Can nature help reduce the impacts of climate change?

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Ecosystem-based solutions

The financial damage amounted to 393 billion Euro (in 2013 prices), on average 11.6 billions Euro/year; 69 000 Euro/sq.km, or 710 Euro/capita.

Ecosystems can provide means to mitigate natural hazard risks and boost societal resilience, locally or regionally, by mediation of flows and nuisances; or through maintenance of physical, chemical, biological conditions in the face of pressures.

The combination of increasing intensity and frequency of natural hazards, continuing conversion, homogenisation and simplification of natural ecosystems, and the increasing footprint of built infrastructure may be contributing to the observed rapid increase in the costs and damage from natural hazards.

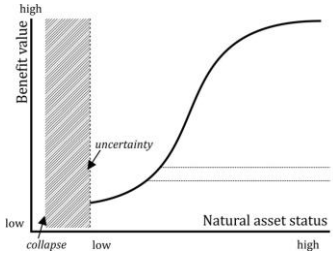
Ecosystem services have an economic value in the context of natural disaster risk reduction and climate adaptation, even if no price actually is paid for their provision and/or maintenance.

Ecosystem services are implicitly human-centred because they are recognised, explored, appreciated and valued for the benefits they offer to humanity.

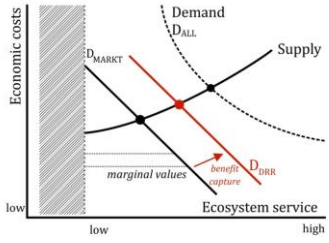
Ecosystem-based solutions (2)

- Ecosystems interact and respond to anthropogenic pressures, such as climate change, extreme weather and intensification of land use. They have some capacity to adapt to and buffer such changes, but they may also collapse or change suddenly with resulting loss of function.

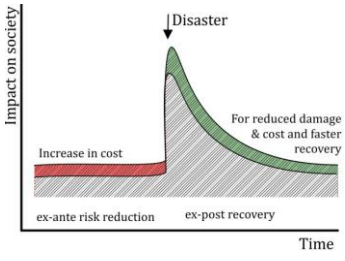
- Financial incentives to harness the potential of nature to reduce climate risk: environmental tax reform (ETR), environmental tax federalism, payments for ecosystem services (PES), public procurements and concessions, large-scale investment programs, and public-private partnerships (PPPs), biodiversity in climate change funding.



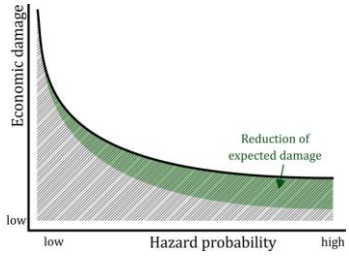
a) Simplified natural asset - benefits relation, based on Mace et al. (2015) modified



b) Economic framework for ESS provision, based on Fisher et al. (2008) but modified



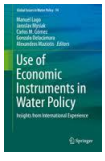
c) Financial flows and distribution, based on (World Economic Forum, 2011) but modified



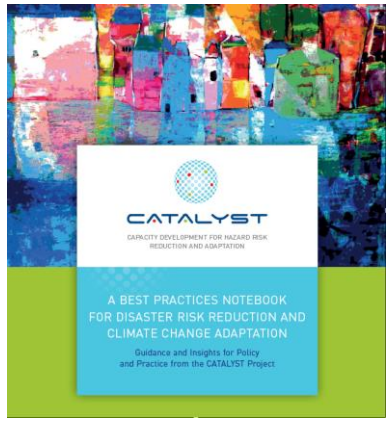
d) Effects of risk-mitigating ESS on exceedance curve

Some collection of examples

European Environment Agency's report 12/2015 **Exploring nature-based solutions**: The role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards.

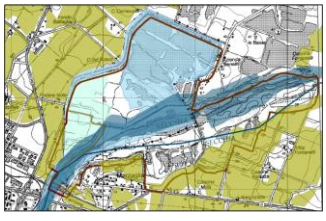


Lago, M., Mysiak, J., Gómez, C. M., Delacámara, G. and Maziotis, A., Eds.: Use of Economic Instruments in Water Policy - Insights from International Experience, Springer- Global Issues in Water Policy., 2015.

