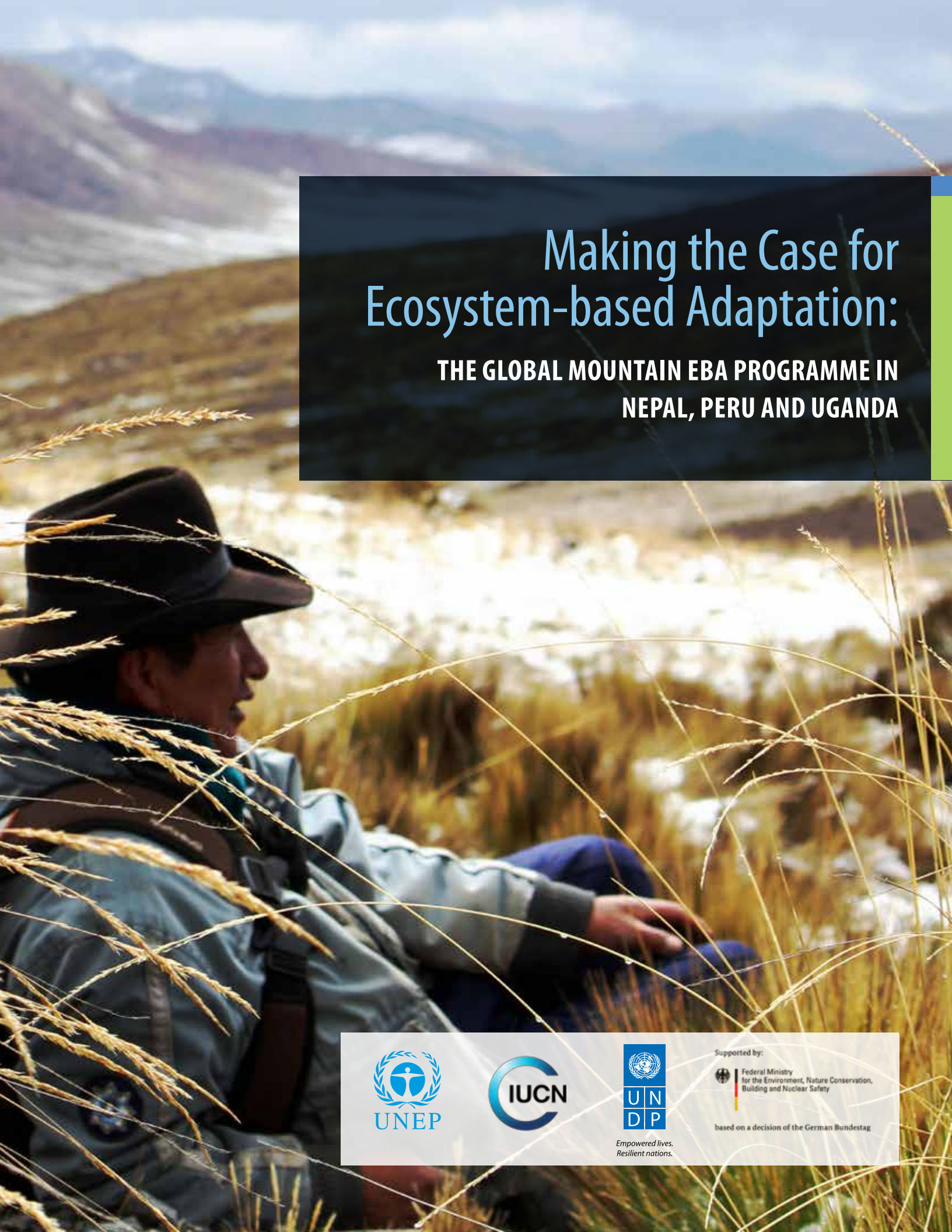

Making the Case for Ecosystem-based Adaptation:

THE GLOBAL MOUNTAIN EBA PROGRAMME IN NEPAL, PERU AND UGANDA

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UNEP, the United Nations Environment Programme, is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as an authoritative advocate for the global environment. UNEP work encompasses: assessing global, regional and national environmental conditions and trends; developing international and national environmental instruments; and strengthening institutions for the wise management of the environment. www.unep.org

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IUCN, the International Union for Conservation of Nature, helps the world find pragmatic solutions to our most pressing environment and development challenges. IUCN's work focuses on valuing and conserving nature, ensuring effective and equitable governance of its use, and deploying nature-based solutions to global challenges in climate, food and development. IUCN supports scientific research, manages field projects all over the world, and brings governments, NGOs, the UN and companies together to develop policy, laws and best practice.

IUCN is the world's oldest and largest global environmental organization, with more than 1,200 government and NGO members and almost 11,000 volunteer experts in some 160 countries. IUCN's work is supported by over 1,000 staff in 45 offices and hundreds of partners in public, NGO and private sectors around the world. www.iucn.org

BMUB, Germany's Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, provides funding through the International Climate Initiative (IKI). Since 2008, the IKI has been financing climate and biodiversity projects in developing and newly industrializing countries, as well as in countries in transition. For the first few years the IKI was financed through the auctioning of emission allowances, but it is now funded from the budget of the BMUB.

The International Climate Initiative is a key element of Germany's climate financing and the funding commitments in the framework of the Convention on Biological Diversity. The Initiative places clear emphasis on climate change mitigation, adaptation to the impacts of climate change and the conservation of biological diversity. These efforts provide various co-benefits, particularly the improvement of living conditions in partner countries. www.international-climate-initiative.com

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Acronyms

BAU	business as usual
BCR	benefit-cost ratio
BMUB	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of Germany
CBA	cost-benefit analysis
CBD	Convention on Biological Diversity
CBO	community-based organization
CEAP	Community Environment Action Plan
CECF	Community Environment Conservation Fund
CFUG	Community Forest User Group
EbA	Ecosystem-based Adaptation
ECOTRUST	Environmental Conservation Trust of Uganda
FPCC	Field Planning Coordination Committee
GCM	General Circulation Model or Global Climate Model
GFS	gravity flow scheme
HEAP	Household Environment Action Plan
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
IPRA	integrated participatory rural appraisal
IRR	internal rate of return
IUCN	International Union for Conservation of Nature
LAPA	Local Adaptation Plan of Action
MAP	Medicinal and Aromatic Plants
MEF	Ministry of Economics and Finance, Peru
MINAM	Ministry of the Environment, Peru
NAPA	National Adaptation Programme of Action
NAHI	Nature Harness Initiatives
NBSAP	National Biodiversity Strategy and Action Plan
NDP	National Development Plan, Uganda
NGO	non-governmental organization
NPC	National Planning Commission, Nepal
NPV	net present value
NYCLR	Nor Yauyos Cochas Landscape Reserve, Peru
PES	Payments for Ecosystem Services
PIP	Public Investment Project (PIP proposal)
SBSTA	Subsidiary Body for Scientific and Technological Advice
SEM	Sustainable Ecosystem Management
SERNANP	National Service of Natural Areas Protected by the State, Peru
TMI	The Mountain Institute
TSA	Targeted Scenario Analysis
UNDP	United Nations Development Programme
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VDC	Village Development Committee, Nepal
VIA	vulnerability and impact assessment
UNEP-WCMC	UNEP World Conservation Monitoring Centre

Foreword

I am pleased to be showcasing the work of the global programme on Ecosystem-Based Adaptation in Mountain Ecosystems, funded by the International Climate Initiative (IKI), and implemented from 2011 to 2016 through UNDP, UNEP and IUCN, in partnership with the Governments of Nepal, Peru and Uganda.

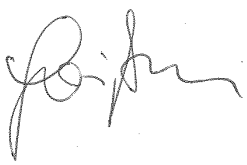
The IKI is a key element of Germany's climate and biodiversity financing. The flagship EbA programme brings together the climate change adaptation and biodiversity conservation agendas, supporting partner countries to maximise achievements on both, whilst simultaneously improving living conditions.

This publication presents the results of innovative work in the three pilot countries, in making the case for ecosystem-based approaches as part of a broader suite of climate change adaptation options. The country-level work of the programme in Nepal, Peru and Uganda has influenced policy formulation in a number of cases, and has spurred important shifts in public finance mechanisms.

An important objective of the IKI is to generate momentum for negotiations on the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD) through targeted cooperation with partner countries, linking negotiations with actions. The Mountain EbA programme has also facilitated a number of key interventions at the global scale, and has generated new evidence on the cost-effectiveness of ecosystem-based adaptation options.

Since 2008, the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) has been financing climate and biodiversity projects in developing and newly industrialising countries, as well as in countries in transition. IKI supports a large number of EbA-related projects, including region-wide initiatives in Micronesia and Melanesia, Latin America, and South-East Asia, as well as projects specific to watershed, mountain, forest, marine, terrestrial, and coastal ecosystems. In 2015, IKI initiatives in the EbA thematic area comprise a portfolio of 73m EUR, as part of a wider Adaptation support.

The legacy of the Mountain EbA Programme, captured in this publication, will be crucial in feeding into Germany's cooperation with partner countries to achieve sustainable and resilient societies, as well as wider global efforts in this important field.



Norbert Gorißen *heads the division of International Climate Finance, International Climate Initiative, of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)*

Foreword

Our planet faces a number of interlinked crises, as we tackle the huge challenges of implementing the new 2030 Agenda for Sustainable Development. Conflict, poverty and environmental degradation are causing the migration and displacement of millions of people. The impact of a changing climate on a natural resource base that is already overexploited, may be devastating for many communities living close to nature.

Mountain peoples are a prime example of this. The ecosystems on which high altitude farming communities depend are likely to be negatively affected, for example, by increasingly frequent landslides due to more intense rainfall; or as the melting of glaciers causes flooding of glacial lakes (and later water shortages). Adaptation strategies help society to plan better and minimize negative impacts, even turn new conditions to their advantage. This publication focuses on ecosystem-based approaches to adaptation in vulnerable mountain areas. These approaches use sustainable management, conservation and restoration of natural and agro-ecosystems, as part of an overall adaptation strategy. This takes into account anticipated climate change impact trends, to reduce vulnerability and improve the resilience of ecosystems and people to climate change impacts.

The book highlights the experience of three pioneering countries, where governments and civil society have joined hands, supported by the German Government's International Climate Initiative, and working with implementing partners UNDP, UNEP and IUCN, in piloting new approaches through the Mountain EbA Programme.

This has involved testing new EbA interventions, such as stabilizing mountain slopes, that are vulnerable to erosion from more intense rains, with indigenous plants, which can be harvested and sold. As the UN's development network, UNDP promotes adaptation efforts like these that have multiple benefits, and create opportunities for poverty eradication and social inclusion. The book shows that demonstrating these benefits is a vital element of making the case for EbA, especially with communities.

At national scale also, demonstrations of the effectiveness and cost-effectiveness of EbA measures have been important in making the case for enhanced public investment in EbA. The publication tracks the experience of the programme in undertaking cost benefit analysis of specific EbA interventions, and comparing these with a business-as-usual scenario. It also highlights national and global policy formulation processes into which EbA approaches have been integrated.

Together with all the implementing partners of the Mountain EbA Programme, we are proud to be able to share the lessons learnt through the programme on effective ways to make the case for ecosystem-based adaptation. I believe this publication is timely, and makes an important contribution to the global evidence base for EbA.

Nik Sekhran *is Chief of Profession, Sustainable Development, in the Bureau for Policy and Programming Support of the United Nations Development Programme*

IN NEPAL, THE MOUNTAIN EBA PROGRAMME WAS IMPLEMENTED IN THE PANCHASE MOUNTAIN ECOLOGICAL REGION, WHERE THE ELEVATION RANGES FROM 742 TO 2,517 METRES ABOVE SEA LEVEL.

EXECUTIVE SUMMARY

The Global Ecosystem-based Adaptation (EbA) in Mountain Ecosystems Programme was jointly implemented from 2011 to 2016 as a flagship programme of UNEP, UNDP and IUCN, funded by the Government of Germany through the International Climate Initiative (IKI), in partnership with the Governments of Nepal, Peru and Uganda. The programme was implemented at global level and at national level with pilot project work in mountain ecosystems in countries that are particularly vulnerable to climate change.

Ecosystem-based Adaptation can be defined as the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change. The programme´s approach was to help rural vulnerable mountain communities in three countries (Nepal, Uganda and Peru) adapt to anticipated impacts of climate change using sustainable management, conservation and restoration of ecosystems, as part of overall local and national adaptation strategies.

The objective of this publication is to present lessons learned throughout the process of 'making the case for EbA' to government and other stakeholders, encouraging them to include EbA approaches in broader adaptation strategies, and to bring about the required shifts in policy and finance. Chapter 1 defines the concept and its relevance for mountain ecosystems.

Proponents of EbA must make the case to key beneficiaries and stakeholders early on, right from the planning and implementation stage of adaptation initiatives. Chapter 2 presents the planning and implementation stage of the pilot projects in Nepal, Peru and Uganda. First, **initial rapid participatory assessments** increased understanding of the linkages between climate change, ecosystems and livelihoods, thereby providing a better understanding of EbA and its different kinds of benefits. Second, these assessments set the stage for implementation of early **'no regrets' measures** on the ground that generated key benefits. These early 'no regrets' activities, which helped secure local commitment and ownership, focused on generating economic benefits, such as promoting alternative livelihoods or increasing agricultural or livestock production. Also, implementing 'grey-green' water infrastructure measures early on yielded tangible and visible environmental and social benefits from the outset.

Once initial benefits from EbA activities were demonstrated at the local scale, the case could then be made for implementing broader, **scaled-up EbA measures at the landscape level**. At this scale, EbA can provide benefits across whole ecosystems in the long term, which are essential for enhancing adaptive capacity. EbA measures provide a range of environmental, social and economic benefits. These benefits will differ depending on the given suite of EbA measures implemented. Within the Mountain EbA Programme, environmental benefits included enhancing water provision, reducing soil erosion and increasing vegetation; social benefits included enhanced food security, access to clean water, strengthened local organizational and technical capacities and empowerment of women and disadvantaged groups; and economic benefits included increased productivity, new sources of livelihoods and increased income. More specifically, the EbA measures applied in the pilot countries can increase agricultural and livestock production during dry spells through increased water provision by well-managed watersheds. Also, restoring grasslands can increase provision of grazing and forage during dry periods, regulate water and floods during heavy rainfall and stabilize slopes to prevent landslides.

Building on the initial rapid participatory assessments, more in-depth **vulnerability and impact assessments** (VIAs) helped frame EbA options in a climate change adaptation context, by assessing available projections of anticipated climate impacts at regional and local scales. Undertaking more detailed VIAs enabled the validation, redesign or elimination of early 'no regrets' measures and a shift into evidence-based EbA measures. The process also enabled adoption of a landscape scale approach and long-term planning of EbA measures. A watershed, catchment or protected area was found to be a particularly good scale for planning and implementing EbA measures. This scale proved appropriate when making the case for landscape scale approaches, particularly to district level governments and protected area managers. It also ensured the attainment of EbA benefits in a more comprehensive and sustainable manner, especially with regard to ecosystem service provision.

When stakeholders recognize the multiple benefits of EbA and are eager to scale up, it is important to quantify the value of EbA measures. Chapter 3 discusses how to make the economic case for EbA and presents the **cost-benefit analysis** (CBA) work carried out through the programme. Cost-benefit analysis can provide an objective methodology for quantifying EbA costs and benefits and can be used to guide decision making on EbA, including comparing potential EbA interventions with business as usual scenarios or other adaptation options.

Results from the cost-benefit analysis carried out by the programme in Nepal showed that the use of broom grass and gabion walls as EbA measures were investments with a net benefit. The CBA from Peru also showed that adoption of EbA measures around sustainable grassland, livestock and vicuña management in the community of Tanta was economically preferable to current management practices. The results of the cost-benefit analysis from Uganda showed that EbA farming practices were profitable compared to

non-EbA farming practices and that profitability can be sustained in the long run.

Challenges in undertaking cost-benefit analysis for EbA included conceptualizing and assessing the multiple benefits provided by EbA in economic terms, including with regards to ecosystem functions. The results of a cost-benefit analysis can be used to make the economic case for EbA to public investors such as local governments or ministries of finance, or to private investors such as individual farmers or hydroelectric companies.

Once the case has been made, EbA can then be integrated into relevant **planning and policy** processes, from local to national and global levels. Chapter 4 presents how the programme has engaged in making the case for policy change for EbA at global, national, regional, local and community levels. The programme has applied a range of approaches, including engaging in dialogues; presenting experiences and lessons learned of planning and implementing EbA; providing technical advice; and carrying out policy advocacy making the case for EbA to global policy audiences.

At the **global level**, advocacy efforts increased acceptance of EbA discourse in the realm of global policy, especially under the Convention on Biological Diversity (CBD) and United Nations Framework Convention on Climate Change (UNFCCC), including its Nairobi Work Programme. Local level experiences in planning and implementing EbA contributed to making the case for needed policy changes for EbA at the global level.

For example, Uganda's experience in building on its project experience as part of the Mountain EbA Programme was shared at the United Nations Environment Assembly (UNEA) in 2014 to make the case for an EbA resolution.

At the **national level**, the case for policy change for EbA can be made with regards to policies such as national development plans, national climate change policies, environment and conservation strategies, sectoral plans and policies.

COP 20 PRESIDENT AND PERU'S ENVIRONMENT MINISTER MANUEL PULGAR VIDAL AT THE OPENING CEREMONY OF THE 2014 UNITED NATIONS CLIMATE CHANGE CONFERENCE HELD IN LIMA, PERU. © Elekhh

The national development plans and climate change policies of Nepal, Peru and Uganda provided supportive frameworks for planning and implementing EbA measures nationally. The projects in each country provided targeted technical guidance and policy review inputs for integrating EbA, including into i) national forest policy in Nepal; ii) Peru's Intended Nationally Determined Contribution (INDC) to the UNFCCC, which refers to the Mountain EbA Programme specifically in the context of results and practical experiences that have informed the INDC; and iii) the National Climate Change Strategy in Uganda. A variety of activities helped lift EbA onto these national policy agendas, such as ongoing sharing of lessons learned on EbA, organizing site visits to show the benefits of EbA on the ground and engaging in policy dialogues. The programme increased understanding and buy-in for EbA amongst policy makers in all project countries and contributed, for example, to the process of establishing a High Level Committee on EbA in Nepal.

Planning and implemention of EbA works best at **landscape or ecosystem scale**, which means that making the case for policy change for EbA at regional and local levels of governance is especially relevant. Making the case for EbA at this level can be challenging, as it requires showing convincingly how EbA benefits can contribute directly to achieving broader development goals. Protected areas were found to be an ideal scale for planning and implementing landscape level EbA. Protected areas often have existing management plans and governance structures that can be tapped into when planning EbA, and into which EbA can be mainstreamed. Projects in the pilot countries enaged with protected areas including the Nor Yauyos Cochas Landscape in Peru and the Panchase Protected Forest in Nepal. At the local level, the projects tapped into existing natural resource management groups, which served as important entry points for making the case for EbA and integrating it into local natural resource management plans. Successful operationalization of EbA policies and implementation of identified priorities and strategies require adequate financial resources, and technical and institutional capacities. Policy change is still needed in all three programme countries to integrate EbA into sectoral and planning and budgeting,

THE ENTIRE MOUNTAIN EBA PROGRAMME TEAM DURING THE LAST ANNUAL GLOBAL TECHNICAL AND LEARNING WORKSHOP THAT TOOK PLACE IN LUNAHUANA, PERU ON MAY 28-30 2015. © Adriana Kato, UNDP Peru

as well as into local level development planning and budgeting.

Chapter 5 shows how the programme made the case for **increased financing** for EbA, which can be accomplished in a number of ways. Public financing for EbA can be allocated through government budgets across sectors and at multiple scales, ranging from local to regional and national level budgets. Planning and budgeting is important at local and regional levels, given that the local district government or regional level is particularly relevant for implementing EbA at a landscape or ecosystem scale. The programme explored how best to make the case for increased financing for EbA from public and private sources, including through engagement in national budgeting processes, incentive schemes and Payments for Ecosystem Services.

In Peru, engagement in the development of the Policy Guidelines for Public Investment in Biodiversity and Ecosystems showed that providing technical guidance to the policy process and showcasing benefits of EbA on the ground were both important in making the case for EbA finance. While communities were interested in seeing EbA results on the ground, hard data provided by cost-benefit analysis was particularly important in making the case for EbA to government players. At the local level, community economic incentive schemes were important in making the case for EbA to communities and local government, especially before the benefits of EbA measures could be shown.

In Uganda, payments for ecosystem services (PES) provided a relevant model for EbA financing. The case was made that EbA can help ensure ongoing availability, in the face of climate change, of such ecosystem services as water provision, carbon storage and biodiversity conservation, which can be applicable for PES payments. The ECOTRUST PES facility piloted by the project in Uganda provided learning on how EbA measures can be used to bundle watershed and carbon services into credits, as well as the potential of PES to sustain financing for EbA. Project experiences also showed that identifying EbA measures that produce new or enhanced ecosystem goods and services, such as provision of plant products in Nepal or fibre from vicuña in Peru, can provide an alternative source of income and enhance sustainability of implemented measures.

Chapter 6 summarizes **lessons learned**, in addition to assessing how these could be replicated to make the case for EbA by other projects, programmes, sites and countries. The Mountain EbA Programme has already 'scaled out' some of its experiences, including to more villages within the Mount Elgon area and to the community of Tomas in the Nor Yauyos Cochas Landscape Reserve. Certain lessons learned on making the case for EbA are likely to be relevant in all types of ecosystems, including with regards to: making the case through step-wise EbA planning; showing socio-economic benefits early on; adopting a landscape scale approach; and engaging a range of policy levels in planning and budgeting for EbA. Some lessons learned may be particularly relevant for mountain or hilly ecosystems, for example on the use of a catchment scale. Local socio-economic dynamics, with regards to issues such as land availability, can strongly frame the context for making the case, requiring differentiated approaches within similar mountain landscapes. The experiences of the programme are being scaled up to national-level protected area management approaches in both Nepal and Peru.

Finally, future opportunities for making the case for EbA are identified. This includes developing methods and tools for EbA such as VIAs, cost-benefit analyses and indicators. Further work is needed with regards to identifying opportunities for collaboration with district and regional governments on EbA, strengthening cross-sectoral policy collaboration and developing finance mechanisms, including in collaboration with the private sector. The Mountain EbA Programme has been a unique flagship programme delivered through a valuable partnership, and has significantly enhanced understanding of EbA practice, in addition to bridging science-policy-practice learning from local to global levels. This learning will be important for future projects, programmes, planning and financing processes that engage in the design and implementation of Ecosystem-based Adaptation to climate change.

IN PERU, THE MOUNTAIN EBA PROGRAMME WAS IMPLEMENTED WITHIN THE NOR YAUYOS COCHAS LANDSCAPE RESERVE, WHERE THE ELEVATION RANGES FROM 2,700 TO 6,000 METRES ABOVE SEA LEVEL.

CHAPTER 1:

PROGRAMME OVERVIEW

In mountain ecosystems, increasing temperatures melt glaciers and snowpacks, bringing flooding, then drought. Increasingly frequent landslides follow more intense rainfall, devastating remote agricultural villages. While healthy ecosystems deliver critical goods and services that underpin socio-economic development, geographical constraints and degradation from ongoing human activity leave these ecosystems and their interdependent human communities vulnerable to adverse climate change impacts. Ecosystem-based Adaptation strategies can help the affected communities to plan better and minimize negative impacts, and even to turn new conditions to their advantage.

Ecosystem-based Adaptation (EbA) measures use sustainable management, conservation and restoration of natural and agro-ecosystems – taking into account anticipated climate change impact trends – to reduce the vulnerability and improve the resilience of ecosystems and people to climate change impacts.

1.1 Introduction to this publication

This publication is a legacy document of the Ecosystem-based Adaptation (EbA) in Mountain Ecosystems Programme. The jointly implemented programme was delivered through a partnership between the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and the International Union for Conservation of Nature (IUCN), together and with the Governments of Nepal, Peru and Uganda and civil society partners. It was funded by Germany´s Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) in response to the 2010 UNFCCC Cancun Agreements towards enhanced action on adaptation, through the International Climate Initiative. The objective of the programme was to strengthen the capacities of these countries to build ecosystem resilience for promoting EbA options and to reduce the vulnerability of communities, with particular emphasis on mountain ecosystems.

The publication focuses on showcasing and capturing lessons learned on the process of making the case to government and other stakeholders for EbA to be included in broader adaptation strategies, and for the policy and finance shifts needed to bring this about.

The process of making the case for EbA through the programme included efforts in several strategic areas:

- Making the case for the multiple benefits of EbA
- Making the economic case for EbA
- Making the case for financing for EbA
- Making the case for policy change for EbA

In Chapter 1, the publication will first introduce the Mountain EbA Programme, the concept of EbA and its relevance for mountain ecosystems in particular.

SECURING ALL-YEAR HEALTHY CROPS THROUGH A GRAVITY FLOW ENGINEERED IRRIGATION SCHEME, DRAWING ON RIVER WATER IN SANZARA, UGANDA. © Silvia Giada, UNEP

Box 1 | Resilience

The Mountain EbA Programme used the Intergovernmental Panel on Climate Change (IPCC) definition of resilience as a starting point, adapting it in practice for application in the programme (Munang 2012).

"Resilience: The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation and the capacity to adapt to stress and change" (IPCC, 2007).

In general terms, resilience can be defined as the capacity of a system to absorb disturbance and reorganize, while undergoing change, so as to still retain essentially the same function, structure, identity and feedbacks. Societies and communities are resilient to climate change when they have the adaptive capacity to minimise its negative impacts, and even take advantage of opportunities.

Chapter 2 will discuss what was needed to show the environmental, social and economic benefits of EbA to key beneficiaries and stakeholders. Chapter 3 will showcase the experience of conducting cost-benefit analysis for EbA as a means for making the economic case. Chapter 4 will examine how the case for policy change for EbA has been made at community, district, regional, national and global levels. Chapter 5 will explain how the case for financing for EbA was made through public finance, incentive schemes and Payments for Ecosystem Services. Finally, Chapter 6 will discuss opportunities for scaling up and scaling out some of the lessons learned from the Mountain EbA Programme to other scales, sites and countries.

This publication is intended for a global audience of adaptation practitioners, policymakers and donors, who may wish to learn more about **why** EbA is a viable adaptation option and **how** to make needed policy and finance shifts to integrate EbA into broader adaptation strategies. This report is complemented by a number of knowledge products in the countries, which are aimed at wider audiences.

1.2 Global Ecosystem-based Adaptation in Mountain Ecosystems Programme

The programme´s approach has been to help rural vulnerable communities adapt to the adverse impacts of climate change through conserving, managing, restoring

Table 1 | Components and lead agencies of the Mountain EbA Programme

Component	Lead agency
1. Development of methodologies and tools for Ecosystem-based Adaptation decision-making in mountain ecosystems	UNEP
2. Application of methodologies and tools at national and ecosystem level	UNEP
3. Implementation of Ecosystem-based Adaptation pilots at ecosystem level	UNDP and IUCN
4. Formulation of national policies and building an economic case for Ecosystem-based Adaptation at national level	UNDP

Source: IUCN, UNDP, UNEP (2010) Project Proposal to BMUB.

Table 2 | Main partners in the Mountain EbA Programme

Nepal	Peru	Uganda
■ 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	■ 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	■ 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: UNEP, UNDP and IUCN (2014), programme leaflet and programme partners.

and maintaining ecosystem services and biodiversity and enhancing adaptive capacities, as part of overall local and national adaptation strategies. The project countries were selected due to the particularly vulnerable state of their mountain ecosystems to climate change impacts. Globally, mountain people tend to be among the world's poorest and most marginalized populations. The disadvantages of general rural poverty are sometimes compounded by gender, ethnicity and geographic discrimination. Mountain communities also tend to face additional challenges of subsistence brought about by elevation, topography and climate (Ives et al. 1997).

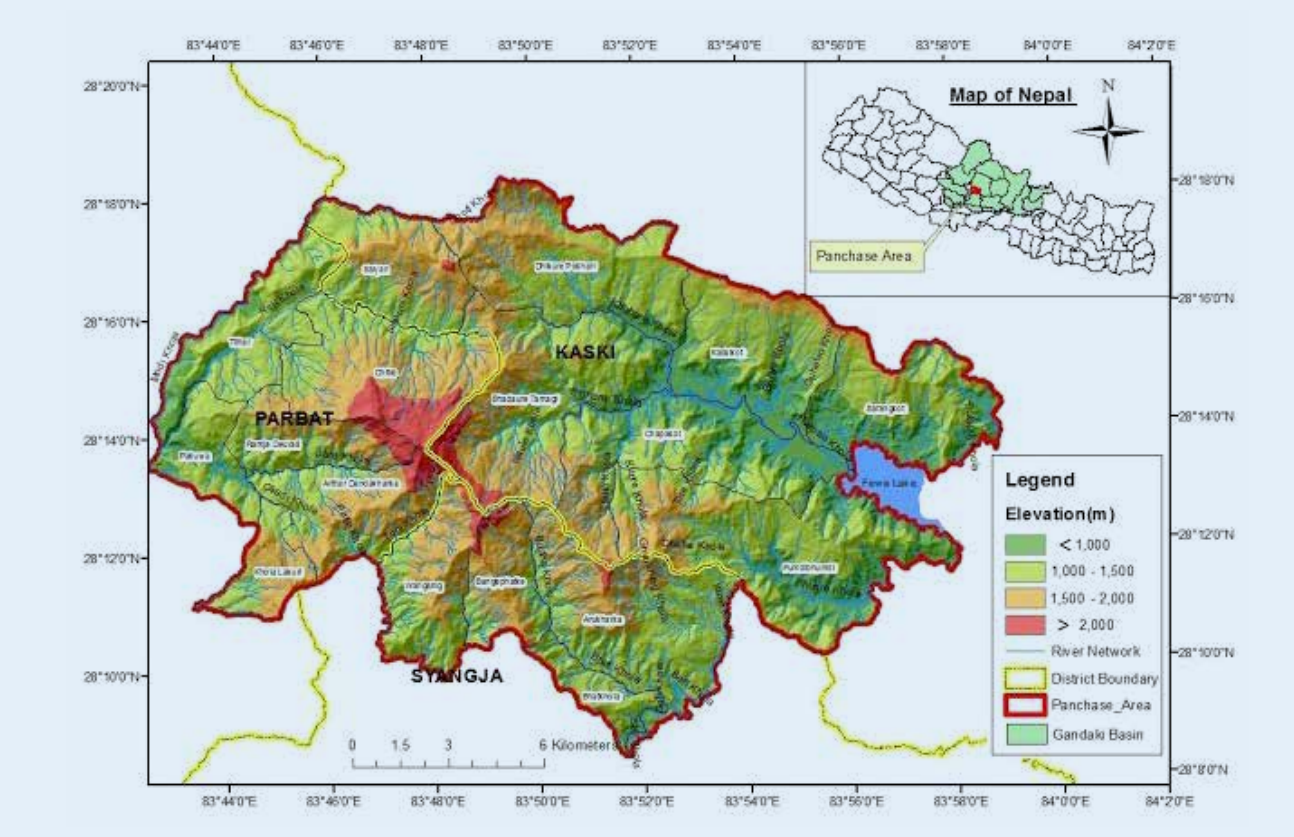
The programme had four components, the implementation of which was led by different agencies, building on their core areas of work, as shown in Table 1. The programme was implemented by UNEP, UNDP and IUCN. The UNEP–World Conservation Monitoring Centre (UNEP-WCMC), a specialist biodiversity assessment centre, played an important role in delivery of components 1 and 2; The Mountain Institute (TMI) was IUCN's implementing partner in Peru. The programme was carried out in collaboration with the Governments of Nepal, Peru and Uganda. It was implemented by national and district authorities responsible for the environment and mountain ecosystems of selected pilot project sites together with non-governmental organizations (NGOs). Communities, civil society organizations and national research institutes were also important partners. An overview of main implementation partners is provided in Table 2.

As a flagship programme, the German Government's BMUB envisaged that it would make the case for EbA scientifically, economically and practically (Ries 2015). This included advancing the concept of EbA scientifically through tools such as vulnerability and impact assessments (VIA). Cost-benefit analysis contributed to the economic case. The practical case was about demonstrating how to identify, plan, implement and monitor EbA measures on the ground. The programme also played a role in informing international dialogue around EbA in various fora.

Nepal

The Mountain EbA Programme was implemented in the Panchase region in the districts of Kaski, Parbat and Syangja through 17 Village Development Committees (VDCs). Nine of the 17 VDCs are within the Panchase Protected Forest,

Map 1 | Panchase Region in Nepal (Government of Nepal, EbA Nepal Project and UNDP (2015))



a conservation area operating under a goal to sustainably manage biodiversity, water resources and ecotourism through participatory management approaches with local communities.[2] The Panchase Protected Forest comprises of a core (35 percent) area, and a fringe area (65 percent) where the majority of the population lives (Y Rai 2015, pers. comm.). Resource use in the core area is restricted, and prohibited activities include trading of endemic species of orchids, hunting and poaching and collection of medicinal and aromatic plants. The remaining eight VDCs are on the margins of the Panchase Protected Forest and are considered, for the purposes of this project, as a buffer zone. Panchase covers an area of 279 km^2 and has a population of 62,000. The economy of Panchase is largely subsistence agriculture based on crops and livestock.

Panchase lies in the mid-hills of Nepal, at the foot of the Himalayas, with a climate varying from subtropical to cold temperate. An annual average temperature increase of 0.04°C has been observed in Nepal between 1996 and 2005, which is in line with long term predictions for a temperature increase of 1.2°C by 2030 for Nepal (Ministry of the Environment 2010) and a projected increase of 2°C to 5°C for the Panchase area by 2100 (Dixit et al. 2015). Meteorological records for the Panchase area from 1977 to 2009 show some increase in annual rainfall, although with significant inter-annual variability, while Parbat and Syangja districts showed some reductions in winter rainfall and increases in summer rainfall (Dixit et al. 2015). By the 2030s, rainfall is expected to be intense and its seasonality more pronounced, while the frequency of floods and landslides is likely to increase (Dixit et al. 2015).

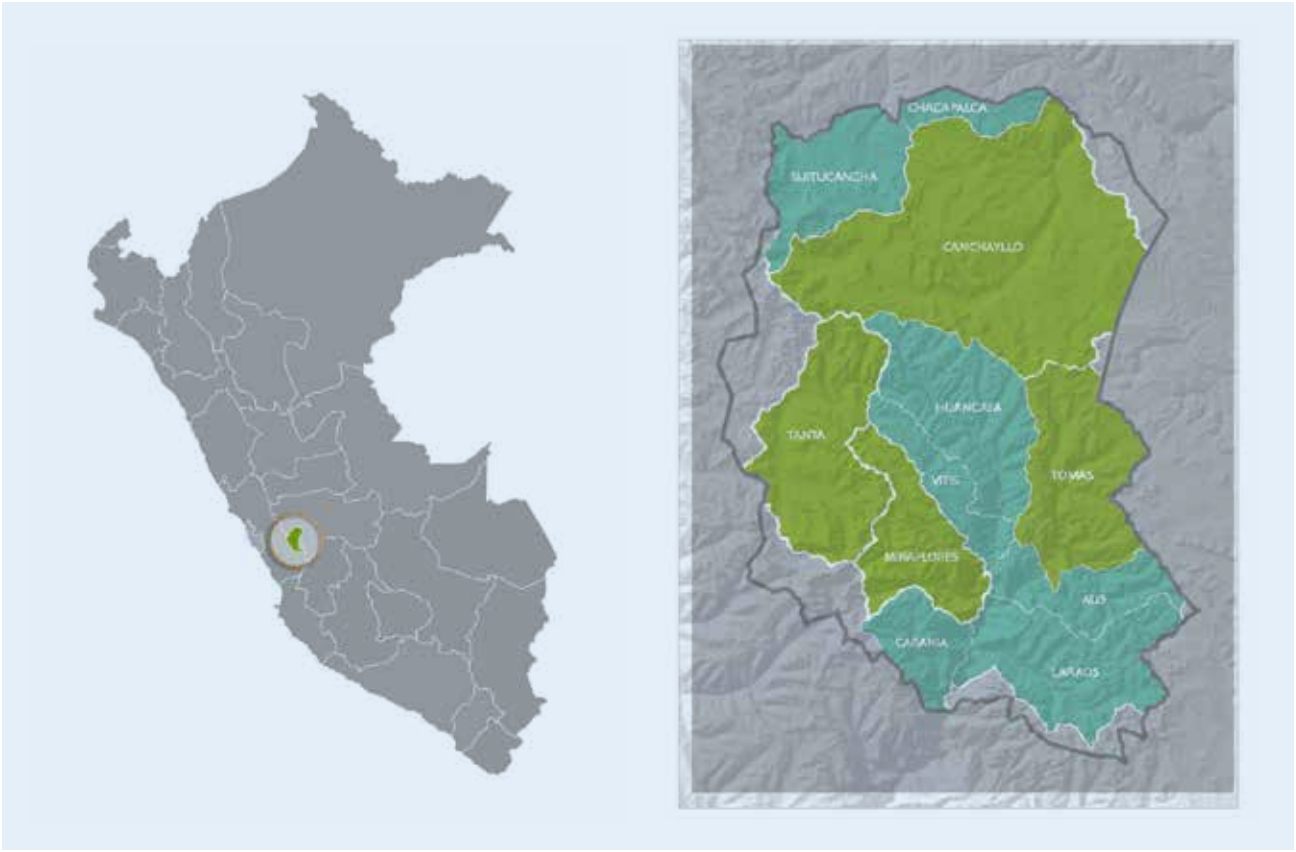
EbA measures implemented under the project in Nepal include: maintaining and restoring ecosystems along roads to reduce landslides; restoring wetlands, springs and ponds to ensure year-long drinking water supply; and soil nutrient management to increase soil moisture during dry periods.

Peru

The Nor Yauyos Landscape, comprising the Nor Yauyos Cochas Landscape Reserve (NYCLR) and its buffer zone, is in the high-Andean region and includes the upper Cañete watershed in the region of Lima and the Pachacayo watershed in the region of Junín – one of the most vulnerable regions to climate change in Peru, according to environmental impact studies. NYCLR is a protected area that aims to conserve natural resources in collaboration between government and communities, while allowing for organized and sustainable management of resources for agriculture, livestock, fishing and tourism as livelihood activities (IUCN Category V).[3] Twelve communities, with a total population of 10,390, live in the reserve, which

HUALHUA LAGOON WITHIN THE NOR YAUYOS COCHAS LANDSCAPE RESERVE IN PERU. © Peru Mountain EbA Programme

Map 2 | Nor Yauyos Cochas Landscape Reserve in Peru (Dourojeanni et al. (2014))



covers 2,212.7 km^2. It is an area of subsistence agriculture and livestock, with communities in the higher areas specializing in livestock (sheep, alpaca, llama and vicuña, sometimes cattle) and in the lower areas both livestock and agriculture (beans, maize, potatoes, wheat, quinoa, medicinal plants). Trout is also produced for personal consumption, internal and external markets. Temperatures are predicted to increase between 0.61°C and 1.12°C between 2011 and 2030; the amount of annual rainfall is predicted to not change, but there will be variability in seasonal patterns and a reduction in surface water runoff; and extreme climatic events, such as hailstorms, have been observed out of season (Ramon et al. 2013).

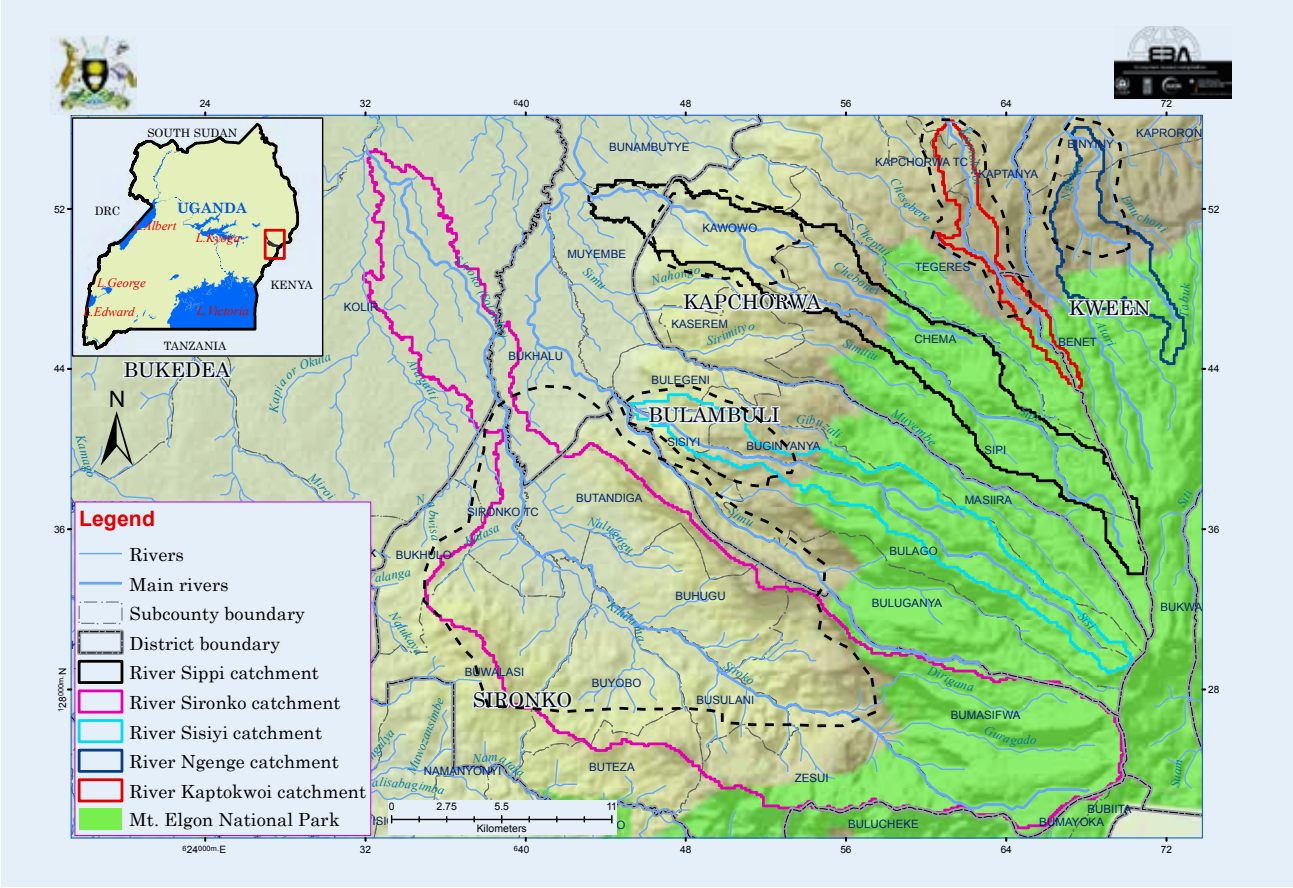
EbA measures implemented under the project in Peru include: restoring water channels and reservoirs to support micro-watersheds and wetlands to secure provision of water for the reserve communities and downstream users; grassland management to enhance pastoral livelihoods and increase resilience to drought and frost; vicuña management to produce animal fibre for livelihoods and communal livestock management in natural grasslands.

Uganda

The Mount Elgon National Park, an IUCN Category II conservation area[4], is on the higher slopes of the mountain covering an area of 1,279km^2 between Uganda and Kenya. The project is being implemented outside the National Park, in the districts of Bulambuli, Kapchorwa, Kween and Sironko with a total population of 624,161 and an area of 2,303.9 km^2. The population relies on rain-fed subsistence agriculture (vegetables, fruit, paddy rice, yams and sugarcane). Predicted climate change impacts include temperature rise of 0.5–0.6°C for the next 20 to 50 years, while rainfall is expected to increase by 18.7 mm over the next 20 years (NaFORRI 2013). In terms of seasons, the present drier months of June, July and August are expected to receive even less rain. This is expected to lead to several climate-related hazards such as soil erosion, flooding, landslides and drought (Ibid.).

