



INTRODUCTION TO ECOSYSTEM-BASED ADAPTATION:

A nature-based response to climate change

GLOBAL ECOSYSTEM-BASED ADAPTATION IN MOUNTAINS PROGRAMME

© Alvaro Beltran, UNDP Peru

Defining Ecosystem-based Adaptation

With growing evidence showing that the world is already locked into warming of close to 1.5°C above pre-industrial levels, finding effective strategies for adaptation that are also cost-effective has become both essential and urgent (World Bank 2014). As weather extremes become more common, and increased climate variability increases risks to food, water, and energy security, harnessing the power of nature through ecosystem-based adaptation (EbA) is vital to help address these challenges.

Climate change, combined with pollution, over-exploitation and human encroachment, are increasingly altering and degrading ecosystems and their ability to deliver the services that are vital to human lives and wellbeing (World Bank 2014). If conserved and well-managed, however, these ecosystems can help enhance the resilience of people to both climatic and non-climatic threats, while providing multiple benefits to both society and the environment (Colls and others 2009). In light of this connection, there is growing recognition that ecosystem-based approaches to climate adaptation can constitute an important element of a country's strategy for adapting to climate change.

There is now broad acceptance of the definition of EbA by the Convention on Biological Diversity (CBD) as **“the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change”** (CBD 2009). This definition was further ratified by the CBD 10th Conference of Parties (CoP) in October 2010, as including **“sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy that takes into account the multiple social, economic and cultural co-benefits for local communities”** (CBD 2010).

The same year, the Cancun Adaptation Framework of the United Nations Framework Convention on Climate Change (UNFCCC) at its 16th COP invited Parties to enhance action on adaptation by **“building resilience of socio-ecological systems, including through economic diversification and sustainable management of natural resources”** (UNFCCC 2011).



Ecosystem-based Adaptation in practice

From 2011 to 2015, the global Ecosystem-based Adaptation in Mountain Ecosystems Programme (hereafter referred to as the Mountain EbA Programme) has made an important contribution in three target countries (Nepal, Uganda and Peru), moving beyond the issue of defining EbA to applying it in practice. The Programme is testing EbA measures in pilot mountain sites, exploring means to finance upscaling and learning how field lessons might be applied to broader adaptation strategies and policies.

The Programme adopted the CBD definition of EbA and agreed to use it as the basis of the Programme’s work. However, much discussion was generated during the course of programme implementation on what effective EbA is and what it looks like in practice, since EbA is described in a variety of ways by the community of adaptation practitioners. Two commonly used sets of principles for EbA are illustrated below as examples (Table 1).

Based on five years of field testing in the Mountain EbA Programme, it has been possible to add further nuances to these sets of principles, to the definition of EbA, and to criteria for determining “what counts as EbA.” What has been learned is that a mix of criteria seems to be appropriate in practice and that some criteria are perhaps more important (or primary) than others (secondary). Also, while some criteria focus on the “what” aspects of EbA, others are more related to the processes of “how.” The following sections

explain in detail what these criteria might be and what lessons have been learned from their application. They are organized under six headings, highlighting that to qualify as EbA, interventions should:

1. Manage, conserve and restore ecosystems to be climate-resilient
2. Help people adapt to the adverse effects of climate change
3. Reduce climatic risks and hazards
4. Work at multiple geographical scales
5. Enhance knowledge and capacity
6. Promote enabling governance

The final section brings all these key criteria together in a proposed holistic framework for EbA.

Table 1 | Principles for effective EbA

Example 1:	Example 2:
<p>An ecosystem-based approach to adaptation:</p> <ol style="list-style-type: none"> 1. Is about promoting the resilience of both ecosystems and societies; 2. Promotes multi-sectorial approaches; 3. Operates at multiple geographical scales; 4. Integrates flexible management structures that enable adaptive management; 5. Minimizes trade-offs and maximizes benefits with development and conservation goals to avoid unintended negative social and environmental impacts; 6. Is based on best available science and local knowledge, and fosters knowledge generation and diffusion; 7. Is participatory, transparent, accountable, and culturally appropriate and actively embraces equity and gender issues. 	<p>Ecosystem-based adaptation should:</p> <ol style="list-style-type: none"> 1. Promote resilient and healthy ecosystems; 2. Maintain ecosystem services; 3. Support sectorial adaptation; 4. Reduce risks and disasters; 5. Complement infrastructure; 6. Avoid mal-adaptation.

