



Catapulting nature onto the climate change adaptation agenda: opportunities and barriers of nature-based solutions

Juliette G. C. Martin¹, JoAnne Linnerooth-Bayer¹, Anna Scolobig^{1,2}

¹ International Institute for Applied Systems Analysis, Laxenburg, Austria

² Environmental Governance and Territorial Development Institute, Université de Genève, Geneva, Switzerland



This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 776681



Nature-based solutions

“Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. (...)

*Nature-based solutions must therefore **benefit biodiversity** and support the delivery of a range of ecosystem services (EC, 2020)*

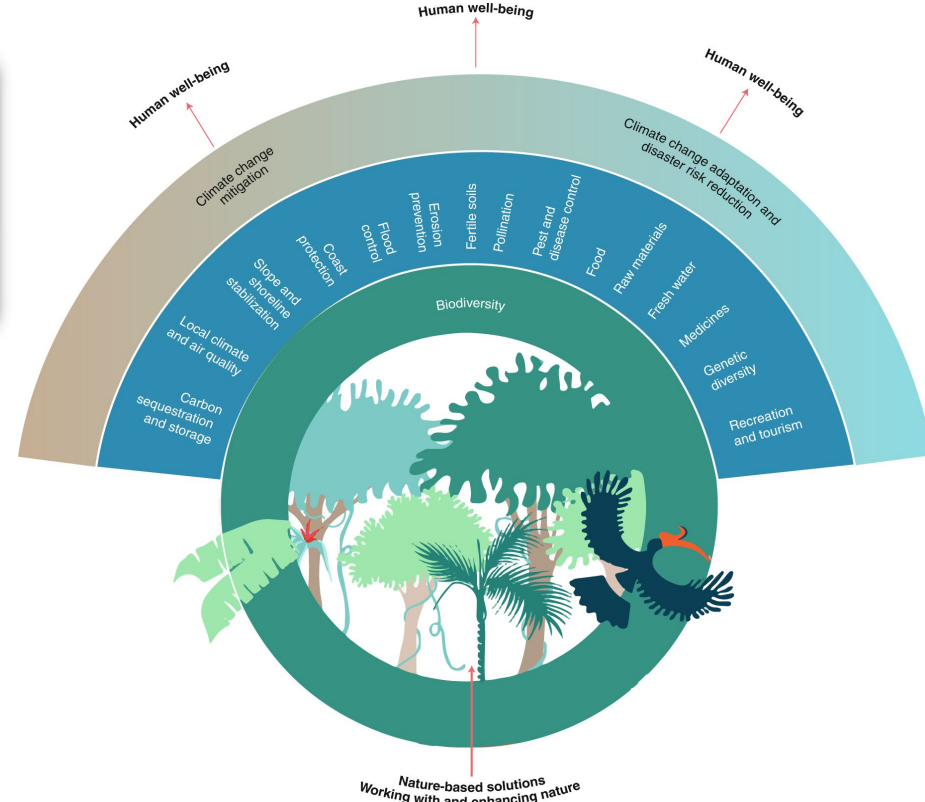


Examples of nature-based solutions

Source: Oxford NBS Initiative, 2021



Source: World Bank, 2019



NBS financing gap for the climate adaptation & biodiversity nexus

If the world is to meet the climate change, biodiversity, and land degradation targets, it needs to close a USD 4.1 trillion financing gap in nature by 2050 (UNEP, 2021).

\$700 billion
annual **financing** gap by 2030
(Nature Conservancy 2020)



Source: Dreamstime 192524383



Main research questions

What governance factors, enablers and barriers of 'successful' NBS?

What governance transformations are needed to upscale NBS?

NBS governance enablers: a case study analysis

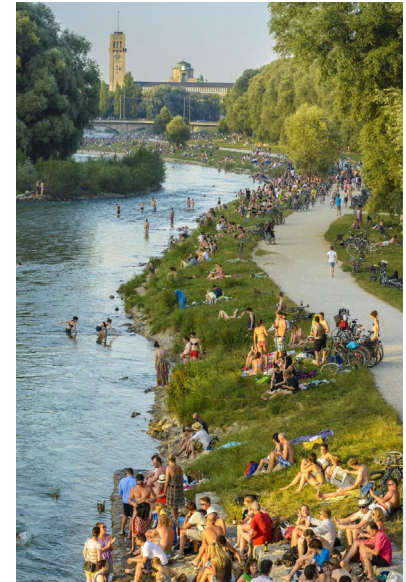
Results from Martin et al., 2021

Co-designed nature-based solutions for landslide risk mitigation in Nocera Inferiore (Italy): The grey versus green battlefield