EbA measures implemented under the project in Uganda include: improved water retention through roadside drainage bunds and run-off retention drains; a gravity-flow engineered irrigation scheme, combined with reforestation, soil and water conservation, and riverbank

Map 3 | Mount Elgon in Uganda (Mountain EbA Programme, Uganda)



MOUNT ELGON LANDSCAPE IN UGANDA. © IUCN Uganda

restoration to create a hybrid grey-green solution to catchment-scale water management; and tree planting using an agroforestry approach to stabilize soil to reduce landslides.

Comparing landscapes

The vulnerable mountain ecosystems and communities in all three countries are reliant primarily on rainfed subsistence agriculture and livestock and all the sites are expected to experience increases in temperature. Panchase in Nepal and Nor Yauyos Cochas in Peru are likely to have more erratic rainfall and changes in seasonal patterns. Mount Elgon is predicted to have more rainfall overall and more frequent intense rainfall events.

There are also significant differences between the sites. Nor Yauyos Cochas (2,212.7 km^2) and Mount Elgon (2,303.9 km^2) are large project landscapes, while the project site in Panchase is significantly smaller (279 km^2). Mount Elgon has a high and increasing population density of 271 people per km^2 (for the area of Bulambuli, Sironko, Kween and Kapchorwa) and Panchase has a density of 222 per km^2, with accelerating out-migration. Nor Yauyos Cochas, on the other hand, has a low and decreasing density of only 4.7 per km^2.[5] The differences in both landscape and population have a significant impact on project measures.

The Peru project site in Nor Yauyos Cochas is in a landscape reserve, which allows for sustainable use of natural resources under community management practices. Part of the project in Nepal sits in the Panchase Protected Forest, which has a similar approach to landscape management as Peru's landscape reserve. However, as a new approach to forest co-management by government and communities, the arrangements for governing protected forests in Nepal are still being developed (Chapter 4). The project site in Uganda is outside the Mount Elgon National Park, although issues around access to resources within the National Park have trickled down to adjoining buffer areas (Chapter 2). Different management approaches are applied to the landscapes, based on whether and what type of Protected Areas they are, and this has a direct impact on how EbA measures are planned and implemented in the landscapes. These issues will be described at further length in Chapter 4.

1.3 Defining the EbA approach

Ecosystem-based Adaptation is the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change.[6] The programme adopted this definition provided by the Convention on Biological Diversity (CBD). The CBD has further elaborated on the approach through COP Decision X/33 (j) as follows: "…ecosystem-based approaches for adaptation may include 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".

Table 3 | Criteria for selecting EbA measures for the project in NYCLR, Peru

1) Criteria for defining what is (and isn´t) EbA	■ The measure reduces the population´s vulnerability to climate change ■ The measure directly or indirectly increases the resilience of biodiversity and ecosystem services ■ The measure uses biodiversity and ecosystem services in a sustainable manner, without damaging them, and in some cases enhances them
2) Criteria for prioritizing between EbA options	■ Quantity of affected population ■ Capacity of the measure to reduce the vulnerability of the population (efficiency) ■ Importance of biodiversity and ecosystem services to the population (prioritizing ecosystem services that support main productive activities, and biodiversity used by the population) ■ Vulnerability of biodiversity and ecosystem services to climate change ■ Durability and immediacy of the measure
3) Principles for selecting EbA options	■ Population participates in the planning and implementation of EbA measures

Source: Dourojeanni et al. (2015) 'Vulnerability Assessments for Ecosystem based Adaptation: Lessons from the Nor Yauyos Cochas Landscape Reserve in Peru'. Unpublished.

EbA takes into account anticipated vulnerability and climate change impact trends to reduce the vulnerability and improve the resilience of ecosystems and people to such climate change impacts (Mensah et al. 2014). It can be implemented at local, national and regional levels and at both project and programmatic scales (Ibid.). EbA is applicable to a range of ecosystems and geographical areas, sectors and stakeholders, in both developed and developing countries (Ibid.). Some examples of EbA measures include: mangrove conservation for coastal protection against increased storm surges; forest conservation and sustainable management to prevent landslides with more intense rains; restoration of degraded wetlands to protect against increasing floods; agroforestry to enable continuous production despite changing climatic conditions; and sustainable management of grassland to protect against floods and soil erosion (Secretariat of the Convention on Biological Diversity 2009).

Andrade et al. (2011) propose a set of principles to consider when implementing EbA: i) promoting multi-sectoral approaches; ii) operating at multiple geographical scales; iii) integrating flexible management structures; iv) maximizing benefits with development and conservation goals; v) being based on best available science and local knowledge; vi) providing benefits to people, especially the most vulnerable; and vii) being participatory, culturally appropriate and embracing equity and gender issues.

Through experience, the Mountain EbA Programme has complemented existing work on criteria for EbA, including by piloting criteria for designing EbA measures for a given site. This has included guidelines for defining which measures can be considered as EbA and how they go beyond business as usual natural resource management or development activities. Table 3 provides an overview of the criteria developed by the Mountain EbA project for the Nor Yauyos Cochas Landscape Reserve in Peru. EbA measures should have a specific focus on reducing people´s vulnerability to climate change specifically, while using biodiversity and ecosystem services in a sustainable manner.

In terms of prioritizing between EbA options, the criteria propose looking at issues such as the importance of biodiversity and ecosystem services to the population and the vulnerability of these services to climate change impacts. The participation of the population in planning and implementing EbA is seen as an essential underlying principle.

Growing evidence is supporting the argument that EbA is able to provide multiple benefits for adaptation, mitigation, environmental protection, biodiversity conservation and sustainable economic development (Mensah et al. 2014). Potential socio-economic benefits include food security, e.g. through securing food production; improved livelihoods, e.g. through delivery of ecosystem services and income diversification; and local actor empowerment (Naumann et al. 2013). According to Girot et al. (2012), if properly designed by taking into consideration social complexities, EbA can also contribute to strengthening capacities and empowering local groups, as well as enhancing governance of ecosystems. Based on an analysis of peer-reviewed literature on EbA-relevant interventions, Doswald et al. (2014) identified additional common environmental benefits such as biodiversity conservation and carbon sequestration; social benefits including water security; and economic benefits such as damage costs prevented.

Some of the challenges for implementing EbA include the lack of comprehensive information regarding climate impacts, ecological and societal vulnerability, as well as

DEFINING WHAT EBA IS AND ISN'T DURING A PROGRAMME LEARNING WORKSHOP. © Adriana Kato, UNDP Peru

limited experience on how to monitor and evaluate EbA effectiveness (Mensah et al. 2014). Institutional challenges also arise because EbA requires collaboration across sectors and institutions, and adaptation involves a need for forward-looking planning and implementation over a period of years. While the impact of some EbA measures can be assessed relatively quickly, in other cases success or failure can only be fully assessed after some years. Measurement of results can also be complex because one needs to take into account not only the counterfactual of what would have happened in the absence of these measures, but also the shifting baseline in terms of how the weather patterns to which the measures are designed to respond have actually changed over the decades, as seen with hindsight.

Though Ecosystem-based Adaptation has been applied in practice more widely in recent years, there remains some confusion about the term as well as skepticism about the efficacy of the approach. An important entry point in making the case for EbA is to make this technical term accessible to beneficiaries. The Mountain EbA Programme has found that the EbA approach needs to be presented in an accessible and locally appropriate form, so as to clarify to all local stakeholders what EbA is about. This information needs to be disseminated widely to key stakeholders from the project outset, alongside awareness-raising workshops that allow for discussion and feedback on EbA – especially about how it is different from approaches to natural resource management, development or even other types of adaptation that could be categorized as 'business as usual'. Raising awareness on the linkages between ecosystem services, livelihoods and climate change is essential in enhancing understanding about what EbA is and how it can provide multiple benefits to different beneficiaries and stakeholders, from communities to government policy makers.

While EbA is a new concept, it also builds on existing practices such as integrated water resource management, community-based natural resource management and forest landscape restoration, bringing in the climate change adaptation angle. Participatory assessments and vulnerability impact assessments (VIAs) are essential in identifying specific climate change impacts and vulnerabilities of ecosystems and ecosystem services, thereby making identified EbA measures additional to existing practices (Chapter 2).

MELTING GLACIERS POSES A SIGNIFICANT CHALLENGE WITHIN THE NOR YAUYOS COCHASE LANDSCAPE RESERVE IN PERU, THREATENING THE LONG-TERM WATER SUPPLY TO DOWNSTREAM AREAS. © Jefatura RPNYC

1.4 Mountain ecosystems: vulnerable to climate change

The mountain ecosystems of this programme found in the Andes of Peru, Himalayan foothills of Nepal and Mount Elgon in Uganda are all very different landscapes. Mountains are located in most regions of the world, but differ in terms of shape, altitude, vegetation and climate (Kohler & Maselli 2009). However, there are certain similar characteristics regarding climate change impacts on mountains (Ibid.). The topography of mountains is complex, with climates varying over small distances, making climate projections challenging. Temperatures vary with altitude, therefore temperature increases will impact different elevations differently. Melting of glaciers and permafrost will release rocks and debris.

Critical water towers, mountains provide vast areas with freshwater for domestic use, irrigation, industry and hydropower (Ibid.). Changes in rainfall and snow will have a direct impact on water provision and services both in mountains and downstream in lowlands (Ibid.). These impacts are expected in all project sites of this programme. Melting of glaciers will also directly impact freshwater supply and storage. Glacial melt is expected to have particular impact in the Nor Yauyos Cochas Landscape Reserve in Peru, which is why it is important to support ecosystems that provide water regulation services such as grassland management. Changes in hydrological cycles, including increase in intense rainfalls, can destabilize slopes and further erosion, resulting in landslides, which are a very common hazard in mountainous areas. Mount Elgon is particularly susceptible to drought, erosion, floods and landslides (NaFORRI 2013).

Mountains are often biodiversity hotspots and home to endemic species that may be particularly susceptible to climate change due to limits in uphill migration to cooler climates (Ibid.). Panchase has 113 orchid species, among which two are endemic (*Eria pokhrensis and Panisea panchanesis*) and may be particularly vulnerable to climate change. Peru is considered a gene bank of potato varieties. Native potato species are cultivated in the terraced landscape of Nor Yauyos Cochas. With climate change, the best conditions for their cultivation are expected to be found at higher altitudes.

In terms of adaptation options, there are some particular opportunities and constraints for mountainous areas. All agricultural communities practice adaptive management in changing circumstances, but mountain communities are accustomed to a high degree of climate variability between years, seasons, times of day and slopes, and therefore tend to have extensive traditional coping mechanisms (Ibid.). They live with risk and have developed time-tested approaches and methods to cope with that risk. Risk coping measures at the project sites include traditional water use practices (Nepal and Peru) and making best use of diverse land use opportunities (Nepal and Uganda).

Agriculture and forestry are often the main source of food security and livelihoods in many mountain areas (Tsering et al. 2010). All of the project landscapes in this programme rely on cultivation of crops. On the other hand, some mountainous areas are not suitable for crops, and grazing and forestry become the only sources of livelihoods. Due to altitude in the community of Tanta, in the Nor Yauyos Cochas Reserve in Peru, there is neither forest nor arable land. Livestock grazing is the only source of livelihood.

Several non-climatic drivers of degradation are typical to mountain areas, such as deforestation accelerating erosion and enhancing landslides and floods; or construction of roads or mining further exacerbating hazards. These drivers are present in all project sites (Chapter 2). Certain drivers of vulnerability, such as inaccessibility, political and social marginality that can lead to food shortages are also common in mountain areas (Kohler & Maselli 2009). This has been evidenced in the Sanzara community in Uganda, an area in the rain shadow of Mount Elgon. Out-migration of the rural workforce can reduce economic activities and, while it may act as a form of adaptation in generating income (through remittances), it also reduces local production and productivity (Tsering et al. 2010). The project sites in both Nepal and Peru have high rates of outmigration and shortage of labour force (Chapter 2).

The project sites in Nepal, Peru and Uganda have different climate impacts, ecosystems, and drivers of degradation and vulnerability. However, there are also similarities typical to mountain ecosystem in terms of climate change impacts as well as opportunities and constraints for adaptation options.

"CULTIVATING BROOM GRASS FOR COMMERCIAL USE HAS ALSO BEEN INTEGRAL IN CREATING A STRONGER SOCIAL BOND BETWEEN THE WOMEN IN OUR NETWORK, CROSSING TRADITIONAL CASTE BARRIERS," SAYS SABINA AC, PRESIDENT, PANCHASE WOMEN'S NETWORK.

CHAPTER 2:

MAKING THE CASE FOR THE MULTIPLE BENEFITS OF EBA

EbA measures provide a range of environmental, social and economic benefits, such as enhanced water provision and reduced soil erosion; strengthened local organizational capacities and empowerment of women and disadvantaged groups; and increased productivity and income.

It is essential to demonstrate short-term benefits, and in particular the socio-economic benefits, of EbA to communities early on so as to make the case for becoming involved in an EbA initiative. The case can then be made for implementing broader, scaled-up EbA measures, which provide multiple benefits across entire ecosystems in the long term and are essential for enhancing adaptive capacity.

This chapter discusses what is needed at the planning and implementation stage for making the case for EbA to key beneficiaries and stakeholders at community, local, national and global level. The chapter focuses on showing how, in the Mountain EbA Programme, initial participatory assessments increased understanding of EbA and its benefits, and enabled the implementation of early 'no regrets' measures on the ground. These measures, in turn, helped make the case for EbA especially at local level. VIAs then enabled the design of well-grounded EbA measures at an appropriate scale, which should enhance the achievement of EbA benefits in the medium to long term. These steps were important in making the case for EbA and ensuring buy-in, especially with communities and government planners at landscape level.

The chapter then makes the case for EbA by presenting how EbA can generate multiple environmental, social and economic benefits, exemplified by observed and expected benefits provided by the EbA measures implemented by the Mountain EbA Programme. In particular, given that EbA is a relatively new approach, this chapter shows how the benefits of EbA are essential in making the case to communities and decision-makers. Once the case has been made, EbA can then be integrated into relevant planning and policy processes, from local to national and global levels.

2.1 Using participatory planning and 'no regrets' measures to promote EbA

Making the case for EbA at local level and securing local commitment requires undertaking immediate, visible actions that provide benefits at the outset of each project's implementation. Rapid participatory assessments were carried out early on at each project site to gather information needed to design and implement initial 'no regrets' activities.

Box 2 | 'No regrets' measures

'No regrets' measures, as that term is used by the Mountain EbA Programme, means autonomous measures by communities which do not worsen vulnerabilities to climate change, or which increase adaptive capacities, as well as measures that will always have positive impact on livelihoods and ecosystems, regardless of how the climate changes. [7]

Each country adopted a slightly different approach to applying a set of participatory tools, as shown in Case Studies 1 and 2. The community-level assessments enabled identification of social and economic dynamics in communities and provided an understanding of livelihood sources and drivers of ecosystem degradation. The role of various ecosystem services in supporting sources of livelihoods was also identified. Local perceptions of climate variability experienced to date were noted and existing secondary climate data on future climate projections were reviewed, where available. Based on the above information and analysis, the assessments put forward proposed 'no regrets' measures.

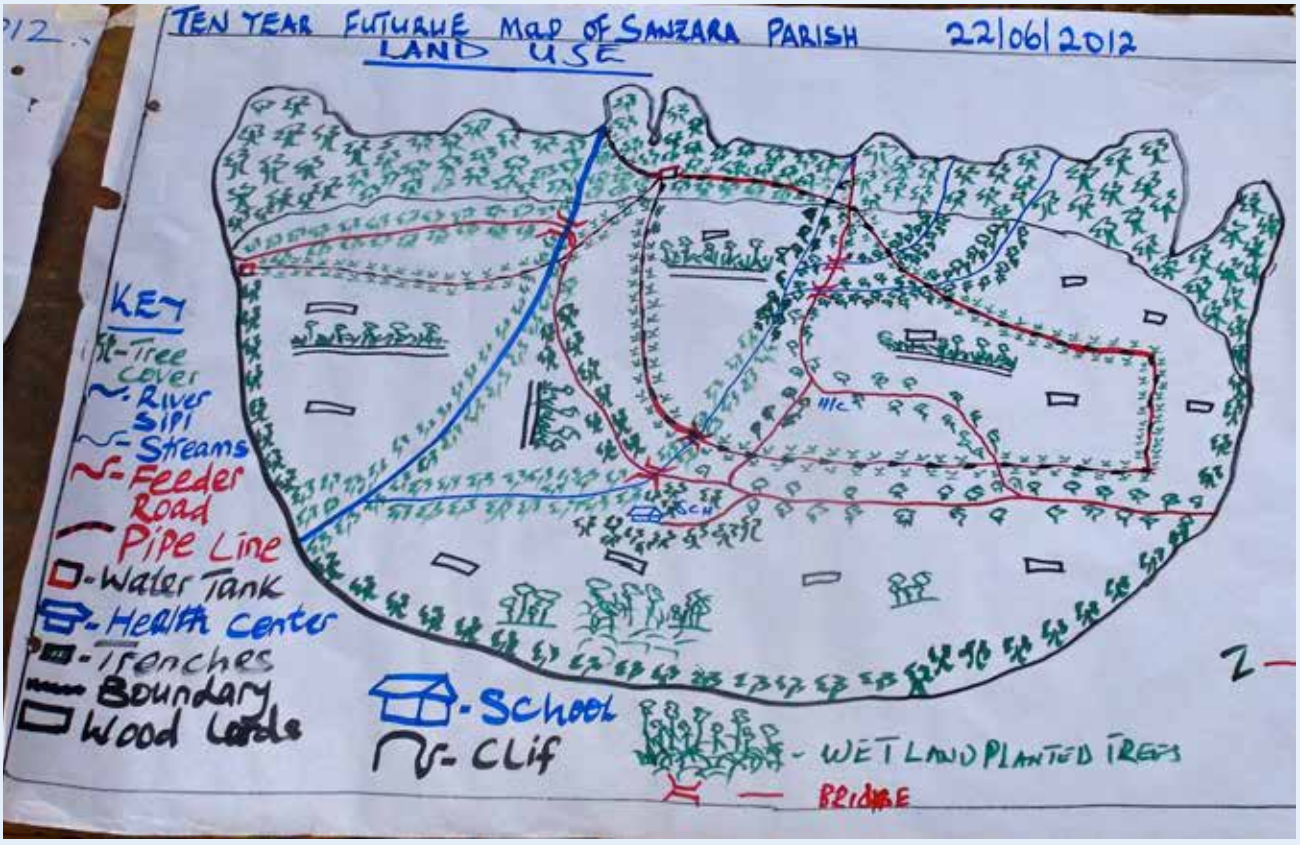
COMMUNITY MEMBERS FROM SANZARA DRAWING THE FUTURE THEY WANT IN THEIR PARISH. © IUCN Uganda

Case Study 1 | Participatory adaptation planning in Sanzara, Mount Elgon, Uganda

From: IUCN Uganda (2012) *"Restoration of the River Sipi Micro-Catchment as an Ecosystem-Based Solution to Build Social and Ecological Resilience of the Sanzara Community to Climate Change Impacts".* Kampala: IUCN.

A participatory assessment was carried out in Sanzara to develop social baselines. The Community-based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL[8]) and Climate Vulnerability and Capacity Assessment tool (CVCA[9]) were used to carry out rapid assessments of potential climate impacts and to see what adaptation measures communities were already undertaking. Five-year timelines and trends were developed based on available, national level climate data. A problem and solution matrix put forward main challenges linked to climate change – flooding and drought were the two prioritized problems. The matrix showed how these affected livelihoods and different categories of people. A list of 'no regrets' activities was identified based on the assessment and ongoing activities. Based on the list, pro-poor activities were prioritized. The PROFOR-IUCN Poverty-Forests Toolkit[10] was used to identify livelihood dependency on natural resources. Water shortage was identified as a key challenge for local livelihoods and resilience. The assessment found that addressing water shortage, through a proposed gravity flow scheme (GFS)[11], would provide a means for making the case for EbA, as well as build up adaptive capacities to manage natural resources as a community. This involved constructing a concrete reservoir to capture river water high in the catchment, and piping it down to agricultural fields located in a rain shadow that is likely to worsen with climate change. The GFS was used as an incentive and entry point to create a platform for planning and demonstrating the value of sustainable management of the entire catchment to enhance social and ecosystem resilience. Through this GFS platform, various proposed 'no regrets' measures (incl. riverbank restoration, soil and water conservation and integration of agroforestry in the farming system) were specifically designed as a means to secure community buy-in and commitment, which would then be used to make the case for broader-scale EbA measures, such as watershed restoration, that were adopted later on.

FUTURE VISION MAP OF SANZARA PARISH DRAWN BY COMMUNITY MEMBERS AS PART OF THE PARTICIPATORY ADAPTATION PLANNING PROCESS. © IUCN Uganda



Case Study 2 | Integrated participatory rural appraisal in Canchayllo and Miraflores, Peru

From: Instituto de Montaña (IM) (2013 and 2014) *Diseño preliminar de la medida robusta de adaptación al cambio climático en la Comunidad Campesina de Canchayllo - Reserva Paisajística Nor-Yauyos Cochas: Rehabilitación de humedales y gestión comunal de praderas nativas.* Resumen ejecutivo. Lima: Instituto de Montaña.

The project staff, together with a team of local researchers, external specialists and the staff of the Nor Yauyos Cochas Landscape Reserve, carried out an extensive integrated participatory rural appraisal (IPRA) for designing 'no regrets' measures for the communities of Canchayllo and Miraflores. The NYCLR Management Plan prepared by SERNANP already provided good information on ecosystems and ecosystem services. This information and the existing priorities of the Management Plan were therefore able to be used as a basis for designing 'no regrets' measures. Measures were also identified based on local priorities and a set of criteria for EbA measures (Chapter 1, Table 3).

Each community selected a team of local researchers (eight people per community, including two park rangers and one specialist from the Reserve) to participate in the IPRA jointly with the team of external experts. Linkages to climate change were already identified at this stage, including with regards to water storage and to regulating impacts of extreme temperatures. The IPRA therefore focused on these issues. Lack of social organization was identified as a driver of degradation and activities to strengthen institutional and technical capacities were put forward as a priority. Field trips and workshops with key stakeholders (communities, reserve staff and municipal authorities) were carried out to identify vulnerabilities based on local perceptions, communities' needs and priorities, and to generate ideas to address such vulnerabilities. Later, after an expert analysis, such ideas would become potential 'no regrets' measures. Two topics were prioritized for Canchayllo: native grassland management and improvement of ancestral hydrological infrastructure. In Miraflores, the following activities were chosen: grassland management, conservation and management of upper micro-watersheds, wetlands and watercourses.

PASTURES SAMPLED BY LOCAL AND COMMUNITY RESEARCHERS FOR IPRA. © Aneli Gomez, TMI

Participatory assessments enabled the identification of community priorities in terms of potential 'no regrets' measures, as well as showing linkages between livelihoods and ecosystems. This helped ensure the identified measures responded to community needs. The participatory process itself helped create buy-in and instill a sense of ownership for the proposed 'no regrets' measures. Participants were asked to reflect on what they understood by climate change and what measures they proposed to address it. The participatory processes helped increase understanding of climate change and EbA through joint gathering of data and bottom-up planning processes for adaptation. The participatory processes also increased understanding in communities that some EbA benefits would take longer to achieve. They helped make the technical issues of EbA more understandable, and provided a means to operationalize and implement 'no regrets' measures. The participatory tools that were applied were flexible and could be adapted to local needs. In the case of IUCN Uganda, the process itself of applying the CRiSTAL tool brought the community together and helped lead to the formation of community water groups, which in turn built up adaptive capacities (Karami-Dekens & Kutegeka 2012).

By understanding the linkages between ecosystems, livelihoods and climate change, communities were better able to understand some of the expected benefits provided by ecosystem services, such as increased provision of water services for livelihoods (Table 5). It was essential for the programme to show some early benefits of 'no regrets' measures, in particular with regards to socio-economic benefits that can enhance livelihoods, to make the case for the project itself and eventually for EbA more broadly. For example, the GFS discussed in Case Study 1 enhanced water provision for agricultural crops, increased income from sale of crops and improved agricultural livelihoods (Table 5). Showing such initial benefits increased the community´s buy-in, while enhancing their understanding of the contribution of ecosystem services to livelihoods. It was then easier to make the case for the adoption of broader-scale EbA measures later on (Case Study 4).

Many of the 'no regrets' measures could be considered business as usual development and ecosystem management, until they could be filtered against the formal VIA process and be integrated into broader scale, longer-term EbA measures, as described below.

2.2 Using vulnerability and impact assessments to promote EbA

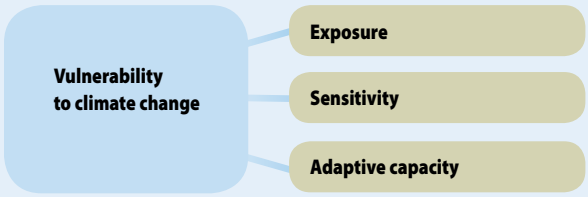
Vulnerability and impact assessmentsare critical in identifying climate change impacts and implementing evidence-based, landscape-level Ecosystem-based Adaptation measures, especially for medium- to long-term implementation. They also help make the case for EbA to local and national government planners and policy makers in particular, by showing expected climate change impacts and how EbA measures can be implemented to reduce vulnerability.

Vulnerability and impact assessments were carried out in each project country. The VIAs were planned to serve multiple purposes.[12] They identified drivers of vulnerability, climate change impacts, biodiversity and ecosystem services. Each VIA was carried out using a slightly different methodology and focus. Reference for the VIAs are provided in Table 4.

Box 3 | Vulnerability

The Mountain EbA Programme utilizes the IPCC definition of vulnerability: Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

Figure 1 | Vulnerability diagram



Source: IPCC (2007)

The vulnerability and impact assessments provided scientific evidence and complemented the participatory assessments built on local knowledge systems. Many of the 'no regrets' measures were mainly focused on enhancing livelihoods, taking into consideration observed changes in weather patterns in recent decades. By bringing in forward-looking climate change scenarios, the VIAs enabled the validation and redesign of many 'no regrets' measures into EbA measures that would be climate-resilient in the longer run. In most cases, this was about validating the results of participatory assessments and other studies that had already been carried out, and which had been used as a basis for implementing the 'no regrets' measures. Based on the VIA findings and recommendations, some 'no regrets' activities were discontinued, as the data of the VIAs showed that these measures were not directly linked to climate change adaptation. For example, many of the alternative livelihood activities such as bee keeping and unbaked bricks were no longer continued (Table 9). However, their value in contributing to adaptive capacities by diversifying livelihoods and making communities better able to deal with external shocks, including climate change, was recognised. As such, many of these activities were continued by communities independently or with the support of local government agencies (P Nteza 2015, pers. comm.). Such activities aimed at livelihood diversification to spread risk could contribute to broader overall adaptation strategies.

Redesigning 'no regrets' measures was done in particular with regards to scale. Most of the 'no regrets' measures were implemented in targeted locations at the community scale. Following the VIA, landscape connectivity, one of the key premises for EbA, became an approach adopted at all sites.

Table 4 | Vulnerability and impact assessments developed by the Mountain EbA Programme

Nepal	Dixit, A, Karki, M and Shukla, A (2015) *Vulnerability and Impacts Assessment for Adaptation Planning in Panchase Mountain Ecological Region,* Kathmandu
Peru	Dourojeanni, D, Giada, S, and Leclerc, M (2014) Vulnerability and Impact Assessment of the Climate Change in the Nor Yauyos Cochas Landscape Reserve and its Buffer Zone. Technical Summary. Mountain EbA Programme in Peru.
Uganda	NaFORRI (2013) *Ecosystem Based Adaptation in Mountain Elgon Ecosystem: Vulnerability Impact Assessment (VIA) for the Mt Elgon Ecosystem.* Republic of Uganda Ministry of Water and Environment, Kampala.

Box 4 | What are VIAs?

Vulnerability impact assessments, or VIAs, are a methodology for determining and quantifying, to the extent practicable, how vulnerable a particular area is to the impacts of climate change. At the outset of any adaptation initiative, an assessment of climate change implications for the composition and functioning of ecosystems, as well as the different aspects of human society (e.g. social well-being, economic activities) is required to determine whether, and the extent to which, climate change will have an impact. Once a determination has been made that climate change poses significant risks and that adaptation is needed to manage those risks, assessments are carried out to provide essential information to inform the subsequent components of the adaptation process: planning, implementation, and monitoring and evaluation.

Assessments of climate change impacts and vulnerability vary widely, depending on the subject matter (e.g. a natural resource/production system such as agriculture, or an economic activity such as investment in infrastructure development); time frame (e.g. near-term consistent with annual crop planning, or longer timeframe comparable to the design lifetime of road transport system); geographic coverage (e.g. a transboundary watershed or a single site); and purposes of the assessments (e.g. to raise awareness of climate change, or to inform the technical design of large/expensive infrastructure). Consequently, a wide range of methods and tools have been developed and applied to facilitate the assessments, with the support of appropriate data and information.

Source: UNFCCC (2011) Assessing Climate Change Impacts and Vulnerability: Making Informed Adaptation Decisions, United Nations Climate Change Secretariat, Bonn, p. 16.

An ecosystem or landscape scale for activities enabled a shift in interventions from stand-alone 'no regrets' pilot activities to interconnected EbA measures embedded in ecosystems and focused on the provision of ecosystem services at a landscape scale.

For example, the project in the Sanzara region in Uganda initially had stand-alone 'no regrets' pilots on tree nurseries, agroforestry, bee keeping and the gravity flow scheme (Case Study 4). Following the VIA, the gravity flow scheme was nested in a broader catchment and riverbank management plan. Tree planting was integrated into broader landscape restoration. This data and change of focus also enabled the move away from short-term 'no regrets' measures to longer-term ecosystem-based adaptation measures.

The VIAs enabled identification and design of appropriate EbA measures at the needed scale. This demonstrated that VIAs can provide a solid evidence base for designing EbA measures that respond to climate change threats and vulnerabilities, and which therefore are more likely to provide multiple benefits in the medium to long term. For example, the VIAs generated data that enabled consideration of upstream – downstream linkages of watersheds. This showed how integrated management at ecosystem scale can better address climate hazards such as floods, in addition to providing environmental benefits such as growth of natural vegetation, or economic benefits such as improved livestock yields and agricultural production (Table 10 and Section 2.3.).

The VIAs produced by the programme proved to be useful in making the case to protected area managers in the Nor Yauyos Cochas Landscape Reserve and the Panchase Protected Forest as to why climate change is an issue in their landscape and how planning for EbA can provide longer-term, landscape-scale solutions. In Nepal and Uganda, the VIAs enabled a more integrated landscape level planning process, which built on the community-level participatory assessments that had been started earlier on. In Uganda, information from the VIA was used as a basis for the development of new Catchment Management Plans and Parish Adaptation Plans (Chapter 4). Relevant water management and climate change committees were established. Plans are underway for integrating the VIA process into existing District Development Plans for Mount Elgon as a means to ensure sustainability of EbA measures. In Nepal, the Panchase Protected Forest Management Plan is under revision, which provides an opportunity for integrating VIA results and EbA measures into this plan.

In Peru, VIA results have been integrated into the NYCLR Management Plan. According to Gonzalo Quiroz, Manager of the Nor Yauyos Cochas Landscape Reserve, the climate change predictions highlighted through the VIA were in line with changes in weather patterns that were already being perceived in the field (Quiroz 2015, pers.comm.). This showed that watershed level planning is important and that activities upstream have a direct impact on downstream provision of ecosystem services. SERNANP is also looking to initiate watershed level planning with the Regional Water Authority, and the VIA is seen as a useful planning tool in this process. Further, the VIA helps make the case for scaling up to regional level. Indeed, the results of the VIA were already considered in the elaboration of the Regional Climate Change Strategy for the Department of Junín (which includes a portion of the NYCLR). Finally, SERNANP is using the NYCLR VIA as a pilot on how to do VIAs in protected areas, and this experience is serving to provide lessons learned for scaling-up the use of VIAs in other protected areas in Peru (Case Study 11).

VIAs can be useful decision-making tools for adaptation planning, especially at sub-national level (Munroe et al. 2015). As described above, the VIAs of the Mountain EbA Programme found that a watershed or catchment, or an existing defined landscape such as a protected area proved a useful scale for planning and implementing EbA. Given the time and financial resources invested in developing VIAs for EbA, their true value can be maximized if they are also developed as longer-term planning tools that feed into local-level planning processes for ecosystems and landscapes under climate change.

Emerging from workshop discussions,[13] as well as a draft paper by Dourojeanni et al. (2015), the programme partners have identified the value of having a phased or integrated approach to planning EbA measures. This can include a process that begins with a rapid participatory VIA assessment at site scale, ideally for a defined ecosystem or landscape: e.g. a watershed, catchment, or protected area, and which embraces existing risk management and knowledge systems. This enables the identification and implementation of early EbA actions on the ground, which in turn helps make the case for EbA at community level, ensuring buy-in, commitment and local relevance. A baseline and monitoring and evaluation (M&E) indicators should be designed at this stage. Depending on existing data or lack thereof (for example, on ecosystem functions, climate change impacts and future projections of ecosystem service supply), a more comprehensive VIA or additional

scientific studies may be needed, which can build on the rapid assessment. In particular government users, whether at local, regional or national level, are interested in scientific data and comprehensive analysis provided by VIAs to support planning and decision-making around adaptation.

2.3 Environmental, social and economic benefits of EbA

Measuring impact and effectiveness of EbA is essential to make the case for EbA to a range of stakeholders from local communities and planners to national level decision-makers, donors and global fora. The programme´s experience in developing EbA indicators to measure impact and effectiveness shows that a holistic approach is needed, which considers social, economic, ecosystem and ecosystem service indicators, in addition to including cross-cutting climate variability and change indicators that can measure all impacts of EbA measures in the context of climate exposure and adaptive capacity.[14] Delays took place in all countries regarding this activity. Challenges included the fact that this was a pilot programme and few prior experiences existed on which to build in the development of EbA indicators. Although many of the indicators were developed and adopted only at later stages of the programme, valuable lessons were learned and examples generated of indicators that can be replicated in future EbA projects, as elaborated in the Programme Learning Brief on *Tracking and Measuring Impact of EbA Projects* (Rossing 2015). The EbA measures implemented through the programme are beginning to demonstrate environmental, social and economic benefits, and additional benefits are expected in the medium to long term, past the lifetime of the programme. Tables 5-10 provide an overview of the multiple benefits of the implemented EbA measures, including those that have already been observed and those that are expected in the medium- to long term.

Environmental benefits

Ecosystem-based adaptation measures provide several environmental benefits, which in turn enhance human well-being. The figure below builds on the typography used in the Millennium Ecosystems Assessment (2005) to show the range of ecosystem services that contribute to well-being in the context of the project sites.

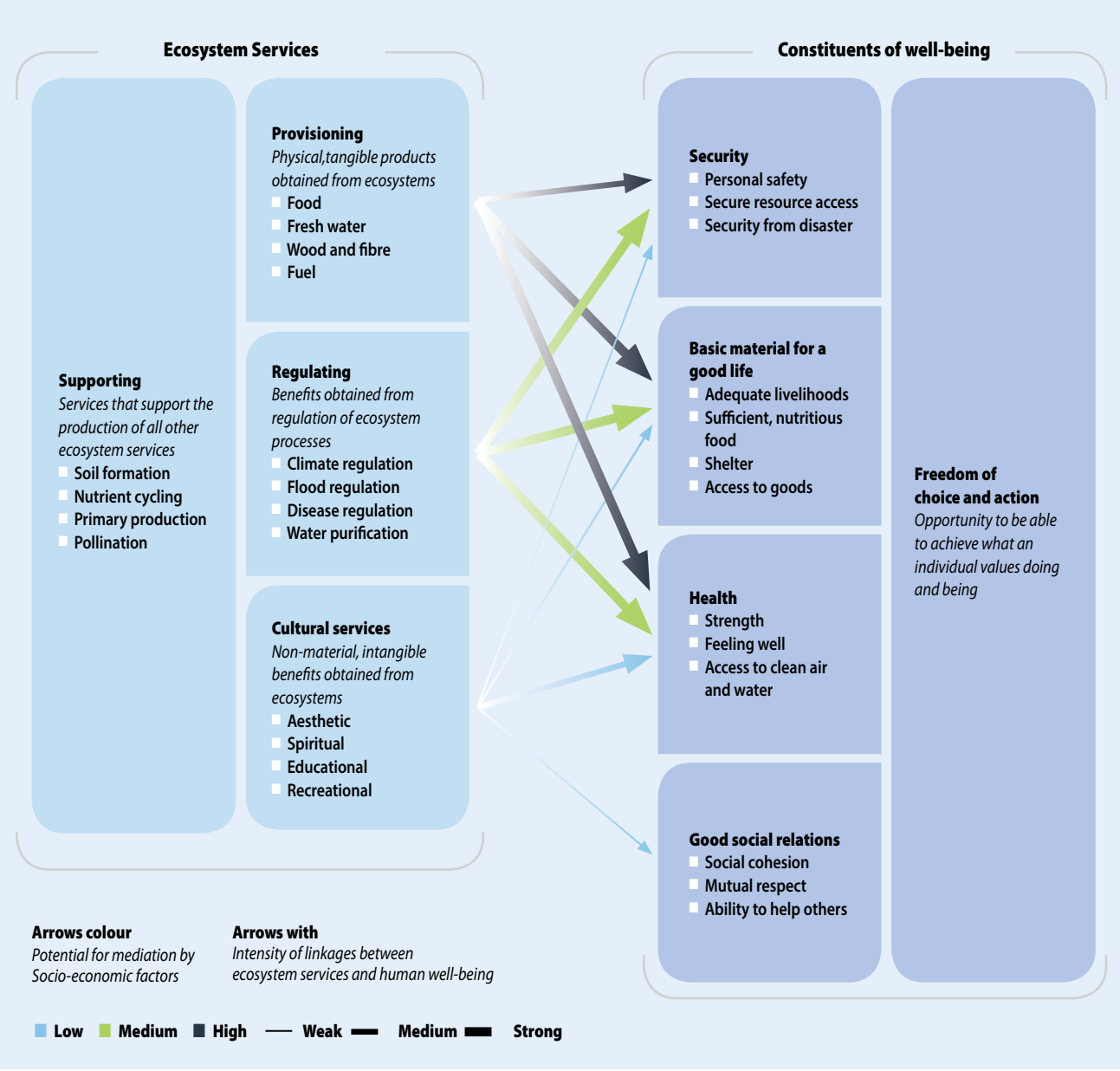
DANDHAGUPTE POND (NEPAL) BEFORE AND AFTER WATER CONSERVATION MEASURES.

© UNDP Nepal, 2014

© Tine Rossing, UNDP

EbA measures around water management such as restoring ponds, water sources and water channels, were implemented at project sites in Nepal, Peru and Uganda, as described in Tables 5 and 10. These measures have enhanced water provision, recharged ground water, increased soil moisture and increased vegetation (Case Studies 3, 4 and 6; Barrow et al. (2015); Khanal et al. (2014).) In terms of climate change adaptation functions, these measures are expected to increase agricultural and livestock production during dry spells, through increased water provision. They are also expected to regulate flooding through channelling excess water, and to reduce the impact of landslides by capturing silt. As described in Case Study 3, the Dandaghupte Pond in Panchase, Nepal, was reconstructed to collect rainwater and surface water runoff. Natural water infiltration through the pond has enhanced soil moisture level and soil quality, reducing soil erosion. It is expected that through reduced water run-off and by capturing silt and eroded soil, the pond will protect agricultural land and downstream areas from disasters such as flooding and landslides.

Figure 2 | Millennium Ecosystems Assessment: range of services



Source: Millennium Ecosystem Assessment (2005 Summary for decision makers. In Ecosystems and Human Well-being: Synthesis, 1-24. Washington, D.C.: Island Press.

Table 5 | Water conservation and management measures: overview of 'no regrets' and EbA measures implemented in Nepal and Uganda, with observed and expected benefits

EbA measure	**Country/ implementing agency**	**Climate change adaptation function** (observed and expected)	**Environmental benefits** (observed and expected)	**Social benefits** (observed and expected)	**Economic benefits** (observed and expected)
Restoration of conservation ponds and natural springs	Panchase region, Nepal, UNDP and IUCN	Continuous clean and sufficient water available for households and agriculture from restored water source, even during increasing dry periods Buffer against water-induced natural hazards such as flooding, drought and landslides Increase resilience of vegetation during dry periods	Increased water provision for domestic, livestock and agricultural use Increased groundwater recharge Increased water infiltration and regulation of ecosystem Enhanced soil moisture and soil fertility Increased water downstream Reduced risk of forest fire due to enhanced soil moisture	Decrease in water-borne diseases for humans as well as a notable decrease in diseases afflicting the livestock, particularly intestinal parasites Better human health from consuming healthier livestock products (mil and meat) Reduced conflict over scarce water resources Water collection time saved and utilized saved time for productive work	Clean and sufficient water will likely result in healthier livestock, which, in turn, is likely to increase returns on sale of both increased milk and meat production. Enhanced income from improved agricultural yield from use of water for irrigation during dry season
Gravity flow scheme	Sanzara, Uganda IUCN	Improved river water provision for irrigation, livestock and domestic use during prolonged dry spells Restored ecosystem services in surrounding catchment ecosystem to sustain water flow	Provision of steady water supply for both human consumption and agriculture Improved health and variety of crops from steady and sufficient water supply	Increased cohesion social capital among parish actors from establishing water groups and jointly planning and implementing activities Improved health from stable water supply, enough food and better nutrition Decrease in conflicts of water use Decrease in time spent in search for water	Improved agricultural livelihoods and increased income from increased local commercial sale of more varied and healthier crops, enabled by the catchment-scale approach Income could further be increased, if additional support was provided to access markets beyond local scale

Sources: Developed by N. Ikkala Nyman and T. Rossing based on analysis of Barrow, E. et al. (2015); IUCN Uganda (2012a and b); Khanal, R. et al. (2014); Rossing, T. et al. (2015b); A Adhikari, R Gafabusa, S Kutegeka, P Nteza, and Y Rai, 2015, personal communications.

EbA measures focused on sustainable grassland and livestock management, such as rotational grazing, livestock organization and planting of native grass species, have enhanced vegetation cover and diversity, and increased forage (Table 6). These measures are expected to restore grasslands, increase soil moisture, regulate water and increase livestock productivity. Expected climate change adaptation functions include increased provision of grazing and forage during dry periods, regulating water and floods during heavy rainfall, and slope stabilization during landslides.

Pasture and livestock management activities in Tanta, Peru, for example, have already significantly contributed to enhanced condition of the pastures, with a visible increase in vegetation cover (see photos and Case Study 5). The provisioning capacity of pastures as livestock fodder has already increased significantly. Increase in vegetation cover is further expected to lead to better water infiltration capacity and reduce soil cover loss.

TANTA (PERU) BEFORE AND AFTER GRASSLAND MANAGEMENT.

