ADAPTATION AT ALTITUDE
KNOWLEDGE NETWORK

Harnessing nature-based solutions for adaptation in mountains

Rosie Witton and Kate Williamson

27 November 2025

SEI Stockholm Environment Institute

zoï environment network

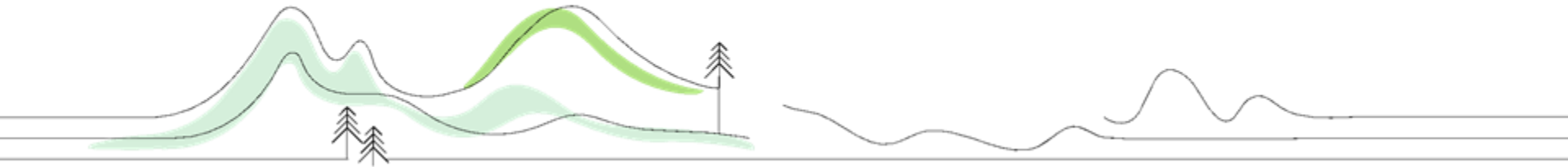
UNIVERSITÉ DE GENÈVE

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

Agenda:

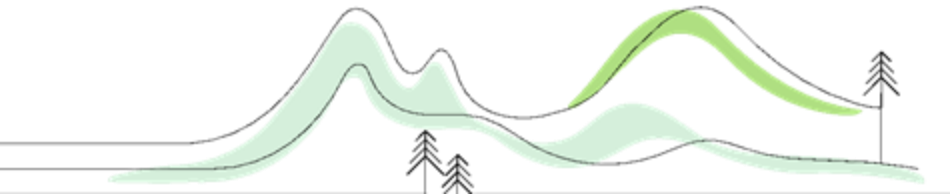
- Welcome and introduction to the A@A Knowledge Network
- Opening remarks
- Panel discussion & Q&A
- Closing and AOB



The Adaptation at Altitude Knowledge Network

A **global community** through which we can share experiences and knowledge on adaptation in the mountains and collaborate to accelerate the uptake of innovative solutions. It aims to:

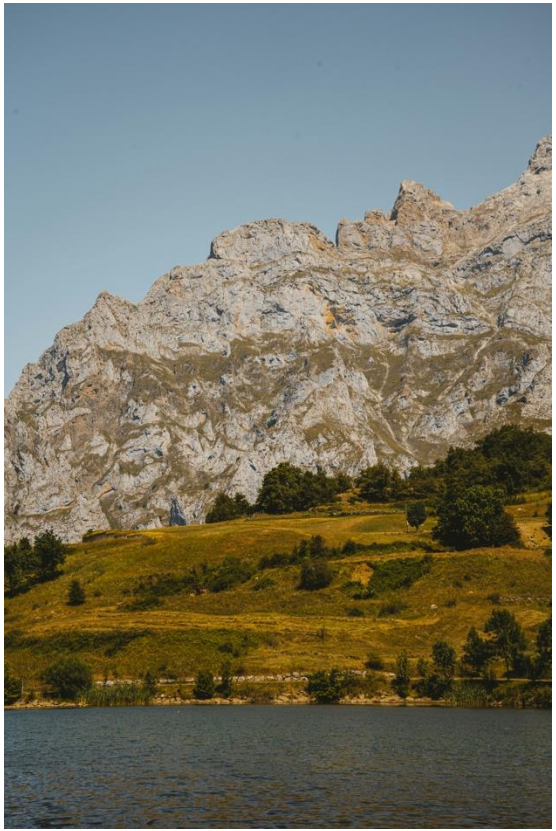
- **Encourage communication between stakeholders** working on and experiencing climate change adaptation in mountainous regions across the globe.
- **Support the sharing of successful solutions** for adaptation in mountains.
- **Foster the translation and uptake of solutions** for use in other locations.



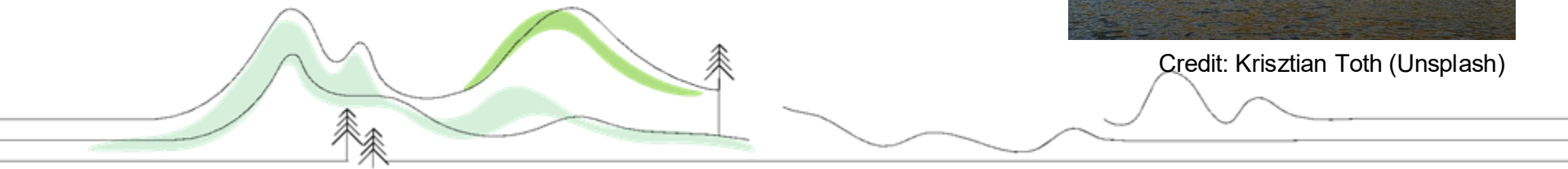
Sign-up here!

Why nature-based solutions?

- Mountain regions, home to 50% of global biodiversity hotspots and the world's 'water towers' supply a wealth of ecosystem services
- **Nature-based solutions** = 'actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (IUCN, 2016).