Carrots and sticks for conserving the forest: A Nature-based Solution for Wolong Nature Reserve (China)

Green is the new grey on Munich's Isar River (Germany): Innovative nature-based solutions boost ambitious flood protection scheme



Picture credits from left to right: ©Luigi Pepe; Meng Ming; © Glacier - Dreamstime.com



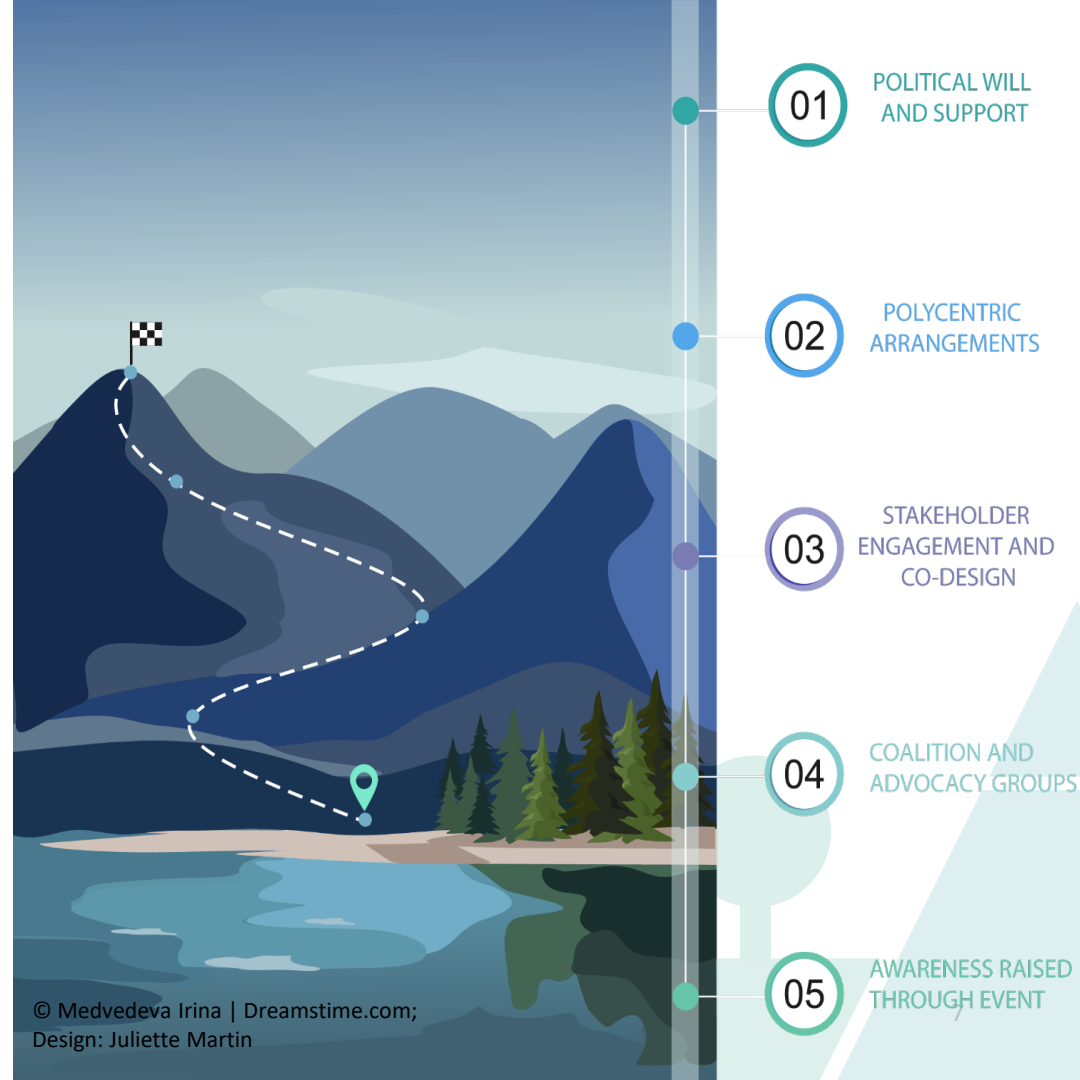
Key results

Governance innovation was demonstrated in 3 key areas:

- **Polycentric governance:** novel arrangements across sectors and scales
- **NBS co-design:** inclusive stakeholder participatory processes
- **Public financing available**



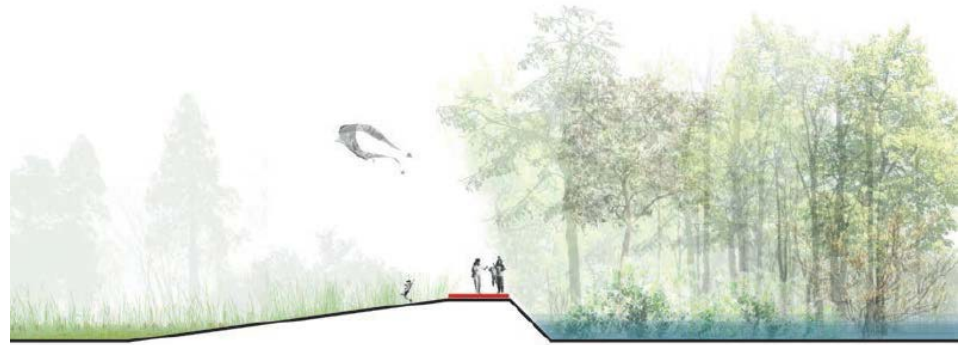
Policy brief available [here](#)



PHUSICOS experience: Jorekstad receded flood barrier

©Agenceter

- Receded flood barrier to allow more space for flooding
- Protection of sport facilities, housing, farmland
- Reduced sediment deposition and shallowing of river
- Restoration of flood plain and riparian vegetation



Jorekstad: NBS implementation barriers

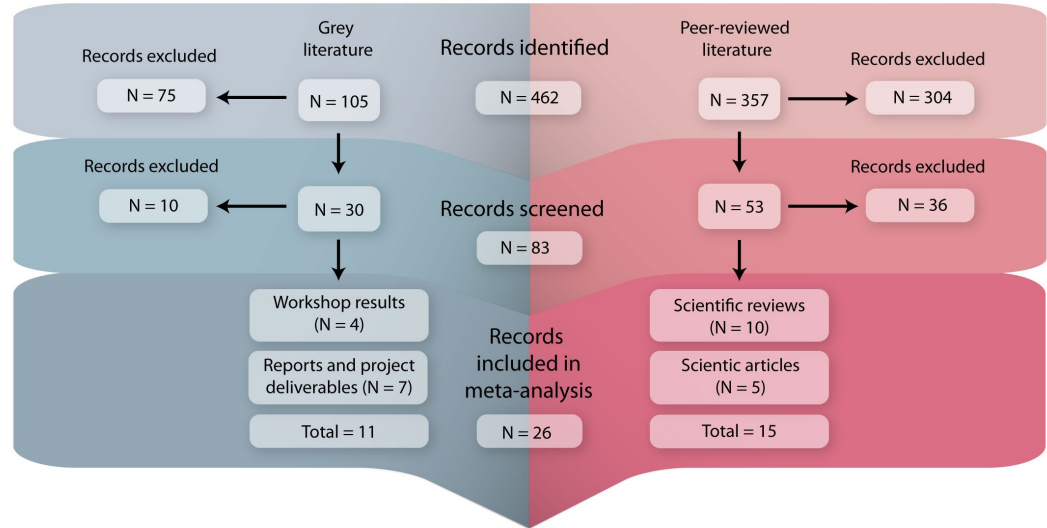
1. Lack of sense of urgency among policymakers
2. Lack of public awareness and support
3. Risk aversion and resistance to change
4. Misalignments between short-term plans and long-term goals
5. Functionality and performance uncertainties
6. Perceived high cost
7. Lack of available financial resources
8. Lack of financial incentives
9. Property ownership complexities
10. Procurement challenges

Solheim et al. 2021 *Sustainability*, 13, 1461.