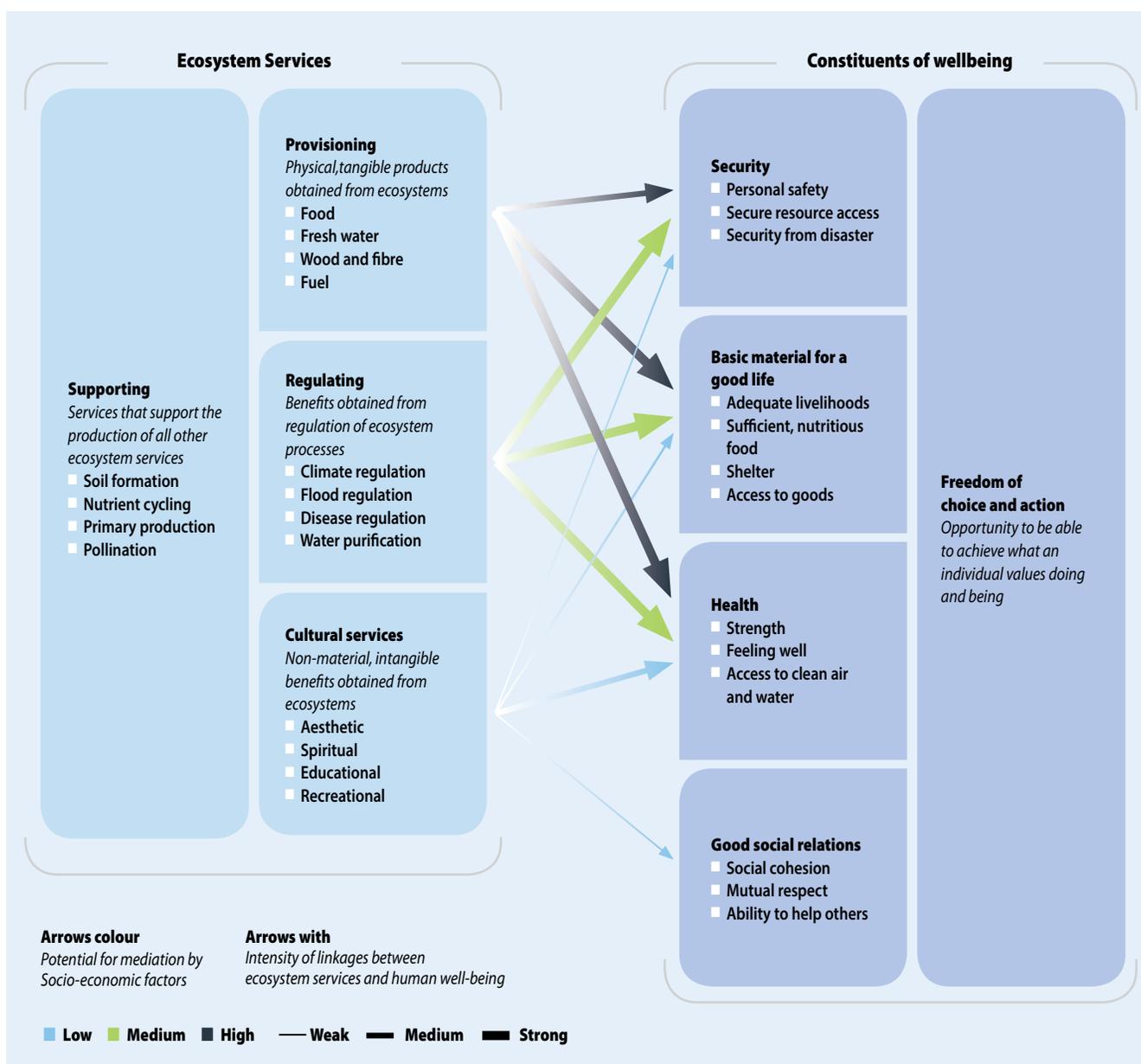
Source: Andrade and others (2011)

Source: TNC (2011)

1. Manage, conserve and restore ecosystems to be climate-resilient

According to the CBD definition, EbA is grounded in “the use of biodiversity and ecosystem services” and “sustainable management, conservation and restoration of ecosystems.” Central to the concept of EbA is the importance of seeing beyond the role of ecosystems as providers of a set of static ‘natural resources’ and instead seeing them as generators of a number of interconnected ecosystem services (Reid and Alam 2014). The Millennium Ecosystem Assessment report defines these services and their importance to human wellbeing, as shown in Figure 1.