Credit: Krisztian Toth (Unsplash)



Introducing the panel

Mountain areas: Interlinkages between the biodiversity and climate change agendas

Harnessing nature-based solutions for adaptation in mountains – Nov. 27/2025

ADAPTATION AT ALTITUDE

ICIMOD

CONDESAN

zoï environment network

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

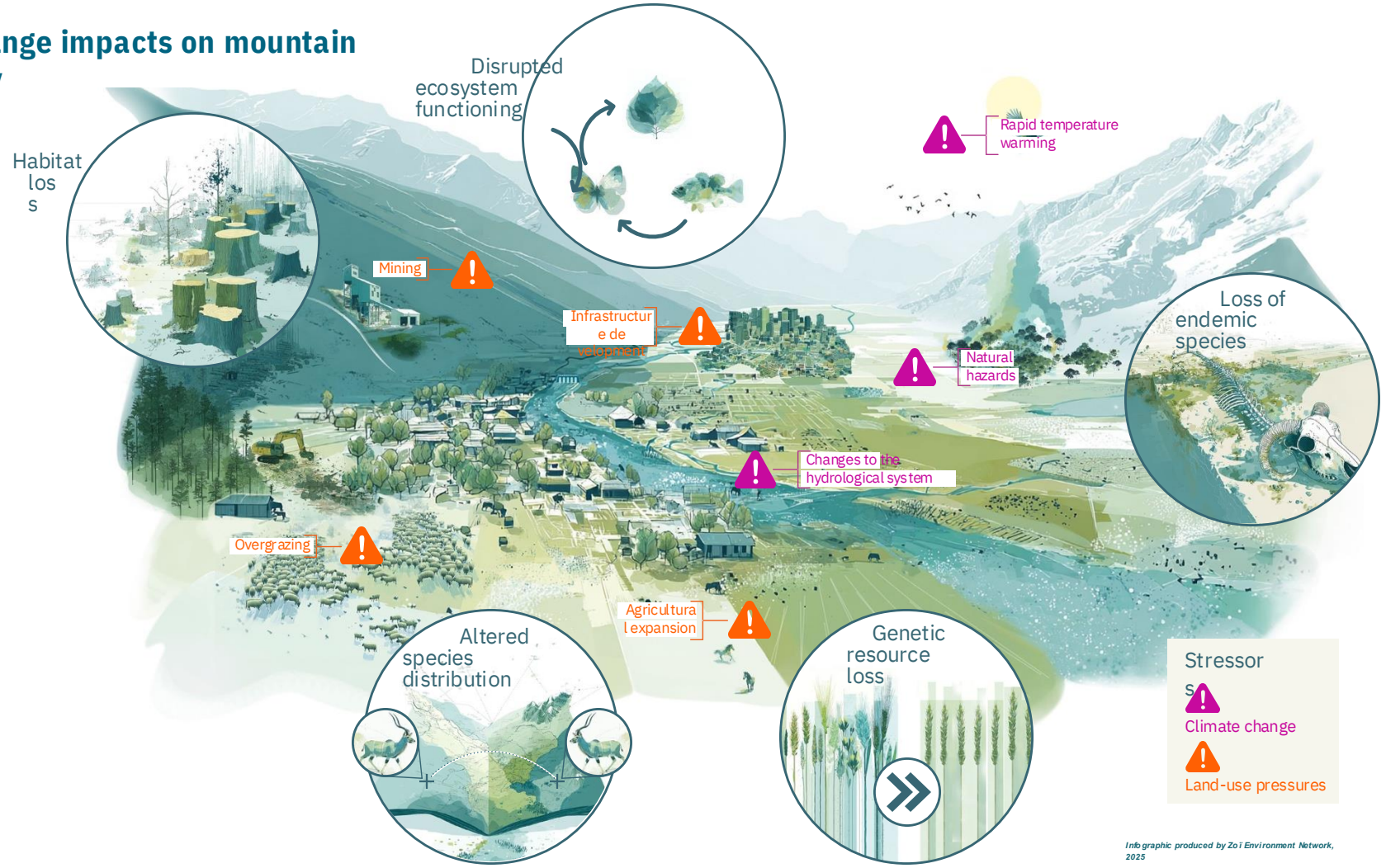
2023 2027 Five Years of Action for the Development of Mountain Regions

Mountain Ecosystems for a Resilient Future: Policy pathways under the CBD and UNFCCC – policy brief

Developed under the Adaptation at Altitude programme

- **Provides and overview of climate change and biodiversity challenges in mountain areas**
- **Highlights the role of mountains in achieving CBD and UNFCCC goals**
- **Suggests policy recommendations and a way forward to take action**

Climate change impacts on mountain biodiversity



Info graphic produced by Zoï Environment Network, 2025

Key messages: the role of mountain ecosystems in achieving CBD and UNFCCC goals

1. Mountain ecosystems harbor unique and exceptionally rich biodiversity

Mountains biological richness is essential for maintaining ecosystem integrity and resilience

- *Topography, climate, geographic isolation, cultural diversity, and natural disturbance.*
- *27 percent of the Earth's land surface*
- *25 out of the world's 34 biodiversity hotspots*
- *30 percent of all Key Biodiversity Areas.*