Scoping study of opportunities and barriers of NBS

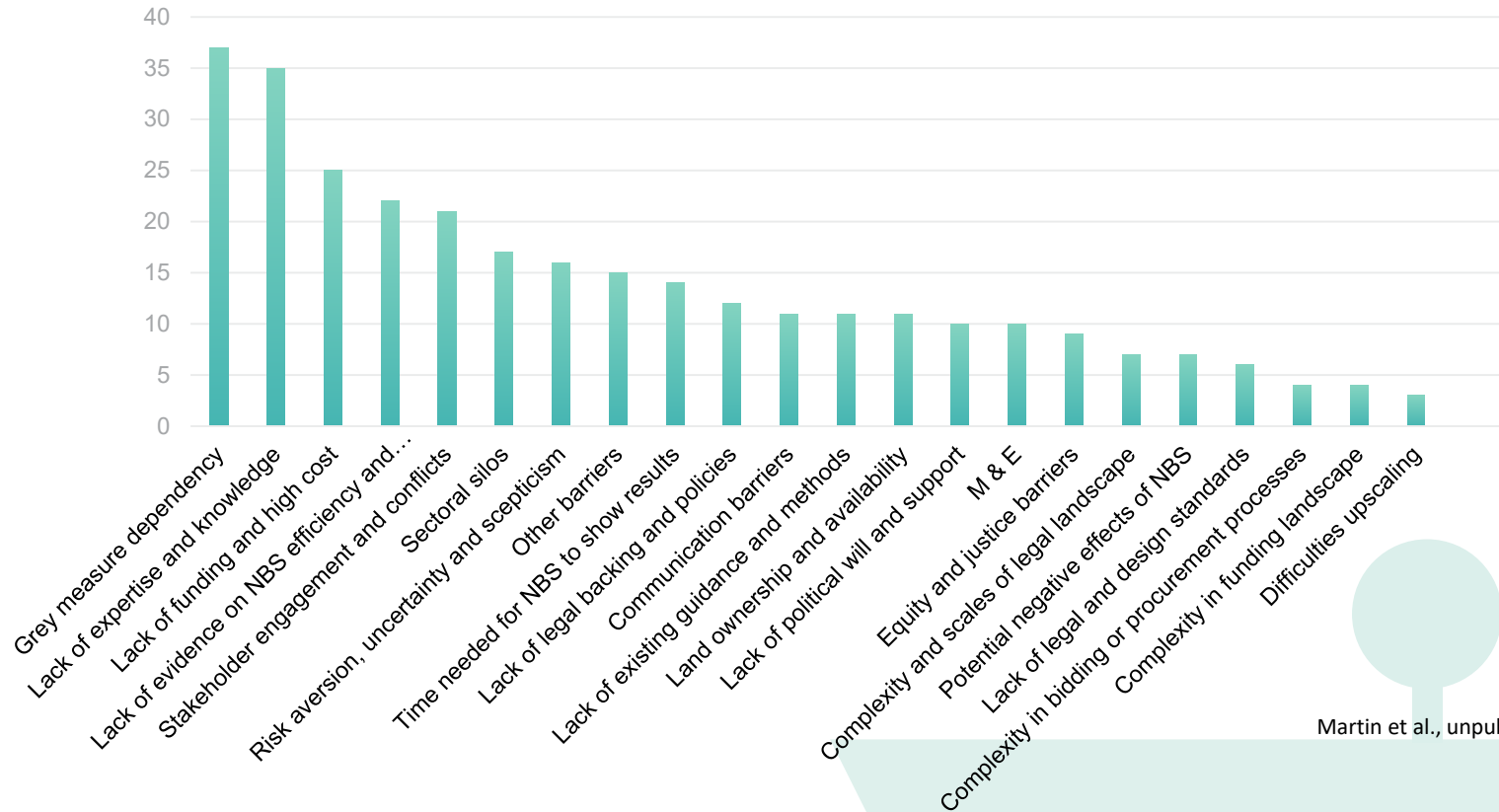
- Systematic literature review
- Workshop results, grey- and peer-reviewed literature
- Meta-analysis of 252 enablers and 264 barriers
- Coding using Nvivo