© Woodro Andia Castelo, UNDP Peru

© James Leslie, UNDP Peru

Table 6 | Sustainable grassland and livestock management: overview of 'no regrets' and EbA measures implemented in Nepal, Peru and Uganda, with observed and expected benefits

EbA measure	**Country/ implementing agency**	**Climate change adaptation function** (observed and expected)	**Environmental benefits** (observed and expected)	**Social benefits** (observed and expected)	**Economic benefits** (observed and expected)
Sustainable management of grasslands through: Enhanced vicuña management Enhanced animal husbandry	Tanta, Peru UNDP	Pastures available for grazing and fodder year round, including during dry season Protection against flood Storage of nutrients and maintenance of soil structure, which are supporting ecosystem services fundamental to enhance the ecosystem's resilience to climatic shocks and stresses	Reduces pressure on natural pastures, wetlands and alpine ecosystems favouring their recuperation. Enhanced provision of animal fibre Provide diverse habitats for animals that are predators and prey	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 Enhanced scenic beauty	Generate new or increased income for local communities through: 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
Rotational grazing and grassland plantation (native and cultivated)	Canchayllo, Peru IUCN/TMI Tanta, Peru UNDP	Moist grassland reduce risk of forest fires during dry periods Pastures available for grazing and fodder year round, including during dry season Grasslands and adjoining wetlands help regulate heavy rainfall and floods Maintain soil structure	Reduced pressure on (over-grazed) grasslands and wetlands, favoring their recuperation Increased vegetation cover, wetland and grassland restoration. Enhanced soil moisture Contribute to hydrological regulation Enhanced provision of pastures and forage Provides diverse habitat for animals that are predators and prey	Strengthened institutional arrangements and capacities for community management of water, grasslands and livestock through institutional strengthening, capacity building, organizing committees and establishing management plans	Improves animal yields and agricultural production. Increased livestock productivity through improved livestock distribution, grassland quality and the creation of natural troughs, likely to lead to increased livelihood income

EbA measure	**Country/ implementing agency**	**Climate change adaptation function** (observed and expected)	**Environmental benefits** (observed and expected)	**Social benefits** (observed and expected)	**Economic benefits** (observed and expected)
Improved livestock shed (urine collection, farm yard manure improvement) (NR)	IUCN Nepal	Less water demand for irrigation in farmyard, relevant in periods of drought	Reduce pressure on grasslands Enhance soil moisture Improved soil properties especially organic matter content	Improved nutrition and dietary diversity at household level Improved animal health and hygiene	Cost saving on external inputs such as chemical fertilizer High market price of organic products so increase income Increase livestock production and better income

Sources: Developed by N. Ikkala Nyman and T. Rossing based on analysis of Adhikari, A. et al. (2014); Fernandez-Baca, E. et al., (2014); Gwali, S. (2014); Instituto de Montaña (2014); Picon, J.C., (2015a and b); Podvin K. et al. (2014); Global technical and learning workshop of the Mountain EbA Programme. Lunahuana, Peru 28-30 May, 2015. Summary.; A Adhikari, Woodro Andia Castello, E Fernandez-Baca, A Gomez, Y Rai and F Zapata, 2015, personal communications.

Conservation agriculture has improved soil quality and fertility, reduced soil erosion, enhanced water infiltration and increased provision of crops (Table 7; Adhikari et al. (2014). Climate change adaptation functions include the enhanced ability of ecosystems to provide food during drought periods, through conservation agriculture measures that increase soil moisture, and through testing of drought resistant varieties. Better land management, through measures such as grass banks and hedgerows, can reduce the impact of heavy rainfall and landslides. For example, in Sanzara in Uganda, soil and water conservation measures adopted by farmers have increased the provision and quality of crops. The community has been able to produce food even during periods of drought. This has been both due to the adopted measures reducing soil erosion and enhanced management of surface runoff water, and to piloting of drought resistant crop varieties (Case Study 4).

FARMERS IN SANZARA ARE NOW ABLE TO IRRIGATE THEIR FIELDS BY DRAWING ON STEADY WATER SUPPLY FROM NEARBY RIVER.. © Christopher Lutakome, IUCN Uganda

Table 7 | Conservation agriculture: overview of 'no regrets' and EbA measures implemented in Nepal, Peru and Uganda, with observed and expected benefits

EbA measure	**Country/ implementing agency**	**Climate change adaptation function** (observed and expected)	**Environmental benefits** (observed and expected)	**Social benefits** (observed and expected)	**Economic benefits** (observed and expected)
Integrated soil nutrient management (use of organic soil nutrients of compost dung and animal urine)	UNDP Nepal IUCN Nepal	Timely cultivation of the crops, as per the cropping season, mostly due to timely availability of production inputs	Enhanced soil productivity and fertility Enhanced moisture retention capacity Reduced soil erosion Reduced influx of nutrients into water bodies Decreased alien and invasive plant invasions	Improved nutrition and dietary diversity through cultivation of high value crops	Increased farm and labour productivity Reduced expenses on chemical fertilizers Increased income from sale of high value crops, especially vegetables
Soil conservation (incl. agroforestry, mulching, grass banks, hedgerows, countours and trenches)	Uganda, IUCN	Increase in water retention and flow, availability of continuous and clean water to downstream areas during drought Reduce soil erosion through increase in soil productivity and retention, maintenance of nutrient and water flow Reduced flooding and landslides through enhanced vegetation Enhanced ability to harvest crops during drought	Enhanced soil productivity and fertility Enhanced moisture retention capacity Reduced soil erosion Reduced influx of nutrients into water bodies Provision of a cool environment for proliferation of fauna Enhanced forest ecosystem from reduced influx of communities	Food security Access to a healthier diet Access to clean water Increase in community cohesion and resilience as farmers help each other Increased cultural values of the forests un upstream areas as less people go to the forests to collect forest products	Increase in income from enhanced agricultural productivity as a result of increased soil fertility Increased income from sale of product on local market Reduced dependence on agricultural inputs, leading to savings
Drought resistant seed varieties	Uganda, Nepal IUCN	Crops resistant during drought, provision of food		Food security	Additional income from increased productivity

Sources: Developed by N. Ikkala Nyman and T. Rossing based on analysis of Adhikari, A. et al. (2014); Baral, B. et al. (2014); Gwali, S. (2014); IUCN Uganda (2012a and b); Tiwari, S. et al. (2015); Global technical and learning workshop of the Mountain EbA Programme. Lunahuana, Peru 28-30 May, 2015. Summary.; A Adhikari, R Gafabusa, A Gomez, S Kutegeka, P Nteza, and Y Rai, 2015, personal communications.

Social benefits

The implemented 'no regrets' and EbA measures provide a range of social benefits including enhanced food security, access to clean water, access to a healthier diet, strengthening of local organizational and technical capacities, as well as some empowerment of women and disadvantaged groups and breaking down social and cultural barriers (Tables 5 to 10).

A social benefit that has been observed across almost all project sites has been the strengthening of local organizational and technical capacities to manage natural resources (Tables 5 to 10). In Canchayllo and Miraflores in Peru, for example, the project has focused strongly on institutional strengthening and capacity building as key pillars underpinning all activities (Case Study 6). Strengthened local organizations and networks provide important social capital needed for increasing community resilience and adaptive capacity. Future climate scenarios will require effective management and decision-making structures for planning and making decisions on ecosystem-based adaptation measures, in response to increasingly changing and unpredictable conditions.[15] Management plans have been developed in several of the project sites for adaptation of watersheds and grasslands in particular. These form an important basis for decision-making and encapsulate the enhanced technical capacities of communities to manage natural resources in a changing climate. These plans will be discussed in further detail under Chapter 4.

EbA measures have provided a means of engaging women and vulnerable groups more proactively, while giving them a voice they did not previously have. In Panchase, women have been active participants in implementing EbA measures, because of the high rate of male out-migration and large number of women remaining in the communities. The Chitre village development committee collaborated directly with the Panchase Women´s Network on planting Amriso or broom grass (*Thysanolaena maxima*), enabling the women to lease abandoned lands and earn cash income (Table 8 and Case Study 7). The activities were designed to fit with women´s demanding schedules and workloads. The cultivation of broom grass has also strengthened bonds across social and cultural barriers by including women from different castes. It has also empowered women to undertake livelihood activities and challenge traditional gender roles, challenging the traditional idea that a Nepali woman, after she marries, is supposed to remain in the home. The recent phenomenon of the feminization of agriculture globally has in some cases provided a positive opportunity for women to break out of these traditional gender patterns.[16] In Uganda, women have participated more actively in agricultural activities through the project in Sanzara, where previously their role in livelihood generation was more passive (R Gafabusa 2015, pers. comm.).

Sustained delivery of social benefits, such as women´s empowerment or reduction of ethnic and social tensions, requires broad-reaching social change over a long period. EbA measures can play but a part in contributing to such broader change.

MEMBERS OF THE PANCHASE WOMEN'S NETWORK IN NEPAL. © Andrea Egan, UNDP

Table 8 | Land rehabilitation: overview of 'no regrets' and EbA measures implemented in Nepal, Peru and Uganda, with observed and expected benefits

EbA measure	**Country/ implementing agency**	**Climate change adaptation function** (observed and expected)	**Environmental benefits** (observed and expected)	**Social benefits** (observed and expected)	**Economic benefits** (observed and expected)
Plant cultivation e.g. broom grass, Timur	IUCN and UNDP Nepal	Perfect plant for restoration and to help prevent landslides. Strong root system helps reduce top and sub-soil loss caused by heavy rainfall, soil erosion and landslides Combat invasive species	Fast rehabilitation of ecosystem, due to decrease in invasive species and regeneration of soil and moist levels Controlled overgrazing Reduced soil erosion	Creation of women's empowerment and stronger social bond between involved women through capacity building and training Break down of caste-determined social and cultural barriers	New climate-resilient livelihood income for involved women from selling brooms commercially
Gabion walls	Nepal, IUCN and UNDP	Reduced landslides and flooding during periods of intense rain	Landslide management Farming yield improved in areas adjacent to gabion walls, due to flood control and absence of upstream debris collecting on farmlands Protected irrigation canal and prevent flooding of adjacent farms Protects agricultural lands and prevents washing away top soil	Protection to riverside households and infrastructure Short-term employment in construction of grey-green infrastructure Enhanced sense of security Enhanced linkages with government agencies Enhanced mobility due to less flooding on roads and bridges	
Roadside stabilization with plantations (incl. broom grass)	Nepal, UNDP	Ensures that the communities have better access to markets, alternative source of livelihood	Protection and stabilization of road slopes to reduce sedimentation	Increased social cohesiveness Enhanced scenic beauty so support tourism Maintenance of infrastructure Strengthening institutional capacity for community management of broom grass	Increased road access to communities provide better market access Fast growing and multipurpose and high market demand Increase income and employment opportunities Alternative resource base creation

EbA measure	**Country/ implementing agency**	**Climate change adaptation function** (observed and expected)	**Environmental benefits** (observed and expected)	**Social benefits** (observed and expected)	**Economic benefits** (observed and expected)
Roadside stabilization with plantations (incl. broom grass)	Nepal, UNDP	Ensures that the communities have better access to markets, alternative source of livelihood	Protection and stabilization of road slopes to reduce sedimentation	Increased social cohesiveness Enhanced scenic beauty so support tourism Maintenance of infrastructure Strengthening institutional capacity for community management of broom grass	Increased road access to communities provide better market access Fast growing and multipurpose and high market demand Increase income and employment opportunities Alternative resource base creation
Gulley control	Nepal, UNDP	Reduces the damage of road and agricultural lands during e.g. floods	Protection and stabilization of gulley and reduced soil erosion	Protection of road and plantation sites	Increase productivity of agricultural land and decreased top soil loss
Fuel-efficient cooking stoves	Uganda, UNDP	Landslides, soil erosion, drought and flooding reduced from decreased deforestation and improved forest and tree cover from reduction in fuel wood collection	■ Enhanced ecosystem restoration as a result of reduced tree cutting ■ Increased indigenous tree species	■ Reduction in time spent in collecting firewood especially for women ■ Improved human health from decrease in less soot/ smoke ■ There is less time spent in cooking which gives women more time to tend to their spouses and children	Increased savings that would have otherwise been used for charcoal or firewood. Farmers shift the incomes to health and education of their children

Sources: Developed by N. Ikkala Nyman and T. Rossing based on analysis of Adhikari, A. et al. (2014); Baral, B. et al. (2014); Gwali, S. (2014); IUCN Uganda (2012a and b); Tiwari, S. et al. (2015); Global technical and learning workshop of the Mountain EbA Programme. Lunahuana, Peru 28-30 May, 2015. Summary.; A Adhikari, R Gafabusa, A Gomez, S Kutegeka, P Nteza, and Y Rai, 2015, personal communications.

Economic benefits

The programme has implemented a range of Ecosystem-based Adaptation measures for generating income with the specific aim to diversify livelihoods and thereby increase economic resilience to climate change. These include beekeeping, commercialization of non-timber forest products, and ecotourism promotion in Nepal; and production of unbaked bricks, bee-keeping and honey harvesting in Uganda (Table 9). An increase in household income has already been observed following these activities (Gwali 2014) and (Tiwari 2015).

In addition, monetary profits have been made also through other project measures, such as the local sales of produce from both the demonstration and family gardens in Uganda (P Nteza 2015, pers.comm. and R Gafabusa 2015, pers.comm.; see also Case Study 4) and through the sales of vicuña fibre in Tanta, the first of which were transacted in September 2015 (Case Study 5). Some project measures such as conservation agriculture have also allowed for household savings in terms of reduced expenditure on agricultural inputs (Case Study 10).

Broom grass (Case Study 7) has commercial potential on local markets and even internationally, especially in India. A single cluster of broom grass can provide enough material for the production of 7 to 9 brooms per year, which results in an annual income of $6 per year per plant (Rossing et al. 2015a).[17] Given that most of the women in the project live on less than $1 a day, harvesting from up to 100 plants each can significantly enhance incomes (Rossing et al. 2015a). Being a perennial plant, this income will contribute to households year after year.

The potential for economic benefit has been one of the main factors needed in making the case for EbA measures to local communities in all project sites. Enhanced access to water in Canchayllo, Miraflores and Sanzara was an essential entry point for making the case for EbA, as it was seen by communities as a means to increase agricultural and/or livestock productivity, which would in turn lead to economic benefits (Case Studies 4 and 6). It is important also to support appropriate assessments of market opportunities for goods harvested or produced through EbA interventions. Such studies have been carried out for project sites in Nepal and Peru.[18]

Communities have shown more interest in the economic and social benefits of EbA, and less in the environmental benefits. An important lesson learned by the programme is, therefore, to ensure that EbA measures generate short-term economic and social benefits, as they can be a means to increase interest and buy-in for environmental benefits and to secure commitment to implement ecosystem conservation, restoration and management measures, including in the medium to long term.

IN UGANDA, PROFITS FROM HONEY SALES ARE PAYING FOR CHILDREN'S SCHOOL FEES AND UNIFORMS, SECURING A FIRM INVESTMENT IN A BETTER LIFE FOR THE NEXT GENERATION. © IUCN Uganda

Table 9 | Alternative livelihoods: overview of 'no regrets' and EbA measures implemented in Nepal, Peru and Uganda, with observed and expected benefits

EbA/ 'no regrets' (NR) measure	**Country/ implementing agency**	**Climate change adaptation function** (observed and expected)	**Environmental benefits** (observed and expected)	**Social benefits** (observed and expected)	**Economic benefits** (observed and expected)
Commercialization of plant products	UNDP Nepal	Diversified livelihoods better able to deal with climate shocks	Supports sub-surface and ground water recharge Rehabilitation of degraded lands and slopes Stabilizes slopes and prevent soil erosion	Strengthens local groups	Additional source of income
Ecotourism promotion	UNDP Nepal		Improved cultural goods and services	Access to financial transactions for women, empowerment Improved household sanitation Enhanced skills for women in hospitality, sanitation and food Enhanced traditional cultural customs	Additional source of income
Bee keeping (NR)	Nepal, IUCN		Increased species diversity with increase in pollination and productivity Increased crop productivity as a result of increased pollination	Empowerment of women through alternative livelihood and income generation	Additional source of livelihood income
Unbaked bricks	Uganda, UNDP		Reduction of deforestation Clean indoor air		

Sources: Developed by N. Ikkala Nyman and T. Rossing based on analysis of Baral, B. et al. (2014); Egan, A. & Aturinda-Kyeyune (2015a and b); Egan, A. et al. (2015b); Gwali, S. (2014); Rossing, T. et al. (2015a); Tiwari, S. et al. (2015); Global technical and learning workshop of the Mountain EbA Programme. Lunahuana, Peru 28-30 May, 2015. Summary.; A Adhikari, R Gafabusa, S Kutegeka, P Nteza, and Y Rai , 2015, personal communications.

Landscape scale multiple benefits

Following the vulnerability and impact assessments, many initial standalone activities (such as conservation ponds, conservation agriculture or the GFS, described above), were linked and combined under a watershed/catchment/landscape approach to managing and restoring ecosystems (Table 10).

In Sanzara, **Uganda** (Case Study 4), a catchment scale management approach was adopted following the initial implementation of the gravity flow scheme and after the results of the VIA became available (S Kutegeka and R Gafabuse 2015, pers. comm.). The project's work was expanded to 22 villages along the River Sipi (from the initial three villages in Sanzara) to cover the entire catchment from the Mount Elgon Protected Area where the river emanates to downstream areas. Both upstream and downstream communities were engaged in restoration and management activities, which include river bank management, soil and water conservation measures, and planting of drought tolerant tree and grass species on river banks, as means to restore the landscape of River Sipi. Water quality has already been enhanced with a sedimentation decrease of approximately 20 percent between 2013 and 2014, based on local measurements (R Gafabusa 2015, pers.comm.). This is understood to be due to the use of soil and water conservation trenches, which have reduced agricultural sedimentation. The aim of the more integrated catchment approach to EbA is to enhance the water regulation, erosion regulation and natural hazard regulation functions of the catchment in the face of climate change.

Before the project intervention, villages in Sanzara had been dependent on food aid during periods of drought, recently on an annual basis (R Gafabusa 2015, pers. comm.). The initial gravity flow scheme allowed extraction of river water for irrigated agriculture and the production of more food (both in terms of quantity and variety) in a shorter period and in smaller areas. This initial 'no regrets' measure addressed the communities´ most urgent need to increase water availability; it was then combined with other measures such as producing vegetables locally using soil and water conservation methods and piloting quick maturing, drought resistant and high value

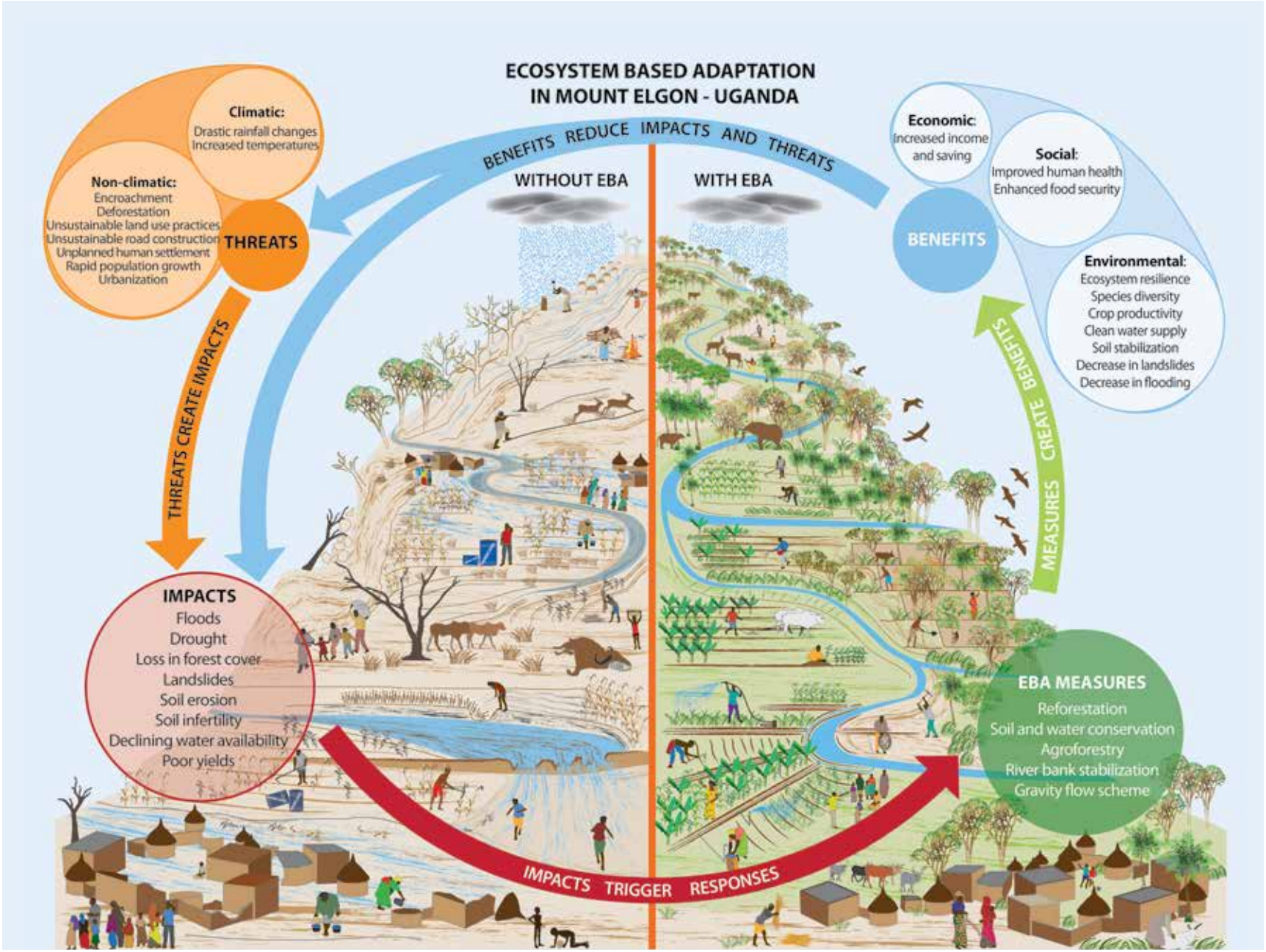
STEADY CLEAN WATER FROM THE GRAVITY FLOW SCHEME HAS IMPROVED FOOD SECURITY AND HUMAN HEALTH IN SANZARA, UGANDA. © IUCN Uganda

Table 10 | Ecosystem restoration: overview of 'no regrets' and EbA measures implemented in Nepal, Peru and Uganda, with observed and expected benefits

EbA/ 'no regrets' (NR) measure	**Country/ implementing agency**	**Climate change adaptation function** (observed and expected)	**Environmental benefits** (observed and expected)	**Social benefits** (observed and expected)	**Economic benefits** (observed and expected)
Sub-watershed restoration	Nepal, UNDP	Hazard regulation: minimize impact of floods, landslides, droughts and for Peru, hail Decreased soil erosion from enhanced vegetation Enhanced provision of water year round, including during drought, for agriculture, livestock, domestic use, hydropower and tourism (where relevant) Restored ecosystem services in surrounding catchment ecosystem to sustain water flow Reduce occurrence of natural fires during the dry season by enhancing wetlands in grassland ecosystems (Peru)	■ Enhance water flow from upstream to downstream ■ Reduce soil siltation and soil erosion ■ Reduce siltation ■ Stabilise slopes ■ Enhance water recharge capacity ■ Enhance vegetation growth downstream ■ Water regulation and storage: regulate runoff, flooding and aquifer recharge ■ Erosion regulation ■ Enhanced carbon storage in grasslands ■ Biodiversity conservation		Household income from seedlings used for reforestation
Catchment restoration: Gravity flow scheme, soil and water conservation, river bank management, agroforestry, tree planting	Uganda, IUCN			■ Increased cohesion social capital among parish actors from establishing water groups and jointly planning and implementing activities ■ Improved health from stable water supply, enough food and better nutrition ■ Decrease in risk to human well-being from prevention of flooding ■ Decrease in time spent in search for water	Improved agricultural livelihoods and increased income from increased commercial sale of more varied and healthier crops at local market
Restoration of upper micro-watersheds, wetlands and water-courses: Restoration of ancient water channels and reservoir dam Community grazing areas for livestock Wetland fencing	Canchayllo and Miraflores, Peru TMI/IUCN			Strengthened institutional arrangements and capacities for community management of water, grasslands and livestock.	Improved animal yields and agricultural production Increased livestock productivity and quality

Sources: Developed by N. Ikkala Nyman and T. Rossing based on analysis of Baral, B. et al. (2014); Egan, A. et al. (2015a); Fernandez-Baca, E. et al., (2014); Gwali, S. (2014); Instituto de Montaña (2014a and b); IUCN Uganda (2012a and b); Picon, J.C., (2015[a] and b); Podvin K. et al. (2014); Tiwari, S. et al. (2015); Global technical and learning workshop of the Mountain EbA Programme. Lunahuana, Peru 28-30 May, 2015. Summary.; A Adhikari, Woodro Andia Castello, E Fernandez-Baca, R Gafabusa, A Gomez, S Kutegeka, P Nteza, Y Rai and F Zapata, 2015, personal communications.

Figure 3 | Mount Elgon in Uganda with and without EbA measures



Source: Nieves Lopez Izquierdo/GRID-Arendal, based on technical guidance from T Rossing, P. Dourojeanni, C. Petersen, N. I. Nyman and P. Nteza

varieties of vegetables and fruit trees. These combined EbA measures have provided several socio-economic benefits, including enhanced self-sufficiency and food security, in addition to providing income through selling produce in the communities. The vegetables grown have allowed for a more varied, healthier diet. Since the project began, the communities have not applied for external food aid (R Gafabusa 2015, pers. comm.). As a result of the initial activities and later watershed management measures adopted by communities upstream, siltation has decreased and water quality measurements have improved, providing access to clean water with direct health benefits to local populations.

Figure 3 illustrates the Mount Elgon landscape with and without the adopted EbA measures. For example, reforestation measures upstream, together with soil and water conservation measures, agroforestry and riverbank stabilization provide multiple environmental, social and economic benefits, as well as increasing water availability for the gravity flow scheme downstream (which was the initial project measure).

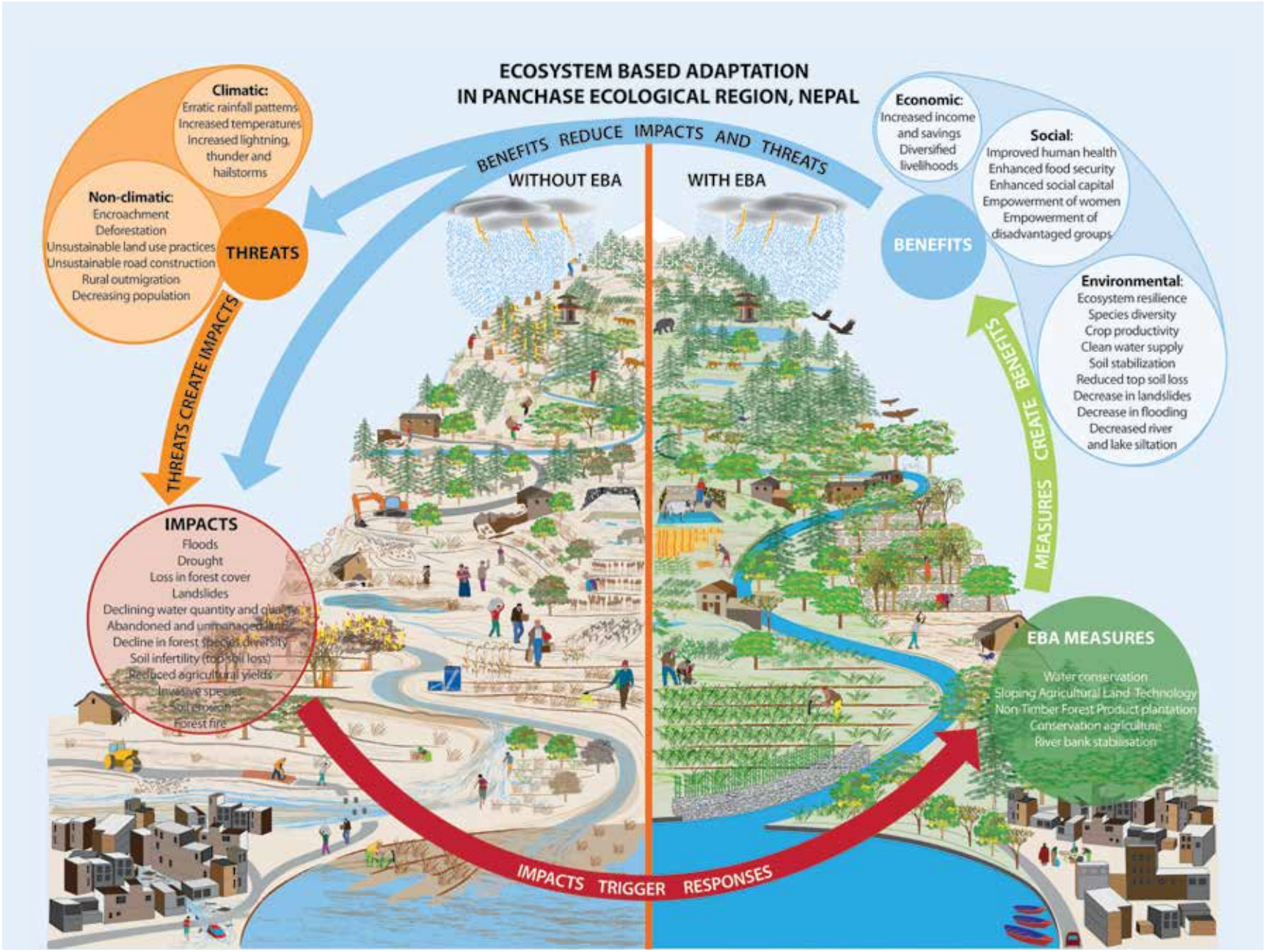
WOMEN'S EMPOWERMENT AND INCLUSION WAS AN INTEGRAL ELEMENT OF PROGRAMME ACTIVITIES IN SANZARA, UGANDA.
© Andrea Egan, UNDP

In **Nepal**, initial 'no regrets' measures were focused and integrated. Pond restoration (Case Study 3) was integrated with sub-watershed level wetland restoration, tree planting to support water recharge and enhance slope stability, and water source conservation (Table 10). When individual water conservation approaches are integrated into a broader watershed management approach, the water regulation function of the ecosystem in terms of regulating runoff, flooding and aquifer recharge is enhanced. The natural hazard regulation function of the sub-watershed in terms of minimizing impacts of floods and landslides is also increased. Maintaining or enhancing these functions is important in the face of anticipated climate change impacts.

Figure 4 illustrates the Panchase Mountain Ecological Region in Nepal and its connection to downstream areas, including Phewa Lake and the city of Pokhara, with and without the adopted EbA measures. For example, restoration of conservation ponds and natural springs upstream, combined with agroforestry, tree planting and river bank management through green-grey measures, provide multiple environmental, social and economic benefits, as well as increasing water availability for both human and agricultural consumption downstream.

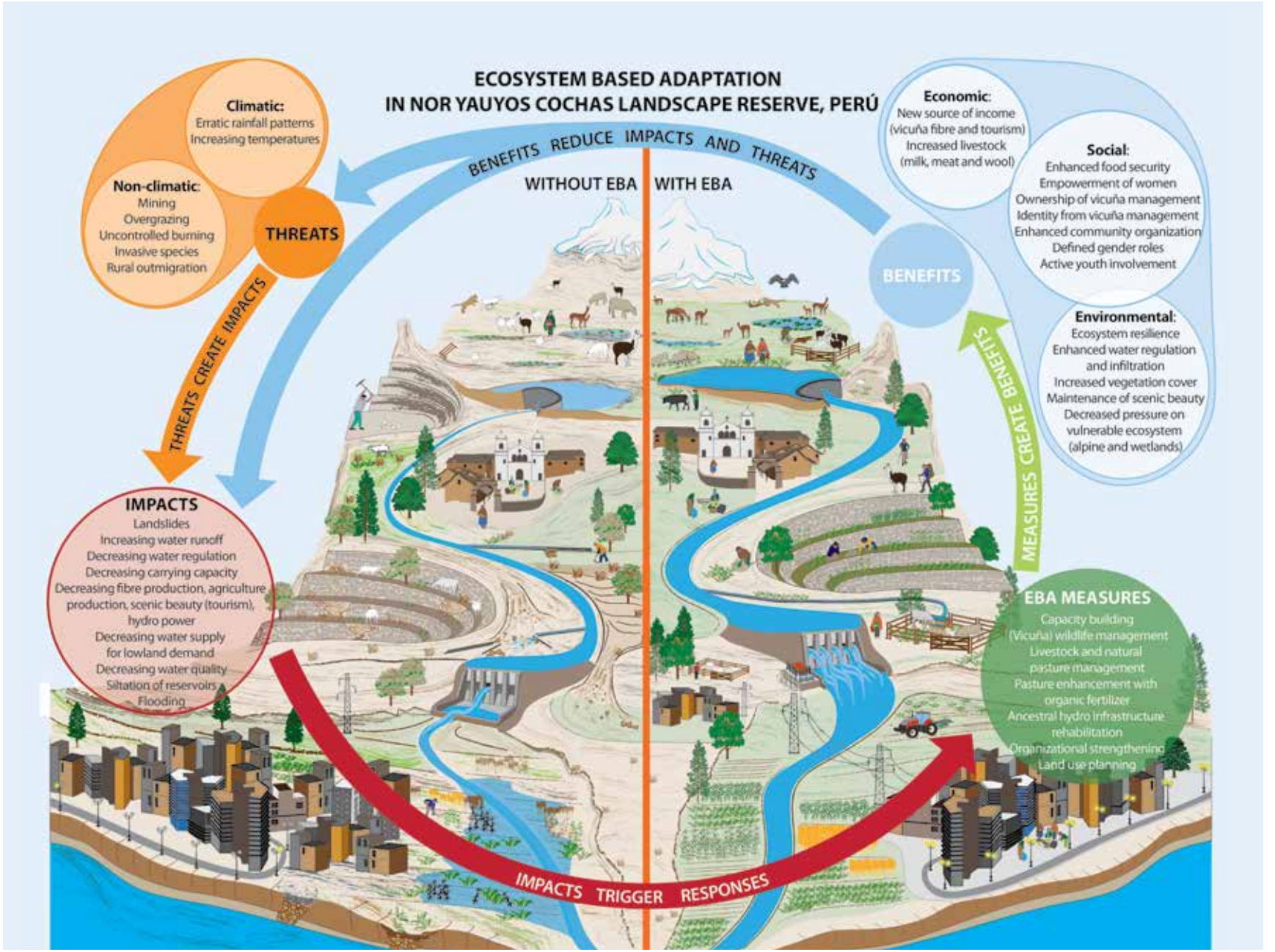
POND RESTORATION ALSO HELPS DECREASE WATER-BORNE DISEASES FOR BOTH HUMANS AND LIVESTOCK. © Andrea Egan, UNDP

Figure 4 | Panchase Mountain Ecological Region in Nepal with and without EbA measures



Source: Nieves Lopez Izquierdo/GRID-Arendal, based on technical guidance from T. Rossing, P. Dourojeanni, C. Petersen, N. Ikkala Nyman and Yalamber Rai.

Figure 5 | Nor Yauyos Cochas Landscape Reserve in Peru with and without EbA measures



Source: Nieves Lopez Izquierdo/GRID-Arendal, based on technical guidance from T. Rossing, P. Dourojeanni, C. Petersen, N. I. Nyman, Edith Fernandez-Baca, and Adriana Kato.

In Peru, an ecosystem scale approach to managing ecosystems and integrating EbA measures was adopted from the outset, mainly because these activities were not initiated until after the completion of the VIA and, hence, were designed based on its findings and recommendations (Case Study 5 and 6, and Table 10). For example in Canchayllo, conservation and management of wetlands upstream are expected to enhance water provision downstream (Case Study 6). Water is being channelled downstream through restored channels and watercourses.

Natural pools are expected to form downstream which will provide troughs for livestock and benefit the sustainable grassland and water management activities being implemented under the project. Grasslands are expected to enhance soil moisture and thereby contribute to hydrological regulation. These joint measures are aimed at enhancing the water regulation function of the micro-watershed, especially during the rainy season, whether there is little or heavy rain. This will increase water availability and thereby the resilience of the ecosystem and of communities who depend on it, specifically during the dry season and during potential droughts or extreme temperatures. One reason behind the choice of the Tanta site (Case Study 5) was specifically that it is high in the mountain ecosystem and part of the river basin head and therefore the ecosystem services the EbA measures will provide, including water provision, will benefit midstream and downstream communities.

In terms of social benefits at all the project sites in Peru, the communities have newfound appreciation for communal land management following the success of initial grassland and water management activities. Existing governance arrangements for water and rangeland management have been strengthened and, in some cases, new management committees have been formed (Case Study 5 and 6). In terms of economic benefits, the potential source of income from vicuña was a clear motivator in securing community buy-in for EbA measures in Tanta (Case Study 5). The wool of these wild camelids can be harvested sustainably, through corralling of the animals once every two years for shearing. The first harvest of vicuña wool was carried out in October 2015 and is expected to increase community income in the medium to long term.

In Canchayllo and Miraflores, small-scale infrastructure such as installing tubes and repairing break-pressure tanks has been combined with the restoration of traditional canals. Together with water management and grassland management, this has enhanced water regulation capacity and enabled the restoration of the micro-watershed. Initiating project activities with the building of infrastructure also provided a tangible and visible result up-front, which reinforced community interest and engagement in the later 'green' measures of the project (Case Study 6).

Figure 5 illustrates the Nor Yauyos Cochas Landscape Reserve and its connection to downstream areas, including the capital of Lima, with and without the adopted EbA measures. For example, sustainable management of grasslands through enhanced vicuña management and animal husbandry upstream, combined with restoration.

CELEBRATING THE REHABILITATION OF THE 2,855-METER LONG CHACARA-JUTUPUQUIO CANAL. © Carlos Diaz Huerta, Tres Mitades

2.4 Lessons on securing benefits through EbA

The Mountain EbA Programme has charted new ground in understanding the opportunities and challenges of planning and implementing EbA. The following sections describe the key lessons learned.

Understanding the multiple benefits of EbA

Understanding the full range of benefits of EbA requires an understanding of ecosystem services, how these provide for human well-being and how climate change can impact delivery of these critical services. Some of the benefits are provided in the short-term and at a local scale, but many are long-term benefits at larger scales, which can be a challenging message to convey and a difficult point to prove. Communities are most interested in more tangible, immediate economic and social benefits, and it is not always easy to demonstrate how these are based on ecosystem services. For example, water provision, an ecosystem service, underpinned the many other benefits desired by the communities of Sanzara in terms of increased agricultural productivity and income from crops sold (Case Study 4). Participatory processes for planning measures, capacity building and awareness raising are essential in understanding the multiple benefits of EbA and making the case for adopting such measures.

Demonstrating the benefits of EbA early on

Key to implementing EbA is the ability to show benefits, and in particular socio-economic benefits, of EbA to communities early on. The participatory methodology applied in the programme in designing and prioritising 'no regrets' measures jointly with communities helped foster a sense of ownership. Having initial 'no regrets' activities prioritize economic benefits, such as promoting alternative livelihoods or increasing agricultural or livestock production, can help respond to urgent livelihood needs of communities and secure commitment for EbA measures in the longer run. Implementing a 'grey-green' approach including water infrastructure measures early, complemented by reforestation later, has provided tangible and visible environmental and social benefits from the outset. For example, the gravity flow scheme in Uganda brought initial buy-in for the project, and was then used to show the role of the broader ecosystem in providing water, which is essential for livelihoods. Once initial benefits have been shown, the case can then more easily be made for implementing broader, scaled-up EbA measures, such as reforesting water catchments, which provide a range of benefits in the long term and are essential for enhancing adaptive capacity.

Implementing EbA at an appropriate scale

The programme found that implementing EbA measures at an appropriate scale, such as at a sub-watershed, watershed, or community/district scale, can ensure the attainment of benefits in a more comprehensive and sustainable manner. In particular achieving ecosystem benefits, which maximize the provision and regulating services (Figure 2, Millennium Ecosystems Assessment) provided by ecosystems, often require a larger scale of implementation. Many of the benefits provided by ecosystem services in the project watersheds downstream depend on the restoration, management and conservation of resources upstream. All project sites have identified catchments or sub-watersheds as the appropriate scale for implementing EbA measures and ensuring achievement of benefits: the sub-watershed level in Nepal; the micro-catchment scale in Peru and the catchment scale in Uganda.

The experience has been that this is the appropriate scale for enhancing provision of a range of ecosystem services, including fresh water, crops and vegetation, as well as regulatory functions such as water and soil erosion regulation. This also accounts for interlinkages between services and enables management of the impacts of ecosystem service use upstream on provision of services downstream. This approach can help bring different actors

Box 5 | Mount Elgon Conservation Forum

The overall objective of the Mount Elgon Conservation Forum, initiated in 2012, is to promote a landscape approach for addressing critical issues in Mount Elgon, where various stakeholders get a common understanding and agree on interlinkages within the landscape to guide strategic interventions that enhance positive change in livelihoods and ecosystem integrity. Activities of the Forum include: a website to act as a depository of information; bi-annual meetings to share information, lessons and to develop strategic interventions; exchange visits among partners; preparing outreach materials to strengthen information sharing; and organizing consultative conferences and talk shows on topical issues. Partners include: IUCN, UNDP, ECOTRUST, Uganda Wildlife Authority, National Forestry Authority, Ministry of Water and Environment, District Local Governments, East Africa Commission, CBOs and NGOs. The Mountain EbA Programme has directly supported the formation of the Conservation Forum.

Source and further details: www.mtelgonforum.org

together for joint planning and decision-making, as through the Mount Elgon Conservation Forum in Uganda. Further, a larger scale is appropriate when assessing likely impacts of climate change, e.g. impacts of temperature increase or changes in precipitation on ecosystem service provision. Finally, watersheds and sub-watersheds can provide a policy-relevant scale for planning and decision-making for adaptation at district and regional level. One lesson learned from the project is that a landscape or watershed level vision to implementation could be adopted from the design stage, even if initial measures that are implemented might be more localized 'no regrets' measures.

Combining local and scientific knowledge

Building on existing knowledge and institutions can further embed the benefits of EbA. EbA is a knowledge-based approach, which requires application of both new technology and scientific knowledge on the one hand, and local knowledge and traditional methods on the other. This was shown through the step-wise approaches used to develop EbA measures in the programme, starting with 'no regrets' measures based on participatory assessments based on community inputs before evolving and moving towards ecosystem-scale EbA measures, which relied on the scientific information provided by the VIAs and were specifically designed to respond to future climate scenarios.

Using local and traditional knowledge when implementing EbA measures can further the achievement of benefits. For example, in Peru ancestral hydrological structures involving earth and stoneworks were improved, restoring a forgotten water management model that can provide important climate change adaptation benefits. Local and traditional knowledge on water, livestock and grassland management is also being relied on, and native pastures are being planted on rangelands. In Nepal, existing conservation ponds used for hundreds of years but degraded over time were restored to their full function. These types of EbA approaches can tap into existing knowledge and skills, while adapting these measures to provide a climate change adaptation function. It is also important to adjust EbA measures to local capabilities. For example, in Nepal, where outmigration is high, measures have been designed specifically to be in line with the time and skills women have available, e.g. planting of broom grass (Case Study 7).

Integrating EbA into existing structures, plans and policies

Incorporating EbA into existing local structures and plans can further make the case on the relevance of EbA benefits for existing goals and priorities, in addition to strengthening institutional capacities to deal with climate change adaptation. Project activities have built on existing structures such as Forest User Groups and Women´s Groups in Nepal, and Water and Pasture Committees in Peru. EbA measures have strengthened local natural resource management governance structures, which are essential in implementing EbA measures and securing the benefits provided (Case Study 6). The role of local committees and champions is also important given that EbA measures tend to require long-term implementation, beyond the lifetime of projects and political government changes.

Working with government technical and extension services has provided an avenue for strengthening linkages between communities and local government, as was shown in the case of Sanzara; for gaining technical expertise from local government experts on issues such as forestry and soil and water conservation; and for making the case for EbA measures to local government through practice. To equip farmers with knowledge, structured learning was carried out in form of farmer-to-farmer exchange visits. These have been highly influential in increasing the farmers' understanding and ability to implement what they learn because of the close involvement/participation of the district technical officers. The peer-to-peer element is a powerful demonstration helping farmers to appreciate that what they see can equally be done on their farms.

Showing the multiple benefits of EbA to government planners and policy makers and thereby making the case for EbA can increase interest in implementing EbA measures. This can then lead to incorporation of EbA into relevant governance structures, plans and policies, as well as allocating budgets in relevant sectors, from local to national level. For example, having seen early benefits on the ground of implemented grassland management measures, the Municipality of Tanta dedicated some of their existing communal budget to hire two communal rangers and buy a motorcycle to help monitor vicuñas. The MEF in Peru was interested in the pilot in Tanta because they learned of the multiple benefits this upstream project could potentially provide to a large populations mid- and downstream.

A success factor for sustainability is the inclusion of EbA in plans and policies, from local level natural resource management plans to district and national level plans and policies. Making the case for policy change for EbA will be discussed in further detail in Chapter 4. Further, budgets need to be allocated for financing plans and policies, and implementing EbA measures on the ground. The case for financing for EbA is discussed in Chapter 5.

Case Study 3 | Water source restoration and conservation at Dandaghupte Pond, Parbat, Nepal

From T. Rossing, N. Chhenjum Sherpa and A. Egan. (2015) *"Water source restoration and conservation: Improving ecosystem resilience in the mountains of Nepal".* [Online] UNDP. Available from: https://undp.exposure.co/challenging-gender-roles-and-crossing-castes

In the Panchase region, natural springs are the primary water source for rural areas, but these natural water sources are being increasingly threatened by climate change and other human activities. According to meteorological data, precipitation patterns have shown a marked shift in the past few decades, with more intense monsoonal rains, coupled with a decrease in rainy winter days. The monsoon season is also becoming increasingly unpredictable. Most people in Panchase region are subsistence farmers, and dependence on rain-fed agriculture is the norm. Traditional water sources upon which so many people depend are being disturbed, degraded, and in some cases destroyed, along with the associated ecosystems.

Dandaghupte Pond and its source are located within the Parbat District in the Panchase region. The targeted beneficiaries are among Nepal's most disadvantaged and marginalised groups, the Dalits. The pond (fed by a natural spring) is a traditional source of water, which has been serving the community for generations by collecting rainwater and surface water runoff. However, rising temperatures and increasingly erratic rainfall, coupled with road construction, disrupted this vital water source, and pond recharge ceased. This resulted in serious drinking water shortages, and also affected water for livestock and crop irrigation.

The Department of Forests under the Ministry of Forest and Soil Conservation worked with the Mountain EbA project to provide support to the Nakatipakha Community Forest User Groups to reconstruct the pond and related basin, and conserve this traditional source of water. Water conservation was further enhanced by adding a new water collection tank. A stone lid was also put on top of the water collection tank to protect the water source from contamination and water evaporation caused by direct sun exposure, and underground pipes were installed to ensure downstream flow continues unimpeded by the new road. Water is now available even during the dry periods and is of better quality. Better-managed and maintained ponds will enable more efficient use of clean water for this community and their livestock.

Restoring ecosystems to a healthy state means they can also deliver a host of downstream benefits. Beyond the provision of adequate clean water for both humans and animals, pond restoration also enables the natural recharge of sub-surface and groundwater resources. Soil moisture level and quality is further enhanced by this natural water infiltration through the ponds, which in turn enables better, more sustainable crop yields in fields close by. The pond now also provides water for irrigation. As a result, crop yield has increased, and locals have been able to grow greater varieties of crops for longer periods outside the monsoon season, which is likely to become increasingly unpredictable with climate change. This has led to improved health and an increase in household income. The regenerated ponds also contribute to increased amounts of water downstream, especially during the dry season, which results in increased vegetation, tree growth and water for agriculture. The pond leads to reduced water run-off, decreased soil erosion and protection of agricultural land and downstream areas from flooding and landslides. Social benefits include access to sufficient and clean water all year round. Based on evidence from case studies elsewhere, such access is likely to enable a decrease in water-borne diseases for humans and livestock. Healthier livestock in turn provide healthier milk and meat for human consumption, which, in turn, is likely to increase returns on their sale.

PROVIDING DEPENDABLE, CLEAN WATER IN A CHANGING CLIMATE IN THE PANCHASE REGION IN NEPAL BY RESTORING CONSERVATION PONDS. © Andrea Egan, UNDP

Case Study 4 | Restoration of the River Sipi Micro-Catchment in Uganda

From IUCN Uganda (2012) *Restoration of the River Sipi Micro-Catchment as an Ecosystem-Based Solution to Build Social and Ecological Resilience of the Sanzara Community to Climate Change Impacts.* [Online] IUCN. Available from: http://www.ebaflagship.org/downloads/ppt/Appendix_1-IUCN_site_information.pdf

The River Sipi is one of eight remaining perennial rivers flowing from Mount Elgon. The upstream section of the river is reasonably well vegetated. High population density in the midstream areas, combined with intensive agricultural activities, compromises the quality of water. Poor farming methods on steep slopes lead to extensive soil erosion and consequent siltation of the river, and increase the probability of landslides. This is compounded by high population pressures and an acute land shortage, resulting in farming being undertaken in ecologically sensitive areas, such as along riverbanks and on steep slopes. Impacts of poor management in the River Sipi catchment are most pronounced in the downstream section in Sanzara Parish. Due to its location in the rain shadow, the parish naturally experiences long dry spells each year. This natural adverse impact is now exacerbated because the river suffers from declining water levels and contamination as a result of upstream actions. It is anticipated that this will be further worsened by longer dry periods as a result of climate change. The population of Sanzara Parish (formed of three villages) is very poor and has, in the past, relied on food aid from the District Local Government.

A gravity flow scheme (GFS) was constructed for Sanzara Parish to highlight the importance of critical ecosystem services provided by the River Sipi catchment and to provide a sustainable flow of water for the local population. Interventions were initiated in three villages: Chema, Kasongo and Kapsinda in Sanzara parish, Kapchorwa District. The interventions have now been scaled up to the midstream covering all four sub counties, and embrace a total of 22 villages. The project was initiated in 2012, in partnership with the Kapchorwa District Water office. Based on a participatory process, it was agreed that any action to address water shortage would provide economic space and help to both mobilise and incentivise community involvement. At the same time communities would develop an appreciation and recognition of the value of the River Sipi in securing and improving their livelihoods.

The gravity flow scheme feeds a tank with a storage capacity of 200 m^3. This has already brought relief to over a thousand people in Sanzara who did not previously have access to a secure water source. The participatory process of deciding upon and then constructing the GFS promoted unity and community cohesion, in a parish that was initially divided and marred by ethnic and land conflicts. Community members acknowledged that water shortages were adversely impacting all of them equally, despite other differences, and this realisation provided a forum for them to discuss and negotiate the best approach to sustainably manage the River Sipi catchment.

The GFS has allowed community members to develop irrigated agriculture, and produce more food in a shorter period and smaller area. Improved on-farm soil conservation and agro-forestry will reduce the incidence of landslides, and enhance the ability of the system to cope with more extreme events. Since 2012, the communities have been able to produce their own food using drought-resistant, quick-maturing crops, and have no longer relied on food aid. New crop varieties include cassava, sorghum, fruit trees and vegetables such as cabbages and onions. Management of the GFS has been linked to community governance structures and the GFS operations and maintenance committees also oversee and coordinate the catchment management actions. The GFS has enhanced capacities of local groups to better manage the water sources and lands, and to initiate restoration of degraded areas. This strengthens local governance and the people's ability to adapt to climate change.

Following construction of the GFS, restoration measures have been agreed upon in the most degraded areas of the catchment. Tree nurseries have been established in each village of the parish and to date 20,000 trees have been planted by 100 families for catchment restoration. Using appropriate indigenous tree and grass species which are drought-tolerant for restoration will improve the resilience of the overall system to climate change.

DISTRICT OFFICIALS AND COMMUNITY MEMBERS AT THE NEW WATER OUTLET IN SANZARA, UGANDA. © Julie Diekens, IISD

Case Study 5 | Vicuña, animal husbandry and sustainable grassland management in Tanta, Peru

Tanta village is located at the headwater of four important rivers that provide water for 11 million inhabitants of Lima and Junín Regions – for domestic, agricultural and hydroelectric use. There are around 400 inhabitants in Tanta who farm across an area of 34,715ha. Temperatures are expected to increase, and while overall volume of annual rainfall is expected to remain constant, rainfall patterns are expected to change and surface water runoff is expected to decrease. Cattle farming at the family level and sheep, cows, llamas and alpacas at the communal level are the main source of livelihoods. Grasslands, which provide for grazing livestock, are essential to the local economy and well-being. Drivers of grassland degradation include overgrazing, exceeding the carrying capacity of these grasslands as determined by local soil structure and climate. The situation is worsened by mismanagement and lack of customary norms. The condition of the majority of the grasslands ranges from average to poor and very poor. Dry periods with low precipitation have a strong negative impact on grassland production. Due to the local climate and altitude, crop production is not feasible in Tanta.

Vicuña management, in association with animal husbandry and sustainable grassland management, are the main project activities being implemented with SERNANP, the local community and local government of Tanta. The community has freed 2,000 ha of communal land from domestic animals to allow the vicuña, a wildlife species, to return to this area. Vicuñas are known to graze more evenly and trample less. This leaves more topsoil, thereby reducing degradation of grasslands and increasing water absorption capacity of the soil. Vicuñas produce animal fibre, contribute to scenic beauty and enhance tourism potential. It is expected that this will create employment opportunities for the local community from the commercialization of the fibre and tourism activities. Vicuña provides high-value fibre for which there is high demand on domestic and global markets. The fibre can be harvested every two years. A rapid increase in numbers of vicuña has been observed since the area of Moyobamba was freed of domestic animals. The first harvest of vicuña through the programme took place in October 2015.

Pasture management and livestock management are other project activities. This includes rotational grazing and using both natural (rocks, lagoons, mountains) and built (cattle mesh) fences around 4,500 ha of communal land for livestock pastures. Livestock, which used to graze in shared pastures, have now been separated to different pastures by species. New pastures are being planted, using both native, and a mixture of native and introduced varieties. These measures have already significantly contributed to enhanced condition of the pastures, with a visible increase in vegetation cover. The pastoral plants are flowering and pollinating. Increase in vegetation cover also leads to better water infiltration capacity and reduces risk of soil erosion. Previously, pastures provided for 0.5 sheep a hectare per year, while under new, introduced-variety pastures, a hectare can now provide for up to 18 sheep. This is a 36-fold increase in the provisioning service of pastures as livestock fodder. Under new native pastures, a hectare now provides for three sheep a hectare, a six-fold increase.

The project has strengthened local organizations and management of communal lands. A management plan, developed with support from the project, has been agreed by the community. The vicuña are providing a new source of income to communities in the remote area of Tanta. Healthier ecosystems in Tanta will have a direct impact on the services this upstream community provides, especially in terms of water provision and regulation, to a vast rural and urban area downstream.

Sources: Fernandez-Baca, E. et al. (2014); Fernandez-Baca, E. (2014) Visit to the Nor Yauyos-Cochas Landscape Reserve with Michael Huettner: Travel report. UNDP. Unpublished; Flores, E. (2015) Parte 1: *"Diagnóstico (línea de base) de la Situación Actual del Ecosistema de Pastos Naturales, Suelos y Agua en Seis Sectores de la Granja Comunal de Tanta"*. UNALM. Unpublished; Picon, J. C. (2015b); Woodro Andia Castelo, 2015, pers. comm.

THE WILD VICUÑAS ARE REIGNED IN TEMPORARILY TO GIVE THEM AN ANTI-PARASITIC DRUG TO HELP IMPROVE THEIR HEALTH AND SURVIVAL RATE. © Carlos Diaz Huertas, Tres Mitades

Case Study 6 | Community-based native grassland management and improvement of ancestral hydrological infrastructures in Canchayllo and Miraflores, Peru

From K. Podvin, D. Cordero and A. Gomez. *"Climate Change Adaptation in the Peruvian Andes: implementing no-regret measures in the Nor Yauyos-Cochas Landscape Reserve"* in Murti, R. and Buyck, C. (ed.) (2014). Safe Havens: Protected Areas for Disaster Risk Reduction and Climate Change Adaptation. Gland, Switzerland.

The communities of Canchayllo and Miraflores are located in the Nor Yauyos Cochas Landscape Reserve. Low agricultural production, especially of native crops, associated with loss of traditional knowledge and lack of market access, has led to the migration of the local population, especially youth. Many households have shifted from agricultural activities towards less labour-intensive cattle farming. This shift towards cattle farming, with weak community organization and dense cattle distribution, is causing degradation of the native grassland ecosystem in certain areas.

The project partnered with the NYCLR-SERNANP, as well as municipal authorities and regional governments to undertake programme activities. The EbA measures chosen by both communities include community-based sustainable water management, where upper micro-watersheds, wetlands, watercourses, and their associated vegetation (mainly grasslands) are managed to provide water storage, groundwater recharge and regulation services. In addition, community-based sustainable native grassland management is being implemented to enhance pastoral livelihoods and increase resilience to drought, frost and other extreme events. Each measure is composed of three pillars. The first on institutional strengthening and community organization has implemented a community water and grassland management plan for both Canchayllo and Miraflores. Natural resources management committees have been either strengthened or, where needed, new ones have been created. The second pillar on capacity building to enhance local and traditional knowledge aims to link local and traditional knowledge with new technological knowledge for identifying best practices to apply on the ground.

The third pillar, 'grey-green' infrastructure, consists in Canchayllo of the restoration of a natural water reservoir dam to reduce water filtration and ensure its storage during the dry season. Furthermore, an underground pipe has been restored to transport water from the upper part of the watershed to the community farm, where the water is distributed through ditches to promote its infiltration into the soil, thereby regulating water availability in the upper and middle micro-watershed. It is expected that the restoration of the underground pipe channel will bring moisture to around 800 ha of grasslands during the dry season, contributing to wetland restoration in the upper part of the watershed and the creation of natural watering troughs for livestock. In Miraflores, the grey-green infrastructure included enlarging protected zones around the Yanacancha lakes encircling the upper micro-watershed, in order to prevent cattle and other animals from entering the area. This is expected to promote wetland enhancement and to allow natural regeneration of the surrounding areas' native vegetation. In addition, an ancient water channel was restored to transport water to the Curiuna grazing area. The water channel is expected to create new natural watering troughs for livestock and/or restore the wetlands as a result of the increase in water availability.

Environmental benefits are expected to be achieved through better management and protection of native grasslands, as well as the restoration of upper micro-watershed wetlands. These measures respond to the climatic vulnerability of the highland pastures, where wetlands have been reduced in size. These expected outcomes and benefits include hydrological regulation through enhanced water storage, groundwater recharge and regulation services. Restoring wetlands in grassland ecosystems is expected to reduce the occurrence of natural fires during dry seasons and lessen the impact of extreme temperatures. Short- and long-term socio-economic benefits are expected to be generated through strengthened institutional arrangements and capacities for community management of water, grasslands and livestock. The community water and grassland management plans will seek to improve grassland productivity by organizing grazing activities in the different areas, reducing pressure on over-grazed areas and distributing livestock across the landscape to where pastures have a higher carrying capacity. In addition, the plans will aim to improve community management of these shared resources.

Tangible activities such as grey-green infrastructure were needed in order to reaffirm local commitment to the project. Although such infrastructure activities will provide benefits in the short term, it is important that local stakeholders understand that EbA benefits (both at the institutional, socio-economic and ecosystem dimensions) will take time to consolidate.

THE RURAL COMMUNITY OF CANCHAYLLO SUCCESFULLY REHABILITATED THE CHACARA-JUTUPUQUIO CANAL AND REPAIRED THE CREST OF THE DAM IN THE CHACARA LAGOON. © Carlos Diaz Huertas, Tres Mitades

Box 6 | Non-climatic pressures affecting the achievement of EbA benefits

Experience from the project sites shows that the achievement of EbA benefits can be undermined by various non-climatic pressures. Ecosystem degradation and vulnerability at project sites is driven by a range of factors, such as overexploitation of natural resources, issues of land ownership or population patterns. In many cases it is difficult to say to what extent vulnerability of ecosystems and livelihoods has been caused by climate change, and to what extent by other compounding factors.

The midstream and downstream watersheds of River Sipi and River Atari in Uganda have high population density and land shortages, which have driven communities to undertake intense agricultural activities on river banks, clearing vegetation for cultivation and increasing the occurrence of soil erosion and siltation of the river. Unsustainable farming practices on steep slopes have led to further soil erosion and siltation, as well as increasing the probability of landslides (Case Study 4).

Land ownership issues have proved problematic for the implementation of EbA measures in Mt Elgon, where there is individual, customary land tenure of small land plots. Farmers have been unwilling to sacrifice medium-term income by dedicating scarce land to long-term measures such as tree planting (R Gafabusa and P Nteza 2015, pers. comm.). Having small individual plots can lead to project activities taking place on dispersed land and implementing EbA measures at different rates (P Nteza 2015, pers. comm.). This can challenge implementation and the achievement of impact at a landscape scale. One of the solutions the project has identified is establishment of clear Memoranda of Understanding between communities, government and the project for undertaking agreed activities, and in some cases this has been accompanied by incentive mechanisms and payments for ecosystem services that help compensate for short-term losses. Secure rights to and responsibilities for land (ownership, sustainable use and management) maximize the chances of successful EbA. Compared with the situation in Uganda, with many small privately owned parcels of land, it has been significantly easier implementing EbA measures on larger areas of communal land in Nepal and Peru.

Outmigration is an issue at project sites in both Nepal and Peru. In the Panchase area, outmigration has led to tracts of land being abandoned, including terraces, the maintenance of which requires frequent labour input. This has meant that much land is not productively used, and has allowed the spread of invasive plant species. The project has had to design EbA measures that are feasible given the time and capabilities of the local population and women in particular (Case Study 7). In Nor Yauyos Cochas, the lack of labour force due to outmigration can impede implementation of large scale and infrastructure-based EbA interventions. Implementing canal restoration, for example, has meant significant inputs of time from the community members that remain (A Gomez 2015, pers. comm.).

In Panchase, unregulated construction of infrastructure, in particular of roads, without consideration of ecosystem fragility and functions has accelerated soil erosion, landslides and biodiversity loss, while undermining ecosystem functions such as water provision. In addition, when faced with such large scale interventions, EbA measures remain small in comparison and might end up having limited impact. Because of its status as a Landscape Reserve, Nor Yauyos Cochas has experienced less pressure from land use change than the project sites in Nepal[19] and Uganda. However, there are ongoing political debates on the expansion of mining in Canchayllo, which could pose a threat to the implementation of EbA. Construction of new dams for hydropower could also cause ecosystem disturbances.

Embedding EbA as part of broader development plans and policies that address issues such as land use planning and infrastructure development, for example at district level, can be one way of addressing some of these pressures and increasing the likelihood of landscape scale multiple benefits being achieved.

Sources: Baral, S. et al. (2014); Dixit et al. (2015); Ikkala (2011); Instituto de Montaña (2014); NaFORRI (2012); Shah et al. (2012); Peru APR- PIR Report, July 2013-June 2014.

Participatory assessments increased understanding of the linkages between climate change, ecosystems and livelihoods and thereby enabled a better understanding of EbA and its benefits in the longer term. Framing EbA benefits can be challenging, as the links and causalities between livelihoods, ecosystems and climate change can be complex to understand. In addition, the process of carrying out participatory assessments enabled a sense of ownership and buy-in for identified 'no regrets' measures.

It is essential to show the benefits, and in particular the socio-economic benefits, of EbA to communities early on to make the case for EbA. Having initial 'no regrets' activities that focus on economic benefits, such as promoting alternative livelihoods, or increasing agricultural or livestock production, can help secure commitment. Implementing grey-green water infrastructure measures early on has been another approach to providing tangible and visible environmental and social benefits from the outset.

Once initial benefits of EbA have been shown, the case can then more easily be made for implementing broader, scaled-up EbA measures, which provide a range of benefits in the long term and are essential for enhancing adaptive capacity.

Undertaking vulnerability and impact assessments helps to frame EbA options in a climate change adaptation context. VIAs enabled the validation or redesign of early 'no regrets' measures into evidence-based EbA measures. They also enabled the adoption of a landscape scale approach and long-term planning of EbA measures.

EbA measures provide a range of environmental, social and economic benefits. These include environmental benefits such as enhancing water provision, reducing soil erosion and increasing vegetation. Social benefits include enhanced food security, access to clean water, strengthening of local organizational and technical capacities and empowerment of women and disadvantaged groups. Economic benefits include increased productivity, new sources of livelihoods and increased income.

Benefits derived from EbA measures can be shown in relation to **climate change adaptation functions.** EbA measures can, for example, increase agricultural and livestock production during dry spells, through increased water provision by well managed watersheds. Restoring grasslands can increase provision of grazing and forage during dry periods, regulate water and floods during heavy rainfall and stabilize slopes during landslides.

A watershed or catchment was found to be a particularly good scale for planning and implementing EbA measures. This scale is appropriate in particular when making the case for landscape scale approaches to district level governments and protected area managers. It also ensures the attainment of EbA benefits in a more comprehensive and sustainable manner, especially with regards to ecosystem provision and regulating services.

Building on **existing knowledge** can further embed the benefits of EbA. EbA is a **knowledge-based approach, which requires both scientific and traditional knowledge.**

Incorporating EbA into existing **local structures and plans** can further **make the case on the relevance of EbA benefits** for existing goals and priorities, in addition to strengthening institutional and adaptive capacities to deal with climate change adaptation.

Showing the multiple benefits of EbA to **government** planners and policy makers can show how EbA helps fulfill public policy goals, and can increase interest in implementing EbA measures. This can then lead to incorporation of EbA into relevant governance structures, plans and policies, as well as allocating budgets in relevant sectors, from local to national level.

Measuring impact of EbA is essential, as so far most evidence is case study-based, and more quantitative evidence is needed to make the case for EbA. The development of EbA indicators is in its initial stages.

MOSES MONJE FROM SIRONKO DISTRICT OF MOUNT ELGON, UGANDA, PROUDLY HOLDS A COFFEE BEAN FROM HIS NEW HARVEST. A LOAN FROM A PROGRAMME-SUPPORTED COMMUNITY LENDING AND SAVING SCHEME ALLOWED MOSES TO INVEST IN A CLIMATE-RESILIENT AGRICULTURAL INCOME STREAM.

CHAPTER 3:

MAKING THE ECONOMIC CASE FOR EBA

In Nepal, cultivating broom grass and constructing gabion walls proved good investments. In Peru, sustainable management of grassland, livestock and vicuña performed better economically compared with current management practices. In Uganda, not only were EbA farming practices more profitable than non-EbA but the profit could be sustained in the long run. These findings came from a cost-benefit analysis (CBA) of each pilot project. This objective methodology for quantifying EbA costs and benefits can be used to guide decision-making on EbA measures. For example, a CBA can compare potential EbA interventions with business as usual scenarios or with alternative adaptation options.

This chapter sets out the relevance of cost-benefit analysis in making the economic case for EbA and why this approach was chosen. It presents the CBA work carried out by the programme in Nepal, Peru and Uganda and demonstrates how CBA can be used to make the economic case for EbA.

3.1 Using cost-benefit analysis to promote EbA

Cost-benefit analysis is a method to evaluate the economic and financial feasibility of a proposed action by a public or private sector role-player that results in certain benefits and certain costs. CBA is an economic methodology that can help make better decisions. Ecosystems provide a variety of services, underpinning human well-being and socio-economic development. These services can be quantified and valued to estimate the benefits gained from a landscape. Various investments can be made – in the case of this programme, through 'no regrets' and EbA measures – to maintain or enhance these ecosystem services. CBA can be used to attempt to estimate the cost of these EbA investments and compare it with the benefits provided by these retained or enhanced ecosystem services. If the benefits exceed the costs, it makes economic sense to invest.

CBA can thereby help make decisions regarding EbA investments, whether at local level, by individual farmers, cooperative organizations or companies, or at national level through state expenditure. It provides a methodology for making decisions in situations of scarcity, or limited resources, and offers an objective way to choose between competing alternatives by weighing their relative costs and benefits. For example, if a farmer is to invest in soil and water conservation measures as part of EbA in order to reduce soil erosion under increasing conditions of drought, he will be interested in knowing whether these measures will provide more benefits and return on the land, compared to business as usual use of fertilizers. The CBA framework can be used to sum up decision criteria for choosing the best alternative.

CBA can be used to compare EbA with business as usual (BAU) natural resource management – for example, restoring conservation ponds to increase water provision or no longer using conservation ponds once they dry up or become degraded. It can also be used to compare EbA with other adaptation options – for example, using mangroves or a seawall to provide coastal protection from sea level rise.

3.2 Comparing tools and methodologies for making the economic case

A number of economic tools and methodologies are available to evaluate, rank or prioritise EbA options, or compare them with non-EbA options. CBA can be used when the costs and benefits of an EbA option are measurable in monetary terms and the value placed on investing in the EbA option can be quantified. However, in certain cases it may be possible to attach monetary value only to the costs of a project, but not to the benefits. In this case, a cost-effectiveness analysis can be a useful tool. Multi-criteria analysis can be useful to decision-makers when environmental or social impacts cannot be assigned a monetary value. It can be used to consider a full range of criteria, e.g. social, environmental, financial, economic and technical. The programme also considered targeted scenario analysis (TSA), which uses socio-economic indicators to compare the pros and cons of continuing with business as usual (BAU) or following in which ecosystems are more effectively managed (sustainable ecosystem management/ SEM). This approach can also be applied to compare a BAU scenario with an EbA scenario. It is conducted for a particular productive or consumptive sector, with a specific decision-maker in mind who has the mandate to make policy or investment decisions that could bring about a shift from a BAU path to a SEM/EbA path (Box 7). Although a full TSA approach was not applied in any of the three programme countries, the methodology influenced the way that the results from assessing costs and benefits were presented in the three countries.

The Mountain EbA Programme decided to use CBA as its methodology for making the economic case for EbA, as it is a widely used methodology accepted by decision-makers, especially in the Ministries of Finance and Planning. Compared to other methods, it provides an objective way of ranking alternatives. For example, the Ministry of Economy and Finance in Peru uses CBA for appraising projects and only accepts CBA as a project appraisal tool.[21] Given that the Ministries of Finance were key partners of the project and a target audience for whom to make the case for EbA (Chapters 4 and 5), the use of CBA was deemed particularly relevant for this programme.

Methods for assessing projects in CBA include calculation of net present value (NPV); internal rate of return (IRR); and benefits-cost ratio (BCR). These methods are explained in Box 8. CBA identifies all direct and indirect benefits and costs of a project, quantifies potential physical and biophysical impacts and values them in monetary terms,

compared against a range of optimality criteria on an ex ante basis (see Box 8 below). Cost-benefit analysis for climate change adaptation is typically done ex ante as a criterion for deciding between alternatives for climate change adaptation. The results from the CBA provide evidence on the optimal adaptation option that the project, or decision-makers, should propose or invest in.

In the case of the Mountain EbA Programme, the 'no regrets' and EbA measures were chosen on the basis of the participatory assessments and vulnerability and impact assessments, as described in Chapter 2. The cost-benefit analyses were generally applied to interventions already being implemented by the programme and the results of the CBA were not, therefore, used to choose between

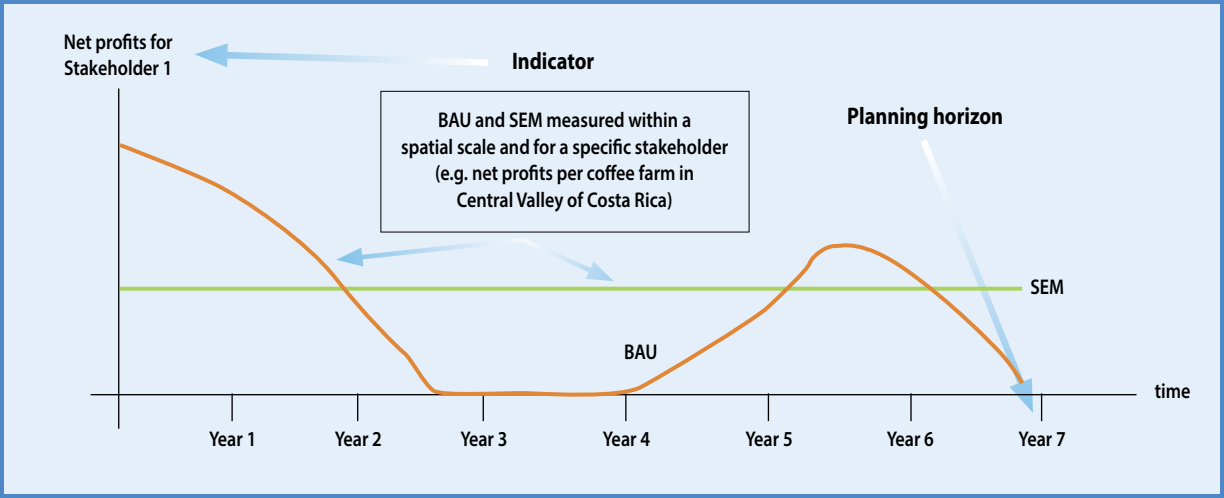
Box 7 | Targeted Scenario Analysis

TSA compares the implications of two contrasting management strategies on the basis of relevant socioeconomic indicators (both quantitative and qualitative) for a specific productive or consumptive sector. It draws from all available information, from existing or newly generated data to expert opinions. TSA is a balanced presentation of evidence, weighing the pros and cons of continuing business as usual (BAU) or following a sustainable development path in which ecosystems are more effectively managed (SEM). A TSA is conducted with a specific decision-maker in mind (e.g. government official or business). The appeal of the TSA approach in making a case for EbA is its graphical presentation of results. Information on a specific decision and/or management practice is presented as a continuous, long-term analysis, showing relative change over time.

The five steps of a TSA are: i) defining the purpose of the analysis; ii) defining the BAU baseline and SEM intervention; iii) selecting criteria and indicators; iv) constructing the BAU and SEM scenarios; v) making an informed policy or management recommendation.

The main product generated using the data amassed during a TSA is a set of graphics, with time on the horizontal axis and a measurable indicator, such as revenues or number of jobs, on the vertical axis. In the graph there are two curves, one capturing and depicting BAU and one the SEM (or EbA) scenario. A TSA graphic should be accompanied by a narrative that explains whom it is for (stakeholders), how it was generated (assumptions, data sources) and levels of confidence and uncertainty, among other things. This complementary text will both rationalize the graphs and also act as the bridge between the graphs and policy decisions.

Figure 6 | Targeted scenario analysis: changes over time



Source: http://www.undp.org/content/undp/en/home/librarypage/environment-energy/environmental_finance/targeted-scenario-analysis.html]

EbA options. In some cases (e.g. siltation dams in Nepal), CBA was used to evaluate potential future EbA measures. The purpose for carrying out cost-benefit analyses for this programme was to use the results of the CBAs as tools for making the economic case for EbA and for guiding decision-making on future EbA investments.

3.3 Applying CBA to the Mountain EbA Programme

Cost-benefit analyses were carried out in the three programme countries with different focuses and approaches. Differences included focusing on communities in Nepal and Peru, and on individual farmers in Uganda. This was due to land ownership patterns at site level, where the project measures in Nepal and Peru are implemented primarily on communal land, and in Uganda on private land (Chapter 2). Different approaches were also taken regarding what EbA options are being compared to – whether to business as usual approaches that allow degradation to continue, or to other adaptation options (e.g. infrastructure).

In all three cases, the CBAs sought to understand if, given the choice between EbA and another adaptation option, or between EbA and inaction/business as usual, EbA would be the optimal choice; and if not, what were the factors influencing this, and in which circumstances would it not be optimal.

Identifying and defining scope is one of the first steps of carrying out a cost-benefit analysis. This step of the CBA

Box 8 | Project assessment criteria for cost-benefit analysis

Economists use discounted methods of project assessment to appraise a project. These methods include the net present value (NPV), economic internal rate of return and benefit cost ratio (BCR). These methods are based on estimating discounted streams of benefits and costs based on the discount rate.

Present values (PV) of benefits and costs are derived from future values (FV) of benefits and costs by a process known as discounting. Discount rate depends on inflation, marginal rate of time preference, and risk associated with a project or intervention. It is used to reflect the productivity of the capital and the preferences of the population. Discounting is how future values (FV) are converted into present values (PV). That is:

$$PV = \frac{FV_t}{(1+\delta)^t}$$

Where t is time and δ is the discount rate. Applying the same principle to benefits and costs, we can define our project assessment criteria as follows:

1. Net present value (NPV): This is the difference between the discounted benefits of a project and discounted costs of the project. A project is said to be desirable if the sum of discounted benefits is greater than the sum of the discounted costs. That is NPV > 0.

$$NPV = \sum_{t=0}^{T} \frac{B_t}{(1+\delta)^t} - \sum_{t=0}^{T} \frac{C_t}{(1+\delta)^t}$$

2. Internal rate of return: the internal rate of return is defined as the discount rate that makes the stream of benefits equal to the stream of costs. The internal rate of return is compared to the discount rate to decide if the project is beneficial or not. A project with an IRR that is higher than the discount rate is considered a good project. Technically, this implies that the return from the project is higher than the cost of capital that goes into the project. Mathematically we can define this as:

$$\sum_{t=0}^{T} \frac{B_t}{(1+\delta)^t} = \sum_{t=0}^{T} \frac{C_t}{(1+\delta)^t}$$

3. Benefit cost ratio: The benefit cost ratio as the name implies is the ratio of the discounted stream of benefits and the discounted stream of costs. A benefit cost ratio of 1 implies that the benefits are equal to the costs.

$$\frac{B}{C} = \sum_{t=0}^{T} \frac{B_t}{(1+\delta)^t} \Big/ \sum_{t=0}^{T} \frac{C_t}{(1+\delta)^t}$$

typically requires understanding the project, analyzing data (spatial, climate and geographical) and engaging in focus group discussions to narrow down the suite of feasible adaptation options. Thus, CBA is typically part of the design of the project proposal and planning. Under this programme, the participatory assessments and vulnerability and impact assessements served as a proxy for defining the scope of the CBA. This made the scope of the CBA differ across countries. The economists in the countries used the data available from those initial assessments and discussions with the project team to define the scope. The CBA for each country addressed one or more of the problems raised in the VIAs. With a different scope in each case, the data needs for carrying out the CBAs in each country also varied, as will be described below.

Various studies including Leary (1999); Nassopoulos et al. (2012); and Wise et al. (2014) have identified and described frameworks for applying economic methodologies for assessing climate change adaptation projects, given the peculiarities of climate change, especially uncertainties related to the benefits and costs. Leary (1999) provides a framework for assessing the benefits and costs of adaptation to both climate change and climate variability, which are factored into the methodology for CBA used in this project.

Climate change impacts differ across the three countries and project sites. Thus, climate change has been incorporated in different ways. The baseline assumption is that the stream of benefits and costs that accrue from the project and the identified alternatives (including business as usual) are not affected by climate change. However, with climate change impacts being mainly negative and expected to intensify in the future, the stream of benefits and costs will also be affected. The general premise is that EbA strategies will lead to better outcomes than other options (BAU in particular), because they improve the ecosystem and should lead to higher benefits or lower costs than the other scenarios. Climate change impact projections for the region or country were used to make the link to benefits and costs.

3.3.1 Nepal

The CBA framework was applied to various interventions in Nepal that focus on major exposures identified in the VIA: landslide and erosion. Several interventions were included in the CBA:

- plantation of broom grass (*Thysanolaena maxima*) in degraded grasslands in Chitre VDC;
- plantation of Timur (*Zanthoxylum armatum*) in private land in Parbat VDC;
- construction of gabion walls and revegetation along the banks of Harpan River; and
- proposed siltation dams along or on the streams of Harpan River.

The first three interventions are currently being implemented in the project area. The siltation dam is a proposition that has not yet been constructed and the CBA was carried out to measure the feasibility of the investment.

Products derived from broom grass and Timur provide alternative livelihoods, and the plants can grow in dry land and reduce soil erosion under changing climatic conditions (Case Study 7). Two scenarios of project or investment outcomes were generated for each of these two plantation interventions: one with the intervention and the other without it (BAU scenario). As outlined in Case Study 7, the CBA analysis shows that planting broom grass as an EbA intervention is more profitable and viable in terms of benefit-cost ratios than business as usual.

In the case of broom grass, understanding the production process and yield of broom grass was important, as well as the ecosystem services the plant provides. Projects in other parts of the country that had invested in broom grass were used to evaluate the investment for this project, because implementation in Panchase had only recently begun and could not be used to gather needed data. This is a standard technique in CBA, known as benefit transfer. In this case, the yield of the broom grass as observed in another location was assumed to be the same on average as at the project site, based on assumed similarities in climatic conditions.

For the gabion walls and siltation dams, analysis of the business as usual scenario could not be carried out, mainly due to lack of data and shortage of time. Instead, a simple cost-benefit analysis to estimate the efficiency and cost-effectiveness of the investments was carried out (Case Study 8). The research found it very difficult to gather externality and valuation data needed for CBA, as this is a new approach and information is not readily available in Nepal (Kanel 2015). The simple economic analysis carried out shows, however, that investment in the construction of gabion walls with anchoring vegetation has net benefits.

Case Study 7 | Broom grass cultivation in Chitre VDC, Parbat District, Nepalu

From: T. Rossing, N. Chhenjum Sherpa and A. Egan. 2015. "Challenging gander roles and crossing castes: Promoting women´s livelihoods through broom grass cultivation in the Nepal Himalaya". UNDP.

K. Kanel, 2015. Cost-benefit analysis of EbA interventions: Case studies from Panchase Project Area. Draft, unpublished.

Broom grass as an EbA project

The Panchase region has lost its once stable population of young men, who now migrate in search of better economic opportunities in Pokhara and Kathmandu and further afield in India, Malaysia and the Middle East. As a result, there is a lack of young men in these mountain communities, leaving mostly the elderly, women and children behind to maintain the households.

Approximately 30 percent of the land originally used for cultivation in the Panchase region is currently abandoned, leading to a problematic decrease in agricultural production and an increase in invasive vegetation. Abandoned, overgrazed and unproductive grasslands and crop terraces in the region are vulnerable to climate change impacts such as rising temperatures and unstable rainfall patterns, which are drying up water sources, changing vegetation characteristics, and making landslides more frequent and severe.

Broom grass (Thysanolaena maxima), an indigenous plant commonly known as Amriso, is a popular product in Nepal. Amriso's inflorescence (panicles) can be used to make sweeping brooms, while the leaves of the plant can be used as livestock fodder and the stems as fuelwood. The plant has mainly been grown for personal use, yet it has untapped commercial potential on local markets, regional centres and even internationally (particularly in India). It has the ability to quickly regenerate even in degraded, dry lands and slopes, and out-competes invasive species. Its strong web-like rooting system also helps to reduce top- and sub-soil loss, thereby reducing soil erosion. This is particularly important with increasingly frequent intense rainfall events. These characteristics make Amriso ideal for Ecosystem-based Adaptation. It can thrive on dry lands; reduce soil erosion; improve slope stability and reduce landslides; rehabilitate degraded lands; and provide an alternative source of income for sustainable livelihoods.

Cultivation of broom grass has a long-standing tradition among poor rural communities in Panchase. The project, led by the Department of Forests of the Government of Nepal and UNDP, is supporting the Panchase Women´s Network to scale up Amriso plantations. As part of the project, the women's network was able to lease 0.25 hectares of marginal land, which was barren and degraded at the time, and prone to soil erosion given its steepness.

AMRISO/BROOM GRASS GROWING IN PANCHASE, NEPAL. © UNDP Nepal

Cost-benefit analysis

A CBA was carried out at the project site. Two scenarios of project or investment outcomes – one with the intervention and the other without it (BAU scenario) were generated for the broom grass plantation intervention.

The methodology included a desk study, expert and stakeholder consultations. Data was gathered from pilot sites with the project team and stakeholders on the types of ecosystem services and their values, through various market and non-market (including applying valuation techniques such as benefit transfer, replacement cost and avoided damage cost) mechanisms. Similarly, the cost of the EbA interventions was calculated based on the types of financial disbursement made by the project for each EbA intervention, and the breakdown of such costs and other costs borne by the stakeholders and beneficiaries in the project area. Economic analysis was carried out to estimate benefit-cost ratio, internal rate of return and cost-effectiveness of the EbA interventions.

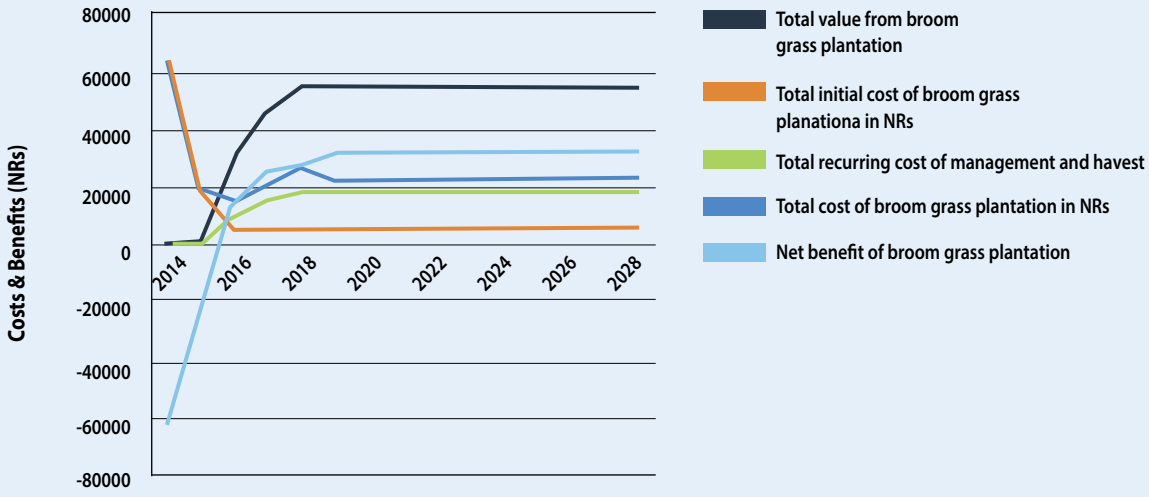
Costs and benefits were mostly based on market prices. However, some of the benefits could not be easily captured through market prices. So, two additional valuation methods were used to value the external benefits of reduced soil erosion. One of the valuation methods was the replacement cost method. This method is a valuation approach to estimate the value of the lost soil nutrients due to erosion. It is the value of the nutrients (nitrogen, phosphorus and potassium or NPK) required to compensate the productivity of the soil due to soil erosion. For this, the magnitude of nutrients lost needs to be established alongside the market price of these nutrients.

A business as usual scenario was analysed based on grass from degraded grassland. Costs included annual rental fee of the land; yield of grass from the degraded grassland; cost of harvesting and transportation of the grass to the household. Benefits included the value of the grass for household use. Given this was a BAU case, no additional benefits would be provided for soil conservation.

The economic life of the broom grass plantation is estimated to be 15 years, for the purpose of estimating the optimal level of benefit from this as an EbA measure. Hence, the same period of economic life has been assumed for the grassland management. The EbA project covered the costs of a rental fee, in Nepalese Rupees, of NRs 14,000 per hectare of grassland for broom grass plantation. This cost will lead to an annual discounted loss of about NRs 3,528 or a negative net present value of NRs 29,816 per hectare. The benefit cost ratio would be 0.9, which also indicates negative returns. The present value calculation was based on a 10 percent discount rate (standard used in Nepal).[22]

An analysis of the EbA project site assessed initial costs of land preparation and weeding; rhizomes as planting materials; training costs for the women's network; wages for maintaining the broom grass plantation. Benefits include the sale of brooms on the market; household use of leaves for feeding livestock, including in the dry season; and household use of stems for fuel. Major income from the plantation is from the sale of bundles of broom grass which is in high demand within the country and in neighbouring countries.