Key messages: the role of mountain ecosystems in achieving CBD and UNFCCC goals

2. Mountain biodiversity is essential for climate resilience and ecosystem stability

Mountain biodiversity is a cornerstone of global climate resilience:

- *Provision of essential ecosystem functions*
  - *Water regulation*
  - *Carbon storage*
  - *Nutrient cycling,*
  - *Soil stabilization.*
- *Early- warning indicators of environmental stress and ecosystem degradation.*

Key messages: the role of mountain ecosystems in achieving CBD and UNFCCC goals

3. Climate change and mismanagement of natural resources are driving a mountain biodiversity crisis

- *Mountain ecosystems are at the frontline of the global biodiversity crisis*
- *Climate change, unsustainable land use, and inadequate conservation efforts are accelerating ecosystem degradation, (species loss, collapse of ecosystem services).*
- *Impacts undermine ecological integrity and people's well-being*
  - *Rising temperatures*
  - *Shifting precipitation patterns*
  - *Glacier retreat*
  - *Upslope species migration*
  - *Biodiversity loss.*

Mountain systems remain underrepresented in global assessments and climate models, and implementation efforts often lack coordination across sectors and administrative and elevational scales.

Key messages: the role of mountain ecosystems in achieving CBD and UNFCCC goals

4. Conservation of mountain ecosystems is essential for achieving global environmental goals

- *Conserving and restoring mountain ecosystems is indispensable to halting biodiversity loss and tackling the climate crisis.*
- *Building ecosystem resilience and delivering mitigation and adaptation co-benefits*
  - *Protected-area management*
  - *Ecological restoration*
  - *Nature-based solutions*
  - *Active engagement of mountain communities: integration of traditional and scientific knowledge.*

Key messages: the role of mountain ecosystems in achieving CBD and UNFCCC goals

5. Mountain platforms play a pivotal role in advancing biodiversity and climate action across all levels

Mountain platforms and networks are key enablers for mobilizing science-based, locally grounded action that advances both biodiversity and climate goals at different levels.

- *Coordinating data collection and monitoring*
- *Fostering knowledge exchange*
- *Linking science with policy,*
- *Improve national and transboundary planning*
- *Generate evidence to support the implementation of climate adaptation strategies.*

Policy recommendations under the UNFCCC

The brief outlines several recommendations for work under the UNFCCC and linkages to the CBD

- *Mountains need to be more explicitly covered in national climate commitments (NDCs, NAPs, and BTRs)*
- *The Global Goal on Adaptation offers an important entry point for measuring progress on adaptation in the mountains*
- *The Nairobi Work Programme should continue serving as a platform to institutionalize mountain knowledge*
- *Future adaptation frameworks (Baku High-Level Dialogue on Adaptation, Baku Adaptation Roadmap) provide further space for mountain-biodiversity linkages*
- *Mountains are strategic entry points of action on the climate-biodiversity nexus under the KM-GBF and GGA, and advancing a joint work programme on biodiversity and climate change*
- *Mountains provide natural platforms for NbS*
- *Mountains illustrate the importance of regional cooperation*
- *A coalition of champion countries and regions could further accelerate this agenda*

Nature-based Solutions (NbS) in mountain regions

- ***Restore and protect high-altitude wetlands and peatlands*** *(páramos, bofedales, turberas) to secure water regulation, reduce flood risk and store carbon.*
- *Implement* ***integrated watershed management*** *and upstream–downstream cooperation to improve water quality, reduce erosion and strengthen basin-level resilience.*
- *Create and restore* ***ecological corridors across elevational gradients*** *to maintain connectivity and enable climate-driven species movement.*
- *Promote* ***climate-resilient mountain agriculture and agroecology*** *to reduce land degradation while sustaining local food security and livelihoods.*
- *Adopt* ***community-based grazing management*** *and grassland restoration to prevent overgrazing, protect soils and conserve carbon-rich rangelands.*
- ***Protect and restore glacier, periglacial and high-mountain ecosystems*** *using NbS to buffer hydrological changes and reduce climate-related hazards.*
- *Strengthen* ***nature-based solutions in mountain cities*** *(urban forests, slope stabilization, river restoration) to lower disaster risk and enhance liveability.*
- ***Support Indigenous and local community-led biocultural conservation*** *as a foundation for legitimate, effective and long-term NbS in mountain regions.*

Thank you!

María Teresa Becerra
mtbecerra@gmail.com

The nature-based solutions governance gap

Anna Scolobig[1,2] Juliette G. C. Martin[1] JoAnne Linnerooth-Bayer[1] Julia J. Aguilera Rodriguez[2]