Figure 1 | Ecosystem services and their links to human wellbeing



Source: Reid and others (2005)



**ENHANCING FOOD SECURITY IN SANZARA VILLAGE, UGANDA,
THROUGH PROVISION OF STEADY AND CLEAN WATER, DIVERSIFIED
CROPS AND ECOSYSTEM RESTORATION.**

© Andrea Egan, UNDP

Like humans, ecosystems are more resilient to stressors and better able to adapt to adverse conditions when they are healthy and fully functioning. According to the MEA, resilience is “the capacity of a system to tolerate impacts of drivers without irreversible change in its outputs or structure (Reid and others 2005).” Ecosystems have limits, however, beyond which they cannot function in their current form. When these limits are breached, an ecosystem may no longer be able to provide the services on which humans have come to depend (Scheufele and Bennett 2012). According to the MEA and more recently the Worldwide Fund for Nature (WWF), growing human demands on nature have become unsustainable.¹ Climate change is expected to aggravate the ongoing ecosystem degradation by causing changes to the hydrological regime, vegetation shifts, habitat loss, species loss and change in species diversity (Dixit and Shukla 2014). Moreover, negative impacts on the function and integrity of ecosystems from human actions also have negative effects on regional and local climate systems (IPCC 2013).

A key focus for EbA should, therefore, be on enhancing ecosystem resilience by maintaining ecosystem structure and functioning in response to current and future impacts. More concretely, this involves securing the stability and resilience of ecosystems as a whole; how they connect with one another; and the multiple roles they can play in increasing the adaptive capacity and resilience of people depending on these ecosystems (Epple and Dunning 2014). In keeping with this thinking, the Mountain EbA Programme protected and restored “natural infrastructure”, including forests, riverbank vegetation, mountain springs and grasslands, to preserve ecosystem services upon which mountain communities depend. These measures were deliberately designed to make ecosystems more climate-resilient, for example by planting tree species that can withstand drought.



© Andrea Egan, UNDP



ENHANCING ECOSYSTEM RESILIENCE THROUGH SUSTAINABLE VICUÑA MANAGEMENT IN NOR YAUYOS COCHAS LANDSCAPE RESERVE IN PERU.

© Alvaro Beltran, UNDP Peru

2. Help people adapt to the adverse effects of climate change

What sets EbA apart from business as usual conservation and ecosystem management, is that EbA uses nature-based approaches to “help people adapt” to the current and future impacts of climate change. The CBD EbA definition emphasises that this is not merely a by-product, but the end goal of EbA (Martin 2011).

Extensive research proves that the more ample and diverse ecosystem services people benefit from, the more likely they are to be resilient to challenges.² Climate change increasingly threatens the provision of ecosystem services that support basic human needs, such as food, water, energy and protection

from natural hazards. Therefore, a key objective of EbA should be to protect or enhance ecosystem functioning sufficiently to generate an entire suite of benefits for its target groups. Box 1 provides a concrete example of how the Mountain EbA Programme has been generating multiple benefits in Peru through implemented EbA measures. Learning Brief 2 will provide a more comprehensive analysis of how EbA can generate multiple benefits as well.

Box 1 | Generation of Multiple Ecosystem Benefits in Peru

In Peru, the Mountain EbA Programme promoted sustainable management of grasslands by enhancing both existing animal husbandry and vicuña management. These EbA measures generated the following multiple benefits:

Environmental	Economic	Social/ cultural
<ul style="list-style-type: none"> ■ Reduced pressure on natural pastures, wetlands and alpine ecosystems, promoting their recuperation; ■ Forage for grazing animals; ■ Provided more diverse habitats for animals that are predators and prey; ■ Enhanced production of animal fibre. 	<p>Generated new or increased income for local communities through:</p> <ul style="list-style-type: none"> ■ New income opportunity from commercial sale of vicuña fibre boosted by value chain development; ■ Increased income from generating better and more milk products and meat from livestock; ■ Boost in recreation and tourism activities. 	<ul style="list-style-type: none"> ■ Enhanced scenic beauty; ■ Likely increase in better health among community members from consuming healthier livestock products (milk + meat); ■ Strengthening of local organizations and management of communal lands; ■ Capacity building and technical assistance in enhanced livestock and vicuña management.

Source: Developed by T. Rossing and N. Ikkala Nyman, based on inputs from Peru Mountain EbA Programme team

3. Reduce climatic risks and hazards

For ecosystems, people and their livelihoods to be climate-resilient, these all need to be protected from climate-related hazards, such as floods, droughts and landslides. This is particularly relevant in mountain ecosystems (see Box 2).

Healthy ecosystems can play a vital role in reducing disaster risk. They can act as natural buffers or protective barriers to floods and landslides. They can also effectively act as water filtration and absorption systems (Renauld et al. 2013). Fully functioning ecosystems can further build resilience against disasters by sustaining human livelihoods and providing essential goods to local populations, like food and shelter. As a result, the EbA and Disaster Risk Reduction practitioner communities are now coming together to explore how to better use nature-based measures to reduce the damage caused by disasters, including those intensified by climate change.³

Box 2 | Adapting to Climate-related Natural Hazards in Mountains in Uganda and Nepal

The need for reducing risks from climate-related hazards is particular relevant in mountain ecosystems. In Uganda, for example, the nature of its soils, steep slopes and heavy rainfall makes Mt. Elgon naturally prone to floods and landslides. To address this risk, the Uganda Mountain EbA project worked with communities to stabilize the fragile mountain slopes through reforestation, contour banding and introduction of agricultural terraces, making cuts into steep slopes to establish surfaces that are supported by mud or stone walls. As these terraces are positioned perpendicular to the flow of water, they allow the water to infiltrate the soil slowly. Erosion was reduced and soil was retained, while soil moisture was improved, enhancing agricultural yield.