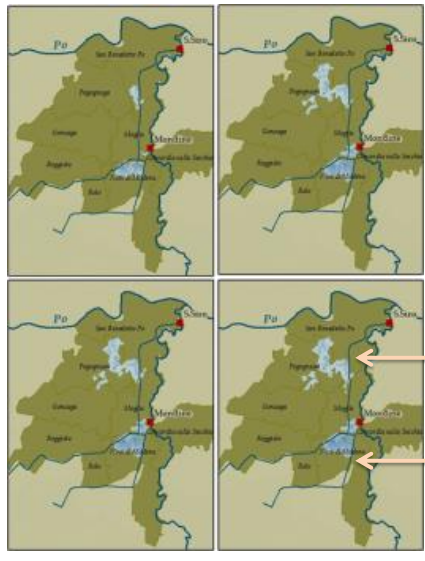


Best Practices Policy Notebook CATALYST - Capacity Development for Hazard Risk Reduction and Adaptation, www.catalyst-project.eu

Flood protection in fluvial plains



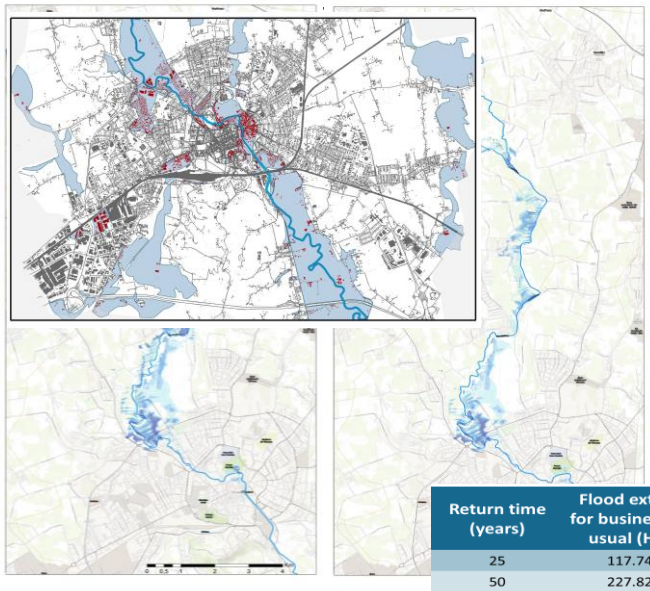
Nature protected area and water retention pond on the Secchia river, (above); (below) retention pond



Avoiding damage

Imposing costs

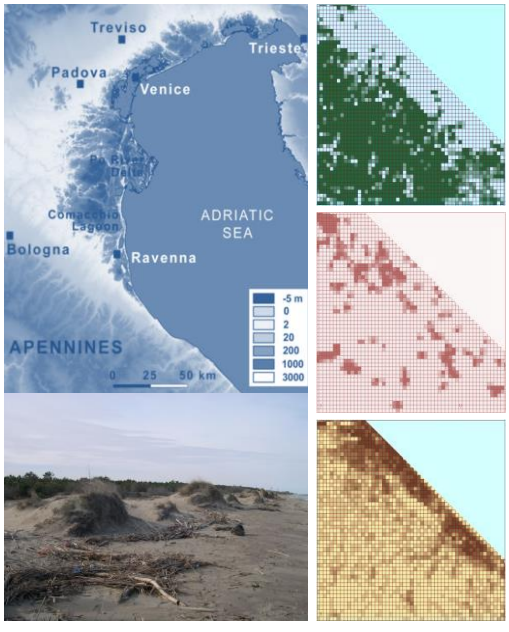
Flood easement

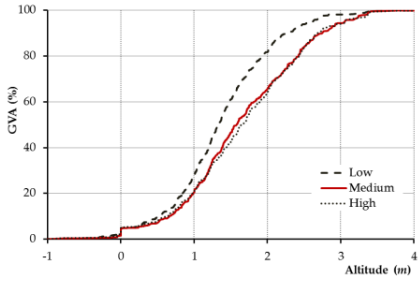


The designed volume of the reservoir amounts to 3.8 million m3 and comprises area of ca. 100 ha. The construction costs amount to 41.5 – 45 million, less than a half of which is dedicated to compensation of land owners and active farmers.

Return time (years)	Flood extent for business as usual (Ha)	Flood extent with retention basin (Ha)	Flood reduction (%)
25	117.74	0.50	99.6%
50	227.82	25.91	88.6%
100	446.61	222.85	50.1%
200	513.38	282.80	44.9%

Coastal flood protection





Around **20%** (360 million Euro or 0.25% of GRP) of the GVA generated in the 1km wide coastal zones of RER and exposed to medium (p=0,01) risk is below 1m altitude. Some **45%** (840 million or 0.65% GRP) of GVA are below 1.5m altitude.

Discussion

The processes underpinning ecological resilience, vulnerability and robustness under short term disturbance and long term environmental change are incompletely understood, and this limits how well they can be reflected in the risk analysis and DRR domains.

The failure to account for the true social value of ecosystem services leads to market distortion and, ultimately, insufficient level of protection with lasting, in some cases irreversible, damage.

The costs of ecosystem preservation and restoration are paid by predominately by general taxation. It is important to design financial and economic schemes to engage those who benefit (most) from the ecosystem services in financing their preservation.

Thank you for your attention

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