Design: Juliette Martin



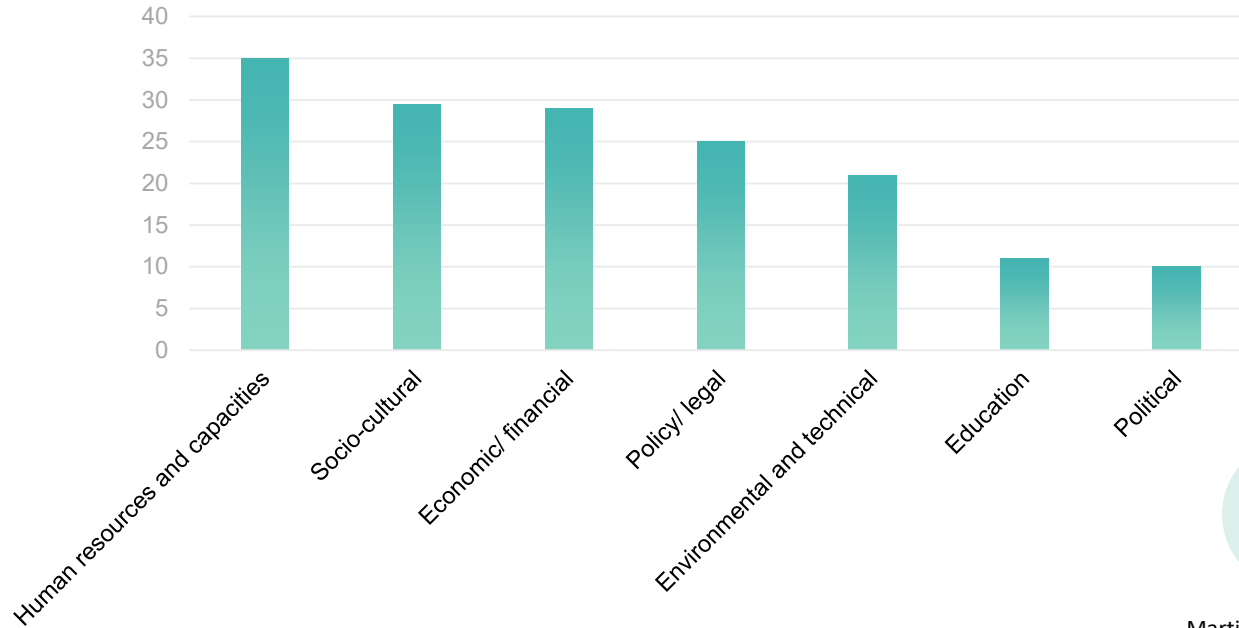
Key results: barriers



Martin et al., unpublished



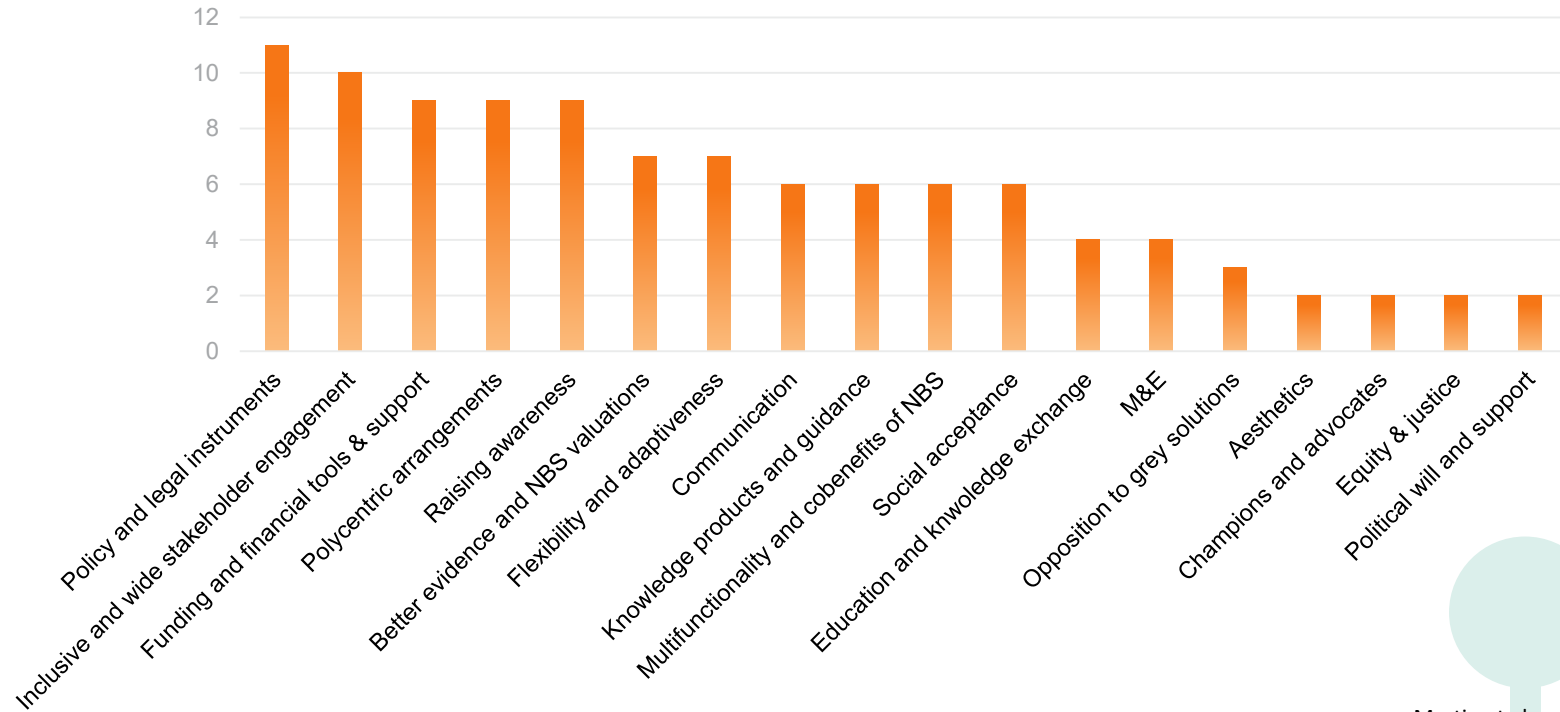
Key results: barriers



Martin et al., unpublished



Key results (preliminary): enablers



Martin et al., unpublished



Diagnosis to cure

Deep dive into financing

How can we close the USD 4 trillion financing gap?

- Public?
- Private?
- Blended?



Biletskiy © | Dreamstime.com



Figure 1. Classification of NbS finance



Divestment from nature-negative investments (EU taxonomy)

Note: These figures are the midpoint between the lower and upper bounds of annual investment.
Source: Vivid Economics, adapted from OECD, IMF and other public data sources listed in the Annex.

Summary

- Nature-based solutions offer strong benefits across the climate-biodiversity nexus
- Yet, there is a huge funding & governance gap on needed investments in nature
- Prominent enablers include
 - Policy and legal instruments
 - Inclusive stakeholder engagement
 - Adequate financing
 - Polycentric governance arrangements
- On financing, perhaps greatest hope is EU's focus on a 'taxonomy' for nature-negative investments



Publications

- Calliari E., Castellari S., Davis M., Linnerooth Bayer J., Martin J., Mysiak J., Pastor T., Ramieri E., Scolobig A., Sterk M., Veerkamp C., Wendling L., Zandersen M. (expected 2022). **Building climate resilience through nature-based solutions: a review of enabling knowledge, finance and governance frameworks**, Climate Risk Management.