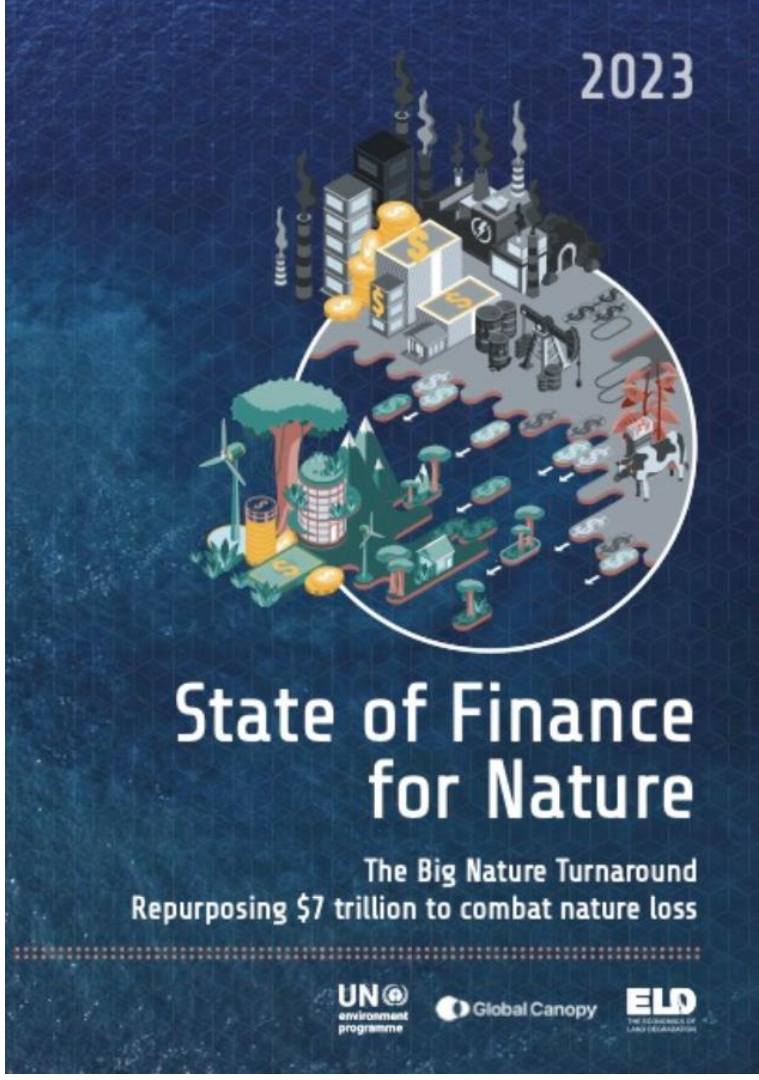
1 International Institute for Applied Systems Analysis, Laxenburg, Austria
2 Université de Genève, Geneva, Switzerland

Carrières-sous-Poissy, France @Agenceter

Nature-based solution (NbS) governance gap

- The **nature financing gap:** investment in NBS **need to double** by 2025 and **triple** by 2030
- The **NbS implementation gap:** mismatch between ambitions for NBS and on-the-ground implementation

What are the barriers to NbS implementation causing this gap?



Systematic literature reviews on barriers of NbS

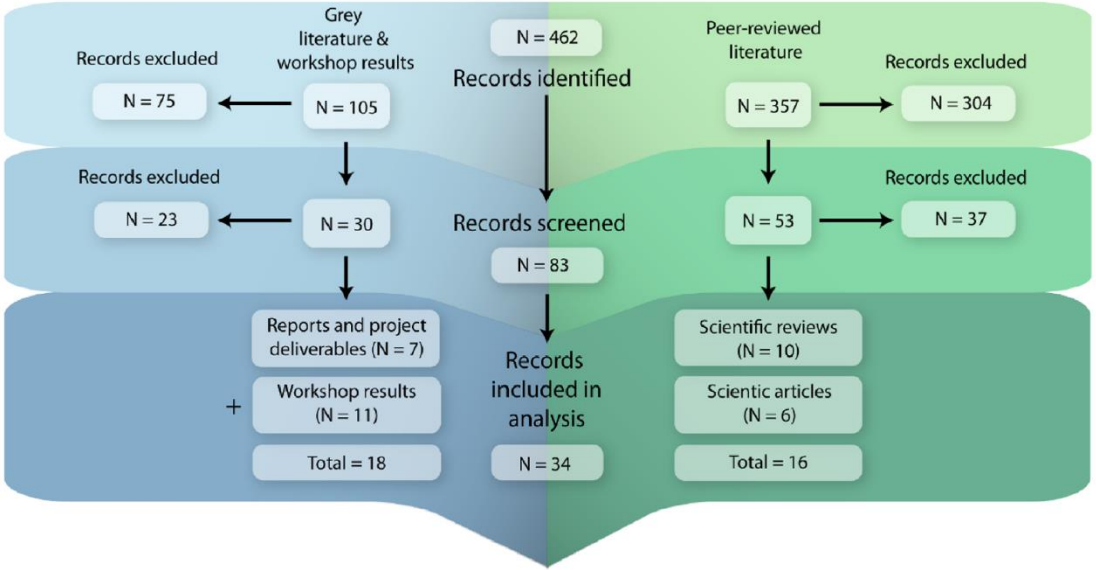


Fig. 1. Data source selection process for the review.