In Nepal, the Mountain EbA Programme used restoration of conservation ponds as an EbA measure to provide a buffer against rainfall-related natural hazards such as flooding and drought. During the dry season and prolonged dry spells, the ponds serve as repositories for water, while they help prevent excess water runoff during the monsoon season, likely to be intensified by climate change.

Sources: Rossing and others (2015); Barrows and others (2015)



4. Work at multiple geographical scales

In working to promote ecosystem resilience, it is important to remember that ecosystems function at different scales (e.g. a community watershed vs. a regional watershed) and that they are interdependent. Similarly, drivers of vulnerability – whether climatic or non-climatic – also play out at multiple scales. For example, the water cycle connects people along the upper reaches of a river with those who live further downstream. Downstream measures and impacts could be local, as in the case of Mt. Elgon in Uganda, where farmers further downstream within the same district are affected by upstream conditions. Such impacts can, however, occur across a wider regional scale, as in the case of Nor Yauyos Cochas Landscape Reserve (in Peru) or Phewa Lake (in Nepal). In Peru, for example, the more than 11 million people living in the Lima Metropolitan Region depend on water from eight river basins, including the Canete, whose catchment includes the Reserve.

As a result, a key lesson learned by the Programme was the need to ensure that the scope of EbA measures accommodates various landscape-level approaches. This discussion will be further elaborated in Learning Brief 2 (Generating multiple benefits from Ecosystem-based Adaptation). Programme activities therefore included bringing together Institutions that straddle these landscapes to support them in developing strong linkages, as the ecological boundaries of ecosystems do not necessarily correspond to political or administrative units (Andrade and others 2011).



DRAWING ON LOCAL KNOWLEDGE OF MEDICINAL PLANTS TO RESTORE ECOSYSTEMS, BUILD COMMUNITY RESILIENCE AND FOSTER WOMEN'S EMPOWERMENT IN NEPAL.

© Andrea Egan, UNDP



© Andrea Egan, UNDP

5. Enhance knowledge and capacity

What further sets EbA apart from “business as usual” conservation and ecosystem management is that climate adaptation is an ongoing process rather than an outcome. EbA must, therefore, go beyond practical adaptation measures (like restoring a conservation pond or a forest) to building capacity of involved stakeholders. Undertaking EbA aims to help communities build on their traditional knowledge to be informed, forward-looking and flexible decision-makers, as they face continuous change and increasing uncertainty.

The use of meteorological data and scientific models of anticipated climate change in guiding decision-making is a critical tool for this capacity building. Successful adaptation requires understanding of predictions of future change, knowledge about adaptation options and the ability to assess information and implement suitable interventions in a flexible manner. In the context of climate change it is important, therefore, to ensure that systems are in place to distribute relevant information at both national and regional scales. In addition, forums must be made available for dialogue and discussion among all stakeholders (ACCRA 2011). For example, in Uganda, encouraged by the Programme, the Mount Elgon Stakeholder Forum provided a platform for dialogue between groups of stakeholders concerning the design of the Community Gravity Flow Scheme in Sanzara district (Box 3 below).

As a basis for decision-making, the best available scientific knowledge and climate modelling should be used in conjunction with local knowledge. The latter can be configured in innovative ways with modern approaches, technologies and governance systems to address the combination of climate and non-climate impacts. For instance, in Nepal, the Mountain EbA Programme helped develop new markets for medicinal plants, such as Timur (*Zanthoxylum armatum*), utilizing local knowledge of medicinals for modern demand for natural health products (Egan and others 2015).

Sustainable, long-term monitoring systems could also enable multi-stakeholder reflection, learning and adoption of new management decisions.

6. Promote enabling governance

Support multi-sectoral approach to EbA

EbA cuts across multiple sectors, such as water, agriculture, energy and infrastructure. It is, therefore, imperative to foster collaboration between sectors managing ecosystems and those benefiting from their services. An example is the scope for generating multiple benefits from integrating EbA into the infrastructure sector. Conventional engineering approaches to “grey” infrastructure – such as dams, dykes and water treatment plants – have many limitations. Construction, operations and maintenance of large engineered projects tend to be costly, and can have destructive impacts on the environment. Such infrastructure also tends to be too inflexible to adapt to uncertainties in climatic conditions (Gartner and Difrancesco 2015).