- Gatzweiler F, Florin M, Linnerooth-Bayer J., Pulwarty R. (forthcoming). UNDRR 2021 (forthcoming), **Global Assessment Report on Disaster Risk Reduction**, Geneva, Switzerland, United Nations Office for Disaster Risk Reduction (UNDRR)
- Martin, J.G.C.; Scolobig, A.; Linnerooth-Bayer, J.; Liu, W.; Balsiger, J. (2021) **Catalyzing Innovation: Governance Enablers of Nature-Based Solutions**. *Sustainability*, 13, 1971. <https://doi.org/10.3390/su13041971>
- Martin J.C.G., Linnerooth-Bayer J., Liu W., Scolobig A. (2019), **Governance innovation through nature-based solutions**, Policy Brief of the PHUSICOS project, According to nature. Nature based solutions to reduce risks in mountain landscapes, EC H2020 Programme. 4 pp. https://phusicos.eu/wp-content/uploads/2019/12/PB_25_Governance-innovation-through-nature-based-solutions_web.pdf
- Martin, J. G. C., Scolobig, A., Linnerooth-Bayer, J., Liu, W., & Balsiger, J. (2019). **Governance innovation through nature-based solutions: IIASA Policy Brief**.
- Scolobig, A., Martin, J. G. C., Linnerooth-Bayer, J., Balsiger, J., Baruffa, C., Andrea, A., et al. (2020). **Policy innovation for Nature-based Solutions in the Disaster Risk Reduction sector**.
- Scolobig A., Pelling M., Martin J.G.C., Deubelli T., Liu W., Linnerooth-Bayer J., Oen A. (forthcoming) **Transformative Adaptation through Nature Based Solutions**, *Global Environmental Change*.