Step 1: Literature identification (Scopus, Overton) and workshop transcription

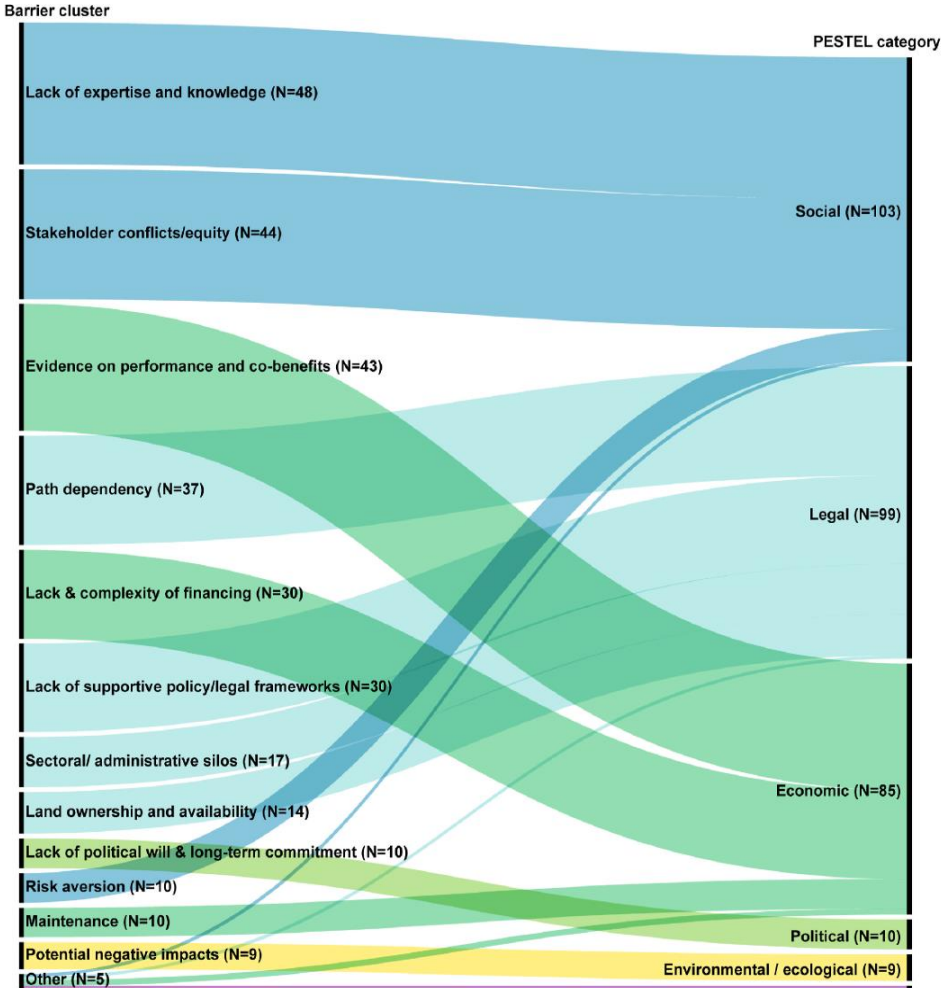
Step 2: Coding of enablers and barriers (NVivo)

Step 3: Classification into clusters and PESTEL categories (NVivo)

Step 4: Quantification and visualisation

Martin et al., 2025

Main barrier clusters



Martin et al., 2025

Tackling the governance gap: selection of proposed innovations

- Strengthen knowledge base
- Switch the burden of proof
- Update policies
- De-risk NbS
- Support public/private NbS investments

Linnerooth-Bayer et al. 2024, Scolobig et al., 2025

Transforming policies and finance for NbS upscaling

- Interest in NbS will keep increasing
- Reshaping NbS governance is crucial for making meeting biodiversity and climate goals. Yet, there are substantial gaps
- Prominent reasons include: lack of expertise and knowledge; lack of evidence on performance and co-benefits; grey path dependency; lack of adequate financing
- We hope proposed innovations will spur further research and deliberation on transformative pathways forward

Biletskiy © | Dreamstime.com

Publications

- Martin J.C.G. et al. (2019), **Nature based solutions in-depth case study analysis of the characteristics of successful governance models**, @ https://phusicos.eu/
- Martin J.C.G. et al. (2019), **Governance innovation through nature-based solutions**, Policy Brief, @ https://phusicos.eu/
- Martin, J. G. C. et al. (2019). **Governance innovation through nature-based solutions: IIASA Policy Brief**.
- Linnerooth-Bayer, J (2020) Contributing author**, TWI2050 - The World in 2050, Innovations for Sustainability. Pathways to an efficient and post-pandemic future**. Report prepared by The World in 2050 initiative.
- Scolobig, A. et al. (2020). **Policy innovation for Nature-based Solutions in the Disaster Risk Reduction sector**. First Policy Business Forum Synthesis, @ https://phusicos.eu/
- Linnerooth-Bayer (2021) **On decision-analytical support for wicked policy issues**, Risk Analysis 41 (6) 866-869.
- Martin, J.G.C. et al. (2021) **Catalyzing Innovation: Governance Enablers of Nature-Based Solutions**. *Sustainability*, *13*, 1971.
- Scolobig, A. et al. (2021).**The role of public and private sectors in mainstreaming Nature-based Solutions**, Second Policy Business Forum Synthesis, @ https://phusicos.eu/
- Linnerooth-Bayer, J. (2022) Chapter Lead Author, Our World at Risk: Transforming Governance for a Resilient Future**, Global Assessment Report on Disaster Risk Reduction 2022 (GAR).** Geneva, Switzerland: United Nations Office for Disaster Risk Reduction (UNDRR).
- Calliari E. et al. (2022). **Building climate resilience through nature-based solutions: a review of enabling knowledge, finance and governance frameworks**, *Climate Risk Management.*
- Scolobig A., et al. (2023) **Transformative Adaptation through Nature Based Solutions**, *Regional Environmental Change.*
- Linnerooth-Bayer J., et al. (2023). **Learning from NBS implementation barriers.** @ https://phusicos.eu/
- Martin J.C.G., et al.. (2023), **Opportunities and barriers to NBS at the EU, national, regional and local scales, with suggested reforms and innovation.** @ https://phusicos.eu/
- Scolobig A., et al. (2025) **Policy and finance innovation for scaling nature-based solutions**, in Haozhi P., Ferreira C. et al. (eds), *Nature-based solutions in supporting Sustainable Development Goals*, Springer, Berlin
- Martin J.G.C., et al. (2025) **The nature-based solution implementation gap: a review of governance barriers and enablers.** *Journal of*