Figure 7 | Costs and benefits of broom grass plantation in Chitre, Parbat



Other benefits accrued to society from EbA include reduced soil erosion on site and reduced sedimentation downstream as a result. Soil erosion is estimated at 10.62 tons/ha/year under the business as usual scenario (degraded grassland management), where no actions are undertaken to reduce land productivity (e.g. no use of fertilizers or other non-EbA land management approaches to reduce erosion). Soil erosion is estimated at 5.54 tons/ha/year under the EbA scenario (broom grass plantation), so there is a net reduction of 5.08 tons/ha/year of erosion from the land. The other external value is NRs 192 per hectare per year to account for the benefits of reduced sediment load in Phewa Lake. Figure 7 shows the discounted present value of benefits and costs of broom grass plantation for the EBA case. The results are presented this way building on how results are presented in a targeted scenario analysis. A look at the figure indicates that broom grass plantation is beneficial with benefits looking higher than the sum of costs.

Table 11 | Economic analysis of broom grass plantations (NRs per Ha)

	BAU	EbA
Discounted annual net benefit	(-NRs 3,528)	
Net present value (NPV)	-NRs 29,618	NRs 277,392
Benefit cost ratio (BCR)	0.9	1.3
Internal rate of return (IRR)		21%

Table 11 presents the results for the discounted present value of benefits, costs and the three decision criteria (NPV, BCR and IRR) that relate to the scenario. It should be noted that the net impact of EbA is the difference between the BAU scenario and the EbA. Since for the EbA scenario the net present value is a lot higher than the BAU (about nine times higher) and the ratio of benefits to costs for the EBA case is 1.3, one can conclude that the EBA intervention of broom grass is relatively profitable. Other decision criteria also suggest that the EbA options are better relative to the BAU – the internal rate of return of 21 percent is higher than the discount rate of 10 percent, which is the assumed cost of capital.

The cost-benefit analysis shows that the planting of broom grass remains a viable and profitable investment compared to business as usual. It should be noted that the EbA scenario also provides additional benefits, which were not quantified and are described below. The implication of this is that the EbA scenario becomes even more attractive if those benefits are accounted for.

Other benefits

Amriso grows quickly and requires minimal time and effort to plant and maintain, making it a good fit for the women's demanding schedules and increasing workloads in an area with high male outmigration. Cultivating Amriso for commercial use has also been integral in creating a much stronger social bond between the women in the Network, crossing traditional caste-determined social and cultural barriers. The Amriso initiative is planned, executed and safeguarded by the women themselves, thereby challenging traditional gender roles in Nepal and empowering the women. Local politicians were initially skeptical but became supportive once they saw the success of the demonstration plantation of the Women´s Network. Broom grass is grown on private land, by the Women's Network on jointly leased land, and on communal land. There is good potential for scaling-up broom grass cultivation as an income-generating, climate resilient livelihood option within Chitre VDC.

BROOMS FOR SALE IN POKHARA, NEPAL. A SINGLE CLUSTER OF BROOM GRASS CAN PROVIDE ENOUGH MATERIAL FOR 7-9 BROOMS PER YEAR.
© Andrea Egan, UNDP

Case Study 8 | Constructing gabion walls along the Harpan River, Nepal

From: Kanel, K (2015) Cost-benefit analysis of EbA interventions: Case studies from Panchase Project Area. Draft, unpublished.

Construction of gabion walls with anchoring vegetation was undertaken to control the ravages of the fast moving Harpan River at Ghatichhina, likely to be intensified by the effects of climate change in the watershed area. This is described as 'bio-engineering' in Nepal, and represents a hybrid green-grey approach to adaptation. Dry stones are stacked in a mat of gabion wire; and bamboos and other shrubs and trees are planted on top of the stacked gabion wall. The trees or bamboos help to support or anchor and reinforce the gabion structure on the ground and make it more effective.

The cost of the gabion includes the soil excavation, fabrication of gabion wire, setting the gabion boxes, transportation of materials from Pokhara to the site, filling boxes with stones, and bamboo plantation on top of the gabion wires. An annual maintenance cost of the structure was also estimated. All of the investment cost was born in the first year. Most of the labour cost of constructing these gabion walls with trees on them, and the annual maintenance cost are borne by the local land owners (about 40 percent in total), while the capital cost of gabion wire, the costs of skilled labour, and the costs of transportation of stones to the site are borne by the government or by the EbA project (about 60 percent). Two types of benefits accrue from the gabion wall structures: benefits to private landowners from protection of their land against erosion, and benefits to downstream users of water and the tourism industry from reducing siltation in Phewa Lake as a result of erosion.

Part of the land along the Harpan stream, where no EbA intervention had occurred, was eroded in the 2014 rainy season. The dimension of the damage and the amount of the soil loss from the site was measured to estimate the annual total loss of productive land along the stream without an intervention, and the amount of sediment that would be deposited in Phewa Lake from the erosion. Once the gabion wall structures are constructed, these losses or damages would be avoided. The benefit of avoided losses (damage averted) due to the reduction on sedimentation in Phewa Lake is estimated to be NRs 155 per ton of soil sedimentation avoided (derived from a previous study on Phewa Lake, Kanel et al. 2013).

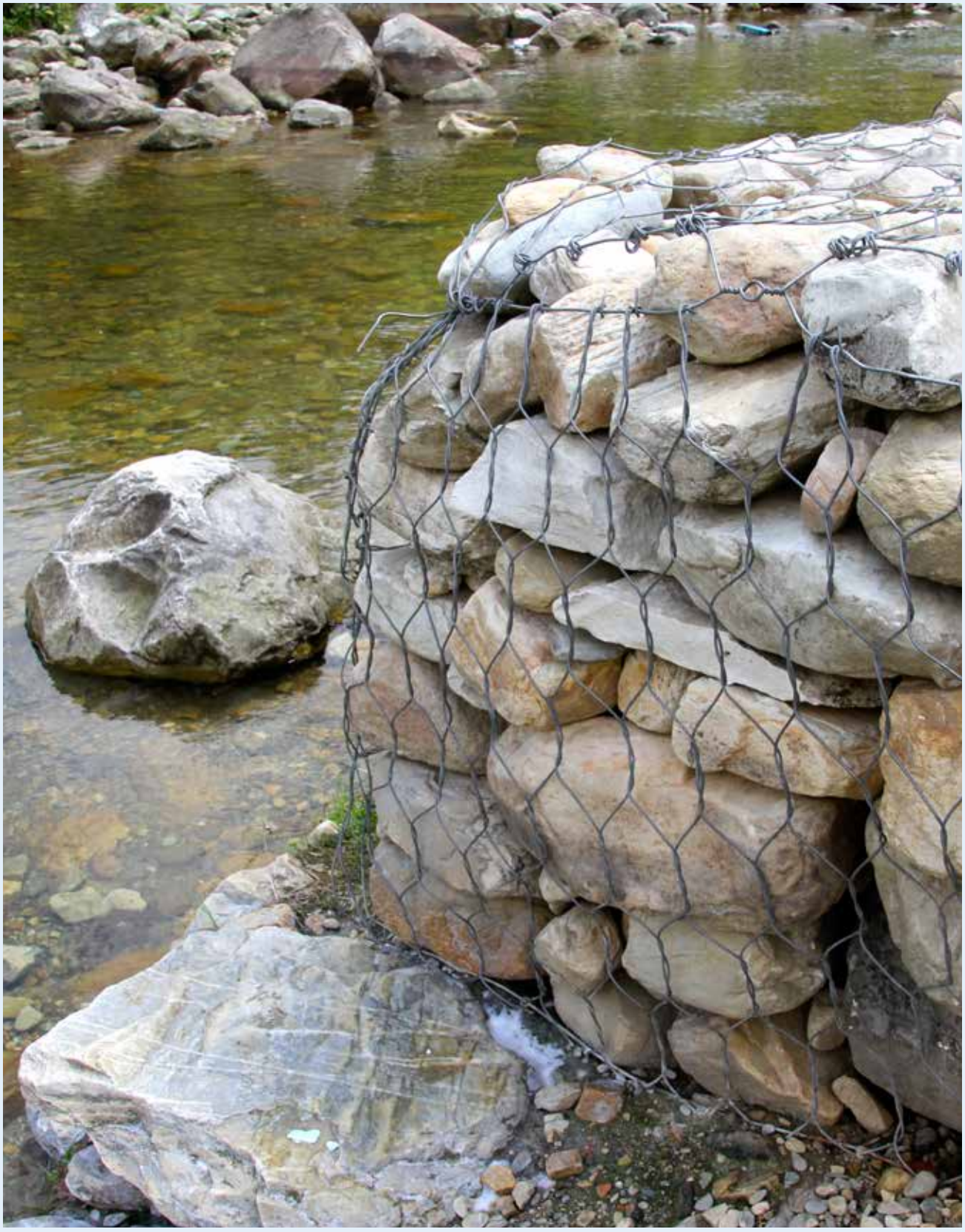
The total investment cost of the bio-engineering structure, which is incurred in the first year, is NRs 651,231. The recurring cost (NRs 25,000) that is incurred from the second year onwards is borne by the farmers. The life of the structure is estimated to be 20 years. Annual benefits from the investment include private and external (social) benefits. The private benefit of annually protection of the land (90 square meters) is NRs 141, 509, and the annual social (indirect) benefit or avoided cost is NRs 12,555 or a total annual benefit of NRs 154,064.

A simple cost-benefit analysis was carried out to estimate the efficiency and cost-effectiveness of the investment. A discount rate of 10 percent was chosen. The total discounted benefit of the cost was NRs 782,140, and the discounted benefits were NRs 1,288,737 over a period of 20 years. Thus, the benefit cost ratio is about 1.6. The internal rate of return is 19 percent. Similarly, the net present value (NPV) of the investment is NRs 506,597. 91.8 percent of benefits accrued to private farmers, while 8.2 percent of benefits accrued to society through reduced sedimentation in Phewa Lake. All of these results show that the gabion wall is a very beneficial investment and a cost-effective way of helping society adapt to anticipated climate change.

Table 12 | Economic analysis of gabion wall

Total discounted benefits	NRs 1,288,737
Total discounted costs	NRs 782,140
Net present value (NPV)	NRs 506,597
Benefit cost ratio (BCR)	1.6
Internal rate of return (IRR)	19%
Calculated with a discount rate of 10% and life span of 20 years.	

A GABION WALL CONSTRUCTED IN THE HARPAN RIVER, NEPAL, TO HELP PREVENT SILTATION AND RIVERBED EROSIION.
© Andrea Egan, UNDP



3.3.2 Peru

The project in the community of Tanta in the Nor Yauyos Cochas Landscape Reserve is focused on vicuña, animal husbandry and sustainable grassland management (Case Study 5), in order to generate hydrological and other ecosystem service benefits that help the community and downstream water users adapt to climate change. Through the EbA interventions of the project, livestock is now separated in grazing areas with natural and built fences, and the wild vicuñas are allowed to roam in the northern part of Tanta. These measures to manage grazing and rangelands will lead to increased vegetation cover, reduced loss of soil cover and enhanced water infiltration capacity, which in turn will help maintain water provisioning and regulation services in the face of anticipated climate change impacts.

LAND USE ZONING HAS BEEN AN IMPORTANT PART OF ENHANCING CLIMATE-RESILIENT ANIMAL HUSBANDRY AND GRASSLAND MANAGEMENT IN THE NYCL RESERVE. © James Leslie, UNDP Peru

The cost-benefit analysis focused on comparing the livestock and rangeland management practices designed for EbA, as described above, with a business as usual scenario. Business as usual was defined as the continuation of current livestock management characterized by overgrazing and sharing of pastures by livestock and vicuñas, with loss of vicuñas as a result of sharing limited, overgrazed land. The valued ecosystem services were: i) food for domestic cattle and vicuña; ii) provision of alpaca fibre; iii) provision of (sheep) wool; iv) provision of alpaca meat; v) provision of sheep meat; vi) provision of beef; vii) provision of vicuña fibre; and viii) provision of water for agricultural purposes. Other benefits such as increased water infiltration, water regulation and soil erosion control, expected over time and at a larger scale, were also evaluated. These additional benefits were found to be more complicated to measure.

The WaterWorld model developed by King's College London for the Tanta area provided the best available data to use in estimating the monetary value of water infiltration, regulation and soil erosion control benefits from the project. WaterWorld is a testbed for development and implementation of land- and water-related policies for sites and regions globally, enabling intended and unintended consequences to be tested *in silico* before they are tested *in vivo*. The WaterWorld model can also be used to understand hydrological and water resources baseline and water risk factors associated with specific activities under current conditions and under scenarios for land use, land management and climate change.

The WaterWorld model does not calculate the rate of water infiltration directly, but provides erosion values. The CBA study used these erosion values as a proxy for what happens to the water retention capacity of the soil. The assumption made was that soil erosion would lead to increased water runoff and reduced water storage capacity of the soil, thereby reducing overall water infiltration/retention capacity.[23] In terms of the cost-benefit analysis, evaluating this additional benefit not only improves the net present value but also highlights the benefits of EbA. While the final CBA result in the country did not include the benefit of water infiltration, we note that the results presented undervalue the benefits of the project.

The cost-benefit analysis conducted in Peru found that the EbA measures were economically preferable to business as usual scenarios (Case Study 9).

Case Study 9 | Cost-benefit analysis for sustainable grassland management, vicuña management and animal husbandry in Tanta, Peru

By Jorje O. Elgegren, with Daniel Abanto (publication forthcoming)

Introduction and methodology

The cost-benefit analysis was carried out in the District of Tanta in the Province of Yauyos, which forms part of the Region of Lima. This is a mountainous area formed primarily of wetlands and grasslands. The area has potential for commercial grazing of alpacas and sheep, although current management practices have led to overgrazing, soil erosion and an increase in invasive plants. The area consists of both private and communally owned land. The Mountain EbA project focuses on vicuña management, in association with animal husbandry and sustainable grassland management (Case Study 5).

A conventional cost-benefit analysis was carried out, extending the scope to incorporate the benefits brought in by EbA measures in terms of both market and non-market benefits. The CBA analysis studied two scenarios: i) without the project and EbA measures (BAU); and ii) with the project EbA measures. Both scenarios assume the impact of climate change over time on temperature, soils and water availability, which ultimately impact on Tanta's carrying capacity. In addition, at the request of the Ministry of Economy and Finance (MEF), scenarios were also developed for a situation without climate change (these are not addressed in this case study).

Eight ecosystem services were valued in terms of change in productivity. Carrying capacity was also valued for the first service, i.e. food for domestic cattle and vicuña. The valued ecosystem services were: i) food for domestic cattle and vicuña; ii) provision of alpaca fibre; iii) provision of (sheep) wool; iv) provision of alpaca meat; v) provision of sheep meat; vi) provision of beef; vii) provision of vicuña fibre; and viii) provision of water for agricultural purposes.

Sources for estimating productivity changes included studies (including those produced by the Mountain EbA project) and personal communications with technical project staff in the field. The analysis was carried out for a time horizon of 20 years, from 2014 to 2033. The discount rate used was 4 percent (as used by the Government of Peru for the evaluation of climate change mitigation projects), however, results are shown for a rate of 9 percent (the usual figure applied by the government for the remainder of project types).

ANIMAL HUSBANDRY, INCLUDING SHEEP, IS AN IMPORTANT INCOME GENERATION WITHIN THE NOR YAUYOS COCHAS LANDSCAPE RESERVE IN PERU. © Carlos Diaz Huertas, Tres Mitades

Results of analysis

The focus of analysis was the community of Tanta, which was divided in two different project areas: i) community farm, where domestic cattle (cow, sheep and alpaca) are raised; and ii) vicuña project, where vicuñas are managed in the wild.

The main costs of the community farm are: i) equipment and inputs, e.g. fences, trucks, slaughter house, veterinary services, etc.; ii) labour, e.g. infrastructure construction and maintenance, shepherding, etc.; iii) training; iv) internship programme; and vi) provision of technical assistance.

As for the vicuña project, the main cost components were: i) inputs for basic chaccu (the act of gathering wild vicuñas to proceed to shearing); ii) shearing equipment; iii) labour for chacu and shearing; iv) training; and v) internship programme.

Local market prices were used in most cases, with the exception of alpaca and vicuña fibre, where border (export) prices (and costs) were used to express social value.

The results of the CBA are highly positive for the use of EbA measures in Tanta. Table 13 shows the profitability indices using a discount rate of 4 percent over the evaluation period.[24]

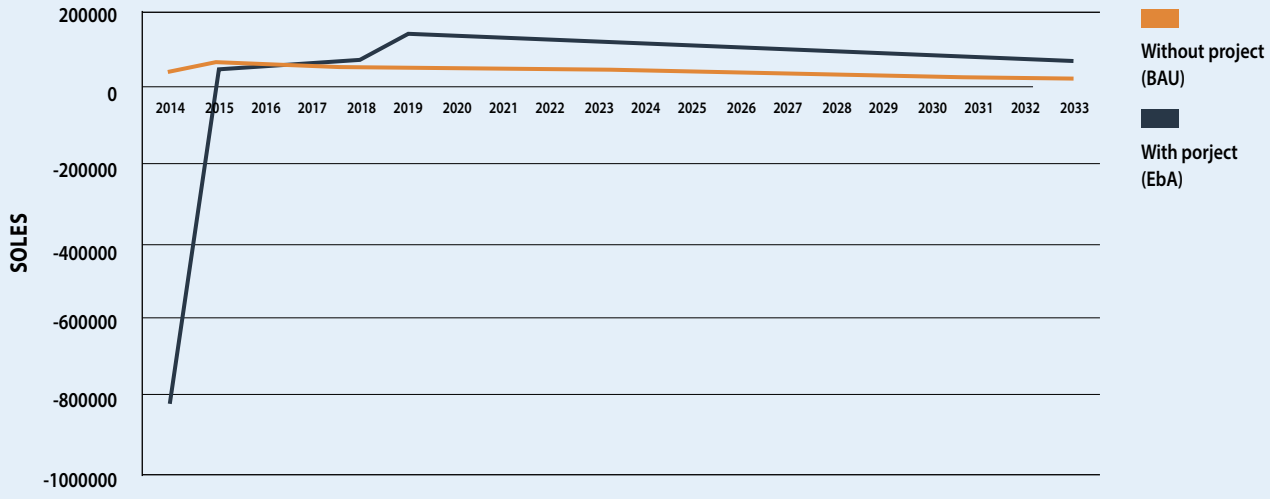
The internal rate of return (IRR) is not included because the net benefit is not negative.

Table 13 | Tanta (Peru) profitability indices, with and without EbA, r = 4%, 2014-2023

Profitability indices	Without project (BAU)	With project (EbA)
NPV Soles	S/. 1,381,862.61	S/. 2,391,004.37
NPV US dollar	$486,571.34	$841,902.95
IRR	NA	20%
BCR	2.71	1.27

Note: The Peruvian Nuevo Sol (PEN) is the currency of Peru.

Figure 8 | Tanta (Peru) discounted net benefit flow, with and without EbA, r = 4%



The net present value (NPV) is twice as much in the case of the project (EbA) scenario, compared to the BAU scenario. While both the BAU and EbA scenarios have a BCR greater than 1, making them profitable, the BCR is much higher at 2.71 for the BAU scenario, compared to 1.27 for the EbA scenario.

Figure 8, in turn, shows the flow of discounted benefits with EbA measures (in green) and without EbA (in red) for the evaluation period. As can be seen, the figures become positive under the with–EbA scenario as early as year 2 (2016) and keep well over the flow of discounted benefits of the alternative scenario through the end of the period, which is another strong indication that the EbA scenario is preferred economically over the without–EbA scenario.

Table 14 presents the estimates of the decision criteria using a discount rate of 9 percent over the evaluation period.[25] The EbA scenario retains a higher net present value, making it attractive financially over BAU. As in the case above, the investor would prefer the with-EbA scenario.

Table 14 | Tanta (Peru) profitability indices, with and without EbA, r = 9%, 2014-2023

Profitability indices	Without project (BAU)	With project (EbA)
NPV Soles	S/. 914,644.36	S/. 1,140,594.10
NPV US dollar	$322,057.87	$401,617.64
IRR	NA	20%
BCR	2.65	1.09

Note: The Peruvian Nuevo Sol (PEN) is the currency of Peru.

Conclusions and recommendations

Cost-benefit analysis can be readily adapted to conduct economic analysis of EbA measures. This has implications in terms of making the case for EbA, as CBA is widely used in countries like Peru, where the Ministry of Economy and Finance (MEF) plays an important role in every government sector, including environment. Since CBA has shown, at least at a pilot site level, that EbA measures are preferred to BAU, the case is ready to be made to policy makers and senior management in MEF.

Working in close coordination with policy makers, especially with MEF, has proven highly beneficial in terms of using the standard parameters, formats, tables and figures that MEF uses regularly in their reports and presentations.

The CBA suggests that EbA measures may be highly sensitive to how the discount rate is set, at least in the case of Peru's pilot site, but this is far from conclusive. Additional studies should be conducted by the government in this regard. Further, ideally a CBA should be carried out comparing EbA to a grey-infrastructure scenario for landscape management.

CELEBRATION AFTER A SUCCESSFUL CHACCU, THE ANCESTRAL TRADITION OF TEMPORARILY GATHERING WILD VICUNAS TO SHEAR THEM. © Carlos Diaz Huertas, Tres Mitades

Box 9 | Cost-benefit analysis by The Mountain Institute (TMI) in Peru

From Podvin, K., Gomez, A. and Alvarado, L. (2015) Cost – Benefit Analysis of the no-regret measures in Canchayllo and Miraflores (Nor Yauyos Cochas Landscape Reserve – Perú), PowerPoint presentation, The Mountain Institute. Presented during 2nd Global Workshop on Sharing Learning on Using Cost Benefit Analysis for Making the Case for Ecosystem-Based Adaptation, June 1st, 2015, in Lima, Peru.

TMI is carrying out an assessment on the cost-effectiveness of 'no regrets' measures in Canchayllo and Miraflores. A hybrid methodology has been developed using traditional CBA and economic valuation, alongside a participatory CBA process for EbA. The methodology has been developed and validated. At the time of going to press in late 2015 this methodology was in the process of being applied. Lessons learned will be used to develop a step-by-step participatory CBA toolkit. The ecosystem services that are being valued include fodder provision, water regulation for agricultural farming practices, and other environmental, social, cultural and recreation services.

Costs and benefits will be compared for a scenario without EbA before the project and with EbA under the project. Methods used include secondary market prices (direct use values), using data from the CBA carried out in Tanta by UNDP. In addition, an assessment of costs and benefits based on local perceptions will be carried out, applying qualitative multi-criteria analysis, using inputs from the project team. This approach will allow integration of local stakeholders and help build capacity, while also emphasizing benefits that may not have been identified and valued in a traditional CBA. Challenges include how to institutionalise the participatory results, which remain subjective, and how to use these more qualitative results for make the policy and financing case for EbA.

HERDING ALPACAS IN TANTA, PERU. © James Leslie, UNDP Peru

3.3.3 Uganda

In Uganda, households in the Mount Elgon region own the land on which the project focuses, and have property rights to use the land as they choose. The project is focused on catchment management, including soil and water conservation measures, reforestation and riverbank management as part of a broader adaptation strategy to address expected climate change impacts in terms of soil erosion, landslides, drought and flooding (Case Study 4). In making the case for EbA in the Mount Elgon area, households needed to be convinced that adopting EbA practices such as reforestation and soil and water conservation will lead to higher revenue and better yield from their farm over time, including under projected climate change scenarios.

The cost-benefit analysis work compared the outcomes of a hypothetical farmer who adopts the set of measures outlined above, defined as 'EbA farming practices', with the outcomes of a hypothetical farmer who does not adopt these measures and rather continues with business as usual. The data used to evaluate the outcomes for each of these farmer types was constructed from a set of data obtained from real farmers, gathered across 12 sub-counties in all four project districts. Each farmer was classified as either an "EbA-practising farmer" or a "non-EbA-practising farmer". The analysis of farm level revenue was used as input to a

financial CBA to measure effectiveness of each type of farming practice (Case Study 9).

Given the focus on the private, household level in Uganda, household level primary data was needed in order to evaluate the impact of EbA interventions. This required sampling households undertaking the various EbA interventions that were to be evaluated (e.g. trenches or drainage channels, grass bunds, planting of indigenous trees as part of agro-forestry). The sample had to be chosen in such a way as to understand which of the activities done by a farmer classified him or her as an EbA farmer. There was also a need to represent upstream, midstream and downstream project interventions in the sampling, and a spread in terms of varying benefits and/or measures that were adopted.

Challenges arose with regards to how to appropriately classify and identify an EbA farmer versus a non-EbA farmer. Making this distinction was essential so as to be able to estimate the impact on productivity and profit of adopting an EbA strategy on a given farm. Farmers enrolled in the EbA Mountain project were not the only farmers practising EbA-type measures on their farms and this needed to be captured. This required a detailed survey that was stratified to capture a range of activities of farmers in the districts.

The results of the cost-benefit analysis showed that EbA practice was not only viable, but also that the viability can be sustained in the long run, even at the relatively high 12 percent discount rate. The practice of EBA was viable throughout the landscape with the exception of the midstream areas in Kapchorwa and Kween Districts, where poor absorption of EBA practices, rather than the use of the EBA practices per se, seemed to result in this performance (see Case Study 9 for further details). Even in the areas where EbA practice was not viable, the failure to achieve positive outcomes was more a result of partial or flawed implementation of EbA practices, rather than the EbA practices themselves.

A FARMER IN UGANDA BENEFITTING FROM HEALTHY AND ABUNDANT CROPS FROM INTRODUCTION OF CLIMATE-RESILIENT AGRICULTURE. © Andrea Egan, UNDP

Case Study 10 | Evaluating EbA farming practices in Mount Elgon ecosystem, Uganda

From: UNDP (2015) Natural Resource Economic Analyses for the Ecosystem Based Adaptation (EbA) Project in Mount Elgon Ecosystem: Draft Report. Uganda, Ministry of Water and Environment. Unpublished

Introduction and methodology

The natural resource economist's assessment was undertaken to establish the current and potential contribution of EbA practice to livelihoods improvement and conservation of the Mount Elgon ecosystem. The vulnerability and impact assessment (VIA) conducted for Mount Elgon (Chapter 2) identified EbA measures such as soil stabilization through tree planting and grass bunds to reduce vulnerability to erosion and landslides, with more frequent intense rainfall events anticipated. Land use planning was also defined as a supporting measure for EbA in this context, helping determine the most appropriate practices in each area for reducing vulnerability to climate change across the landscape. The measures outlined in the VIA were used as a basis for defining EbA practice as it is referred to in the context of this economic assessment.

The most popular practices for EbA are hillside ditches and bench terraces, often practised together with grass bunds and use of organic manure. Hillside terraces are popular in the upstream and midstream areas. Grass bunds are often planted alongside hillside terraces and/or in the demarcation of contours. In the Mount Elgon landscape, terraces, drainage channels, grass bunds and contours are more commonly practiced in Kapchorwa, followed by Kween and then Bulambuli and Sironko Districts respectively.

In addition to EbA measures supported by the Mountain EbA project, livelihood practices are also promoted by project partners as part of an EbA approach, since these practices enable farmers to spread their risk or create new added value, in the face of potential adverse impacts of climate change on incomes from business as usual farming practice. These livelihoods practices are promoted through community-based organizations and NGOs such as ECOTRUST, and private sector stakeholders, including coffee processing and exporting firms, and occasionally through government interventions.

The economic assessment made use of a profitability analysis – gross margin analysis that fed into the cost-benefit analysis. The cost-benefit analysis was used to show the net present value of implementing a range of EbA practices, vs. not practising EbA in the landscape. The sampling frame was defined based on the landscape zoning for the study area; comprising upstream, midstream and downstream zones. Twelve sub-counties in the Districts of Bulambuli, Sironko, Kween and Kapchorwa were selected based on location within the

Box 10 | Defining EbA practice for the Mount Elgon ecosystem

On the basis that the following measures help retain soil moisture, soil fertility, crop productivity, slope stability, and surface and groundwater availability – all increasingly important in the face of climate change – a specific set of measures implemented through the EbA project in the Mount Elgon Ecosystem was included in the definition of EbA practice.

In this context, EbA practice refers to:

(a) Soil and water conservation measures such as: (1) hillside trenches, (2) bench terraces, (3) farming along contours and (4) grass bunds

Or (b) Other practices such as (5) addition of organic manure, (6) use of improved seed and/or (7) wise use of fertilizers, (8) proper spacing and (9) agro-forestry
– where at least three of measures 5, 6, 7, 8 and 9 are undertaken in combination;

and/or (c) If one of (measures 5, 6, 7, 8 and 9)is practised alongside the soil and water conservation measures outlined in (a).

If a farmer does not have practices fitting into one of these three categories as described above then they would not be considered as practising EbA and would be categorised as Non-EbA practising.

landscape and existence of EbA practice within farm households. Overall, 770 people were interviewed, of whom 375 were EbA-practising farmers, while 395 respondents were categorized as non-EbA-practising farmers.

Farm household data was obtained through an administered questionnaire. The gathered data was comprised of farm household crop and livestock production data (consisting of inputs, outputs and prices for produce), socioeconomic data, and data on EbA practice and livelihoods characteristics. Additional data based on case studies of key agricultural enterprises was also obtained to illustrate the potential of EbA in the landscape. A third set of data on soil erosion captured in the rivers due to erosion after rains was also obtained for each of the sampled sub-counties. The production data was used to illustrate profitability and the economic case of the cost-benefit analysis, case studies illustrated the potential of key enterprises, while the soil erosion data highlighted the soil erosion hotspots.

The principal focus of the data analysis was to achieve cost-benefit analysis based on the net present value (NPV). However, the analysis also consisted of a descriptive analysis of farmer characteristics, exploring the scenarios that were built, based on orientation developed using the targeted scenario analysis (TSA) approach; profitability analysis based on gross margin analysis; and using the t-test to show the significant differences between gross margins earned for EbA and non-EbA farming practice.

Crop enterprise profitability for EbA and non-EbA practising farmers

The gross revenues for EbA practising farmers were generally higher than those of the farmers not practising EbA (Table 15). Findings on gross revenues for EBA practising farmers showed strong performances in Bugitimwa, Kamu, Ngenge and Sipi sub-counties. The strong gross revenue performance was based on incomes from coffee, bananas and rice in Bugitimwa and Sipi, Kamu, and Ngenge sub-counties respectively. Farmers who produced higher value commodities always had the likelihood of a higher profit, whether or not they had EbA practice on their farm. With perennial crops such as bananas and coffee, the farmers also had the boost of minimising nitrogen, phosphorus and potassium (NPK) soil nutrients loss from avoided soil erosion, compared to annual crops where soil and soil fertility losses, and the need to compensate by purchasing external inputs such as fertilisers, cut into farmers' returns.

Table 15 | Net profit and mean test for EbA and non-EbA practising farmer by crop enterprise over a projection of 15 years

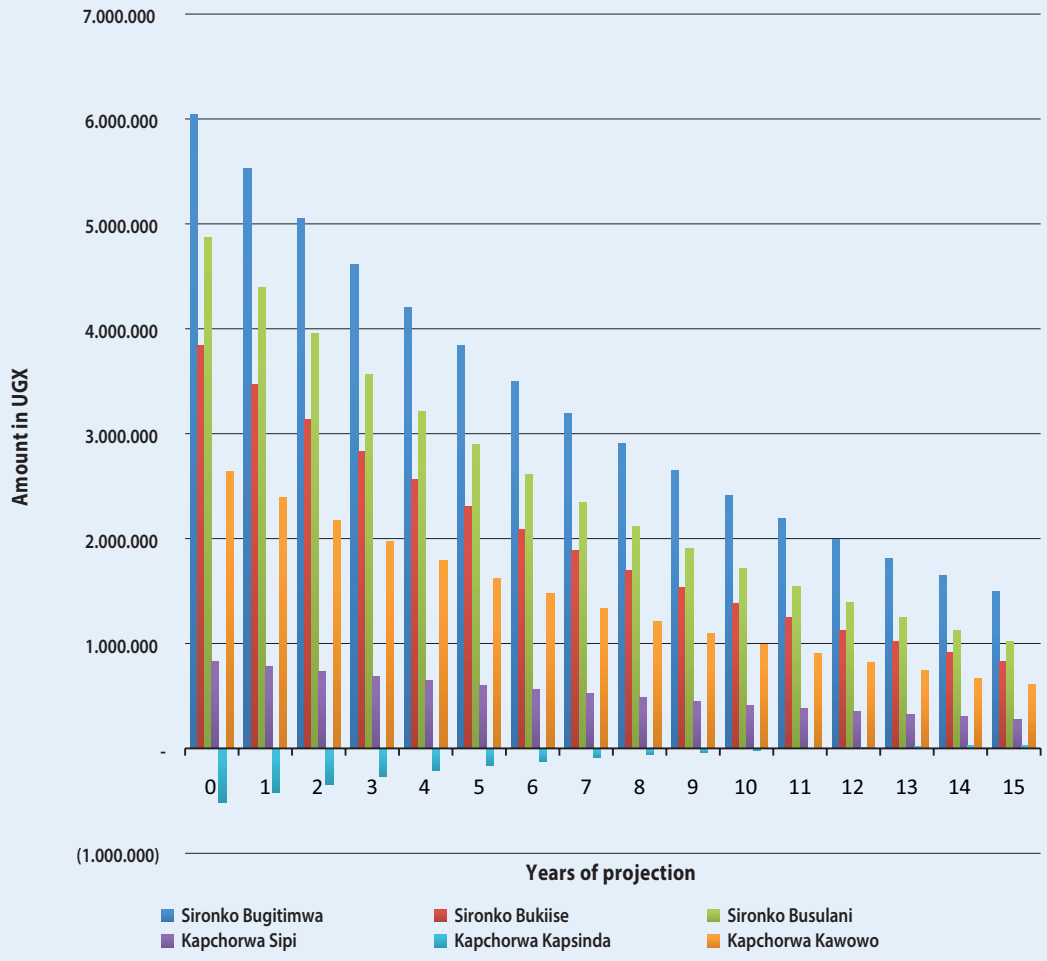
District	Sub-county	Gross margins		Net profit (UGX)
		EBA	***NEBA***	
Bulambuli	Buginyanya	10,729,395	8,727,038	2,002,357
	Kamu	19,933,236	16,019,824	3,913,412
	Bulegeni	5,492,072	1,576,281	3,915,791
Kween	Benet	9,592,793	9,309,927	282,866
	Kaptoyoy	1,858,317	6,372,819	-4,514,502
	Ngenge	15,252,965	12,315,995	2,936,970
Sironko	Bugitimwa	24,239,316	9,148,413	15,090,903
	Bukiise	12,249,610	9,909,327	2,340,283
	Busulani	4,989,574	1,670,976	3,318,598
Kapchorwa	Sipi	14,785,421	10,924,162	3,861,259
	Kapsinda	10,607,162	11,887,263	-1,280,101
	Kawowo	5,570,847	3,419,845	2,151,002
		0.028		
Differences in mean test (p-values reported)				

Upstream and midstream areas generally had higher gross income than the downstream areas. The higher revenue in upstream areas shows the higher productivity and production effort, while the lower gross income downstream may have been associated with variations in agro-ecological zones. The upstream cooler climate with volcanic soils is conducive for crops such as coffee and bananas, which generally have stable high prices. The downstream flat lands have warmer conditions with loamy, and clay-loam soils, in which grains such as maize, millet and pulses including beans, cowpeas and soybean are more frequently produced. Grains and pulses generally have lower and unstable prices.

Generally, the gross margins of EbA-practising farmers were higher than those for non-practising farmers, indicating a higher percentage of total revenue retained by the farmer after incurring direct costs. The exceptions were in Kaptoyoy and Kapsinda sub-counties, where non-EbA-practising farmers had a higher margin than EbA-practicing farmers. Standard statistical tests of the differences in average margin between the two groups showed that the gross margins are higher for the EbA-practising farmers (Table 15).

The profit analysis for crops showed much higher profits for EbA-practising farmers vs.non-EbA- practising farmers in Bugitimwa followed by Sipi, Kamu, Ngenge and Buginyanya sub-counties. The higher profits seemed to be due to the cumulative effect of high crop yields and how these costs outweighed the labour and input costs. The labour costs across the landscape generally show higher costs for EbA-participating farmers compared to non-EbA practising farmers. The implementation of EbA practices such as contour farming, terraces and planting of grass bunds were largely associated with the additional labour requirement.

Figure 9 | Present values for Kapchorwa and Sironko Districts



The performance of EbA-practising farmers in Kaptoyoy sub-county was lower than for the other areas. The crop gross revenues in Kaptoyoy point to low production and productivity that minimises the profitability of EbA practice investments farmers made.

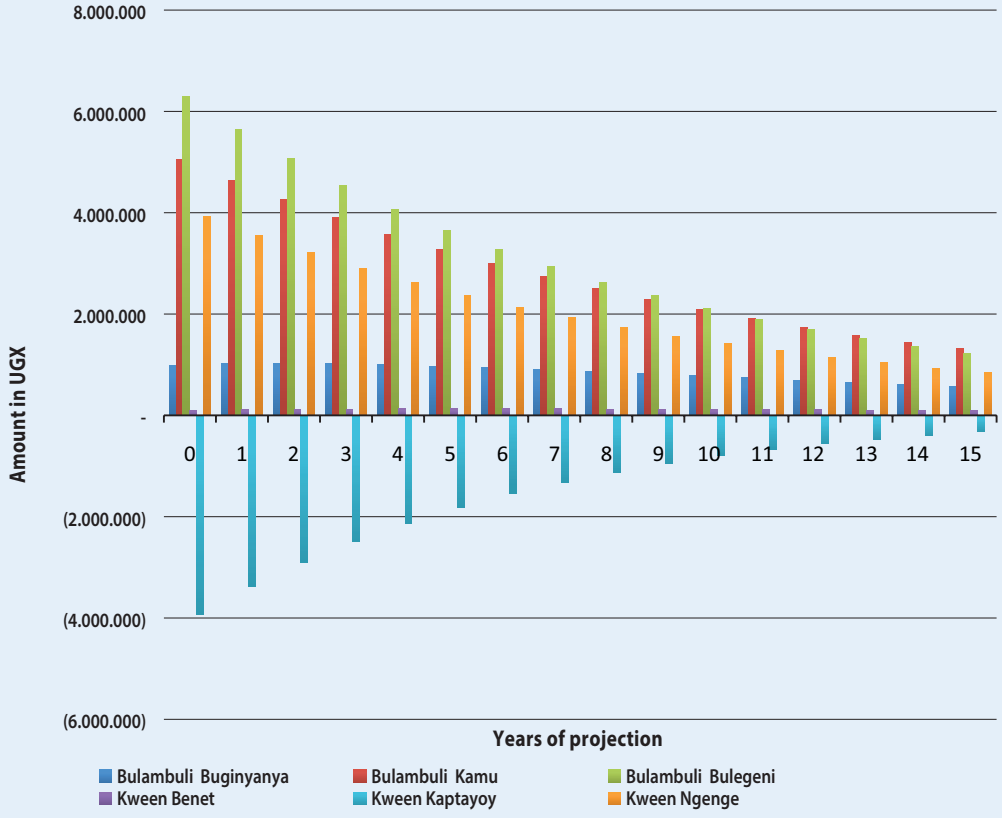
The profitability of EbA-practising farmers across the landscape was significantly higher than that for non-EbA-practising farmers across the landscape. The strength of the significance based on a one tailed t-test result at 5 percent level of significance showed that investing in EBA was a worthwhile undertaking and generally likely to increase the income position of participating farmers.

Cost-benefit analysis

One of the major appeals of EbA is the potential impact on reducing loss of fertile topsoil. The rate at which this loss of soil productivity will be reduced as a result of implemented EbA measures or other soil improvement technologies, however, differs by region and slope. According to Nkonya et al. (1999), soil loss in upstream areas would require long-term investment to achieve change, given the steepness of the slopes, therefore decreasing soil productivity was simulated at 5 percent annually even for EbA option. This decline in soil loss will be expected to be higher upstream without EbA. Downstream areas with less soil loss would require modest investments in technology for soil erosion control. EbA is expected to be more effective and the investment would be expected to lead to a higher return compared to non-EbA investments. Therefore, we assume a 2 percent increase in soil productivity as a result of EbA investment above the status quo. Midstream areas were simulated to be at constant level of returns to scale implying no soil loss due to EbA investments.

The net present value (NPV) shows that generally using EbA practice is a viable alternative to maintaining non-EbA practice (Figures 9 and 10 below).[26] The exceptions were for Kapsinda and Kaptoyoy sub-counties. Nonetheless, the cost-benefit analysis shows that using EbA practice at the current rate, the viability of an EbA practice scenario in Kapsinda would be attained by the 12th year of the projection. However, the NPV were not viable within the projection period.

Figure 10 | Present values for Bulambuli and Kweem Districts



Robustness test for the Bugitimwa NPV, based on Table 15, shows that the EbA scenario would only become not viable with a decline in profitability of between 58 percent and 80 percent over the 15-year projection. For Kaptoyoy sub-county, an additional increase in profitability of at least 57 percent will be required for EbA practice to be viable. Whereas a 57 percent improvement in gross margin can be attained through increased productivity and improvement in prices, the profitability of the Bugitimwa sub-county farms would only be compromised were there an escalation in degradation associated with a very large decline in productivity and prices.

The results of cost-benefit analysis show that profitability from EbA practice can be sustained in the long run, even at the relatively high 12 percent discount rate. The practice of EbA seems quite viable throughout the landscape, with the exception of the midstream areas in Kapchorwa and Kween Districts. A further limitation to adaptation in Kaptoyoy sub-county was the failure to diversify crop enterprises. The performance of crop enterprises was low, moreover the crops produced were mainly annual crops. The low adaptive capacity from income diversity, gross revenue and low use of inputs to boost production, cumulatively contributed to the poor performance observed.

Conclusions and recommendations

The main influence of EbA practice studied was through crop enterprises, where research showed how EbA practice can help farmers that plant crops improve crop productivity. Practising EbA with perennial crops significantly enhanced profitability. EbA practice has a higher income success when farmers choose crops with strong value chains. Crops with strong value chains include coffee, bananas, rice, and Irish potatoes. The results of the cost-benefit analysis showed that EbA practice was not only viable, but also that the viability can be sustained in the long run, even at the relatively high 12 percent discount rate. The practice of EbA was viable throughout the landscape, with the

Table 16 | Net present value projections for EbA practice over non-EbA for a 15-year projection

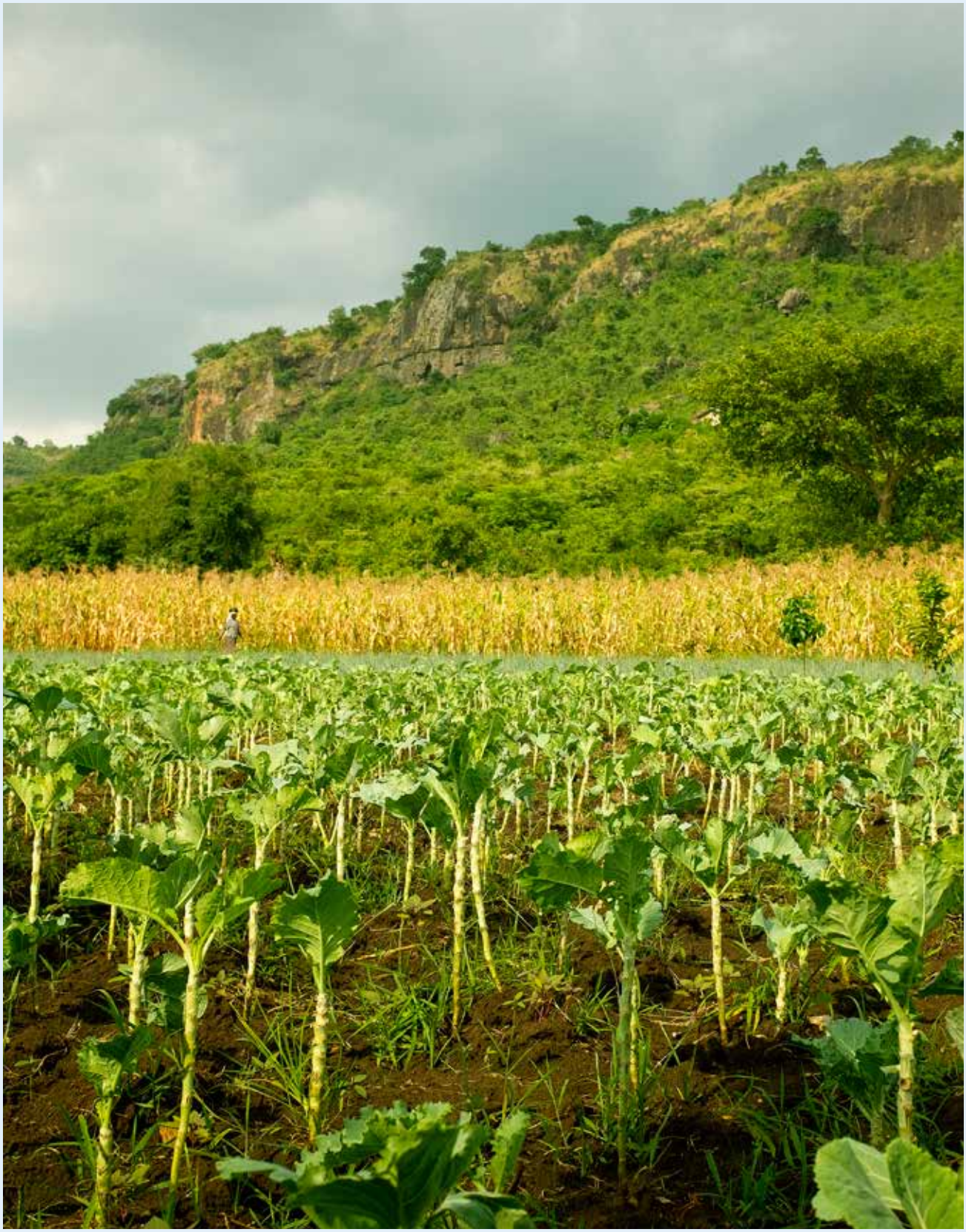
	Bulambuli			Kween		
	Buginyanya	Kamu	Bulegeni	Benet	Kaptayoy	Ngenge
0	994,143	5,049,600	6,296,806	96,280	(3,922,746)	3,934,629
1	1,015,768	4,636,711	5,645,949	109,764	(3,374,312)	3,553,478
2	1,021,346	4,254,332	5,062,276	119,254	(2,898,367)	3,208,835
3	1,014,069	3,900,663	4,538,863	125,450	(2,485,675)	2,897,251
4	996,626	3,573,943	4,069,497	128,950	(2,128,145)	2,615,599
5	971,281	3,272,456	3,648,605	130,259	(1,818,694)	2,361,041
6	939,925	2,994,546	3,271,188	129,808	(1,551,124)	2,131,006
7	904,139	2,738,622	2,932,761	127,958	(1,320,012)	1,923,160
8	865,231	2,503,162	2,629,303	125,014	(1,120,618)	1,735,390
9	824,281	2,286,720	2,357,204	121,232	(948,798)	1,565,779
10	782,174	2,087,923	2,113,229	116,826	(800,933)	1,412,591
11	739,627	1,905,474	1,894,475	111,972	(673,861)	1,274,255
12	697,219	1,738,154	1,698,337	106,817	(564,824)	1,149,347
13	655,407	1,584,813	1,522,482	101,481	(471,417)	1,036,576
14	614,552	1,444,378	1,364,813	96,062	(391,541)	934,777
15	574,927	1,315,844	1,223,453	90,640	(323,370)	842,892
Total	13,610,714	45,287,341	50,269,240	1,837,768	(24,794,438)	32,576,607

exception of the midstream areas in Kapchorwa and Kween Districts. Even in the areas where EbA practice was not viable, this seemed to be more a result of poor absorption of EbA practice than of the EbA practices per se.

An overall lesson that can be drawn from this analysis for policymakers is that EbA practice should be linked to strong commodity value chains to enhance the monetary income for farmers. Additional applied research is needed to identify more synergies between EbA practice, ecosystems and climate change adaptation based on existing livelihoods. There is a need for increased focus on both subsistence and commercial crop enterprises, including stimulating increased crop diversity. Natural resource economics assessment showed that EbA practice has great potential to be scaled-up, both within the Mount Elgon landscape and in other mountain ecosystems of Uganda, such as Rwenzori.

	Sironko			Kapchorwa		
	Bugitimwa	Bukiise	Busulani	Sipi	Kapsinda	Kawowo
0	6,046,734	3,844,815	4,874,118	830,198	-517,625	2,635,436
1	5,527,010	3,473,287	4,392,307	781,665	-421,749	2,393,484
2	5,049,242	3,137,235	3,957,789	734,001	-340,475	2,173,126
3	4,610,404	2,833,323	3,565,960	687,578	-271,776	1,972,511
4	4,207,640	2,558,520	3,212,661	642,676	-213,889	1,789,938
5	3,838,257	2,310,078	2,894,132	599,504	-165,287	1,623,844
6	3,499,725	2,085,503	2,606,980	558,204	-124,645	1,472,794
7	3,189,675	1,882,533	2,348,137	518,873	-90,814	1,335,471
8	2,905,888	1,699,115	2,114,833	481,562	-62,801	1,210,667
9	2,646,297	1,533,391	1,904,568	446,29	-39,749	1,097,276
10	2,408,973	1,383,673	1,715,081	413,047	-20,915	994,286
11	2,192,127	1,248,436	1,544,336	381,805	-5,662	900,768
12	1,994,093	1,126,294	1,390,490	352,516	6,564	815,876
13	1,813,331	1,015,993	1,251,883	325,121	16,234	738,835
14	1,648,412	916,399	1,127,015	299,549	23,757	668,936
15	1,498,016	826,484	1,014,533	275,724	29,482	605,534
120	53,075,825	31,875,079	39,914,825	8,328,313	(2,199,349)	22,428,782

ENHANCING FOOD SECURITY IN SANZARA VILLAGE, UGANDA, THROUGH CLIMATE-RESILIENT AGRICULTURE AND ECOSYSTEM RESTORATION. © Andrea Egan, UNDP



3.4 Challenges of doing cost-benefit analysis for EbA

Cost-benefit analysis can be challenging for a number of reasons. Quantifying and estimating monetary values of any commodity can be challenging. This is even more challenging when ecosystem services and environmental resources are considered. Many environmental goods are either extremely difficult to value in practice, or confidence in the values/methodology used may be low. This requires careful selection of economic methods, and making careful tradeoffs between the dual risks of underestimating benefits and overconfidence in estimating benefits. In any CBA work, being conservative about benefits can be a better practice, with high confidence in the values estimated.

Conceptualizing total benefits from an EbA project or intervention can be challenging for an economist who is not familiar with the biophysical nature of the project. For example, for the CBA of broom grass plantation in Nepal (Case Study 7), initial focus was on the economic value and livelihood benefits. Bringing in the ecosystem benefits took time, and an argument was gradually built up about the value of the roots' soil binding and water retention capacity, as ecosystem services that can help adapt to climate change. Undertaking costs benefit analysis for EbA interventions requires more extensive background research on multiple benefits than is normally the case in doing CBA.

Certain data on the benefits of EbA, such as those relating to ecosystem functions, can be hard to measure and obtain. For example, making a comprehensive assessment of how grassland management, water retention capacity and soil erosion are interlinked in Tanta in Peru, or how broom grass reduces soil erosion in a given site in Panchase in Nepal, requires not only observation, but detailed monitoring and scientific expertise, as was discussed in Chapter 2. Capturing such benefits in a CBA will remain challenging. Lack of data can also lead to an undervaluation of the benefits provided by EbA. The experience of the programme has shown that, while ideally site-specific data would be used in undertaking cost-benefit analysis for EbA interventions, proxy data from other, similar sites, can be used for the purposes of a CBA in some cases, as was done for the broom grass CBA.

In other cases, the time required to get necessary information on benefits from technical experts may be too long for the goal of using the results for a CBA as to feed into a specific decision-making process. The economist thus needs to make a tradeoff between adding more benefits and only using the available benefits that are easily calculated. For instance, in Peru, estimates of the water retention/infiltration capacity provided by partners were not identified in time to be incorporated in the final CBA report and had to be left out.

One other challenge is related to incorporating climate change considerations into conducting cost-benefit analysis. In order to be able to incorporate climate change, it is necessary to build on other studies that have already estimated the anticipated impact of climate change on the specific project area. However, in many cases this information is not available or only available at the national or regional scale, requiring further work to be downscaled to the project site.

3.5 Using CBA to make the economic case for EbA

Cost-benefit analysis is a methodology that can be used to justify investment in a particular intervention or project. How the results of the CBA studies will be used in each project country of the Mountain EbA Programme will depend on the scope of the CBA and available entry points. Someexisting opportunities for using CBA results are presented below. At the time of writing, CBA results were available for Nepal, while the studies were still being finalized in Peru and Uganda.

In Nepal, the project, in coordination with the recently established High-Level Technical Committee on EbA (Chapter 4) organized a National Sharing Workshop on Cost-benefit Analysis of EbA interventions to share the findings of the CBA study as well as discuss opportunities to mainstream EbA approaches in various sectors of forestry, soil conservation, agriculture and local development. The workshop was attended by representatives of the Technical Committee and key officials from Ministry of Forest and Soil Conservation, Ministry of Agriculture Development, National Planning Commission, and Ministry of Federal Affairs and Local Development.

In Peru, the project has worked closely with the Ministry of Economy and Finance (MEF) in the development of Policy Guidelines for Public Investment in Biodiversity and Ecosystems (see Case Study 10). The project has presented initial results of the cost-benefit analysis work to the MEF. A case study based on CBA results from Tanta will be developed together with the MEF, providing an example of the economic benefits of undertaking investment in EbA. This hard data can increase municipal, regional and national level interest in developing EbA-related Public Investment Project (PIP) proposals. The aim is to include the CBA results in training

materials on how to apply the policy guidelines in practice, which would then be used in training project managers at all levels of government in developing PIPs for investments harnessing the power of biodiversity and ecosystems.

In Uganda, CBA results and data generated will be used to make the case to the government through meetings with the Top Policy Committee of the Ministry of Water & Environment. In addition, results will be showcased during a Joint Sector Water and Environment Review being held by the National Climate Change Policy Committee and the National Environment and Natural Resources Sector Working Group. The CBA report will be summarized into policy briefs targeted at policy makers, and booklets with key findings in a summarized form will be published and widely distributed.

In addition to the current plans to use the cost-benefit analysis work to make the case for EbA, results could be used in the future to make the economic case for EbA to various local governments, sectoral ministries or other policy makers potentially interested in investing in ecosystem-based adaptation measures. Results would also be relevant for private stakeholders, whether individual farmers or even private companies considering EbA investments. They can be useful tools for policy advocacy at global level, in sharing needed hard quantitative data on EbA benefits.

IN UGANDA, SUPPORT TO THE SANGAASANA WOMEN'S COLLECTIVE FOR AN UNBAKED BRICK PRODUCTION IS PREVENTING FOREST LOSS, CREATING NEW INCOME AND EMPOWERING WOMEN. © Monicah Kyeyune, UNDP Uganda

Cost-benefit analysis provides an objective, widely accepted methodology for quantifying EbA costs and benefits. CBA can be used to guide decision making on EbA. This can be done with regards to assessing whether EbA is a beneficial investment as such; whether it is more beneficial than not taking action or a 'business as usual' scenario; or in comparison to other adaptation options (e.g. infrastructure-based options).

Results from the CBA carried out by the project in Nepal showed that planting broom grass as an EbA measure to control soil erosion and provide drought-resilient livelihoods was more beneficial than business-as-usual grassland management. Constructing gabion walls with anchoring vegetation was found to be a beneficial EbA investment.

The CBA from Peru shows that the adoption of EbA measures around sustainable grassland, livestock and vicuña management in the community of Tanta is economically preferable to current management practices.

The results of the cost-benefit analysis from Uganda showed that EbA farming practice was not only viable compared to non-EbA farming practice, but also that the viability can be sustained in the long run. The Uganda analysis also suggests that EBA practice should be linked to strong commodity value chains to enhance the monetary income that farmers earn.

Challenges for doing CBA for EbA include conceptualizing and assessing the multiple benefits provided by EbA, for example with regards to climate change adaptation and ecosystem functioning (Chapter 2). This affects both how the scope of the CBA is framed, as well as the inclusion of interlinkages and benefits of e.g. pasture management, water regulation and soil conservation functions into CBA calculations. Measuring such benefits can require both time and scientific expertise. Lack of data can lead to undervaluing EbA benefits, while the time needed to gather data can be too long in relation to the need for quick CBA results to guide specific decision-making processes. Proxy data from other sites can sometimes be used for carrying out CBA for EbA, for example, transferring data for assessing broom grass yields and soil erosion control capacity from other similar sites.

CBA results can be used to make the economic case for EbA to public investors, such as local governments or Ministries of Finance, or to private investors such as individual farmers or private companies. The hard quantified data provided by CBA can be particularly relevant when reaching out to new sectors, such as Ministries of Finance or Planning, and when making the case for the value of hybrid green-grey approaches to adaptation over approaches based only on grey infrastructure interventions. Ministries of Finance and private sector investors are key players for providing sustainable financing for EbA (Chapter 5).

CATHERINE NABUTSALE FROM SIRONKO DISTRICT IN MOUNT ELGON, UGANDA, IS TEACHING THE NEW GENERATION ABOUT ENVIRONMENTAL CONSERVATION.

CHAPTER 4:

MAKING THE CASE FOR POLICY CHANGE FOR EBA

The Mountain EbA Programme has engaged in making the case for policy change for EbA at global, national, regional, local and community levels through a range of approaches, including through providing information and technical advice, engaging in events and dialogues, and direct assistance in shaping plans, policies and governance arrangements that support the implementation of EbA.

Experiences generated by the programme are already being used to make the case for policy change. In Uganda, the Government of Uganda used programme lessons to advocate for an Ecosystem-based Adaptation resolution at the United Nations Environment Assembly. In Peru, the programme informed the development of the adaptation INDC, the country´s commitment to action post-2020 under a new international climate agreement, while input emerging from the programme strengthened Nepal's new forest policy at national level.

4.1 Introduction to EbA policy

Ecosystem-based adaptation has been endorsed as an adaptation option in international policy fora through decisions of both the CBD and the UNFCCC (Boxes 12 and 13). These global policy frameworks can provide guidance for the development and implementation of national policies. Bodies and programmes of the Conventions, such as the Nairobi Work Programme under the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA), can enhance the development of such guidance, as will be discussed below. The UN Convention to Combat Desertification (UNCCD) is engaged in enhancing the adaptive capacities of dryland populations to highly variable environmental conditions, highlighting the importance of land-based adaptation.[27]

However, key limitations remain as to the efficiency of such international policies in guiding the development of national level planning and implementation of EbA, including with regards to lack of sufficient global adaptation finance, weak transfer of capacity building and technical resources from global to national level (Chong 2014).

Despite these limitations, EbA planning needs to take place at national level. Research on the integration of EbA into national level policy frameworks is gradually emerging. Early research shows, for example, that EbA is applicable across multiple sectors and scales (Sierra-Correa et al. 2015; Chong 2014; Doswald et al. 2014; Munroe et al. 2014; Pramova et al. 2012; UNFCCC 2011[28]). Some of the challenges for the inclusion of EbA in national policy frameworks include fragmented national policies; weak institutional and governance structures; weak enforcement of existing policies, laws and regulations; and lack of financial and human resources (Chong 2014). Early case study-based research on mainstreaming EbA into municipal or local level planning has shown the importance of bridging organizations that can support governance of EbA across scales (Vignola et al. 2013), the need to support learning by doing and integrating a diversity of actors in municipal planning processes for EbA as to cross sectoral divides (Wamsler et al. 2014).

4.2 Global policy

At the global level, the Mountain EbA partnership has been actively involved in sharing its experience and lessons learned on EbA through a range of dialogues, workshops and events during meetings of the United Nations Framework Convention on Climate Change

Box 11 | Terms used when referring to different levels of government and policy

For the purposes of this Chapter, the following terms are used in the policy context:

- Global: referring to international Conventions and bodies such as UNFCCC and CBD
- National: referring to national and sectoral level policies and institutional arrangements in Nepal, Peru and Uganda
- Regional: referring to regional governments encompassing larger geographic areas, e.g. Junín in Peru
- Local: Local governments, meaning District Development Committees in Nepal; municipality in Peru; district, county and municipality in Uganda, and their plans and strategies
- Community: The localized level referring to the Village Development Committees (VDCs) or ward in Nepal; community in Peru; village or Parish in Uganda, and their plans and strategies

Box 12 | CBD decision relevant for EbA

CBD Decision X/33 "Invites Parties and other governments to: (k)… integrate ecosystem-based approaches for adaptation into relevant strategies, including adaptation strategies and plans, national action plans to combat desertification, national biodiversity strategies and action plans, poverty reduction strategies, disaster risk reduction strategies and sustainable land management strategies."

Box 13 | UNFCCC decision relevant for EbA

The UNFCCC "Invites all Parties to enhance action on adaptation under the Cancun Adaptation Framework, […] by undertaking, inter alia, the following: (d) Building resilience of socio-economic and ecological systems, including through economic diversification and sustainable management of natural resources".

FCCC/CP/2010/7/Add.1

(UNFCCC), the Convention on Biological Diversity (CBD), the United Nations Environment Assembly (UNEA) and other high-level intergovernmental policy forums and events. This has included organizing and presenting at events, participating in dialogues, providing direct technical advice, and policy advocacy. Work has been carried out by programme team members from UNDP, UNEP and IUCN; by the funding partner, BMUB; as well as by the Governments of Nepal, Peru and Uganda. This section presents some of the key achievements in making the case at a global level.

The United Nations Environment Assembly, the governing body of UNEP, has the mandate to take strategic decisions, provide political guidance on the work of UNEP and promote a strong science-policy interface.[29] At its first session in 2014, the UNEA adopted a resolution on ecosystem-based adaptation. The resolution was advocated for by Uganda, who brought in its experience of implementing EbA in practice through the Mountain EbA Programme (K Alverson 2015, pers. comm.). This helped make the case on the value of EbA to other countries and, together with Zimbabwe, proposed the resolution that was adopted. The UNEA Resolution 1/8 requests UNEP, in partnership with Governments and other stakeholders, to develop and implement ecosystem-based adaptation programmes, and encourages all countries to include ecosystem-based adaptation in their policies. The UNEA experience shows how, through a government partner and based on national level experience on implementing EbA in practice, the Mountain EbA Programme managed to make the policy case for EbA to an intergovernmental governing body of the UN, thereby prioritizing EbA as a key topic in UNEP's global agenda from now on, in addition to empowering governments to include EbA in their national plans and policies.

Box 14 | Integrating EbA into national adaptation planning: guidance by UNEP WCMC

UNEP has developed guidance on how EbA can be integrated into national adaptation planning (Munroe et al. 2014), through its specialist biodiversity assessment centre, UNEP-WCMC. The step-by-step recommendations start by assessing the existing legal and institutional frameworks relevant for EbA, existing resources and institutions. Interconnectedness of ecosystem services should be assessed and multiple stakeholders brought together for joint planning. Climate change scenarios are then assessed to identify the impact of climate change on ecosystem services and dependent livelihoods, on the basis of which adaptation options can be identified, including ones that cross sectoral boundaries such as grey-green infrastructure. Implementation strategies for the identified options should align with existing national and sectoral plans. The final step involves monitoring implementation strategies. The Mountain EbA Programme has been informed by the development of this guidance, and has adopted a process somewhat in line with this step-wise guidance, in terms of how adaptation planning has evolved at national and local level, and this has been described in Chapter 2 and below.

Table 17 | Integrating EbA into national adaptation planning

Step 1	Laying the groundwork and understanding the adaptation context
Step 2	Analysing climate change scenarios and assessing current and future vulnerability
Step 3	Identifying, appraising and selecting adaptation options
Step 4	Developing implementation strategies
Step 5	Monitoring and evaluating adaptation planning

Source: Munroe, R., Mant, R., Hicks, H., Kapos, V., Woroniecki, S., Soi, N., Crane, S., Vestergaard, O., and Kay, R. (2014) How can ecosystem-based adaptation to climate change be integrated into national adaptation planning? UNEP, Nairobi, Kenya.

The Mountain EbA partners were actively involved in organizing the UNFCCC Nairobi Work Programme technical workshop on ecosystem-based approaches to adaptation, which had been requested by the UNFCCC COP (Decision 6/CP.17; UNFCCC, 2013). The workshop was held in Dar Es Salaam (Tanzania) in March 2013 and took into account the role of ecosystems, including forests, in adaptation; vulnerability and impacts in ecosystems; the implementation and benefits of ecosystem-based approaches for adaptation; and lessons learned. The Mountain EbA partners assisted in the design and facilitation of the workshop, in addition to holding several presentations during the workshop (K Alverson, E Barrow & M Mumba 2015, pers. comm.). Several aspects of the programme were presented, including: the importance of multiple benefits and the experience of making the case for policy change for EbA; the use of EbA tools; and the VIA experience from Uganda. The report of the workshop includes concrete examples from the Mountain EbA Programme, including on VIAs and economic assessments, as part of its discussion and recommendations on priority areas of work for enhancing understanding on EbA. The report of the workshop was included in the conclusions of the UNFCCC Subsidiary Body for Scientific and Technological Advice at its 38th Session (FCCC/SBSTA/2013/3).

The partnership has also engaged in the Nairobi Work Programme process more broadly, through attending events and reviewing documents (K Alverson, E Barrow & M Mumba 2015, pers. comm.). This engagement has enabled access to an important platform that feeds practical experience on adaptation into the UNFCCC policy process through its Subsidiary Body for Scientific and Technical Advice. The programme has enhanced thinking on issues such as how to mainstream ecosystems into VIAs, the value of carrying out economic assessments for EbA, and the importance of the multiple benefits of EbA. With practical experience to back the case, the programme has increased buy-in for EbA amidst a range of stakeholders, from other governments to researchers and organizations (K Alverson, E Barrow, M Mumba & F Ries 2015, pers. comm.). The Nairobi Work Programme has provided an ideal platform for outreach on making the case for EbA. The programme has played an important role in including EbA in future work of the Nairobi Work Programme, where the range of stakeholders involved can jointly further understanding on this approach to adaptation.

INTRODUCING EBA DURING A PROGRAMME-SPONSORED SIDE EVENT AT COP-20 IN LIMA, PERU, 2014. © Adriana Kato, UNDP Peru

The current negotiating text for UNFCCC COP 21 to be held in Paris in November-December 2015 (FCCC/ADP/2015/1), includes options for reducing risks to ecosystems and people caused by climate change, as well as enhancing the Nairobi Work Programme in order to incorporate an approach of sustainable management of ecosystems in adaptation. These provide a background that could enable the inclusion of references to EbA-relevant measures in the agreement to be adopted in Paris.

The partnership of the Mountain EbA Programme has been very active in sharing lessons learned and its evolving thinking around the concept and implementation of EbA through a range of high-level policy events. This has included events, sessions and presentations focused specifically on the Mountain EbA Programme (Table 18). The partners, UNEP, UNDP and IUCN, as well as BMUB, have been active in presenting and engaging in dialogue. Having the range of partners involved in making the case has strengthened outreach, political weight and influencing power (K Alverson, E Barrow, M Mumba & F. Ries 2015, pers. comm.). In addition, these global platforms have provided unique opportunities for Government partners from Nepal, Peru and Uganda to present their experiences of implementing EbA at country level. Engaging government partners in this

way is a unique opportunity to make the case for EbA from government to government at a global policy event. In addition to reaching out to governments, these events have also provided an opportunity to make the case for EbA to other international and non-governmental organizations, research institutes and donors.

The UNFCCC COP 20, held in Lima, Peru, provided an excellent opportunity to showcase the work of the Mountain EbA project that was being implemented in Nor Yauyos Cochas Landscape Reserve in Peru. The global programme, and the Peru experience in particular, were showcased through a range of events, as shown in Table 18.

A guided tour was arranged for the United Nations Secretary-General Ban Ki-moon and the President of Peru Ollanta Humala to visit the Mountain EbA Programme in Tanta (Dourojeanni 2014). The three-hour helicopter tour provided an exceptional opportunity to present and discuss climate change impacts in Peru, the linkages between ecosystem services and climate change adaptation, and the EbA measures implemented by the Mountain EbA

Table 18 | Events organized by the Mountain EbA Partnership (in bold) or where the Partnership has presented

Meeting	Event title	Organizer
UNFCCC COP 20, Lima, Peru, 2014	Enhancing local knowledge and capacity about Ecosystem-based Adaptation through innovative communication strategies and tools	UNDP
	My Mountain, My Forest, My Sea: Our Daily Bread	SERNANP/UNDP
	Making Ecosystem based Adaptation Effective: Lessons from the Field	IUCN
	Climate Mitigation and Adaptation in Forest Landscape Restoration: Exploring the Synergies	IUCN
	Natural Protected Areas as Effective Strategies for Climate Change Management in Peru	SERNANP/UNDP
CBD COP 12, Pyeongchang, Korea, 2014	Ecosystem-based Adaptation: Contributing to the Post-2015 Development Agenda. Presentations by Government of Uganda and UNDP	UNDP
Adaptation Knowledge Day IV, Bonn, Germany, 2013	What do Decision-makers and Practitioners Need to Know about Ecosystem-based Adaptation (EbA)? Presentations by Government of Nepal, WCMC and UNDP	UNEP
	Lessons Learned from Climate Change Adaptation Case Studies. Presentation by Government of Peru	UNEP
CBD COP 11, Hyderabad, India, 2012	Ecosystem-based Adaptation: Sharpening our Approach to Assessment and Monitoring	Partnership and Government of Germany
UNFCCC COP 17, Durban, South Africa, 2011	Ecosystem-Based Adaptation in Mountain Regions (EBA Flagship Initiative)	Partnership
Adaptation Knowledge Day II, Bonn, Germany, 2011	Ecosystem-based Adaptation – Tools, methodologies and experiences on the ground. Presentations by Governments of Nepal and Uganda; by Programme Partners	UNEP

Programme. The role of SERNANP and of protected areas as part of an overall adaptation strategy was highlighted. The President of Peru indicated particular interest in the EbA pilot project in Tanta on the management of vicuñas, a national flagship species of Peru. Unfortunately due to unforeseen weather circumstances, the helicopter was unable to land in the community of Tanta. Nevertheless, the direct engagement with the United Nations Secretary-General and the Peruvian President represented a unique opportunity for the Mountain EbA Programme to make the case for EbA at the highest political level.

The programme has managed to bridge practice and policy from the local to global level, by presenting local-level experiences on EbA to a global level policy audience, as a means for making the case for EbA. The partners have, independently, also attended a range of other events, which have provided further opportunities for sharing the experience and lessons learned from the Mountain EbA Programme. No single event is likely to be the platform where the case can be made for policy change for EbA; however, the range of events have provided an ongoing platform for influencing key policy makers and practitioners (K Alverson, E Barrow, M Mumba & F Ries 2015, pers. comm.). This outreach has provided a much larger audience than could have been reached by any of the partner organizations working alone (Ibid.). The fact the Mountain EbA Programme has been delivered as a partnership between UNEP, UNDP and IUCN has also meant that three organizations, in addition to the German Government's International Climate Initiative, have put their technical expertise and organizational standing behind making the case for EbA. This political weight given to messaging on EbA has led to faster recognition and acceptance of EbA discourse at the global policy level (Ibid.). The partnership has enhanced understanding on what EbA is, how it can be designed and implemented, what are some of the benefits and challenges involved.

4.3 Nepal

4.3.1 National level policy change

A solid framework for guiding Nepal's climate change work is provided by the country's National Adaptation Programme of Action (NAPA, 2010) and Local Adaptation Plans of Action (LAPAs) and the National Climate Change Policy (2011) (Nepal

GUIDED TOUR TO TANTA PROJECT SITE FOR SECRETARY GENERAL BAN KI-MOON AND PRESIDENT OF PERU OLLANTA HUMALA. © James Leslie, UNDP Peru

2013). However, while climate-compatible development has become a major development strategy for Nepal, turning policy into action remains a challenge (Ibid.).

The National Climate Change Policy has a specific objective (7.4.) that aims to enhance adaptation by and resilience capacity of local communities through natural resource management. It also puts forward a set of policies for "climate-friendly natural resources management" (8.7.), which includes a range of EbA measures such as sustainable management of forests, agro-forestry, pasture and rangeland, and soil conservation to address the impacts of climate change and provide for livelihoods.

Nepal´s 13th Plan (2014-2016), the country´s overarching development plan, includes implementing development programmes which support climate change adaption as one of seven key national priorities. Adaptation measures are integrated as strategies for delivering sectoral policies put forward in the 13th Plan with regards to agriculture, irrigation, food security, forests and soil conservation, water and sanitation, local development and environment. Many of these adaptation strategies put forward are directly relevant for EbA, for example, strategy 3.2. on Environment and Climate Change: "Adapt to climate change and sustainably conserve and manage natural resources by pursuing disaster risk mitigation, poverty alleviation, and environmental protection".

Climate change has also been acknowledged in sectoral and environmental policies and plans. The Nature Conservation National Strategic Framework for Sustainable Development (2015) has been developed by the National Planning Commission and includes EbA approaches. The National Biodiversity Strategy and Action Plan (NBSAP, 2014) addresses the changing context of conservation and provides nature-based adaptation solutions to climate change impacts. Nepal has a strong policy framework supporting local level adaptation measures, including through Local Adaptation Plans of Action) and channelling adaptation finance to local level. The Environment Friendly Local Governance Framework (2013) aims to focus climate change adaptation at the local level and complements the LAPA framework. Climate change is recognized in the Agro-biodiversity Policy 2063[30] (First Amendment) and conservation of agrobiodiversity is put forward as an adaptation strategy. The Forest Policy (2015), which also includes adaptation, will be discussed below. A key challenge for the implementation of all EbA-relevant plans and policies in Nepal remains the lack of financial and human resources for implementation, and weak technical capacity (Gurung et al. 2015).

The Mountain EbA project coordination sits under the Ministry of Forest and Soil Conservation, which has provided a direct avenue for delivering project activities through the Ministry, as well as an opportunity for the project to engage in broader policy dialogue, in particular with regards to forest-related policies. The new forest policy (2015) has climate change as one of seven thematic areas and includes EbA as one of the approaches put forward for adaptation. The Mountain EbA project is involved in a working group developing a five-year action plan for the delivery of the climate change area of this Policy in all 75 Districts of Nepal. The project is thereby providing direct technical input into how this key national policy will be implemented in practice, with regards to climate change and making the case for integrating EbA measures into its delivery.

The Panchase Protected Forest is one of 13 of its kind in Nepal. Given these were only established in 2011, they lacked defined rules and regulations (P Rai 2015, pers. comm.). Through its collaboration with the Panchase Protected Forest under the Department of Forests, the Mountain EbA project has been a pilot project in terms of increasing understanding and developing the concept of protected forests themselves (P. Rai 2015, pers. comm.). The project has provided technical and financial support to the Protected Forest Council to produce draft guidelines on protected forests, which provide regulations and directives on managing protected forests, which are in the process of being approved by the government (P. Rai 2015, pers. comm.). The proposed guidelines incorporate EbA and provide the opportunity for integrating EbA into the national protected forest management plans and programmes (H Gurung 2015, pers. comm.). Through its active engagement in developing the Guidelines on Protected Forests, through both practical implementation of EbA measures in Panchase and technical guidance to national level policy development, the project has successfully made the case for EbA being part of protected forest management at a national scale in Nepal.

The project has collaborated with Tribhuvan University in validating the VIA tools and methods developed and implemented by the Mountain EbA project (Chapter 2). These have been tested in the Shivapuri Nagarjun National Park. The aim is to integrate the results of the tested VIA approach into the National Park´s Management Plan (P. Rai 2015, pers. comm.). This could pave the way for policy

change that would enable integration of VIAs and EbA measures into other Protected Area Management Plans. The project is engaged in ongoing discussions with the Department of National Parks and Wildlife Management to this end (Ibid.). Capacity development of protected area managers (e.g. park wardens) and planning officers would be essential in mainstreaming EbA opportunities into protected area plans and programmes (Gurung 2015).

Research carried out by the project identified future opportunities for integrating EbA into national policies and strategies in Nepal (Gurung et al. 2015). This includes considering the relevance of EbA for the National Adaptation Plan (NAP) and Intended Nationally Determined Contributions (INDC) developed as part of national commitments under the UNFCCC. The case could be made for mainstreaming EbA into the Vision 2030 document being developed by the National Planning Commission, which would increase the weight given to EbA in national level, cross-sectoral development planning. In the forestry sector, both the adaptation and mitigation benefits provided by ecosystems can be of particular relevance, especially given increased funding for forestry in Nepal and the recent establishment of a Reduced Emissions from Deforestation and Forest Degradation (REDD) Implementation Centre, which addresses both mitigation and adaptation projects.

The project is also engaged in the process of forming a High-Level Technical Committee on EbA to be led by the Ministry of Forests and Soil Conservation. The main role of the Committee is to coordinate and mainstream ecosystem-based approaches to climate change adaptation into sectoral plans and programmes.[31] This will be done, for example, through technical guidance, facilitating discussions on investment opportunities and identification of capacity development needs. The Committee will include representatives from various Ministries, such as the National Planning Commission; Ministry of Forest and Soil Conservation; Ministry of Science, Technology and the Environment; Ministry of Agriculture; and Ministry of Federal Affairs and Local Development. The project´s role in showcasing benefits on the ground and identifying opportunities for EbA planning and policy has helped make the case for national level recognition of the importance of ecosystem-based approaches to adaptation in Nepal.

It is important to note that following the catastrophic earthquakes of 25th April and 12th May 2015, Nepal´s policy priorities have changed and any future opportunities for short- to medium-term policy change are likely to be readjusted and reviewed based on new national priorities in the face of massive scale reconstruction. Adaptation to effects of climate change will continue to be important, but will be carried out alongside increased investments in reducing the impacts of natural disasters, including those not affected by climate change, such as earthquakes.

4.3.2 Local level policy change

The project has focused its activities at the level of the Village Development Committee (VDC). It has engaged with existing resource user groups, such as: Community Forest User Groups (CFUGs), Agriculture Groups, Water User Groups and Livestock Groups, as well as Women´s Groups. These have been key implementing partners and have enabled the implementation of measures through existing governance structures, thereby building on existing expertise and strengthening capacities to manage natural resources under climate change. Workshops and training-of-trainers events have been provided at VDC level. CFUGS are the major participants in and beneficiaries of many of the implemented EbA measures, such as conservation ponds and plantations. One of the measures the project has promoted is the integration of EbA solutions into existing local level management plans. For example, CFUGs have recognized the ecosystem services and value-added of EbA measures, such as promotion of specific plant species, in the long-term, and the EbA project has been supporting CFUGs through capacity development trainings towards integration of the EbA approach into the management plans of CFUGs (P Rai 2015, pers. comm.).

Box 15 | Local government in Nepal

Nepal is divided into 75 District Development Committees (DDCs), which make up the top tier of local government in Nepal. The second tier is occupied in the rural areas by 3,915 Village Development Committees (VDCs) and in the urban areas by 58 municipalities. The third tier is made up of the wards, with several wards per VDC. The term 'village development committee' is commonly used to refer both to the geographical area and the executive VDC committees of elected and nominated VDC officials. One of the most important functions of VDCs is to implement development programmes to improve local infrastructure, livelihoods and services.

Source: Inlogos (2009). Assessment of Village Development Committee Governance and the use of Block Grants. Page 1. Kathmandu: Ministry of Local Development and United Nations Development Programme.

Following the vulnerability and impact assessment, the sub-watershed was identified as an appropriate level for implementing EbA measures. Sub-watershed management plans were prepared based on the results of the VIA, which prioritised Andheri Khola, Harpan Khola and Orlang Khola. These plans identified both climatic and non-climatic drivers of vulnerability, and prioritised EbA options and roles for implementation. Ten additional sub-watershed plans are currently being developed. The aim is now to integrate these sub-watershed plans into the Panchase Protected Forest Management Plan (P. Rai 2015, pers. comm.).

The Panchase Protected Forest Management Plan is a five-year work plan, which is currently being reviewed and revised. The project is supporting the review of the plan, including an analysis on gaps regarding climate change and adaptation, in addition to highlighting opportunities for integrating EbA and the sub-watershed plans (P. Rai 2015, pers. comm.). The review will be submitted to the Department of Forests and the Panchase Protected Forest Council for their consideration on how these opportunities could be included in the revised management plan.

The project has engaged in making the case for EbA to various stakeholders involved in planning at local level. The project provided technical support and engaged in discussions that led to the forming of the Panchase Protected Forest Council and the three District Forest Councils. The manager, rangers and councils of the Protected Forest are important implementing partners of the project and were involved in designing 'no regrets' and EbA measures for the VDCs within the forest.

At district level, 'no regrets' measures were developed with district line agencies for the eight VDCs that are outside the Panchase Protected Forest. The project has signed MoUs with district line agencies for delivery of project activities, thereby instilling a sense of ownership of and accountability for implemented measures, as well as aligning them with ongoing government activities. Supported by initial capacity building on EbA, several relevant district offices have provided technical backstopping for EbA activities, including: soil conservation, forest, livestock and agricultural development agencies. These are key project partners and their extension staff has worked directly with e.g. CFUGs on land use, technical inputs, providing guidance on species used, and implementation of EbA interventions. Such collaboration has been an important step in strengthening local ownership, bringing change into planning practices and ensuring sustainability of project interventions (Tiwari 2015). Collaboration with existing institutions has provided

IN NEPAL, THE PROGRAMME MOBILIZED THE ENTIRE CHIHANDANDA COMMUNITY FOREST USER GROUP TO BE INVOLVED IN RE-PLANTING EFFORTS. © Andrea Egan, UNDP

a channel for making the case on EbA and mainstreaming it into local planning processes.

The project has established a Field Planning Coordination Committee (FPCC), chaired by the Regional Forest Director and with participation from government district line agencies, Panchase Protected Forest Council and VDC representatives. The FPCC oversees the project and helps plan and endorse project action plans, as well as enabling government ownership of implemented measures. The FPCC has been a key channel for disseminating information, such as the results of the VIA. This specific body dedicated to the EbA project has provided an important channel for dialogue and discussion on EbA planning and implementation at a local scale, and has been a platform from which to disseminate information and make the case for EbA more broadly within local institutions and to key stakeholders at local level.

The case for policy change for EbA in Nepal has been made effectively, especially at local and district level. This has been achieved through engaging with existing government structures and groups such as Forest Community User Groups and Panchase Protected Forest Council in implementing EbA measures in practice, thereby building capacity and increasing understanding of the benefits and relevance of EbA. Research by the project (Gurung et al. 2015) identified that significant opportunities remain for integrating EbA into local level planning processes, across sectors in areas such as forestry, soil conservation, agriculture and infrastructure. The project has played an important role in developing understanding at national level on protected forest management, as well as making the case on how EbA measures are relevant for protected forests. The project has also provided technical guidance on how to integrate EbA into the new Forest Policy and supported the process of forming a High-Level Technical Committee on EbA. Overall, the project has increased understanding of the relevance of ecosystem-based adaption for national development and climate change planning and policies in Nepal.

4.4 Peru

4.4.1 National level policy change

The Mountain EbA project has adopted a unique approach by bridging local to district, regional and national level planning and implementation of adaptation measures, an innovative approach for climate change project delivery in Peru.

The Ministry of the Environment (MINAM) is the national level counterpart. The project has also engaged closely with the Ministry of Economy and Finance (MEF) in developing 'green guidelines' for mainstreaming climate change and ecosystem considerations into public investment projects. This initiative will be discussed in further detail in Chapter 5. MINAM and MEF sit on the project Steering Committee, in addition to the national Protected Areas agency, SERNANP, and the Regional Governments of Lima and Junín. The Steering Committee provides a space for dialogue and an entry point for making the case for EbA to government counterparts.

The National Climate Change Strategy (MINAM, 2014a) integrates an ecosystem-based approach to adaptation in a comprehensive manner. The Strategy provides a framework with objectives, actions and priority themes, and identifies critical ecosystem goods and services, from which sectoral or regional plans can select and prioritise in their own planning. The valuation of ecosystem services is identified as a key service, and proposed actions include increasing understanding of climate change impacts on ecosystem services and carrying out vulnerability assessments. Cross-cutting themes for all work, whatever the sector, are ecosystem-based: air; water and soil; forests; biodiversity; and ecosystems and landscapes. The Peruvian National Climate Change Strategy goes beyond proposing EbA as an adaptation measure, to adopting an ecosystem-based lens, where appropriate, to all adaptation planning. Overall, by being a pilot project on EbA in Peru, the project has increased understanding of EbA at national level, which is also reflected in the Strategy.

The Peru Intended Nationally Determined Contribution (INDC) was recently developed, with the project team asked to contribute by reviewing the draft and providing

Box 16 | A new approach to adaptation in Peru

"The most significant change that the Mountain EbA Programme has brought about is having ecosystems form the basis of an adaptation project. This has enabled both MINAM and SERNANP to articulate our on-going work on e.g. Payments for Ecosystem Services (PES) and conservation in the context of adaptation to climate change. Working with local governments directly has also been a new approach to project delivery for us."

Eduardo Durand, Director General of Climate Change, Desertification and Hydrological Resources, MINAM (2015, pers. comm.)

recommendations on how to integrate EbA (Peru 2015). The scope and objectives for achieving Peru's adaptation goals in the prioritized sectors of water and forestry include EbA-relevant elements. The scope of the water sector specifically refers to ecosystem/natural infrastructure, while the forestry sector considers protecting the ecosystem services that forests provide and promotes comprehensive land management within a landscape approach. The INDC even refers to the Mountain EbA Programme specifically in the context of results and practical experiences provided by key projects, which have informed the INDC adaptation proposal. The project team also hopes to be included in the consultations on the development of the National Adaptation Plan (NAP), which will be developed following the INDC (J Leslie & E Fernandez-Baca 2015, pers. comm.).

Overall, Peru has a solid set of policies at national level that provide a framework for implementing ecosystem-based adaptation (Ikkala 2011) and (Soncco 2014). Climate change and adaptation are comprehensively addressed through the National Climate Change Strategy and the legal requirement that each regional government should have a Regional Climate Change Strategy. This enhances decentralization on climate change and provides an opportunity for more detailed and localized adaptation planning. Sub-watershed level adaptation plans also exist for several watersheds. Climate change is included in various environmental policies, such as the National Policy on the Environment (MINAM, 2009), the National Action Plan on the Environment 2011-2021 (MINAM, 2011), and the Strategy for the Conservation of Biodiversity 2021 (MINAM, 2014b). Although not specifically linking ecosystems and adaptation, they do provide an enabling framework by prioritizing ecosystem management, while also identifying climate change as a threat to ecosystems, and emphasizing the importance of overall climate change adaptation. At the sectoral level, the National Policy and Strategy on Water Resources (2012) identifies an action around ecosystems and adaptation. The National Plan for Risk Management and Adaptation to Climate Change in the Agricultural Sector 2012-2021 does not specifically refer to EbA.