Thank you!

bayer@iiasa.ac.at
martinj@iiasa.ac.at
anna.scolobig@unige.ch
<https://phusicos.eu/>

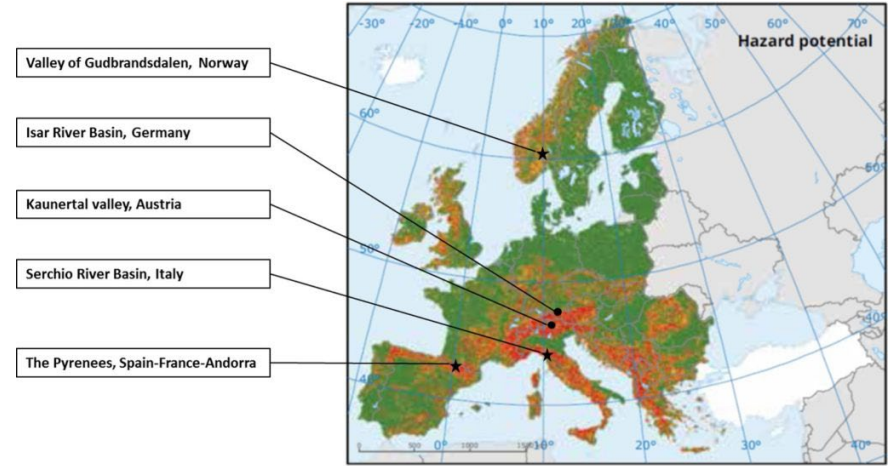


This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 776681

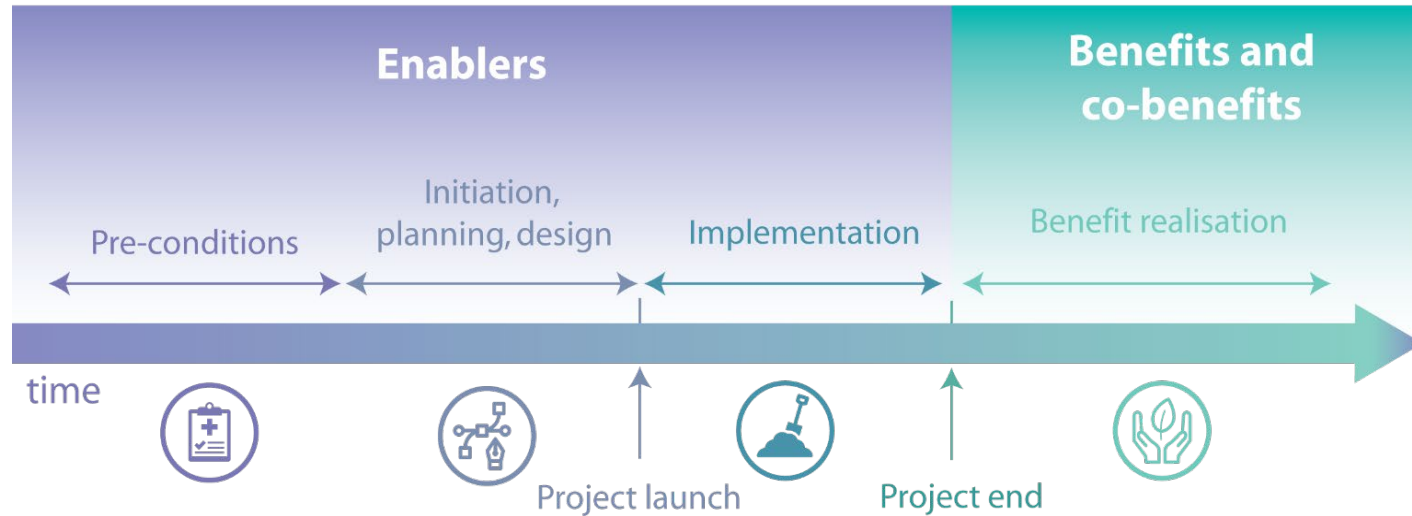


PHUSICOS

- May 2018 – April 2023
- Transdisciplinary consortium of 15 partners from 7 European Countries
- Aims: demonstrate that NBS provide sustainable and cost-effective measures for reducing risks of extreme weather events in rural mountain landscapes



NBS governance enablers: a case study analysis



© sahua d, Adrien Coquet and Line Icons Pro from the Noun Project; Design: Juliette Martin

- Methods: semi structured interviews (N=47), desktop-based review