ADAPT: Nature-based Solutions for resilient societies in the Western Balkans

NbS pilot project in Gledic, Serbia

Presenter: Ivana Tomasevic, NbS Officer, IUCN ECARO

Sweden
Sverige

ADAPT 2.0
NATURE-BASED SOLUTIONS FOR CLIMATE CHANGE MITIGATION AND ADAPTATION IN THE WESTERN BALKANS

Project background

Challenges:

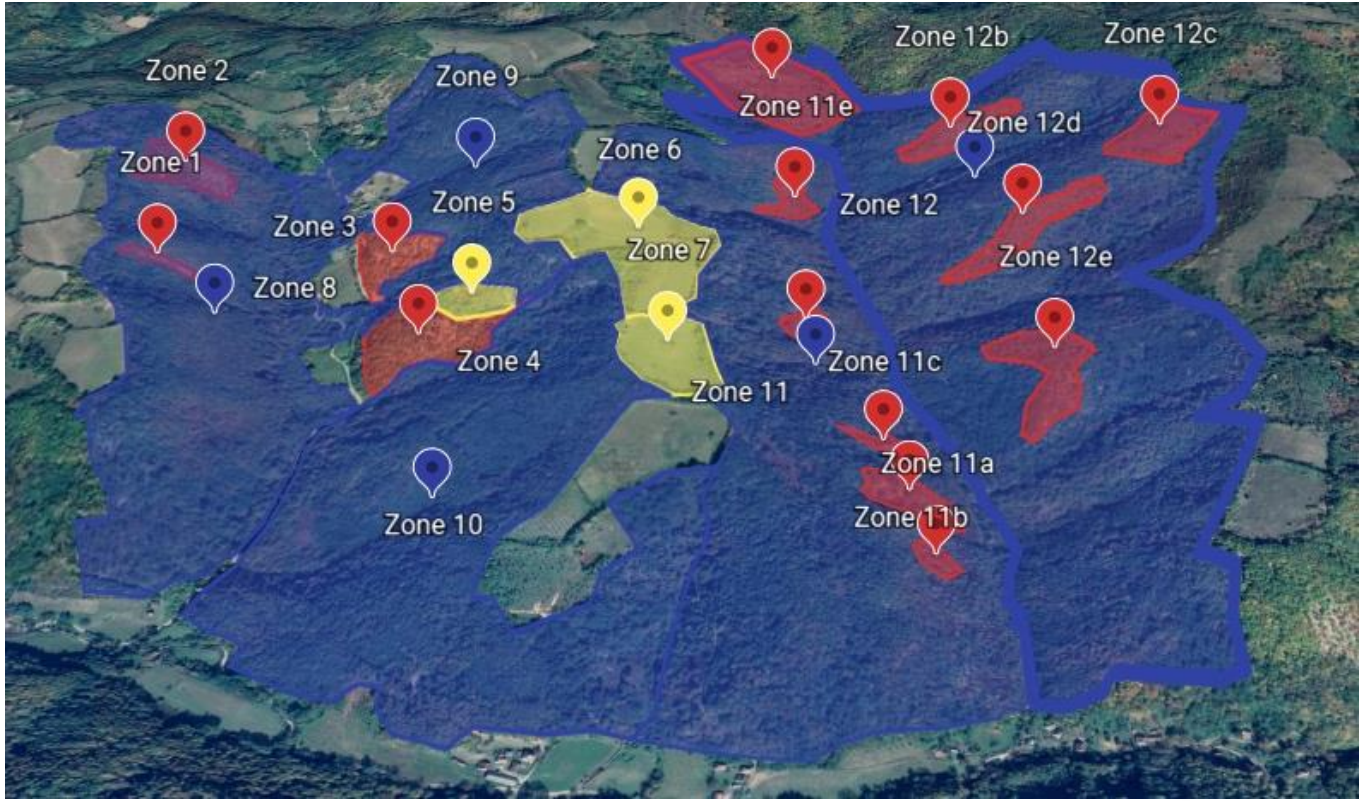
- Increased vulnerability due to climate change (extreme weather- extensive rainfall, flooding, landslides, soil erosion, biodiversity loss)
- Extreme degradation of forest landscapes
- Direct threat to local infrastructure, households, water resources, forests, and communities predominantly depending on agriculture