In contrast, “green” infrastructure can provide more flexible functions, such as healthy watersheds regulating and purifying water supply, as promoted by the Mountain EbA Programme in all three pilot countries. Experience in the Programme has also shown that ecosystem-based approaches and grey infrastructure can be designed to complement one another. For example, in Nepal, a hybrid of grey and green elements was used in reinforcing riverbanks against flash floods through constructing gabions with bamboo planted above them. Box 3 highlights how a Community Gravity Flow Scheme promoted in Uganda can combine both green and grey measures.

Promote institutional strengthening

Enhanced knowledge and access to information also makes it easier to make informed decisions within institutions about how to minimize trade-offs and maximize benefits between conservation and development goals. While winners and losers cannot be avoided, processes should be carefully negotiated and implemented with full and active participation by all stakeholders, from communities, local governments and NGOs through to the national government level. In Peru, the Mountain EbA

Programme used Participatory Assessments to ensure that fully informed decision-making processes brought ecosystem issues into the equation when identifying community vulnerability to climate change impacts. A key lesson learned was that a full assessment of costs and benefits should also be done rather than a simple, short-term economic analysis that fails to capture the full economic and non-economic benefits that ecosystem services provide (see Learning Brief 3).

Create enabling policy and financing environment for EbA

EbA planning and implementation predominantly take place at the local and landscape level in response to localized climate impacts. To support scaling up of these efforts, however, they must be supported by an appropriate institutional framework along with the necessary linkages between the practice and policy (Rossing and others 2012). Local and national institutions need to be substantially involved to ensure that implementation at different scales is supported through coherent policy, legal and financial frameworks. The Mountain EbA Programme therefore invested significant effort in building partnerships with the Governments of Peru, Nepal and Uganda to create an enabling policy and funding environment for EbA. Significant efforts were also made to mainstream EbA into existing planning frameworks (see Brief 4 on making the case for financing and policy change for EbA).

Box 3 | Adapting to Drought Through a Community Gravity Flow Scheme in Uganda

The construction of a community gravity flow scheme covering three villages of the Kapchorwa district of Mount Elgon was launched in April 2012 by IUCN, in partnership with UNDP, UNEP and Kapchorwa District Local Government who provided additional finance to the scheme. Costing under \$150,000 in total and targeting about 1,000 people in Chemaare, Kasongo and Kapsinda villages in Sanzara Parish, the scheme has provided a solution to water shortages in communities living in a “rain shadow” that is expected to worsen as a result of climate change.

The construction of a concrete reservoir and water pipes to bring water from the River Sipi for drinking and irrigation of crops could be considered a “grey” solution rather than a “green” one. What makes this part of an EbA approach, however, is the fact that the scheme was designed to address climate impacts across the entire River Sipi catchment. The gravity flow scheme was accompanied by interventions to manage land use, and protect and restore forested slopes upstream in the Mount Elgon National Park to enhance water availability and quality.

