



Climate Change Adaptation in Mountain Ecosystems

Brief for the UNFCCC SB60 Expert Dialogue on Mountains and Climate Change

This brief aims to contribute to the [Expert Dialogue on Mountains and Climate Change Dialogue during SB60](#) and advocates for using Ecosystem-based Adaptation (EbA) in global adaptation efforts aligned with the goals and decisions of the [UAE Framework for Global Climate Resilience](#). Informed by experiences of three transboundary mountain regions in Peru and Colombia, Nepal and Bhutan, and Kenya and Uganda from the IUCN initiative, '[Scaling Up Mountain Ecosystem-Based Adaptation: building evidence, replicating success, and informing policy](#),'¹ this brief provides key recommendations on means of implementation **concerning 1) finance, 2) capacity-building, and 3) technology development/transfer** needed for scaling up EbA actions within mountainous areas, informing future investments and enhancing action in other critical ecosystems worldwide.

Ecosystem-based Adaptation (EbA)² is widely recognised as an important strategy for adapting to the impacts of climate change as it can enhance ecosystem and community resilience, protect and conserve biodiversity, help maintain and manage natural resources and land, and support and create sustainable livelihoods. It is cost-effective, yields multiple benefits, and is community-centred. Through effective global frameworks and policies at all levels, EbA can pave the way for long-term sustainability in the fight against climate change.

Summary of Recommendations:

- *Financing EbA in Mountain Regions:*
 - Design EbA financing options in collaboration with key stakeholders, including rights holders.
 - Scale up investments for income-generating EbA measures through blended finance.
- *Capacity-building using EbA:*
 - Develop projects that link issues of concern, such as the food security-climate-biodiversity nexus or the nature-health-climate nexus and empower mountain communities throughout.
 - Utilise and build upon existing knowledge to develop transboundary projects.
- *EbA and Technological Development/Transfers:*
 - Improve technology innovations for EbA by sharing experiences and technologies with replication sites or scaled-up initiatives.

¹ '[Scaling Up Mountain Ecosystem-Based Adaptation: building evidence, replicating success, and informing policy](#)', supported by the Federal Ministry for Economic Affairs and Climate Action (BMWK), Germany, and jointly implemented by IUCN from 2021 to 2022 and The Mountain Institute from 2017 to 2019

²A nature-based solution that harnesses biodiversity and ecosystem services to reduce vulnerability and build resilience of human communities to climate change (CBD, 2009 & 2010).



Vulnerability of mountain ecosystems and their critical importance in building resilience towards climate change

Mountains are crucial in global ecosystems, providing millions of people with water, biodiversity, and livelihoods.

As moist air rises over mountain ranges, it cools, condenses, and forms precipitation, stored as snow or glacier ice during wet seasons. This stored water is then gradually released downstream during dry seasons, providing a reliable supply for freshwater needs in densely populated areas, agriculture, and industry. Mountains – 'water towers', – are vital for sustaining human livelihoods, food security, and ecosystems downstream. They contribute significantly to the global economy, generating 4-18% of the world's GDP through various industries such as tourism, agriculture, and forestry.³

Mountains also play a crucial role in filtering air, protecting downstream areas from extreme weather events, and serving as carbon sinks by sequestering carbon in montane forests. Additionally, mountain regions harbour a significant proportion of the world's biodiversity, including many endemic species, making them important hotspots for conservation.

At the same time, they are highly vulnerable to climate impacts, including melting glaciers, changes in precipitation patterns, and increased frequency of extreme weather events. These changes significantly affect mountain ecosystems, including the distribution and abundance

of species. As a result, some mountain species are at an increased risk of extinction. Glacier retreat and changing precipitation patterns severely affect downstream water resources, hydropower generation, and ecosystems.

Addressing these impacts and enhancing the resilience of mountain ecosystems and communities to climate change through EbA is crucial for sustaining mountain biodiversity, water resources, and livelihoods in a changing climate.

With approximately 670 million people, including Indigenous communities, and around 50% of global biodiversity hotspots residing in high mountain regions,⁴ it is essential to highlight their ecological significance and the need for effective conservation efforts in the face of climate change.

1. Financing EbA in Mountain Regions

Designing, financing, and implementing EbA with the participation of all key stakeholders is critical to its success.

This includes government stakeholders, multidisciplinary technical experts, private sector actors, non-governmental and civil society organisations and rights holders, allowing for technically sound, transformative interventions.

Engaging such groups at the country level was a priority for the Scaling-up Mountain EbA Project. Those learnings were shared and mainstreamed across multiple international platforms, including [FEBA](#), the [Global EbA Fund](#) and [UNFCCC's Nairobi Work Programme](#). The project contributed directly to the [FEBA](#)

³ Immerzeel, W.W., Lutz, A.F., Andrade, M. et al. 2020. Importance and vulnerability of the world's water towers. *Nature* 577, 364–369. <https://doi.org/10.1038/s41586-019-1822-y>.

⁴ IPCC, 2019: Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegria, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. <https://www.ipcc.ch/srocc/chapter/summary-for-policymakers/>



[framework](#) through its capacity-building activities to benefit wider audiences. Leveraging on its successes, [Peru](#) received Global EbA Fund financing to fund mountain-based projects, ensuring the continuity of EbA in mountain ecosystems and communities highly vulnerable to climate change.

[EbA projects could also utilise blended finance to fund income-generating EbA measures](#). Using capital from government sources to attract private-sector investment⁵ supports the development of proof-of-concept business models and competitive risk-return profiles, expanding into new sectors and locations. This inherently means including the private sector within EbA project design and activities.

Many businesses depend on ecosystems and their services, no matter the scale. Continuing to enforce Corporate Social Responsibility (CSR) through its three pillars of people, planet, and profit, as well as embedding nature and climate risks in companies' materiality assessments, can provide the rationale for the private sector to invest in EbA projects. In turn, EbA projects involving livelihood alternatives with a direct impact on increasing climate resilience can be both environmentally and economically viable, ensuring that private sector funding can get financial returns and generate nature- and climate-positive impacts.

From the Scaling Up Mountain EbA project, [4 EbA measures](#) (agroforestry, beekeeping, vicuña management and medicinal plant cultivation) contributed directly to long-term sustainability (i.e. affordability, socioeconomic benefits and

stakeholder buy-in), with 8 other measures also having socio-economic benefits. As a result, long-term economic activities generate sustainable livelihoods for communities.

2. Capacity-building using EbA

The "Scaling Up Mountain EbA" project was originally launched in three flagship countries: [Nepal](#), [Peru](#) and [Uganda](#). Located in 3 main mountain ranges (Andes, Himalayas, and Mt. Elgon), each country had a 3-pronged approach of raising awareness, capacity building and policy influencing woven into their EbA design, making targeted countries champions of self-sustaining EbA. EbA interventions focused on promoting resilient livelihoods, adaptive land management, and secure water resources. The three expansion countries of [Bhutan](#), [Colombia](#) and [Kenya](#) also worked to build capacity of key stakeholders and communities, for instance, through the development of a four-module [EbA Course](#) adapted to the Colombian context, community-based vulnerability and feasibility analysis and spatial mapping with the Ogiek Indigenous community in Kenya to enhance water security and enhancing springshed management in Bhutan.

From the experiences and lessons of each country's EbA interventions, future [transboundary mountain-based projects must target interconnected issues such as the food security-climate-biodiversity nexus or the nature-health climate nexus](#). Addressing multiple challenges facing communities will allow greater access to financial resources and address the key issues typically siloed in global work, even though they are quite

⁵ WB, 2021. <https://www.wavespartnership.org/>



interconnected. This is critical to an intervention's success and sustainability. EbA is a known approach to effectively addressing food security, climate change, and biodiversity, as demonstrated by the restoration of riverbanks in Uganda and wetland and pasture restoration in Peru from the "Scaling Up Mountain EbA" project.

Increasing investments in EbA projects with longer time frames will better support capacity-building processes, providing more opportunities for replication and scaling up. These processes, however, should continuously seek to empower and include mountain communities. Active and informed participation from local communities, Indigenous Peoples and other vulnerable groups ensures that adaptation strategies are context-specific, participatory, and socially inclusive.

3. EbA and Technology Development/Transfer

Reassessing known issues using technological developments will generate the design of innovative approaches for EbA. Innovations of technology, such as climate-smart agriculture, GIS mapping to visualise and communicate changes in ecosystems before and after EbA interventions, remote sensing of environmental drivers and using civil society for the collection of data, should be included in EbA project design, as they can enhance resilience, efficiency, and effectiveness of EbA projects. Traditional knowledge also unveils successful technologies for implementing EbA successfully.

Notably, using local experiences and knowledge to revive ancient technologies has proven strategic for EbA in the Miraflores community of Peru. Designed

and constructed over 700 years ago, the ancient water system comprises several reservoirs and a canal, and its revival directly led to the restoration of wetlands and native pastures, better cattle production and increased household income. This measure directly engaged the Miraflores community, which developed a management plan for the reservoirs to ensure its long-lasting impacts on their community.

Sharing technology and knowledge amongst projects was also key to realising effectiveness under the "Scaling Up Mountain EbA" project. The success of the flagship countries' technologies and interventions in the early stages of the project directly influenced the EbA measures done in their neighbouring countries (Peru-Colombia, Uganda-Kenya and Nepal-Bhutan). With over 5 years of experience from the original project sites, replication sites were set up for success, and the countries' neighbours could benefit from measures that reflected and engaged similar climates, biodiversity, industries and cultures as their own.