Is it worth investing in NBS aiming at mitigating water risks?

Insights from three European case studies


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Introduction

• Annual damages due to climate risk expected to increase by 77% (IPCC, 2014), doubling of centenial floods in the next 3 decades (Alfieri et al., 2015)

• Limits of grey solutions to handle risks: environmental damages, high costs. Growing recognition of the role of ecosystems (NBS, green infrastructure…) in risk mitigation and the production of co-benefits

• Evaluating NBS economically is fundamental:
  • Cost-benefit analysis is a pre-requisite for large scale public investments in Europe.
  • Evidence are needed to convince decision makers and build business models

• We developed a common methodological framework fully applied to 3 case studies: Rotterdam (NL), Lez (FR) and Brague (FR)
A diversity of scales and NBS Scenarios

Rotterdam (NL): Neighbourhood scale

Brague (FR): river catchment scale

Lez (FR): city scale
Overall methodological framework

BAU - 2050

- Co-benefits
- Productive assets
- Water risk damages

NBS strategy 2050

- Co-benefits
- Productive assets
- Implementation costs
- Water risk damages

Δ Co-benefits

Opportunity cost

Δ Co-benefits

Avoided damages

Implementation costs

Opportunity costs

CBA of NBS vs. BAU

Here with
Benefits > Costs

Benefits

Costs

Avoided damages
Results

Rotterdam

Cost of NBS scenarios (M€) • Opportunity cost (M€)
Avoided damages (M€) • Co-benefits (M€)

NPV in M€

Green

Hybrid

Grey

Lez

Cost of NBS scenarios (M€) • Opportunity cost (M€)
Avoided damages (M€) • Co-benefits (M€)

NPV in M€

NBS 1

NBS 2

Brague

Cost of NBS scenarios (M€) • Opportunity cost (M€)
Avoided damages (M€) • Co-benefits (M€)

NPV in M€

Grey

NBS High
Results

• The cost of grey scenarios is higher than the cost of NBS scenarios for the same level of risk management: cost effectiveness advantage of NBS. Opportunity costs may be nevertheless large.

• Benefits in terms of avoided damages are not sufficient to cover costs. This situation is however worse for grey solutions evaluated in the project.

• Co-benefits represent the largest share of the value generated by NBS scenarios.
Results

• Opportunity costs, estimated by the land value occupied by NBS, represent a very large share of NBS especially in urban contexts.

• There is no clear cut conclusions on the overall economic efficiency of NBS (Positive in Lez but slightly negative in Brague and Rotterdam).

• The assessment of avoided damages requires large modelling efforts for the evaluation of the impact of NBS on hazard and damages.
Recommendations

• NBS for water-related risks cannot be automatically assumed to be economically efficient. Need for economic valuation to identify the most suitable strategy in a context of limited public funding.

• The largest share of the value of NBS comes from co-benefits. Large implications for the funding of NBS and the need to maximize co-benefits in the design of NBS.

• In urban areas: from designing NBS to solve one issue to managing scarce urban land with NBS and maximizing the diversity of benefits.