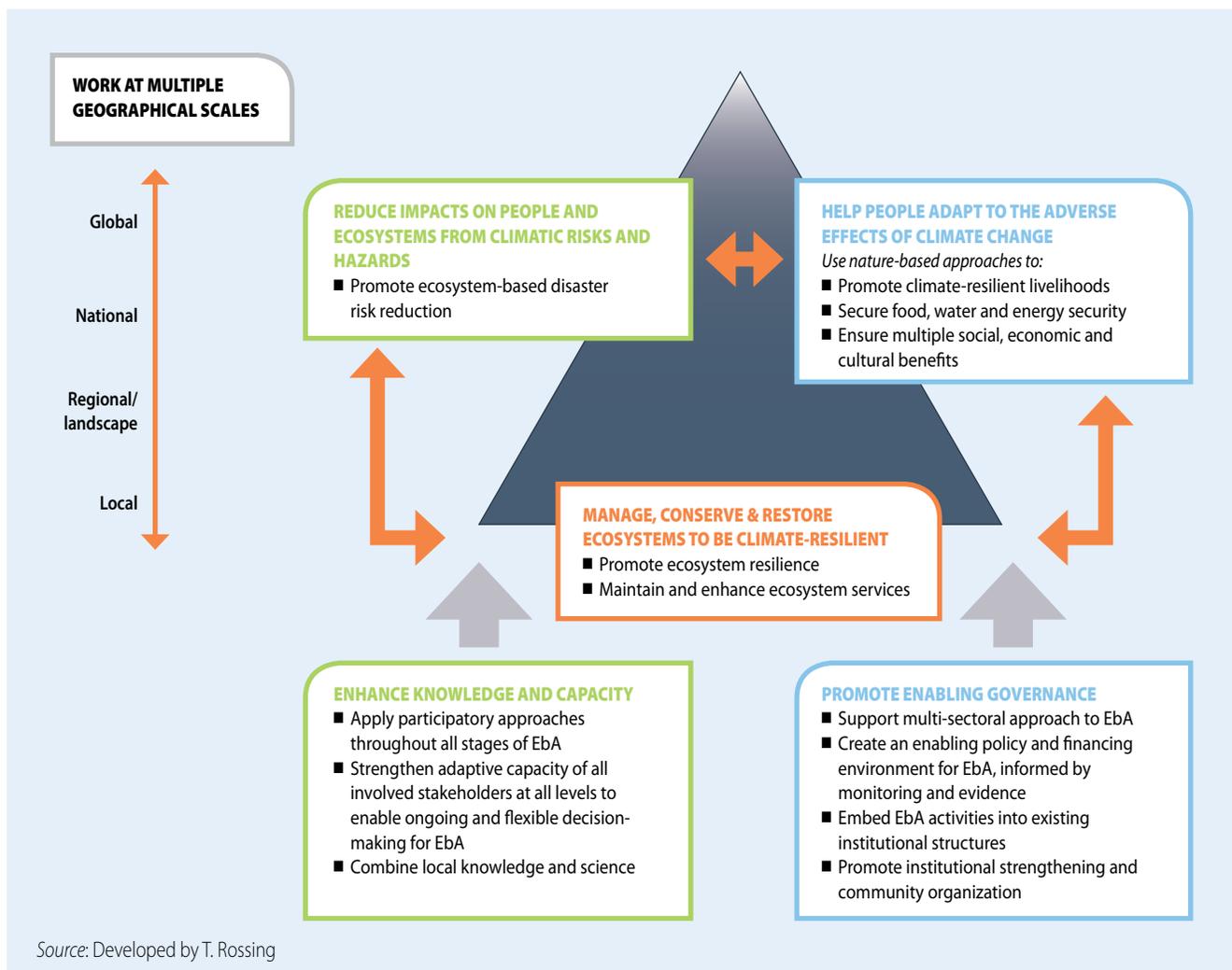
Source: IUCN (2012)

Bringing it all together: Proposed framework for holistic EbA

A key lesson learned in the Mountain EbA Programme has been that an adaptation measure is more effective in reducing the vulnerability of both people and ecosystems, when it is implemented in conjunction with a wide range of complementary measures. This is also what sets EbA part from “business as usual” conservation and restoration practices: EbA is not constituted by a single measure, but made up by a composite of activities across time and space. Figure 2 shows how all the elements discussed above can be brought together in one unifying EbA framework. If viewed separately and in isolation, each measure may appear as business as usual restoration, livelihood improvement, disaster risk reduction or capacity building. When combined, however, they jointly help build the necessary resilience of both ecosystems and people to withstand climatic and non-climatic stresses and risks.

Finally, many of the activities carried out in other contexts, for example, to conserve ecosystems or farm more sustainably, might look similar to EbA activities. A Programme learning workshop in Pokhara, Nepal in 2014 concluded, however, that the key distinguishing feature of EbA activities lay in their motivation and planning in order to address climate change. In other words, it is not so much what we do, but why and how we do it, that distinguishes EbA from more standard practices.

Figure 2 | Framework for Ecosystem-based Adaptation



REFERENCES

- ACCRA (Africa Climate Change Resilience Alliance). 2011.** "The ACCRA Local Adaptive Capacity Framework."
- Andrade, A., R. Córdoba, R. Dav, P. Girot, F. Herrera, R. Munroe, J. Oglethorpe, E. Pramova, J. Watson, W. Vergara. 2011.** "Draft principles and guidelines for integrating Ecosystem-Based Approaches to Adaptation in project and policy design: A discussion document." CEM/IUCN, CATIE. Kenya.
- Barrows, E., A. Raza, R. Khanal and A. Adhikari. 2015.** "EbA and additionality – an example of restored community ponds in Panchase, Nepal." IUCN working paper. Mountain EbA Programme.
- CBD (Convention of Biological Diversity). 2009.** "Connecting biodiversity and climate change mitigation and adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change." Technical Series No. 41. Secretariat of the CBD, Montreal. [<http://www.cbd.int/doc/publications/cbd-ts-41-en.pdf>]
- Convention on Biological Diversity (CBD). 2010.** X/33 Biodiversity and climate change, Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting; UNEP/CBD/COP/DEC/x/33; 29 October 2010. Nagoya, Japan: Secretariat of Convention on Biological Diversity.
- Colls, A., N. Ash, and N. Ikkala. 2009.** "Ecosystem-based Adaptation: A natural response to climate change." Gland, Switzerland: IUCN.
- Dixit, A., Karki, M. and Shukla, A. 2015.** "Vulnerability and impacts assessment for adaptation planning in Panchase Mountain Ecological Region, Nepal, Kathmandu, Nepal." Government of Nepal, United Nations Environment Programme, United Nations Development Programme, International Union for Conservation of Nature, German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety and Institute for Social and Environmental Transition-Nepal.
- Mountain EbA Programme. 2014.** "Ecosystem-based Adaptation: Adapting to climate change in mountain ecosystems, a flagship programme of UNEP, UNDP and IUCN." Programme Leaflet.
- Egan, A., N.C. Sherpa and T. Rossing. 2015.** "Medicinal plants and poverty reduction in a changing climate." Photo Essay. UNDP, Mountain EbA Programme.
- Epple, C. and E. Dunning. 2014.** "Ecosystem resilience to climate change: What is it and how can it be addressed in the context of climate change adaptation?" Technical report for the Mountain EbA Programme. UNEP World Conservation Monitoring Centre, Cambridge.
- Estrella, M. & N. Saalimaa. 2013.** "Ecosystem-based Disaster Risk Reduction (Eco-DRR): An Overview." In: Renaud, F., Sudmeier-Rieux, K. and M. Estrella (eds.) The role of ecosystem management in disaster risk reduction. Tokyo: UNU Press
- Gartner, T. and K. Difrancesco. 2015.** Blog: *From Gray to Green. Investing in natural infrastructure to address water, food, and energy nexus challenges.* IUCN.
- IPCC (International Panel on Climate Change). 2013.** "Climate change: The physical science basis." Contribution of working group I to the fifth assessment report of the intergovernmental panel on climate change, 1535. Stocker, T. F., Qin, D., Plattner, G. K., Tignor, M. Allen, S. K., Boschung, J. Nauels, A. Xia, Y., Bex, V. and Midgley (Eds.). United Kingdom and New York, Cambridge, NY, USA: Cambridge University Press.
- IUCN. 2012.** "Communities in Uganda adapt to drought through a gravity flow scheme." News story, 16 April 2012. http://iucn.org/es/noticias/noticias_por_fecha/?9606/Communities-in-Uganda-to-adapt-to-drought-through-a-gravity-flow-scheme
- Jeans, H., J. Oglethorpe, J. Phillips and H. Reid. 2014.** "The role of ecosystems in climate change adaptation. Lessons for scaling up." In Ed. Schipper, Ayers, Reid, Huq and Rahman. Community-based adaptation to climate change. Scaling it up. Earthscan from Routledge.
- Martin, S. 2011.** "Ecosystem-based Adaptation: What does it really mean?" ClimatePrep: Adaptation stories, lessons, and explorations.
- LPR (Living Planet Report). 2014.** "Species and spaces, people and places." World Wildlife Fund (WWF).
- Reid, H. and S. Alam. 2014.** "Ecosystem-based Approaches to Adaptation. Evidence from two sites in Bangladesh." Working Paper. IIED.
- Reid, W. V., Mooney, H. A., Cropper, A., Capistrano, D., Carpenter, S. R., Chopra, K., Desgupta, P., Dietz, T., Duraiappah, A. K., Hassan, R., Kasperson, R., Leemans, R., May, R. M., McMichael, T. A. J., Pingali, P., Samper, C., Scholes, R., Watson, R. T., Zakri, A. H., Shidong, Z., Ash, N. J., Bennett, E., Kumar, P., Lee, M. J., Raudsepp-Hearne, C., Simons, H., Thonell, J. and Zurek, M. B. 2005.** "Ecosystems and human well-being. Millennium ecosystem assessment synthesis report." Washington DC: Island Press.
- Renaud, F., Sudmeier, K. and Estrella, M. (eds). 2013.** "The Role of Ecosystems in Disaster Risk Reduction." Tokyo: United Nations University Press.
- Rossing, T., A. Otzelberger and P. Girot. 2012.** "Scaling up the use of tools for community-based adaptation: Issues and challenges." In Ed. Schipper, Ayers, Reid, Huq and Rahman (2014) Community-based adaptation to climate change. Scaling it up. Earthscan from Routledge.

Rossing, T., N.C. Sherpa and A. Egan. 2015. "Restoring the flow of life in a changing climate. Improving ecosystem resilience in the mountains of Nepal." Photo Essay, UNDP, Mountain EbA Programme.

Scheufele, G. and J. Bennett. 2012. "Valuing ecosystem resilience." *Journal of Environmental Economics and Policy* 1(1): 18-31.