Reasons to implement project:

- Improve state of ecosystems and biodiversity
- Enhance community resilience to climate change
- DRR- safeguard downstream cities such as Kraljevo and agricultural land from flooding by reducing flow intensity

Location

Gledic village, City of Kraljevo, Serbia covering 120 ha



Project phases

First phase: Baseline assessment based on ROAM methodology (approach that includes broad consultations with relevant stakeholders, and analyses of environment, socio-economic and gender aspects)

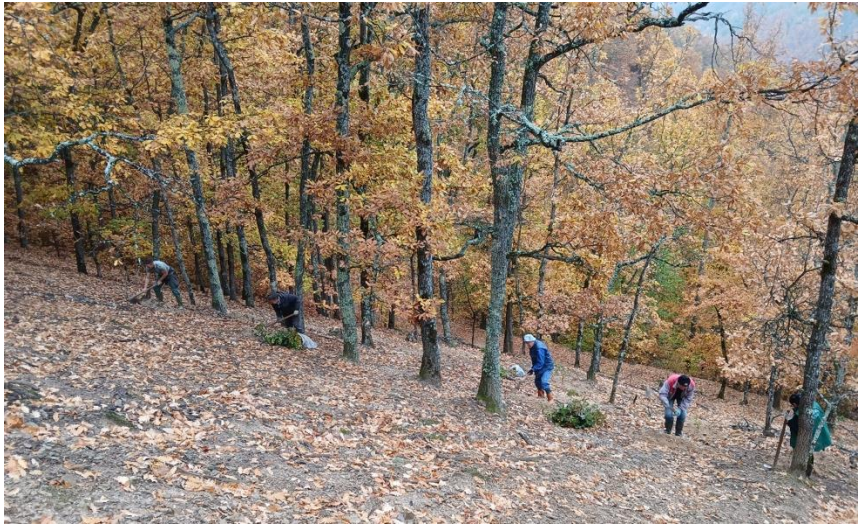
Second phase: Development of technical project (concrete measures and locations); development of Monitoring and Evaluation Framework for the project

Third phase: Obtaining permits; procuring services; implementation on the ground

Implemented NbS measures

Underplanting and enrichment planting in the shelter of existing and remaining trees, using manually constructed individual gradoni terraces

- On a very steep slopes and highly degraded land
- 22,787 seedling of native species such as Quercus frainetto, Quercus cerris, Quercus petraea, Prunus avium, Corylus colurna



Implemented NbS measures

Planting and enrichment planting in manually prepared planting holes

- In the area with no direct risk of flooding, where the capacity of the soil to absorb water needs to be increased
- 575 seedlings of native species
- will significantly increase the absorption and storage of water in the soil

Implemented NbS measures

Building Loose-Stone Check Dams using locally available stone material

- Built in gullies, made as a result of torrential flows on a steep slopes
- 80 check dams made in the area of 1.5 ha

Sweden
Sverige

ADAPT 2.0
NATURE-BASED SOLUTIONS FOR CLIMATE CHANGE MITIGATION AND ADAPTATION IN THE WESTERN BALKANS

Implemented NbS measures

Assisted Natural Regeneration

- To support and accelerate the natural regrowth of forests by protecting and enhancing existing seedlings and natural regeneration processes
- 2,322 regenerants (Quercus, Oak) on the 59 ha
- Selection and labeling of regenerants, control of competitive and weed vegetation; protection of the land from degradation

Silvopastoral measures

- Measures to support local community
- One large water reservoir built as a constant water source for livestock
- Wooden fence long 1090 meters built to protect cattle

IUCN

Thank you!

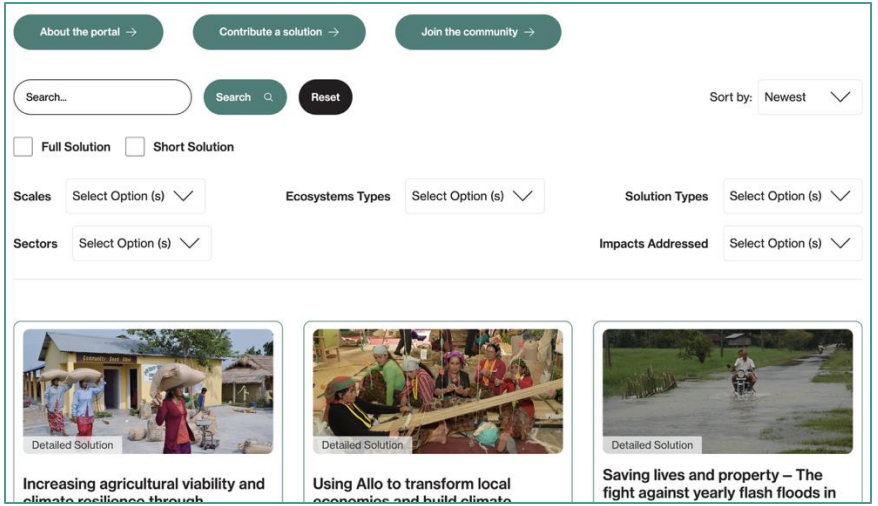
Sweden
Sverige

How to get involved:

Visit the **A@A website and Solutions Portal** to:

- Access and share resources
- Learn and be inspired by solutions
- Share your solutions
- Keep up to date with the work of the A@A programme

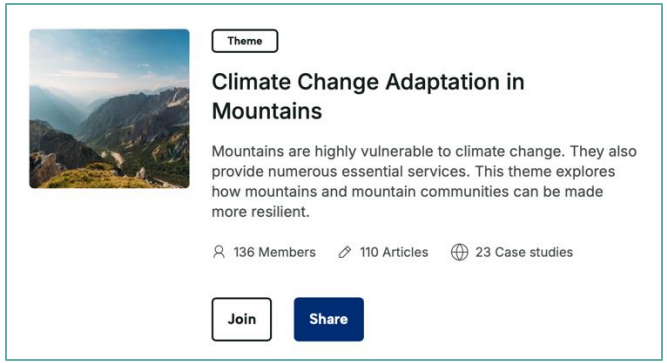
Visit the A@A website here

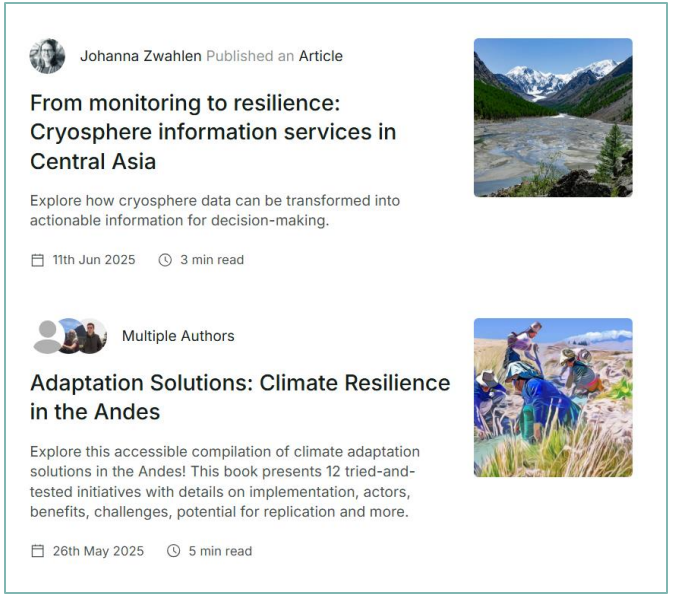


Visit the **'Climate Change Adaptation in Mountains' theme** on weADAPT to:

- Share your projects and article
- Subscribe for notifications
- Create an account

Visit the page here





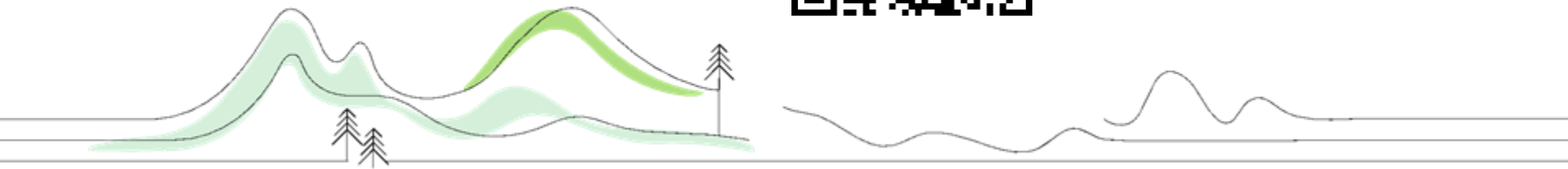
Join the Adaptation at Altitude Knowledge Network and hear about our latest events and activities by signing up to our mailing list! You can also:

- Keep an eye on the A@A KN homepage
- Watch the A@A social media for updates!

@AdaptationAtAltitude

@AdaptationAtAltitude

Join the A@A Knowledge Network

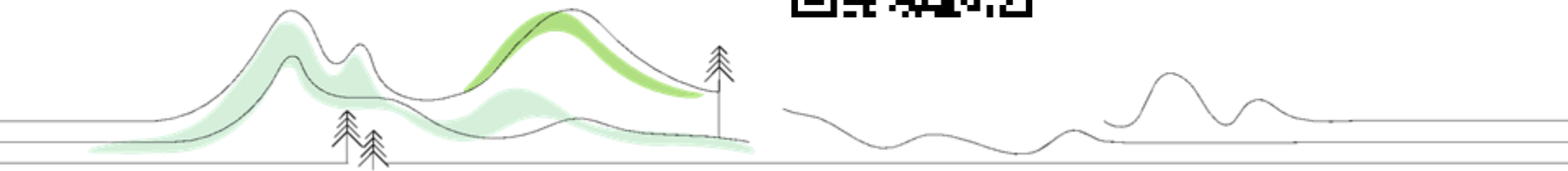


We want to hear from you!

Share your feedback and ideas to help shape the future of the Adaptation at Altitude Knowledge Network in our upcoming survey.

We will share the survey in December via our mailing list – so if you would like to have a say, please sign up!

Join the A@A Knowledge Network



Thank you!

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC