year


35
30
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Bare soil with tillage and pruning debris burning
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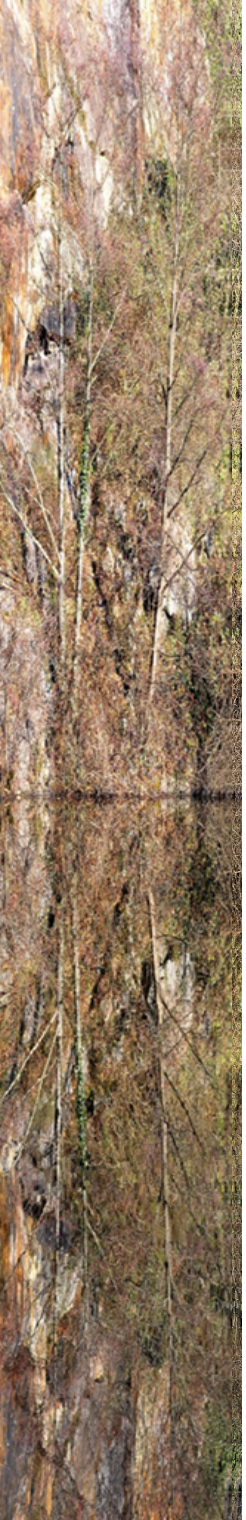
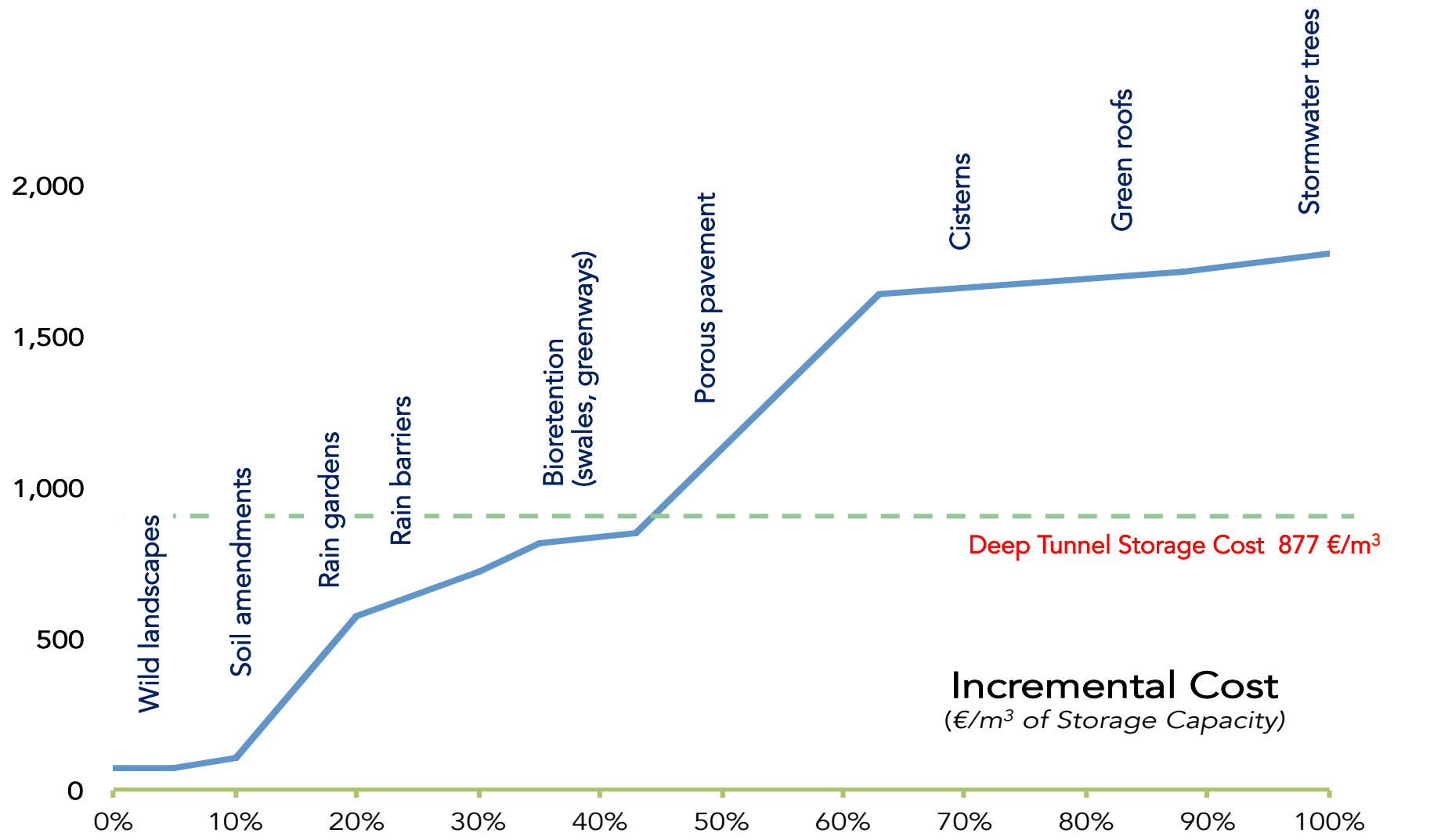
Weed cover crops und herbicide control and incorporation ofshredded pruning debris
Weed cover crops und mechanical control and incorporation of shredded pruning debris
Carbon Sequestration C02 t/ha/year
Erosion Control Soil Ton/ha/year
Biodiversity (# of bird species)



Sometimes cost-effectiveness advantages of NWRM on financial grounds are clear…



Source: Own calculations based on MMSD (2011)

…but just enough to pick the low-hanging fruit?

Traditional cost-effectiveness analysis uses only one environmental benefit (7) and just one economic criterion (2).

Economic Benefits
1 Green Job Opportunities
2 *Reduced infrastructure Cost*
3 Reduced Pumping and Treatment Cost
4 Increased Property values

Social Benefits
5 Improved quality of Life and Aesthetics
6 Improved Green Space

Environmental Benefits
7 *Captured stormwater runoff*
8 Reduced pollutant loads
9 Increased Groundwater recharge
10 Reduced Carbon Emissions
11 Reduced Energy Use for Cooling
12 Improved Air Quality

And then it ignores 10 of the 12 benefits of any sustainable urban drainage system.

Thank you!!!