Peru's Bicentenary Plan 2011-2021, the main document guiding national development, has an objective on the *"conservation and sustainable use of natural resources and biodiversity using an integrated and ecosystem approach for an environment that enables good quality of life for people and healthy, viable and functional ecosystems in the long term"*, under which climate change adaptation approaches should be implemented. Peru's policy structure itself is conducive for policy and planning on adaptation, and provides greater opportunities for integrating ecosystems and adaptation than many other countries. Peru is one of the world´s ten most megadiverse countries, on the one hand making its biodiversity vulnerable to climate change, on the other hand it also provides an important natural resource. The conservation and sustainable use of natural resources are regarded as important contributors to local, regional and national development and are seen as national policy priorities (MINAM 2015).

4.4.2 Regional, district and local level policy change

The project´s strongest focus in instituting policy change has, however, been at the regional and local level. The development of Regional Climate Change Strategies is stipulated in the National Climate Change Strategy (2014). The Mountain EbA project has worked directly with the Regional Government of Junín in formulating the Regional Climate Change Strategy (2014) (W Lopez 2015, pers. comm.). The project provided technical support to the formulation of the strategy, through a consultant technical advisor who was engaged throughout the participatory process for developing the strategy, which included holding over 25 consultative workshops. The consultant assisted

IN PERU, WORKING WITH COMMUNITY MEMBERS AND SERNANP RANGERS TO INTEGRATE EBA INTO THE NEW RESERVE MANAGEMENT PLAN. © Hector Bonilla, UNDP Peru

in both training and information provision, including introducing the concept and approach of EbA. The project supported the formation of a management committee, composed of civil society, regional government and MINAM representatives, who worked jointly on the formulation of the strategy. The strategy provides policy guidance, which is then developed into action plans for implementation. EbA is included as an approach in both the vision and strategy of the Junín Regional Climate Change Strategy.[32]

EbA is thereby recognized as a cross-cutting approach for the whole Junín strategy. An annex includes specific projects that are proposed, many of which are focused on EbA, such as: restoring areas with high rates of soil erosion; broadening areas of conserved wetland to enhance water storage capacity; conserving and protecting lagoons, rivers and pastures to ensure continued provision of water and water regulation services; integrated management of watersheds; and terracing on slopes leading to roads and infrastructure, as a measure of protection from landslides. A more comprehensive climate monitoring system is also proposed. The regional strategy covers a range of sectors and provides a framework for implementing EbA at a regional scale, as well as taking a needed multi-sectoral approach to implementation. The challenge now remains to implement this strategy in practice, with sufficient resources to deliver. The strategy does not provide a budget or defined roles and responsibilities for delivery.

The project has provided direct technical support to the development of the Regional Climate Change Strategy of Lima Region, which is still at the formulation stage. The case of Lima has been more challenging, as this is a much more dispersed and complex geographical area than Junín, ranging from coastal to mountain ecosystems (E Fernandez-Baca 2015, pers. comm.). Both the regional governments of Junín and Lima are represented on the project steering committee.

A key partner for planning and implementing EbA at landscape level in the Nor Yauyos Cochas Landscape Reserve (NYCLR) has been SERNANP, the national protected areas agency. As described in Case Study 11, collaboration with SERNANP has enabled an entry point into planning processes at community and landscape level, and an important avenue for making the case for EbA. The Reserve has provided a well-defined and appropriate scale for implementing EbA (even if to date activities have been focused in three communities only), the NYCLR Master Plan has acted as a guiding framework for prioritizing and embedding activities, while the staff of SERNANP at the NYCLR Headquarters have provided an essential institutional framework, technical expertise and counterpart for sustainable delivery of EbA.

Climate change and EbA are now integrated into the new management plan for the NYCL Reserve, which also means that measures will be scaled-up from the initial three communities. Further, SERNANP is now collaborating more closely with the regional governments of Junín and Lima on the management of middle and lower stretches of the watershed, given the critical ecosystem services provided by the upstream Reserve directly to the large rural and urban populations downstream (G Quiroz 2015, pers. comm.). This provides an opportunity for including EbA in planning for a broader area, beyond the Reserve. The project has promoted and enhanced engagement between different levels of government on climate change planning. The regional government of Junín and SERNANP in the Reserve are now looking to promote visits and exchanges to increase interest in climate change planning in other protected areas and communities in the region (W Lopez & G Quiroz 2015, pers. comm.).

In addition, the project has played an important role in making the case for EbA being part of protected area planning and management at national level in Peru. As described in the case study, the approach to planning for climate change adaptation and adopting EbA measures within NYCLR has been shared at national and global level events and through technical working groups. SERNANP is looking to replicate the experience in other protected areas in the country.

At local level in Tanta, the project has worked directly with the community, organized under a Community Assembly

Box 17 | Vision of the Junín Regional Climate Change Strategy

The Department of Junín will have adapted to the adverse impacts and will have embraced opportunities imposed by climate change, thereby creating a base for low carbon sustainable development with a focus on ecosystem-based adaptation.[33]

ERCC Junín, 2014

Case Study 11 | Collaboration with SERNANP implementing EbA in a landscape reserve, Peru

The National Service of Protected Areas of the State (SERNANP) in Peru is a government agency under the Ministry of Environment and Natural Resources (MINAM) in charge of managing the National System of Protected Areas (SINANPE) and conserving biodiversity, in coordination with regional and local governments, as well as land owners of private protected areas. SERNANP has been an essential partner for project delivery in the Nor Yauyos Cochas Landscape Reserve from the outset.

The project has worked with SERNANP from the design phase onwards. SERNANP has provided an entry point to communities, mayors and local leaders; expertise on the local context; and a framework for planning all project interventions. The Nor Yauyos Cochas Landscape Reserve Master Plan has provided an overall guiding framework, under which all project interventions have been planned. The landscape approach of the Reserve has also enabled a natural scale for implementation action, which has meant that an ecosystem vision has been part of EbA measures right from the design stage. For example, an integrated approach to watershed management is included in the Plan. Close collaboration between the project and SERNANP has instilled a sense of ownership within SERNANP for the project´s plans and measures from the outset. The project has also been able to inform existing planning processes and plans.

The Master Plan is currently being updated for 2015-2020. The project has directly supported the updating process. The VIA results have been integrated into the revised Plan. Climate change is now recognized as a threat to conservation and the Plan incorporates adaptation strategies for enabling the continued provision of ecosystem services that increase the resilience of the local population EbA measures prioritized by the project have also been included in the Master Plan, including measures related to vicuña management, pasture management and water management. Climate change has been mainstreamed into other sectoral areas, such as tourism and agriculture. Project indicators for monitoring EbA were developed, based on existing indicators used by SERNANP and were designed to fit in with existing activities and plans of SERNANP, so as to ensure continuity and to mainstream them into SERNANP´s work.

The successful collaboration with the Mountain EbA project has raised the interest of SERNANP in EbA and mainstreaming climate change into protected area management at national level in Peru. The Nor Yauyos Cochas Landscape Reserve has provided a nationally relevant pilot for testing different approaches to mainstreaming climate variability and change. This includes reflecting on issues such as: integrating climate variability, change and vulnerability in existing planning and management tools; redefining protected area boundaries to allow for species migration; strengthening human and financial resources; enhancing territorial planning; identifying alternative sources of livelihoods and sources of financing (Leslie, 2014). The project has contributed to national level trainings on how to integrate climate change into protected area planning and management.

A Technical Working Group for EbA, climate change and protected areas has been formed within SERNANP at national level, with government, UNDP, WWF and The Mountain Institute representatives. This also led to the organization of a national level event in October 2014, hosted by SERNANP, on climate change and protected areas. The event took place in Lima and was broadcast to 10 sub-national level events. The event provided inputs for Peru´s engagement at the IUCN World Parks Congress held in Sydney, Australia in November 2014 and for a side event hosted by SERNANP during UNFCCC COP 20 in Lima in December 2014 (see section 4.1. above). The Mountain EbA project has acted as a catalyst for increasing national level dialogue on climate change and protected areas in Peru, in addition to providing opportunities for taking forth lessons learned to international forums.

Source: G Quiroz, E Fernandez-Baca and J Leslie, 2015, pers. comm.; Reserva Paisajistica Nor Yauyos Cochas, Plan Maestro 2015-2019. Borrador; Leslie, J (2014) Fortaleciendo la resiliencia a través de la gestión adaptativa de las ANP. PowerPoint Presentation

SERNANP STAFF MEETING WITH LOCAL STUDENTS INVOLVED IN PROGRAMME-SUPPORTED COMMUNITY OUTREACH ACTIVITIES. © Adriana Kato, UNDP Peru

(Asamblea Comunal), which has community Committees (Comites de la Comunidad) (W Andia Castelo 2015, pers. comm.). The Cattle/Livestock Committee has been the project´s main partner in implementing measures on the ground. A participatory process was applied in developing a Management Plan for Rotational Grazing, which specifies, for example, conservation measures to be implemented, time periods for rotation and arrangements for livestock location on communal land. A voluntary interest group has been set up to pilot pasture and livestock management on individual family land and provide training for three days each month. The project is also collaborating with the mayor´s office, which has co-financed vicuña management activities, thereby showing commitment to implementing and sustaining EbA measures.

Management plans for pasture and water resources have been developed for the communities of both Canchayllo and Miraflores for managing communal resources. A year long, step-wise participatory process, coordinated by The Mountain Institute was used to develop the plans (Instituto de Montaña 2014). This process included establishing a shared vision; an analysis of the current condition of resources; and defining objectives, results and activities. The plans identify climate change as a key driver of degradation. While the activities of the EbA project are included, a range of other measures is also put forward, including with other partners. Existing natural resource committees are strengthened and new ones created, e.g. for management of pastures in Miraflores and for management of pastures, water and climate in Canchayllo. The project has thereby also strengthened overall management capacities at community level. The participatory process of developing the plans has in itself strengthened local capacities and increased understanding of how to manage natural resources in the context of a changing climate (IUCN 2015). The communities have now also dedicated part of their own, community level participatory budgets for implementing jointly planned activities under the project (Ibid.).

All management plans at the project sites in Peru have been ratified at community level through the relevant community assembly, and included in minutes of the assemblies (W Andia Castelo & K. Podvin 2015, pers. comm.).

EbA has been mainstreamed in Peru at national level policy, at regional level in Junín, within the NYCLR Master Plan and in local level management plans. A critical step remains to apply and implement the identified priorities and strategies that are supportive of EbA. Opportunities for further policy change include applying the experience to natural resource management plans in other communities in NYCLR and to management plans in other protected areas. The Protected Area of Huaytapallana, managed by the regional government of Junín, is a case in point, where collaboration between regional government and SERNANP has already begun to scale up the NYCLR experience. Regional climate change strategies are being developed in many regions, including Lima, and the lessons from Junín's experience are proving valuable.

4.5 Uganda

4.5.1 National level policy change

The Mountain EbA project in Uganda has engaged in making the case for policy change to accommodate ecosystem-based approaches to adaptation in a range of ways, at local, district and national levels. The project sits under the Ministry of Water and Environment, in its Department of Environmental Affairs, and this provides a channel for reporting and dialogue with government. At the national level, the National Climate Change Policy Committee, with representatives from the Ministries of Water and Environment, Energy, Health, Finance, Justice and Agriculture, also acts as the project steering committee. This has provided an entry point for direct dialogue with Ministries across sectors, and an opportunity to engage at governmental level, not only on issues pertaining to the project, but also to ecosystem-based adaptation more broadly (M Anino, S Kutegeka, P Nteza & A Rwabutomize 2015, pers. comm.).

The project has also made the case for EbA at national level by engaging with stakeholders through key sectoral groups. The Environment, Natural Resources and Water Sector Working Group includes participants from Ministries, donors and NGOs (including IUCN), and is chaired by UNDP on a monthly basis. The working group reviews policies and carries out annual reviews of projects, based on which it is able to influence financial commitments within Government. In 2014, the group visited the Mountain EbA project and, following this, increased funding to the Environment and Wetlands Department within the Ministry of Water and Environment (P Nteza 2015, pers. comm.). The Parliamentary Committee on Natural Resources also visited the project site, providing an ideal opportunity to raise awareness on EbA and promote ecosystem-based approaches to decision-makers (P Nteza 2015, pers. comm.). The project further presented the major findings of the VIA to the 200-member Parliamentary Forum on Climate Change, enhancing understanding of EbA among members of parliament (P Nteza 2015, pers. comm.)

Following the initiation of the Mountain EbA project, there has been a noticeable increase in understanding and support among policy makers in Uganda regarding EbA. This has also led to direct policy change. As mentioned above, Uganda was the lead country in promoting the Resolution at the UNEA Assembly on EbA in 2014. In addition, the National Climate Change Policy was finalized in 2013 with project staff taking part in the working meetings. This provided an opportunity to mainstream EbA into this multi-sectoral national policy for climate-resilient development. (P Nteza 2015, pers. comm.) Biodiversity and ecosystem services are identified in the national policy as adaptation priorities, alongside other priorities relevant for EbA, such as agriculture and livestock, water, forestry and wetlands. A range of specific adaptation strategies, already being implemented by the project in Uganda, are specifically referred to as priorities within the policy, including: conservation agriculture; conservation and protection of watersheds and catchment areas; agroforestry and reforestation; protection and restoration of wetlands; sustainable land management in hilly and mountainous ecosystems; and payments for ecosystem services. The policy thereby provides a comprehensive framework for implementing several EbA measures in Uganda.

The policy also includes a costed implementation strategy, which provides an action plan, indicative climate change programmes, costs, roles and responsibilities. Specific EbA relevant activities and outputs are included across sectors and reference is directly made to ecosystem-based adaptation as a prioritized approach to fisheries management, wetland management, and overall sustainable land and natural resource management.

Based on research carried out by the project (Baguma 2014), there is high level of acceptance, with 88.6 percent of respondents including public servants, local leaders and community members, agreeing that climate change is a serious issues requiring intervention and supporting the National Climate Change Policy. The challenge now remains to implement this multi-sectoral policy, with several Ministries in charge of delivery. The research included an analysis of feasibility of implementing the policy, and found that financial and technological resources are currently inadequate for efficient implementation. The Ministry of Water and Environment was assessed as having insufficient resources to coordinate delivery across all government agencies and levels, from national to community.

With support from the project, the Ministry of Water and Environment is developing guidelines on how to integrate EbA into national and district level planning and policies. This is a participatory process that has been undertaken through training workshops and provision of tools. A specific training package on implementing EbA in Mt Elgon has also been developed, which provides step by step guidance on planning and implementing EbA as a tool at supporting extension services (Uganda, Ministry of Water and Environment, 2015a).

The Second National Development Plan (NDP) for Uganda 2015-2020 guides the strategic direction, development priorities and implementation strategies of the country. Climate change is identified as a key threat to Uganda´s overall development, and climate change is put forward as a key cross-cutting issue to be mainstreamed into planning and budgeting. Ecosystem-based adaptation is identified as a priority intervention in the Environment and Natural Resources sub-sector.

EbA-relevant interventions are put forward within other sectors also, such as catchment management plans that integrate climate change adaptation measures in the water sector.

Box 18 | National Climate Change Policy of Uganda

The Government of Uganda will pursue the following policy priority: […]To effectively address the challenges posed by climate change impacts on biodiversity and ecosystems, so as to ensure ecosystem health and provision of ecosystem services that are crucial to sustainable and resilient development.

Government of Uganda (2013)

Box 19 | Second National Development Plan of Uganda

Objective 1. Restore and maintain the integrity and functionality of degraded fragile ecosystems. Intervention v. Promote ecosystem based adaptation to climate change in order to increase the resilience of ecosystems and communities to the impacts of climate change.

Government of Uganda (2015)

The objectives, results, strategies and interventions identified in the NDP need to be integrated into sectoral plans and policy statements developed at Ministerial level, with specific interventions and costing. These provide further opportunities for integrating EbA in actual delivery of government priorities through costed interventions. However, adequate funding needs to be identified to deliver such interventions, including through Payments for Ecosystem Services (PES). The ECOTRUST PES facility piloted by the project provides an interesting example in this regard (Chapter 5).

The operationalization of the National Climate Change Policy remains a challenge, including due to lack of appropriate institutional and legal frameworks. The need to establish an appropriate institution for coordinating the National Climate Change Response is recognized in the NDP, as well as the need to establish an appropriate legal framework for Climate Change Policy implementation and compliance.

Bringing about policy change for EbA also depends on the policy opportunities available within a country at a given time, depending on how policy development processes are unfolding, and if policies are being revised or updated, providing an opportunity for new issues and priorities to be integrated. The National Environment Management Plan is currently being formulated, and the project has been invited to take part in working group discussions (P Nteza 2015 pers. comm.). The NBSAP is also in the process of being reviewed and the incorporation of EbA is already being discussed. UNDP has been engaged in the working groups for the development of the Intended Nationally Determined Contribution and National Adaptation Plan, providing a means to feed in opportunities for policy change in support of EbA (P Nteza 2015, pers. comm.).

4.5.2 Local level policy change

Uganda[34] is divided into 111 districts, which are further divided into counties and municipalities. Counties are further subdivided into sub-counties, which in turn are divided into parishes and villages. At district government level, Natural Resource District Officers, under the Ministry of Water and Environment, have been assigned as EbA focal points for the project in the four districts of Bulambuli, Kapchorwa, Kween and Sironko. These officers were the entry points for the project into local government. Other district officers, such as district water engineers, were also key for the project. District officials were not initially convinced of the benefits of EbA, and the project needed to prove that EbA was a means to increase wealth and bring about socio-economic development, in line with the priorities of the National Development Plan. Generating political leadership for EbA, in particular through resident district commissioners (the president´s representative at district level), was critical in paving the way for EbA implementation and later policy change. The project has signed Memoranda of Understanding with District Local Gover\nments of Sironko and Bulambuli, through the Ministry of Water and Environment, on project activities and mainstreaming EbA.

The Mount Elgon Conservation Forum, established by IUCN, provides a platform for coordinating efforts across the ecosystem, through meetings, exchange visits and information sharing. This has provided a useful platform for discussing ecosystem-wide issues and developing common messages to feed into policy processes, linking the grassroots and national level policy and decision-making processes on key emerging issues such as climate change. In addition, the platforms created by the EbA project and lessons learned are being used to support the transboundary management of Mount Elgon, which is being spearheaded by Uganda Wildlife Authority and Lake Victoria Basin Commission of the East Africa Community (EAC).

Once initial buy-in had been attained, the project was able to begin a process of instituting policy change. The project has also worked at village level in Kapchorwa and Kween, through elected leaders, including the Chairperson as the focal point. At village level, Community Environment Action Plans have been developed in collaboration with district government, setting environmental targets and activities for implementing EbA at both communal and household levels. The action plans also established monitoring and evaluation frameworks, to be followed-up by communities and local leaders.

At parish level, the policy change process has entailed developing Parish Climate Change Adaptation Plans, which provide action plans for implementing EbA measures. The adaptation plans identify key climate change issues and vulnerabilities to be addressed, such as flooding, soil erosion and landslides. They then identify adaptation solutions that the community wishes to undertake, such as tree planting, agroforestry, riverbank management and water harvesting. Parish adaptation committees have been set up to oversee the implementation of these plans in the districts of Sironko and Bulambuli. At the sub-county level, technical officers, such as community development officers, agricultural extension officers and water officers have been key project partners and have been able to mobilise communities into action. A territorial plan for the management of Mount Elgon has also been developed, although it lacks funds for implementation.

Following development of the community and parish level plans, the project has also targeted mainstreaming of EbA into district planning. Training workshops were held in 2014 for the districts of Kapchorwa and Bulambuli, with district technical officers from several sectors (including planning, health, infrastructure and agriculture), district leaders and women´s representatives.[35]The workshop discussed and brainstormed how EbA could be included in District Development Plans, across sectors. This integration was particularly important, as sectors such as works and health have more funding available, which could also be channelled to EbA, compared with sectors such as environment. District Level EbA Action Plans on EbA were developed, which were then taken on board by the districts for follow-up and mainstreaming into their planning activities. The draft Action Plan for Bulambuli, for example, includes proposed, budgeted actions and partners to undertake the following types of EbA measures in 2015-19: good agricultural practices to address food insecurity due to drought and floods; tree nursery establishment to address deforestation; improved farming methods and agroforestry true to control floods; and afforestation and farming to reduce landslides; vaccinations to reduce pest and diseases in livestock.

District development plans are the main local plans developed for delivering the national development plan, and are therefore crucial planning documents. Mainstreaming EbA at this level helps ensure broad-reaching, cross-sectoral policy change that enables delivery of EbA measures at the ecosystem scale. The Ministry of Water and Environment is in the process of developing guidelines on how to integrate EbA into district level planning processes and into district development plans.[36] Community and stakeholder consultations will be carried out at district and sub-county levels to develop district EbA action plans, which can then be integrated into district development plans, where appropriate. This shows how the project has had impact at national level in making the case for policy change, which in turn can then be trickled down to local, district level policy change for EbA.

Tools have been presented to the district authorities on planning for EbA, including the results of the VIA and related mapping. Overall, the project has strengthened district level institutional capacities to plan for EbA. The district technical teams are also involved in monitoring project activities. Through district development plans, EbA can be integrated into district level planning and budgeting. Indeed, the sustainability of delivering EbA will depend, in part, on available financial resources. It is therefore critical to identify alternative public financing and other sources for sustainability, as will be discussed in Chapter 5.

4.6 Future opportunities for making the case for policy change for EbA

Opportunities remain for making the case for policy change for EbA to stakeholders with whom the project has engaged to a limited degree. One level that may be of relevance to explore is the outreach to regional level institutions, such as the UN Regional Commissions, the East African Community, the Andean Community and South Asian Association of Regional Cooperation. This could provide an opportunity for dialogue on EbA and an entry point to share the lessons learned from the programme. Sometimes the higher level can provide a more neutral platform for dialogue, without political or financial tensions that are more prominent at national level. This level of dialogue can also help address EbA as a transboundary issue, as has been shown in the case of feeding experiences from the project to the Lake Victoria Basin Commission of the EAC.

The project has also not engaged in significant degree with national level politicians and Parliamentarians, with the exception of some engagement in Uganda. This is an important group of decision-makers at national level. Finally, the private sector has not been engaged with directly in a significant way. These groups were not prioritized in project design, and focus so far has been targeted at global, national, regional and local levels. These identified gaps could be relevant for scaling-up and scaling-out the programme's experiences on making the case for EbA policy change in the future, both within the project countries and beyond.

CATHERINE NABUTSALE, CHAIRPERSON OF THE PROGRAMME-SUPPORTED SANGAASANA WOMEN'S COLLECTIVE. © Andrea Egan, UNDP

Global level policy guidance on EbA has a direct impact on how certain types of national plans, such as NAPs, INDCs and NBSAPs are developed. Such guidance can provide needed policy support in designing and drafting national policies that mainstream EbA.

The programme has applied a range of approaches for making the case for EbA to global policy audiences, thereby increasing acceptance of EbA discourse at the global policy level. Programme partners, supported by the Government of Germany, have engaged in dialogues; presented experiences and lessons learned on planning and implementing EbA; provided technical advice; and carried out policy advocacy at global level, including through events at the UNFCCC and CBD meetings.

Local level experiences in planning and implementing EbA can be used to make the case for needed policy changes for EbA at global level. The role of Uganda in building on its Mountain EbA project experience in making the case for an EbA resolution at the UNEA shows how EbA practice and policy can be bridged from local to global level.

The case for policy change for EbA at national level can be made with regards to policies such as National Development Plans, National Climate Change Policies, environment and conservation strategies, sectoral plans and policies. Overarching national development plans that acknowledge the importance of ecosystems for human well-being and adaptation, can be further elaborated in sectoral and local level budgeted plans and strategies. National climate change policies and strategies should integrate EbA as one of the adaptation options.

The National Development Plans and Climate Change Policies of Nepal, Peru and Uganda provide supportive frameworks for planning and implementing EbA measures nationally. The programme provided technical guidance and policy review inputs for integrating EbA into the Forest Policy in Nepal, the INDC in Peru and the National Climate Change Strategy in Uganda. The Peru INDC refers to the Mountain EbA Programme specifically in the context of results and practical experiences provided by key projects, which have informed the INDC adaptation proposal.

Ongoing sharing of lessons learned on EbA, organizing site visits to show the benefits of EbA on the ground and engaging in policy dialogues can help lift EbA onto the national policy agenda. The projects have successfully generated increased interest in EbA at country level by piloting this approach. This has increased understanding of and buy-in for EbA amongst policy makers and has contributed, for example, to the process of establishing a High Level Committee on EbA in Nepal and the high-level profiling of protected areas and climate change by Peru during UNFCCC COP 20.

Operationalization of policies and the implementation of identified priorities and strategies, including with regards to EbA, is dependent on adequate financial resources, and technical and institutional capacities. EbA is relevant across sectors, and policy change is still needed in all project countries for integrating EbA into sectoral planning and budgeting.

EbA is relevant across scales. **Given that a recommended scale for planning and implementing EbA is the landscape or ecosystem (Chapter 2), making the case for policy change for EbA at regional and local level is especially relevant.** District level agencies are critical, especially where measures are implemented across landscapes or outside clearly defined boundaries such as those of protected areas. Implementing EbA at e.g. watershed scale will require planning and oversight beyond community level, and across sectors, making district or regional level a relevant scale. Local level budgeting is often also decided at municipal or district level. In addition to collaboration with line agencies such as agriculture, forestry or water, it is relevant to consider broader land use planning and engagement of infrastructure and works sectors to avoid maladaptation[37] and explore opportunities for hybrid grey-green infrastructure solutions, for example.

Protected areas have been found to be an ideal scale for planning and implementing landscape level EbA. **Protected areas often have existing management plans and governance structures that can be tapped into when planning EbA, and into which EbA can be mainstreamed.** The project experience from NYCLR of working jointly with SERNANP and from Panchase of working with the Panchase Protected Forest in planning and implementing EbA measures has been a powerful way to make the case for EbA to local protected area managers

and communities. This has provided an entry point for making the case for national level policy change which can integrate climate change and EbA measures into protected area management across Nepal and Peru.

At local level, existing natural resource management groups have been important entry points for making the case for EbA and how to integrate it into local natural resource management plans, such as Community Forest Work Plans in Nepal.

Delivering needed policy change for EbA requires collaboration across policy scales. The role of different levels of policy and planning in achieving EbA is summarized in Table 19. For example, in Peru, the National Climate Change Strategy has provided a framework for developing Regional Climate Change Strategies and has also helped guide SERNANP´s work. The NYCLR Management Plan has, in turn, influenced how local level natural resource management plans have been developed. On the other hand, a bottom-up process has also taken place, where the NYCLR experience in integrating EbA and climate change is being scaled-out to other communities and protected areas in the region and scaled up to national level. Maintaining flows of dialogue, technical support and sharing of experiences can, in the medium- to long-term, help achieve needed policy changes for EbA across sectors and scales in a given country.

Table 19 | Opportunities for policy change for EbA at various policy and planning levels

Policy level	Global level policies and plans	National level policies	District and/ or regional plans	Protected area management plans	Local natural resource management plans
Examples of policies	UNFCCC decisions CBD decisions NWP	National development plans Climate change policies and strategies Sectoral policies: water, agriculture, forests, infrastructure, DRR, environment, etc.	Environment plans Climate change plans Development plans		Water management plans Forest management plans Pasture management plans
How relevant for EbA	Define EbA; provide guidelines and tools; influence adaptation funding; defines national reporting e.g. NAP and NBSAP	National priorities and visions for adaptation; influences national and sectoral budgets for adaptation; sets institutional priorities for adaptation; ensures political buy-in	Can provide an appropriate scale for EbA (landscape, watershed); multi-sectoral approach to EbA; Upstream-downstream linkages; local budgeting for EbA; technical support for implementation and monitoring of EbA; political buy-in	Guiding frameworks for EbA planning at landscape scale; governance and capacity to work at landscape scale; ownership; sustainability; monitoring of EbA	Detailed planning and implementation of EbA measures; management plans; sustainability across political changes; ownership; monitoring of EbA; political buy-in
Key stakeholders to engage	UNFCCC: SBSTA, NWP; CBD; Donors	Ministers; Technical officers; Parlamentarians; Cross-sectoral working groups	Line agencies; Extension workers; District officials and leaders	Protected area managers and staff; National protected area agencies	Natural resource management groups; Local leaders; Community assemblies; Community members
Additional, cross-scale bodies	Project coordination mechanisms and bodies: platforms for dialogue and coordination on roles and responsibilities for implementing EbA across sectors and levels; cross- scale institutions and agencies, such as: research institutes				

VICUÑAS ARE REIGNED IN TEMPORARILY TO GET VACCINATED WITH ANTI-PARASITE MEDICINE IN TANTA, PERU.

CHAPTER 5:

MAKING THE CASE FOR FINANCING EBA

Public financing, community economic incentives and identifying new EbA measures that produce new or enhanced ecosystem goods and services can all contribute to financing EbA. In Peru, the inclusion of EbA in public investment guidelines for biodiversity and ecosystems promises far-reaching impact by mainstreaming EbA into government investments. In Uganda, EbA measures were used to bundle watershed and carbon services into credits, demonstrating that Payments for Ecosystem Services (PES) is a relevant model for EbA financing. EbA measures that produce new ecosystem goods and services, such as provision of plant products in Nepal or fibre from vicuña in Peru, can provide an alternative source of financing and enhance sustainability of implemented measures.

This chapter will present the piloted approaches, some of the lessons learned and proposed future opportunities for financing EbA based on the programme´s experiences.

5.1 National and local level public finance for EbA

The enabling policy frameworks, strategies and plans for EbA in Nepal, Peru and Uganda were discussed in Chapter 4. While there was a relatively good framework in place in all countries, implementation of policies remained dependent on supportive legal frameworks, sufficient capacities and financial resources. Funding for adaptation remains one of the main gaps in transferring societally set goals into actually implemented adaptation (UNEP 2014). Climate change policies need to be translated into budget allocations and expenditures, thereby making climate change part of the national budgeting process (Adelante et al. 2015). Climate change adaptation was included in the national development plans of Peru (Bicentenary Plan 2011-2021), Nepal (Thirteenth Three-year Plan) and Uganda (Second National Development Plan 2015-2020), the main documents guiding national priorities for planning, budgeting and implementation. The Peru National Climate Change Strategy (2014) provides a framework from which costed sectoral and regional climate change plans are to be developed. In Uganda, the National Climate Change Policy is costed, but operationalization has been hampered by lack of institutional capacity and resources to actually implement the costed plan (Baguma 2014). The Nepal National Climate Change Policy (2011) puts forward the establishment of a national Climate Change Fund for implementing climate change programmes, but this Fund remains to be operationalized.

One of the easiest ways to prioritise budgets for climate change is through increasing allocations for climate change actions within Ministries (Miller 2013). It is also important to reduce interventions, which are contributing to non-climatic pressures on ecosystems. For example, current investment in road construction in Nepal has a direct negative impact on ecosystem service provision and the implementation of EbA measures in Panchase (Box 6, Chapter 2). Further, climate change impacts are felt at the local level, requiring additional resources to be transferred from national to local government in order to counteract these impacts. In Nepal, a specific decision has been taken to channel up to 80 percent of climate change funding to the local level (Gurung et al. 2015).

5.1.1 Public finance for EbA in Peru

The project carried out research in Peru on public finance for climate change and EbA specifically (Soncco 2014). Since 2012, Peru has been implementing a process of Results-

MOUNT ELGON IN UGANDA IS HIGHLY PRONE TO LANDSLIDES PARTLY AS A RESULT OF DEFORESTATION ON ITS COFFEE-PRODUCING SLOPES. © BBC

based Budget Programmes (PPR-Programas Presupuestales por Resultados), which are 2-3 year programmes at ministerial or sectoral level. Results-based budgeting directly links continued public expenditure to previous products and results. This makes it easier to identify public expenditure on climate change adaptation. The research carried out (Soncco 2014) showed a gradual increase in government expenditure on projects that are relevant for climate change adaptation, up by 18 percent between 2009 and 2012. The majority of projects were in riverbank protection and forestry. The research also found that the majority of these projects were carried out by municipal governments. This may be due to the fact that impacts of climate change are felt most strongly at this level, and that riverbank protection is seen as an efficient method for dealing with some changing weather patterns, in line with climate change predictions, that have been experienced to date.

On the other hand, forestry has traditionally been a high investment area for regional and municipal governments, regardless of anticipated climate change impacts. From an EbA perspective, municipal and regional governments are often in charge of managing ecosystems (Chapter 4). PPRs provide a future opportunity for collaborating on financing for EbA. The Ministry of the Environment and Natural Resources (MINAM) is already collaborating with regional governments on including climate change in existing regional budgetary planning. Engaging with regional and district governments on budgeting can be a particularly relevant avenue for making the case for financing for EbA from public finance sources.

In Peru, the project has collaborated with national and local governments on making the case for EbA finance. The project collaborated closely with the Ministry of Finance and Economy (MEF) and MINAM in the development of policy guidelines for public investment in biodiversity and ecosystems, as described in Case Study 12. These new guidelines, which have EbA integrated into them, provide an opportunity for mainstreaming EbA in public investments. This makes EbA relevant for public investments across sectors and at multiple scales from municipal to regional and national level. It also enables public investment to shift from traditional, grey infrastructure to EbA-type measures.

In addition to engaging in the policy guideline development process and providing technical guidance, the project has made the case for financing for EbA by showing benefits on the ground. The interest of the Tomas community and municipal government in developing a Public Investment Proposal for EbA is based on the experience and the benefits provided by the EbA measures implemented by the project in the neighbouring community of Tanta. At national level, hard data on economic benefits and cost-effectiveness of EbA provided by the CBA analysis (Chapter 3) has been important in making the case for EbA to the MEF. Mainstreaming EbA into government policies and budgeting processes at national level can have a potentially far-reaching impact on EbA finance in the long-run and enable the integration of EbA into national, regional and local planning and implementation processes.

SERNANP STAFF WORKING CLOSELY WITH THE PERU MOUNTAIN EBA TEAM AND LOCAL COMMUNITIES IN THE NYCL RESERVE TO PROMOTE EBA.© Hector Bonilla, UNDP Peru

Case Study 12 | Public Investment in Ecosystem-based Adaptation in Peru

The Mountain EbA project collaborated with the Ministry of Economy and Finance and the Ministry of the Environment and Natural Resources on development of policy guidelines for public investment in biodiversity and ecosystems. The guidelines provided an opportunity for making the case to MEF and MINAM for increasing public investment in EbA. The project played a key role in incorporating EbA in the guidelines through participating in ad hoc working group meetings, and providing technical guidance and text suggestions on ecosystem-based adaptation measures.

The Policy Guidelines for Public Investment in Biodiversity and Ecosystem Services 2015-2021 were approved by Ministerial Resolution of MINAM in August, 2015. The objective of the guidelines is to promote public investment in conservation and sustainable use of biological diversity and ecosystems, so as to achieve social well-being. They provide a guiding framework for formulating and implementing public investment projects at local, regional and national level. Climate change is considered a cross-cutting issue under the guidelines. EbA is identified as a policy guideline under the specific objective of conserving and restoring biodiversity.

EbA actions are further identified as an expected result of the guidelines.

Traditionally, public investment in Peru has focused on grey infrastructure, such as building roads or schools. The guidelines now open a path for investing public finance in projects such as watershed management and species conservation. The National System for Public Investment (Sistema Nacional de Inversion Publica SNIP) is the main source of finance for public investments in Peru. Proposals for Public Investment Projects (PIP-Proyectos de Inversion Publica) are developed by project managers in a range of public sector offices in national government agencies as well as regional and local governments. The guidelines thereby open a country-wide, cross-sectoral opportunity for developing EbA proposals for public investment in Peru.

Box 20 | Policy guidelines for public investment in biodiversity and ecosystems

Policy guideline 1.4. "Implement ecosystem-based adaptation actions to ensure the sustainable provision of ecosystem goods and services, as a means to reduce current and future vulnerability to climate change of human populations."

Resolucion Ministerial N° 199-2015-MINAM

CANCHAYLLO VILLAGERS OPENING THE INTAKE AT THE BEGINNING OF THE NEW CANAL © Carlos Diaz Huerta, Tres Mitades

UNDP has been more broadly engaged in the coordination and development of the guidelines through the BIOFIN initiative[40] and hopes to continue this active engagement as the guidelines are applied in practice. This engagement includes supporting development of pilot proposals and projects to test the guidelines. The Mountain EbA project has worked with the municipality of Tomas in the Nor Yauyos Cochas Landscape Reserve on developing a PIP proposal on water regulation to control soil erosion, based on its pilot project in the neighboring community of Tanta. The project has supported an initial baseline and assessment for Tomas. The project team, including the national protected area agency, SERNANP, has worked closely with both the municipality and the Mayor of Tomas, who will submit the PIP proposal and be the implementer of the project, making the case for EbA by building on the experience of Tanta. A local technical expert of the Mountain EbA project has been voted President of the community of Tomas, thereby providing a direct entry point at community level for making the case for EbA. A community visit from Tomas to the project site in Tanta was carried out so that community members could take part in a technical capacity building workshop of the Mountain EbA project.

At national level, the project has maintained regular engagement with the MEF to make the case for EbA as a strategic public investment, and to ensure interest in the EbA PIP proposals that are being developed. The project has presented initial results of the cost-benefit analysis work to the MEF (Chapter 3). A case study based on the CBA results from Tanta will be developed together with the MEF, providing an example of the economic benefits of undertaking investment in EbA. This hard data can increase municipal, regional and national level interest in developing EbA-related PIPs. The aim is to include the CBA results in training materials on how to apply the policy guidelines in practice, which would then be used in training project managers at different government levels in developing PIP proposals related to biodiversity and ecosystems.

The Mountain EbA project identified an important policy opportunity to make the case for EbA finance through engaging in the development of Peru's policy guidelines for public investment in biodiversity and ecosystems. It is hoped that this successful integration of EbA into a guideline which applies to public investments at all levels will have a far-reaching impact on increasing the number of EbA actions on the ground. These guidelines also enable the sustained mainstreaming of EbA into government planning and investment in Peru.

Sources: J Leslie & E Fernandez-Baca 2015, pers. comm.; Resolucion Ministerial N° 199-2015-MINAM

FOSTER DAMIAN, CANCHAYLLO COMMUNITY PRESIDENT, OFFICIALLY OPENING THE CANAL. © Carlos Diaz Huerta, Tres Mitades

5.1.2 Public finance for EbA in Uganda

The Mountain EbA project carried out a study on public financing for EbA in Uganda (Uganda, Ministry of Water and Environment, 2015b). The study identified that Sectoral Budget Framework Papers, which outline sector expenditure priorities, and Ministerial Policy Statements, which link strategic priorities with proposed budgetary allocations, provide opportunities for integrating EbA in national budgeting processes. Research by Tumushabe et al. (2013), found that about half of the current climate change-related programmes in Uganda are run by the Ministry of Water and Environment and the Ministry of Agriculture, Animal Industry and Fisheries. Climate change-related expenditure is expected to increase. The Water and Environment Ministerial Policy Statement for the Financial Year 2014-2015 includes a *Sector Outcome 3 on Improved Weather, Climate and Climate Change Management; Protection and Restoration of Environment and Natural Resources ecosystems.* This includes a range of budgeted, EbA-relevant measures, such as wetlands management plans, buffer zones for rivers, catchment management plans and weather station establishment.[41] One of the challenges, however, has been that budgeted measures are not always implemented in practice. In addition, public financing for climate change remains limited due to lack of resources, weak regulatory instruments and institutional capacity to deliver (Baguma 2014).

PART OF THE GRAVITY FLOW SCHEME IN SANZARA, UGANDA.
© IUCN Uganda

The research carried out by the Mountain EbA project found that integration of EbA at local level is best done through integration into District Development Plans, the overall planning tool at district level, which includes all budgeted activities (Ibid.). A national decentralization process enables district authorities to make decisions regarding utilization of funds, in line with national policies and priorities, using such financing instruments as Local Government Development Programmes and unconditional grants. In practice, however, limited funds are made available for EbA-relevant activities. For example, funding for wetland management for the financial year 2012-13 for Bulambuli district was around $1,900 and for Kween district around $1,940.[42]

The project´s engagement in working with District Development Plans, described in Chapter 4, therefore aims to have direct impact on district level budgeting. During the District Development Planning Workshop, it was recognized that funding available at district level for Water and Environment is extremely low, currently with a conditional grant only for wetlands.[43] Therefore, it will be essential to identify EbA opportunities in other, better funded sectors, such as works and production. To date, the District Government of Kapchorwa has co-financed the Mountain EbA project by financing access to water from the Sanzara Gravity Flow Scheme to a third village not covered by project funding. This was done through District funds under the Northern Uganda Social Action Fund, which is a project built on a loan from the World Bank. The majority of funds available at district level come through donors (IUCN Uganda 2012b).

The experience from Uganda shows that opportunities for making the case for EbA financing exist at sectoral and district level through plans and budget frameworks. While

some public budget relevant for EbA has already been identified, implementation remains hampered by lack of available resources and capacity. Making the case for financing for EbA to new sectors, such as infrastructure, that are better funded and implemented and may be interested in, for example, hybrid grey-green infrastructure, is one way to increase public finance for EbA.

5.1.3 Public finance for EbA in Nepal

A study carried out by the project on policy and public finance opportunities and challenges for EbA in Nepal (Gurung et al. 2015) identified the National Planning Commission (NPC); the Ministry of Finance; the Ministry of Forest and Soil Conservation; Ministry of Technology, Science and Environment; and Ministry of Agriculture Development (MoAD) as the major government institutions implementing climate change adaptation projects in Nepal. A Climate Change Budget Code was formulated by the NPC to facilitate tracking of climate expenditure. The Code has been implemented in the National Budget since the fiscal year 2012/2013. This also provides an opportunity for dedicating expenditure, from both donor and public sources, to adaptation and specifically ecosystem-based approaches.

The study identified that investment in climate change has traditionally relied on bilateral and multilateral donor funding; however the Government of Nepal has been gradually increasing financial resources allocated to tackling climate change. During its budget speech in 2014, the Ministry of Finance allocated $930,000 (Rs. 930 million) for implementation of national and local level climate change adaptation programmes in fiscal year 2014/2015 for the Ministry of Science, Technology and Environment (including both donor and public financing sources). An ongoing challenge for delivering climate change projects and implementing increased budgets in Nepal is the lack of technical capacities and shortage of human resources to oversee the increasing number of projects and finance (Gurung et al. 2015).

5.2 Community level schemes for financing EbA

Various approaches to making the case for EbA using economic incentive schemes at community level have been piloted in Uganda. These schemes have tested: using external funding to initiate a credit system (NAHI); a reward/compensation mechanism for undertaking EbA measures (CECF); and a Payments for Ecosystem Services-type model (ECOTRUST). All these models have in common that they aimed to become schemes that would, in the long run, run by themselves through the generation of either local finance (through interest rates), external private finance (carbon markets) or external public finance (PES payments by public service providers) to support delivery of adaptation strategies and implementation of EbA measures. In addition, the project has explored the use of market opportunities for products generated through EbA measures as a market-based source of ongoing financing for EbA.

5.2.1 NAHI and CECF incentive schemes in Mt Elgon, Uganda

IUCN piloted two community incentive schemes in the Mount Elgon districts of Kapchorwa and Kween. The Nature Harness Initiatives (NAHI) incentive scheme, supported by project funds, was targeted specifically at the Sanzara community, as a means of raising community interest and making the case for 'no regrets' measures and EbA (Case Study 13). Incentives were paid for implemented 'no regrets' measures outlined in household-level land use plans. The Community Environment Conservation Fund (CECF) was adopted at a much broader scale, covering the catchments of Sipi, Kaptokoi and Ngenge (Case Study 14). It provided credit for community members, which could be used for any purpose. However, receiving the credit was tied to completion of EbA measures outlined in Community Environment Action Plans.