The Nature Conservancy (TNC). 2011. "Ecosystem-Based Adaptation: Bridging Science and Real-World Decision-making." Second International Workshop on Biodiversity and climate Change in China. Anne Wallach Thomas, Global Climate Change Adaptation Program

UNFCCC. 2011. Decision 1/CO.16 The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, para 14. <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=4>

World Bank. 2014. "Turn Down the Heat: Confronting the New Climate Normal." Washington, DC: World Bank.

END NOTES

- ¹ According to Reid and others (2005), over the past 50 years, nearly 60 per cent of the world's major ecosystems have undergone degradation, and according to LPR (2014) "Wildlife populations have dropped sharply, by 52 per cent between 1970 and 2010, especially freshwater vertebrate species, which declined 76 per cent."
- ² For a good, recent example, please see Reid and Alam (2014).
- ³ According to Estrella and Saalismaa (2013), this is also called Eco-DRR, defined as 'sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development.'

INFORMATION ABOUT LEARNING BRIEF SERIES

This brief is part of a series of learning briefs produced by UNDP. These briefs draw together experiences and lessons learned from working on ecosystem-based adaptation (EbA) within the global Ecosystem-based Adaptation (EbA) in Mountain Ecosystems Programme from 2011 to 2015. The content also draws on lessons generated by the broader global EbA community of practice. The briefs are designed for practitioners, including local government representatives, civil society organizations and other actors working on climate change issues. They will also be useful for policy makers and donors engaged in planning and allocation of resources for adaptation action.

The Programme is a partnership between UNDP, UNEP and IUCN, with funding from the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). This global partnership also involves national and regional government agencies, civil society and local communities in Uganda, Nepal and Peru. By promoting the use of sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy, the Programme aims to reduce the vulnerability and enhance the resilience of fragile mountain ecosystems and their local communities to climate change impacts.

LEARNING BRIEF SERIES

This learning brief is part of the following series:

1. Introduction to Ecosystem-based Adaptation:
A nature-based response to climate change;
2. Generating multiple benefits from Ecosystem-based Adaptation in mountain ecosystems;
3. Making the economic case for Ecosystem-based Adaptation;
4. Making the case for financing and policy change for Ecosystem-based Adaptation.

AUTHOR

Tine Rossing

ACKNOWLEDGMENTS

The following colleagues provided valuable suggestions, reviews and contributions: Anu Adhikari, Cordula Epple, Edith Fernandez-Baca, Silvia Giada, Sheila Kulubya, James Leslie, Jessie Mee, Yalamber Rai, and Ali Raza Rizvi.

Special thanks to Caroline Petersen, Ninni Ikkala Nyman and Pablo Dourojeanni for their detailed review, technical guidance and ideas.

DESIGN AND LAYOUT

Phoenix Design Aid A/S, a CO2 neutral company accredited in the fields of quality (ISO 9001), environment (ISO14001) and CSR (DS49001), and approved provider of FSC™ certified products.

© Copyright 2015

United Nations Development Programme

UNDP, the United Nations Development Programme, partners with people at all levels of society to help build nations that can withstand crisis, and drive and sustain the kind of growth that improves the quality of life for everyone. On the ground in 170 countries and territories, we offer global perspective and local insight to help empower lives and build resilient nations. www.undp.org

United Nations Development Programme

Bureau for Development Policy
One United Nations Plaza
New York, NY, 10017 USA
Tel: +1 212 906 5081

MAIN COUNTRY PARTNERS FOR THE MOUNTAIN EBA PROGRAMME

NEPAL	PERU	UGANDA
<ul style="list-style-type: none">■ Ministry of Forest and Soil Conservation, Department of Forest■ Ministry of Science, Technology and Environment■ Government Authorities of Kaski, Parbat and Syangja (District Forest Office, District Soil Conservation Office, Panchase Protected Forest Programme)■ Machhapuchhre Development Organization and Aapasi Sahayog Kendra (ASK) Nepal■ Panchase Protected Forest Council	<ul style="list-style-type: none">■ Ministry of Environment;■ National Service of Natural Protected Areas■ Ministry of Economy and Finance■ The Mountain Institute (IUCN's implementing partner)■ Nor Yauyos Cochas Landscape Reserve■ Regional governments of Junín and Lima and the district municipalities and community authorities in the Reserve	<ul style="list-style-type: none">■ Ministry of Water and Environment■ Ministry of Finance Planning and Economic Development■ Ministry of Agriculture Animal Industry and Fisheries■ Ministry of Health■ National Planning Authority■ Uganda Wildlife Authority■ Makerere University Institute of Natural Resources■ National Forestry Authority■ National Environment Management Authority■ Members of the Mt. Elgon Conservation Forum■ Kapchorwa, Kween, Sironko and Bulambuli District Local Governments

Source: Mountain EbA Programme (2014)