Both models served the purpose of securing community buy-in through providing economic incentives early on in the implementation of measures, before the full scale of EbA benefits could be seen. In the case of Sanzara, this was because localized measures were only beginning to be implemented, while in the case of the river catchments, achieving benefits at such scale would require time. The incentive schemes tied in closely to broader project activities. Participatory assessments, and in the case of the CECF the VIA, informed development of local adaptation plans at household and community level and were used to inform which measures were supported by the incentive schemes. Capacity building and technical support was needed in implementing the identified EbA measures and carrying out monitoring. While community empowerment was an important goal of the incentive schemes, engagement of district government was important both in ensuring compliance as well as integrating the fund model into district level planning.

The schemes provided financial incentives for implementing EbA and helped make the case for EbA to communities and local government. The NAHI initiative ran its course once a broader, catchment scale approach to EbA was adopted and the CECF model was seen as more appropriate at that scale, with potential for a longer life.

Case Study 13 | NAHI Incentive scheme for 'no regrets' measures in Sanzara, Uganda

From: IUCN Uganda (2012) *Restoration of the River Sipi Micro-Catchment as an Ecosystem-Based Solution to Build Social and Ecological Resilience of the Sanzara Community to Climate Change Impacts.* [Online] IUCN. Available from: http://www.ebaflagship.org/downloads/ppt/Appendix_1-IUCN_site_information.pdf . Additional information from interviews with Sophie Kutegeka, June and September 2015.

IUCN partnered with Nature Harness Initiatives (NAHI) to develop a participatory incentive mechanism for landowners in Sanzara Parish to adopt ecosystem-based adaptation interventions, as a means to enhance social and ecological resilience. This small-scale incentive scheme was specifically designed for the needs of a parish with high levels of poverty and limited experience in planning and implementing development and ecosystem management projects. An important goal of the scheme was to trigger community interest in EbA and motivate people to undertake early 'no regrets' measures. Along with the measures implemented in Sanzara (Case Study 4, Chapter 2), the scheme aimed to increase appreciation for the value of ecosystem services. Nature Harness provided capacity building and technical support for the communities throughout the pilot incentive scheme process, which was important given lack of experience in the community to plan and implement projects.

Farmers who were interested in applying for the incentive scheme developed an individual land use plan integrating restoration and enhancement of ecosystem goods and services. Measures supported by the scheme were identified based on the participatory assessment (Case Study 1) and included climate-smart, no-regret interventions such as planting trees as riverbank protection and digging trenches to retain water and control soil erosion. Baselines and indicators were agreed as a means to measure change.

The incentive scheme ran for one year, from 2012-13; 120 farmers participated in an area covering 130 acres of land. Performance-based instalments were paid in two parts: the first, once trees had been planted and trenches dug; and a second instalment six months later, based on whether seedlings had survived and trenches had been maintained. Payments varied in amounts from around $8 to $300 (in US dollars), based on the number of trees planted, the species used, and survival rate; as well as the size of trenches dug. Monitoring was originally based on self-monitoring by community members, including by ranking farmers who had performed best. However, it was found that more neutral monitoring was needed, and evaluations were carried out by NAHI and the local district government. In case of non-compliance, payments were not provided. Many farmers failed to comply with the targets set in their land use plans and therefore did not receive their payments.

Funds for the incentive scheme were provided by the Mountain EbA project, and administered by the local government. The role of the local government in administering funds and carrying out evaluations was found to be important in increasing government buy-in and interest in the initiative. The scheme ended after a year, as a broader, catchment-scale approach and scheme was adopted (see below). Some of the funds farmers received were reinvested into other EbA measures implemented at the site.

Overall, the experience of the incentive scheme was positive. Alongside other measures (Case Study 4), it played an important role in engaging Sanzara Parish in the EbA project and making the case for adopting broader, landscape scale EbA approaches. Sanzara became a model community to which other communities from the broader River Sipi catchment, including those involved in the later CECF incentive scheme described below, would come to learn about EbA.

COMMUNITY NURSERY IN SANZARA, UGANDA. © IUCN Uganda

Case Study 14 | Community Environment Conservation Fund (CECF) in the catchments of Sipi, Kaptokoi and Ngenge, Uganda

The Mountain EbA project in Uganda used the Community Environment Conservation Fund (CECF) as an incentive mechanism to catalyse community action for ecosystem-based adaptation in the river catchments of Sipi, Kaptokoi and Ngenge. The CECF, a model developed by IUCN, works by providing money for the establishment of a credit fund to communities who have collectively agreed to implement a Community Environment Action Plan (CEAP). EbA measures, in line with the CEAP, were undertaken and monitored by the communities as the basis on which access was granted to credit. This loan finance, while its access is conditional, can be used for any purpose (e.g. school fees, medical expenses, investments).

The CECF was developed to speed up implementation of EbA actions on the ground, scale up adoption of EbA measures to a catchment scale, create ownership and promote sustainability after the project ends. CEAP Plans were developed at community level and respond to climate vulnerabilities and risks identified in the participatory assessments and the VIA, such as flooding of rivers. EbA measures such as tree planting, river bank rehabilitation and soil and water conservation were put forward with clear milestones. Simpler Household Environment Action Plans (HEAPs) included planned actions at household level. CECF Memoranda of Understanding were signed between communities, local government and IUCN as commitment to progress and implementation of the CEAPs.

All community members have access to the provided credit, but initial receipt of credit is conditional on submission of the CEAP or HEAP, and further extension of credit is dependent on proof of progress in implementing such a plan. Farmers wishing to apply for loans must present their HEAP to the community and the fund management committee (made up of community members and local government). A community meeting is held monthly to review credit requests, monitor progress, enforce agreed plans and facilitate farmers making loan repayments. Decisions are made jointly on who receives credit and for what purpose. Requested loans range from

LAYING THE PIPES DOWN IN SANZARA FOR THE GRAVITY FLOW SCHEME, BRINGING WATER FROM THE RIVER TO IRRIGATE FIELDS AND PROVIDE STEADY WATER SUPPLY TO THE COMMUNITY. © IUCN Uganda

approximately $15 to $300 each. The loans are to be paid back within 3 months maximum and have an interest rate of 3 to 5 percent. Specific conditions of loans in a given community are agreed by the communities themselves. Community members play the lead role in managing the fund.

Community members were initially trained to carry out monitoring; however, it was found that community monitors could be compromised because they were monitoring one another. The district local government got involved in monitoring, and second instalments became dependent on performance and monitoring reports provided by district government to IUCN.

Loans have been provided from 2013 onwards. IUCN provided initial funding for the CECF, through instalments paid in three phases to each participating community. A first instalment was paid following the development and agreement of a CEAP. The following payments were paid after monitoring visits by local government and achievement of set milestones. All instalments by IUCN have now been disbursed.

The CECF model works strategically through empowering local structures to perform their roles and responsibilities, hence promoting transparency, accountability and ownership. Delays in paying back loans have repercussions on the entire community, as this would further delay receipt of the following instalments contributing to the fund. This has led to high compliance rates for loan paybacks. In terms of achieving CEAP targets, non-compliance has, in some communities, led to longer delays in getting instalments paid for the CECF of a given community.

District government has played an important role in monitoring the CECF fund and achievement of targets set out in the CEAP. District government has also been in charge of disbursing fund instalments to communities at community meetings. Involvement of district staff in administration of the fund has been critical in creating ownership and buy-in by local government for the fund itself, as well as for the broader EbA measures being implemented. This enables better integration of the fund into local planning processes, facilitating the adoption and potential scaling-up of the scheme in the future.

Challenges in implementing the fund have included initial difficulties in getting local leaders on board in seeing the value-added of EbA and understanding climate change impacts. Engaging leaders in the participatory assessments (Chapter 2) was essential in this regard. It took some time to garner government buy-in, as CECF funds were directly channelled to communities to manage them. This was a new model for local government, but they bought in once they were given a clear role in the process. A lesson learned is that in future applications of the CECF, a percentage of the interest rate gained could be channelled back into monitoring expenses by local government. Currently, interest gained is fully reinvested into providing new credit through the CECF.

Some communities have more fully embraced the CECF model than others, who have remained focused on the credit function of the CECF rather than seeing the broader benefits provided in terms of EbA. However, the model itself has been conducive to increased discussion and understanding of EbA. The community meetings where the fund is managed bring people together to discuss not only the fund, but also the CEAP and HEAP, achievement rates, successes and challenges of catchment-scale natural resource management and potential climate impacts. Overall, the CECF model has acted as a catalyst for EbA action in the catchments of Sipi, Kaptokoi and Ngenge.

Sources: Interviews with Sophie Kutegeka, June and Spetember 2015; Ecosystem Based Adaptation in Mountain Ecosystems, IUCN COMPONENT PROGRESS REPORT Jul 2013-Jun 2014; IUCN ANNUAL REPORT 2013 Mt Elgon, Uganda; IUCN Esaro (2013) Practical guidelines for establishing a Community Environment Conservation Fund as a tool to catalyse social and ecological resilience. Nairobi: IUCN.

5.2.2 ECOTRUST payments for ecosystem services in Mount Elgon, Uganda

TEEB, 2009 UNDP Uganda is implementing a PES facility through the Environmental Conservation Trust of Uganda (ECOTRUST), an environmental non-governmental organization specialized in conservation finance. The scheme works through bundling of ecosystem services and providing payments to farm households for EbA measures that provide watershed services and carbon sequestration services. The scheme aims to incentivize the adoption of EbA measures. As with the NAHI and CECF schemes described above, the ECOTRUST PES facility is also part of a broader set of supporting activities. The VIA informed the choice of 12 parishes vulnerable to climate change, which were chosen as participants in the PES pilot scheme. Parish Adaptation Plans were developed in collaboration with district government to prioritise adaptation activities at parish level, after which household level and use plans were developed. Capacity building was provided on adaptation planning, implementing EbA measures and monitoring.

The model is innovative in that it provides payments to farmers directly based on credits, sold to buyers in other countries through voluntary markets, for the ecosystem services provided by the implemented EbA measures (carbon sequestration and watershed services). The project supported the set-up of the PES facility and initial activities. The goal is for the PES facility to become self-financing, by continuing the generation of carbon and watershed credits that are sold on international or potentially national markets. The market for such bundled credits is emerging, and it remains to be seen how the credits will sell in the future. ECOTRUST has also explored the interest of the government-owned public service provider National Water and Sewerage Corporation of Uganda in contributing to PES payments. The aim is to also scale up this pilot to a watershed scale.

The Minister of Water and Environment officially launched the scheme and the national government has expressed interest in the potential of PES incentives in enhancing adaptive capacities and livelihoods.

Box 21 | Definition of payments for ecosystem services (PES)

PES can be defined as voluntary transactions where a well-defined ecosystem service (ES) (or land-use likely to secure that service) is 'bought' by at least one ES buyer from at least one ES provider, if and only if the ES provider secures ES provision (conditionality). The term covers payments for sustainable management of water resources and/or agricultural land, biodiversity conservation and storage and/or sequestration of carbon in biomass.

IN UGANDA, TRENCHES WERE DUG IN FIELDS TO HELP CONSERVE WATER AND IMPROVE SOIL MOISTURE. © Edmund Barrow, IUCN

Case Study 15 | ECOTRUST Payments for Ecosystem Services for EbA in Uganda

The Mountain EbA project has contracted the Environmental Conservation Trust (ECOTRUST) of Uganda to pilot an incentive-based mechanism for ecosystem-based adaptation activities which generate both watershed and carbon sequestration services. The Payment for Ecosystem Services (PES) facility aims to contribute to adaptation by providing an incentive for farm households to adopt specific EbA measures, which in turn are hoped to enhance provision of ecosystem services and adaptive capacities. The mechanism is currently being piloted with farmers on individual household land in 12 Parishes in the Districts of Bulambuli and Sironko. Parishes were prioritized based on the findings of the VIA.

Planning and implementing EbA activities

Project activities began in September 2014. An initial 113 farmers were recruited through community meetings to participate in the pilot phase of the PES facility. Capacity building workshops were held on adaptation planning, community mobilization, farmer training and monitoring. Adaptation interventions are chosen based on Parish Adaptation Plans, which identify climate change issues relevant for the parish, prioritise adaptation options and provide budgets for these options. ECOTRUST has supported the participatory development of these Plans with communities and local government. ECOTRUST has favoured adaptation activities that require some external support and upfront investment, as well as activities that are measurable – for example, the length and width of a trench can be easily measured. The table below describes the EbA activities included under the PES facility.

Following the initial prioritization of adaptation activities at parish level, land use plans are developed with farmers at household level. A farmer sets his or her own management and livelihood objectives, which are reviewed by ECOTRUST or local government extension workers, who provide technical advice and specifications. Following joint agreement, simple plans are developed, often pictorial maps of a farmer´s land, identifying where measures will be undertaken, which measures are prioritised and what the objectives (in terms of growth and earnings) are, in a given time period.

To date, some soil and water conservation measures have been implemented in the project sites, but in a scattered manner. The project has worked with 12 different farmer groups to jointly implement soil and water conservation measures, thereby hoping to achieve a greater scale of impact and ensure that benefits from measures such as terracing, which require larger tracts of land, are attained.

Table 20 | EbA activities included in the ECOTRUST PES facility

Adaptation activity	Expected ecosystem service	Payment/reward mechanism
Tree planting	Carbon and watershed services	Based on amount of CO_2 sequestered
Soil and water conservation: Countours and terracing; channels and trenches; planting grassbands; strip mulching	Watershed services to reduce runoff, soil erosion and siltation	Based on acreage put under improved management
Riverbank management	Watershed management	

Table 21 | Example of a payment scheme for watershed and carbon services

Year	Percentage of payment	Milestone (detailed milestones defined in Land Use Plans)
1	20%	Adoption of improved land use plan
2	20%	Adherence to land use plan
3	10%	Continued adherence to land use plan
6	10%	Continued adherence to land use plan
8	20%	Average Diameter Breast Height (DBH) of trees of 10cm
10	20%	Average DBH of 20cm

PES design

The PES facility provides upfront funding to farmers to initiate adaptation activities and uses the market to increase cash flow and invest in the expanding number of participating farmers. Performance-based payments administered by ECOTRUST cover both watershed and carbon services generated by the adaptation measures. Bundled credits of carbon which include watershed functions are sold on the international carbon market, to buyers such as Myclimate, through ECOTRUST´s Trees for Global Benefits programme, which adheres to the Plan Vivo standard.[44]

Credits are sold ex ante through the Trees for Global Benefits programme, meaning that they are financed before a farmer enters into contractual agreement with ECOTRUST. The price received for the sale of carbon credits as offsets at a given time ($6 per ton of CO_2 for the first pilot) is the basis for the payment defined in the agreement with a given farmer. The price the farmer receives remains constant throughout the contract, although the instalments and payments can vary based on the performance and results achieved by the given farmer. The generation and trading of the PES credit sold in tons of CO_2 offsets is divided so that the farmer gets 60 percent of the sales, while the remaining sum covers administrative, monitoring and verification costs.

The payment a given farmer receives is based on the amount of carbon sequestered on their land (calculated according to land area, number and type of trees). For soil and water conservation measures, this is paid by the acre of land under management. The price is based on a carbon proxy, marking up the price received by a farmer in an area of land where soil and water conservation measures are adopted alongside tree planting, by e.g. $2 per ton of CO_2. The first five years' payments are for both watershed and carbon services, and final payments for carbon sequestration (see table below). The price received by farmers varies, based both on when they start the contract (and the price of carbon at that time) as well as their set targets in the land use plan and rate of achievement. The first payments were disbursed in September 2015.

The programme provided an initial grant of $75,000 to ECOTRUST, which has been used as seed capital to create the PES fund and support initial activities. Ongoing cash flow to the fund is expected from the continued selling of carbon and watershed credits on the international market. In addition, ECOTRUST is negotiating with the government-owned public service provider, National Water and Sewerage Corporation of Uganda, to make a contribution for the ecosystem services provided by the adaptation activities. ECOTRUST is also exploring integrating

TREE PLANTING IS A MAJOR ACTIVITY UNDER THE ECOTRUST PES SCHEME. © Monicah Kyeyune, UNDP Uganda

a model on commodity value chains for Arabica coffee into the PES facility, which has been piloted on the other side of Mount Elgon. A UK-based platform purchases coffee from farmers, marking up the price of every kilogram of coffee that includes a watershed approach in its production and can be traced back to this origin.

In addition to the PES facility, a small grants scheme of $70,000 has also been put in place to support interventions identified in the Parish Climate Change Adaptation Plans, which cannot be implemented under the PES scheme. This has included supporting interventions such as a micro-irrigation project, water harvesting tanks and extending existing gravity flow schemes.

Monitoring

A monitoring plan has been developed for the PES facility. Main indicators being monitored are the technical specifications provided by ECOTRUST for tree planting and soil and water conservation, and the agreed management practices set out in the land use plans. Monitoring is undertaken over a period of five years for soil and water conservation measures and 10 years for tree planting. Progress on soil and water conservation measures, for example, contour trenches, is measured in the first year, and then in following years the target is the maintenance of these trenches. For tree planting, for the first year a 50 percent survival rate of saplings is expected, then 100 percent by the second year, moving onto diameter breast height targets in later years.

Initially, ECOTRUST piloted the use of community monitoring. Groups of farmers were trained to undertake monitoring of each another. However, it was noted that the monitoring results generated were not reliable, as it was unrealistic to expect a farmer to be "penalizing a neighbour". ECOTRUST remained interested in building capacity to monitor at local level, so they decided to partner each farmer with an ECOTRUST staff member for monitoring visits. Results are monitored annually by these staff members together with farmers for soil and water conservation measures. For tree planting, this is done in accordance with the timeline for the agreed payment schedule.

Indicator milestones are set based on conservative estimates, so as to make them achievable for farmers. If targets are not achieved, farmers receive a letter explaining the corrective actions they need to take, and clarifying that payment will only be processed once these actions have been undertaken. In practice, this is likely to lead to payments being paid later than originally scheduled, once corrective actions have been undertaken.

Conclusions and next steps

The PES facility was officially launched in March 2015 by the Minister of Water and Environment, Hon. Ephraim Kamuntu. The Minister emphasized the contribution of the fund to many of the investment priorities identified in the National Development Plan of Uganda, such as skills development, water and sanitation; and facilitating availability and access to critical production inputs, especially in agriculture. The PES facility is hoped to generate additional alternative resources, divert funds to sustainable production patterns and increase the involvement of the private sector in environmental protection. "We hope that these [PES] incentives will provide ground for introducing innovations that could lead to changes in current land use and enable farmers to gradually shift towards actions that will enhance their adaptive capacity and livelihoods," the Minister said.

A second pilot phase has seen the overall number of participating farmers increase to 263. So far, the project has been able to support all those farmers interested in participating. Shortage of land and the small individual plots of land available for farming is one reason why farmers have been hesitant to adopt tree planting, while relatively high labour input for digging contour bunds has been a reason for not adopting soil and water conservation measures. The long time required to see the results of tree planting has been another disincentive. However, interest in the facility is gradually growing and is expected to keep increasing as the first payments are disbursed.

The PES facility has made the case for EbA by providing an incentive for farmers to adopt EbA. Through implementation, the benefits of the adaptation measures will be shown to farmers, and it is hoped that this practice will prove the benefits of planning and implementing adaptation measures in the medium- to long-term. It is hoped that the continued sale of watershed and carbon credits will enable the number of farmers participating in the scheme to continue to grow, helping the scheme to become self-financing. Further, the goal is for initial pilots to be scaled up to a broader catchment level. Together with the implementation of the broader Parish Adaptation Plans, such an approach would increase the resilience of livelihoods and the ecosystems on which they depend to climate change impacts.

Sources: Interviews with Pauline Nantongo Kalunda, Executive Director, ECOTRUST and Paul Nteza; ECOTRUST (2015) Developing an Incentive Scheme for the Ecosystem Based Adaptation Project: July2014-March 2015 Progress Report. Unpublished; UNDP (2015) Uganda's first Payment for Environmental Services Fund launched. [Online] UNDP. Available from: http://www.ug.undp.org/content/uganda/en/home/presscenter/articles/2015/03/27/uganda-s-first-payment-for-environmental-services-fund-launched-.html

5.2.3 Potential for PES and EbA

As showcased by the PES facility piloted by the project in Uganda, PES provides a relevant financing source for EbA.

According to a study carried out by the project in Nepal (Khanal et al. 2013), around a dozen PES schemes have been piloted by various organisations in Nepal, focused on watershed services and drinking water and irrigation in particular. The majority are private deals between buyers and sellers, although some have used intermediary organizations such as carbon services. The schemes have generated conservation awareness and some financing. However, none of the schemes have been sustainable. Challenges have included low compliance with contractual obligations, a limited number of buyers for services, free availability of services and poor conservation awareness. A PES Policy is currently being drafted in Nepal, which would provide needed governmental support and regulation to PES schemes in the country. IUCN Nepal also carried out a feasibility study on a PES scheme for a performance based restoration scheme to improve management effectiveness and enhance adaptive capacities through forestry and agroforestry (Khanal et al. 2013). The scheme has yet to be implemented in practice, although there have been ongoing discussions with government on potential for piloting such a scheme.

Project sites in Peru are located in the higher reaches of watersheds. The project activities of restoring pastures, wetlands and water management will enhance the provision of key ecosystem services, especially water mid- and downstream – notably not just within the Reserve itself, but to a vast area downstream, including the city of Lima. The watersheds provide water for hydroelectricity, agriculture, tourism, fishing and domestic use to millions of people in the regions of Lima and Junín. Project partners are interested in the potential of PES, although no measures

VILCA WATERFALL AND WETLANDS IN NOR YAUYOS COCHAS LANDSCAPE RESERVE. © Tine Rossing, UNDP

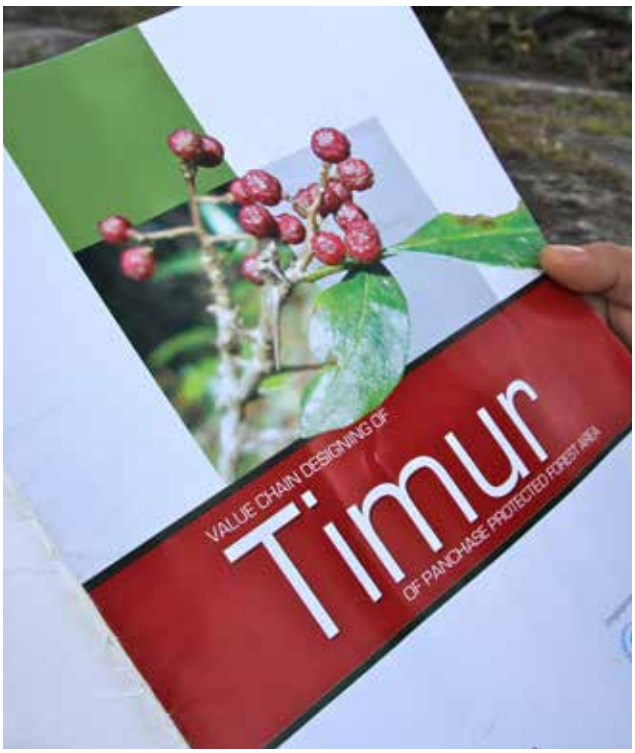
THE WETLANDS IN THE NOR YAUYOS COCHAS LANDSCAPE RESERVE ARE PROVIDING CLEAN WATER TO MILLIONS OF PEOPLE LIVING DOWNSTREAM, INCLUDING THE CAPITAL OF LIMA. © PERU Mountain EbA

have yet been taken to explore feasibility of PES at the sites (W Andia Castelo, E Fernandez-Baca & A Gomez 2015, pers. comm.). There is a law in Peru on Payment for Ecosystem Services (Ley de Mecanismos de Retribucion por Servicios Ecosistemicos), which provides public regulation and guidance for PES schemes in the country. Several studies have been carried out on the feasibility of PES in different watersheds, including the Rio Cañete watershed in the NYCLR area (MINAM, CIAT, CARE y WWF, 2011). Peru has prior experience of PES schemes, including for water services in watersheds, carbon sequestration through reforestation, and for tourism and conservation services (Veen 2007).

PES is intended to change the economics of ecosystem management and can support biodiversity-friendly practices that benefit society as a whole (TEEB 2009). Existing models such as payment for sustainable management of water resources and/or agriculture, biodiversity conservation, and storage of carbon through forest or wetland management are relevant for EbA measures, which can also provide these types of services.

PES schemes can make the case for additional EbA financing, act as incentives for local communities to undertake EbA measures, increase understanding for ecosystem values and provide sustainability beyond project financing. They can also attract private investment for EbA and increase funding in e.g. hybrid grey-green adaptation approaches and reforestation. The effectiveness and feasibility of PES, including with regards to compliance, is closely tied to regulatory frameworks and their enforcement (TEEB 2009). The PES law of Peru provides a promising initiative in this regard. A range of actors needs to be involved and awareness needs to be raised on the multiple benefits of EbA and why environmental services have economic value. PES for EbA should be part of broader adaptation planning, enabling the development of joint adaptation strategies between communities and local governments, as well as enabling provision of needed capacity building and technical support to implementation and monitoring of PES schemes by governments and technical organisations.

VALUE CHAIN STUDY FOR TIMUR (PRICKLY ASH, ZANTHOXYLUM ARMATUM) PREPARED BY PROGRAMME. © Andrea Egan, UNDP



5.2.4 Market opportunities for EbA

Another way the programme has aimed to generate finance for EbA is through exploring market opportunities for the sale of indigenous plants harvested or cultivated through implementing EbA measures. In Nepal, the project has carried out specific studies on the value chains of products of plants, namely Allo (nettle, *Girardinia diversifolia*), Chiraito (*Swertia chirayita*), Kurilo (asparagus, *Asparagus racemosus*), Orchids and Timur (prickly ash, *Zanthoxylum armatum*).[45] The studies identify constraints and opportunities for trade in such products in Panchase, identifying key actors; supply and demand; and upgrading opportunities in production and markets. The studies helped make the case and guide the design of piloted Amriso and Timur cultivation as EbA measures in Panchase. However, these market opportunities need to be developed into adequate business plans as to be operationalized in practice (UNDP 2015).

Harvesting of vicuña wool in Peru is also an income-generating venture, and a market feasibility assessment is being carried out. In Uganda, market opportunities for agricultural products produced as part of EbA measures implemented by the project in Mount Elgon have not been explored, and this has limited the income generation potential to small-scale local production (R Gafabusa 2015, pers. comm.). Identifying EbA measures that produce new or enhanced ecosystem goods can provide an alternative source of private financing for 'green climate-friendly goods' and enhance sustainability of implemented measures.

Public financing for EbA can be allocated through national budgets across sectors and at multiple scales, ranging from local to regional and national level budgets. EbA-relevant sectors have traditionally included water, agriculture and environment sector budgets. However, making the case for EbA financing in other sectors, such as infrastructure (moving from grey to green), is also relevant, especially given that the environmental sector is often underfunded.

The local district government or regional level is particularly relevant for implementing EbA at a landscape or ecosystem scale. Therefore, planning and budgeting for EbA at this scale is also an important entry point for EbA financing. Integrating EbA into , for example, cross-sectoral district development planning and budgeting provides an opportunity for EbA financing.

The project´s engagement in development of Peru's policy guidelines for public investment in biodiversity and ecosystems showed that providing technical guidance to the policy process and showcasing benefits of EbA on the ground were both important in making the case for EbA finance. While communities were interested in seeing EbA results on the ground, **hard data provided by cost-benefit analysis was particularly important in making the case for EbA to government role-players.**

As shown by the Peru PIP proposal process, **mainstreaming EbA into government policies and budgeting processes at national level can have a far-reaching impact on EbA finance in the long run, and enable the integration of EbA into national, regional and local planning and implementation processes.**

Community economic incentive schemes were important in making the case for EbA at local level to communities and local government, especially before the benefits of EbA measures could be shown, either due to the early stage of implementation or the time needed to achieve catchment scale impact. Such schemes enhanced community commitment to implementing and maintaining mid- to long-term EbA measures.

Incentive schemes for EbA should form part of a broader approach to adaptation planning and implementation. Supported EbA measures need to form part of broader adaptation strategies, so as to contribute to longer term benefits and ensure sustainability of adopted measures, with or without incentive schemes. Local government officials and staff can play an important role in providing, for example, technical support and oversight of compliance with EbA targets.

Payments for Ecosystem Services provide a relevant model for EbA financing. Such payments can provide additional financing for adopted measures, increase understanding of the value of ecosystem services and act as an incentive for implementing EbA at, for example, a catchment scale. EbA can provide such ecosystem services as water provision, carbon storage and biodiversity conservation, which can be applicable for PES payments.

The ECOTRUST PES facility in Uganda provided learning on how EbA measures can be used to bundle watershed and carbon services into credits for sale. The development of Parish Climate Change Adaptation plans with local government contributed to the sustainability of the EbA measures supported by the incentive scheme, and integrated these into broader adaptation strategies. National government has already expressed its support to the PES facility. The facility has the potential to become self-sustaining through the continued generation of credits by implementing catchment-scale EbA measures in line with local adaptation strategies.

Identifying EbA measures that produce new or enhanced ecosystem goods and services, such as indigenous plant products in Nepal or vicuña wool in Peru, can provide an alternative source of financing and enhance the sustainability of implemented measures.

There is significant potential to make the case for financing for EbA through public finance, incentive schemes and PES. Additional piloting, testing and capturing of lessons learned is needed. This learning can build on relevant existing schemes such as PES, environmental incentive schemes or national climate budgeting.

IN NEPAL, 10,000 TREE SEEDLINGS WERE PLANTED BY PROGRAMME-SUPPORTED ECO-CLUBS AND COMMUNITY FOREST USER GROUPS.

CHAPTER 6:

SCALING UP AND SCALING OUT: OPPORTUNITIES AND CHALLENGES

The Mountain EbA Programme tested EbA in practice, seeking both to generate new learning about ecosystem-based approaches to adaptation, and to promote the use of such approaches. The programme generated lessons learned in planning, implementing and monitoring EbA, and in making the case for needed policy and finance changes that support its implementation. These lessons can be scaled up and scaled out to bring enhanced climate change resilience to vulnerable ecosystems and communities in other places around the world.

6.1 Summary of lessons learned about making the case for EbA

The innovative nature of the programme and the fact that it was implemented in mountain ecosystems in three different countries, facilitated by the International Climate Initiative and implemented through a collaboration between UNEP, UNDP and IUCN (in addition to key players such as TMI, UNEP-WCMC, national governments and NGOs), provided a unique opportunity for learning on EbA and bridging the divides between science, policy and practice. The programme played an important role in making the case for EbA to a broad range of potential beneficiaries, stakeholders and proponents. This included individual farmers, communities, local government officers and planners, national policy makers and global audiences.

The process of making the case for EbA was ongoing throughout the programme, and was essential for the various steps of planning and implementing EbA across scales. At the outset, the case had to be made to farmers, communities and local leaders as to why EbA represented a worthwhile investment of human and financial resources. Demonstration of tangible, immediate socio-economic benefits was needed to secure their buy-in. District governments were also interested in seeing the contribution EbA could make to broader development goals. Enabling irrigation of crops through the gravity flow scheme in Uganda, or the clear economic returns provided by conservation agriculture and plant products in Nepal, provided needed benefits from early 'no regrets' measures. Community incentive schemes in Uganda also provided an approach for incentivizing early action, before full benefits of EbA could be seen. Participatory assessments played an important part in increasing understanding of what EbA is and what benefits it can provide, and helped to identify early measures that would provide benefits on the ground.

A landscape or ecosystem scale was adopted at project sites following the VIAs. This scale enabled the design of EbA measures that were framed with future climate change scenarios in mind. Tackling adaptation challenges at this scale would enhance provisioning ecosystem services related to water, crops and vegetation, as well as regulatory services related to water and soil. This landscape approach makes it more likely that multiple benefits will be provided in the medium- to long-term. The VIAs proved particularly useful in making the case for EbA to regional and local level planners, such as the Regional Government of Junín and the Nor Yauyos Cochas Landscape Reserve-SERNANP in Peru, by showing what climate change impacts are likely to affect their landscapes and how EbA measures can be used to reduce vulnerabilities.

Overall, protected areas were found to provide relevant governance structures and plans for planning and implementing EbA at a landscape scale. The project experiences in Peru's Nor Yauyos Cochas Landscape Reserve and Nepal's Panchase Protected Forest provided entry points for making the case at national level for policy change, which would enable the integration of climate change and EbA measures into protected area management across both countries.

The cost-benefit analyses carried out in Nepal, Peru and Uganda demonstrated the viability of EbA options compared to inaction or to other adaptation measures. The CBAs are providing needed hard data to make the economic case for EbA to both public and private investors. This will be especially relevant in making the case for EbA financing, for example to local government or Ministries of Finance. It is challenging to gather the data needed for showing and quantifying the multiple benefits of EbA, especially with regards to climate change adaptation and ecosystem functions, as this takes times and often requires multifaceted scientific expertise. The lack of such data can lead to undervaluing EbA benefits in CBA. This lack of data has also been a challenge for the monitoring of EbA benefits by the programme more generally.

The programme has had exceptionally broad reach in terms of making the case for policy change for EbA, ranging from working with communities to revise and develop new natural resource management plans for pastures or water, to engaging with United Nations Secretary-General Ban Ki-moon. The programme has worked to bridge local practice with global policy, for example by sharing site and country level experiences on planning and implementing EbA through global policy platforms under the UNFCCC and CBD. The case of Uganda applying its in-country experience from the Mountain EbA Programme to pass the EbA Resolution in the United Nations Environment Assembly was a specific example of this. Making the case for policy change for EbA at global level has entailed ongoing sharing of lessons learned, ongoing dialogue, technical advice and policy advocacy by all programme partners through a range of global platforms. The programme has, through these means, increased understanding and acceptance of EbA discourse at global policy level.

Nepal, Peru and Uganda all had supportive national frameworks in terms of including EbA-relevant priorities or

measures in their National Development Plans and Climate Change Policies. The projects and their staff were engaged directly in policy processes through attending working groups and providing technical guidance on EbA, in the case of Uganda in the formulation of the National Climate Change Policy, in Nepal in the development of the Forest Policy, and in Peru of the INDC. The Peru INDC even refers to the Mountain EbA Programme specifically in the context of results and practical experiences provided by key projects, which have informed the INDC adaptation proposal. In addition, ongoing engagement with policy makers through sharing of lessons learned, policy dialogues or site visits enabled the projects to raise EbA onto the national policy agenda of all countries, as exemplified by the High Level Technical Expert Committee on EbA being formed in Nepal.

The operationalization of EbA-supportive policies remains dependent on adequate technical and institutional capacities, as well as on financial resources. Sectoral and local development plans and budgets become important entry points for making the needed policy changes for delivering EbA on the ground. In Uganda, the Mountain EbA project has initiated collaboration with local governments on including EbA into district or municipal development. Local level natural resource plans are relevant for integrating EbA into community-level planning processes and ensuring the adoption of EbA measures on the ground. Dialogue, technical support and sharing lessons learned across policy scales all remain important to ensure that the needed policy changes for EbA have been made across scales and sectors. PES schemes were found to be relevant for EbA, providing means to compensate farmers to undertake EbA measures on a long-term basis, in the context of providing wider water, carbon and biodiversity conservation services. The ECOTRUST PES facility in Uganda showed how, in Mount Elgon, carbon and watershed services were able to be bundled into carbon credits for sale on international markets, providing a potential source of ongoing financing, and raising government interest. Goods produced by EbA measures, such as vicuña fibre in Peru or broom grass products in Nepal, showed the income-generating potential of EbA measures and their contribution to livelihoods. Many of these lessons learned can be of relevance for other sites and countries, as will be discussed below.

6.2 Replicating lessons learned on making the case for EbA

The concept of vertical 'scaling up' can be used to refer to scaling up from local or community-level to higher levels of decision-making, while horizontal 'scaling out' refers to expanding over a larger geographical area or to a larger number of beneficiaries (Rossing et al. 2012). Challenges to upscaling include the context-specific nature of adaptation interventions, while at the same time local case studies are often used as sources to inform planning and policies. Policy-practice dialogues can facilitate uptake of case studies for up-scaling, while multi-stakeholder platforms can provide useful means of out-scaling. Institutions and larger governance structures become critical for scaling up adaptation measures into policy. Capacity building becomes an essential bridge between practice and policy, although this often requires substantial financial and human resources to be delivered.

The Mountain EbA Programme has already carried out some out-scaling. In Uganda, initial beneficiary communities were broadened to cover more villages, following the adoption of the catchment and landscape level approach to delivery after the VIA. Furthermore, it is hoped that the results of the cost- benefit analysis can make the case for expanding EbA practices to other districts in Mount Elgon and even beyond to the Rwenzori mountain ecosystem. In Peru, the UNDP pilot in Tanta is being replicated in the nearby community

DEMONSTRATION IN HOW TO PLANT SEEDLINGS IN A MORE CLIMATE-RESILIENT MANNER. © IUCN Uganda

of Tomas, where animal husbandry management and sustainable community grassland management measures, to help adapt to anticipated climate change impacts, have been initiated.

A key objective of the Mountain EbA Programme was to enhance learning across the various project mountain ecosystem sites in Nepal, Peru and Uganda. On certain issues, there has been shared learning, either between two particular sites, or across all sites. Cases in point include the lessons learned on the need for a step-wise approach in carrying out participatory assessments initially to make the case for EbA to communities, followed by VIAs, which were more relevant for local and regional decision-makers. Socio-economic benefits were critical in ensuring buy-in from local communities, while environmental benefits and adaptive functions are often visible only in the longer-term. Appropriate planning and capacity building processes are needed to increase understanding of EbA, promote ownership and commitment to EbA. Local and regional governments are important players for planning and budgeting for implementing EbA measures, while protected areas can provide needed governance structures and plans for adopting a landscape approach. The need to engage a range of policy levels, from community to national level was also noted. These lessons learned are likely to be applicable to EbA measures in general, and can provide guidance for EbA in all types of ecosystems.

Some of the lessons learned through the programme, however, may be more applicable to mountain or hilly ecosystems specifically. For example, the micro-watershed or watershed, taking into consideration upstream-downstream linkages, was seen as the ideal scale for planning and implementing EbA at the project sites in Nepal, Peru and Uganda. This is likely to be less relevant in certain marine, coastal or dryland ecosystems, unless a very broad scale approach to planning and implementation is adopted.

The Peru case studies are believed to be of relevance for scaling out to other high-Andean mountain ecosystems, given that the ecosystem types are rather similar, and the same can be said of the experiences from Panchase for other foothill areas in Nepal. Attention would still need to be paid to socio-economic dynamics and other distinguishing features. In many cases, the experiences at site level were so context-specific that the similarity of the ecosystems (i.e. all being mountain ecosystems) was not relevant. For example, the issue of limited land availability in Mount Elgon, Uganda has undermined EbA measures, where shortage of land has led to reluctance in dedicating it to measures such as tree planting (see Chapter 2 for more details). This has not been an issue in Panchase in Nepal and NYCLR in Peru, where there is communal land ownership and lower population density, and especially in Peru, where vast tracts of land are available for implementing broader scale EbA measures. Further, Nepal and Peru have had to adopt EbA measures that are not labour-intensive, given the high rate of outmigration, while Mount Elgon faces overpopulation and related degradation of resources.

In terms of scaling up, the experience of working with the Nor Yauyos Cochas Landscape Reserve in Peru has provided an ideal framework for planning and implementing EbA by providing existing guidelines and an institutional framework, as well as ensuring sustainability for EbA measures. Indeed, the experience from NYCLR is now being scaled up by SERNANP to national level dialogue, and there are opportunities to scale out to other protected areas in Peru. A similar process has taken place in Panchase Protected Forest in Nepal. The protected forest model is less established and still lacks guidelines. This situation has, however, provided a means for the project to scale up the experience from Panchase and support the establishment of protected forest guidelines at the national level. In Uganda, the lack of an existing landscape level planning system made it more challenging initially to adopt an ecosystem scale for implementating EbA measures. Acting at this scale required developing new plans together with communities and local governments.

On the other hand, the experience from Uganda of feeding experiences from the project into the transboundary management process of Mount Elgon between Uganda and Kenya, through the Lake Victoria Basin Commission of East Africa Commission, provides an interesting example of the relevance of EbA to transboundary natural resource management. The different scales for engaging with policy-making on EbA, as described in Table 19, are likely to be relevant for other countries working on making the case for policy change for EbA. The project has also succeeded in scaling up very specific local experiences to national and even global levels. For example, Uganda used its practical experience with EbA in Mount Elgon for making the case for global level policy change through the UNEA Resolution (Chapter 5).

Capacity for scaling out and scaling up is a critical issue. For example, in Uganda, despite local government interest in scaling out EbA measures, financial and human resource constraints are likely to hamper this. In Peru, the

institutional set-up and capacity of SERNANP provides the likelihood for continued implementation of EbA at project sites, as well as opportunities for scaling out and up, although challenges remain in applying EbA in production landscapes and with large scale private sector role-players such as hydroelectric companies. Peru's Public Investment Guidelines for Biodiversity and Ecosystems also provide a unique opportunity for increasing public financing and enabling implementation of EbA at local, regional, sectoral and national scales across Peru.

The bridging of practice-policy on EbA, from local and national levels to global level policy processes such as the CBD and the UNFCCC, remains relevant as learning on EbA continues to evolve.

6.3. Opportunities for further work

The programme identified several areas for further work needed on EbA. Delivering EbA in practice can often mean adopting compromise approaches such as 'no regrets' measures in the beginning, or grey-green approaches that combine EbA with more engineered adaptation approaches. Further research is needed on how best to design and implement such measures, while avoiding maladaption and ensuring the continued provision of ecosystem goods and services in changing climatic conditions.

The programme piloted vulnerability and impact assessment tools tailored for EbA, which are still being tested and refined within other sites within the project countries. These provide a good base for further developing VIAs for EbA, which would adopt a phased or gradual, participatory approach at a predefined scale. The cost-benefit analyses provided several important lessons, which can be taken on board for carrying out future analyses for EbA.

The development of indicators and M&E frameworks for EbA was initiated late in the national-level projects, and is only being finalized towards the end. The complexity of measuring ecosystem change, adaptive capacity and climate change within one project or programme proved challenging. Indicators need to be measurable and manageable within existing capacities in order to be sustainable. The extensive work carried out by the project in developing EbA indicators is likely to be of use for future EbA projects and programmes.

In terms of making the case for policy change, several entry points were identified. Further work is needed in collaborating with district and regional governments in integrating EbA measures, where appropriate, into district level planning and budgeting. This includes further work on identifying cross-sectoral opportunities for EbA in such areas as infrastructure and public works, and cooperating more closely with relevant sector Ministries. New policy opportunities will arise, and the National Adaptation Plans being developed in many countries provide policy development processes in which there are excellent opportunities to make the case for EbA. The programme did not explore the opportunities for policy change with regional intergovernmental bodies, or with the private sector. Also, there is scope for exploring EbA collaboration with parliamentarians.

Several potential opportunities for EbA finance were identified, including with regards to market opportunities and PES. There is much scope for further work in this important area of finance mechanisms for EbA, which in many cases will determine the sustainability of adopted EbA measures in the long run. Further, other sources of finance such as REDD+ schemes or tax incentives for grey-green approaches are yet to be explored.

The Mountain EbA Programme has been a unique flagship programme delivered through a valuable partnership, and has significantly enhanced understanding of EbA practice, in addition to bridging science-policy-practice learning from local to global levels. This learning will be important for future projects, programmes, planning and financing processes that engage in the design and implementation of ecosystem-based approaches for adaptation to climate change. The Mountain EbA Programme's learning will help make the case for this approach to adaptation, which can provide multiple environmental, social and economic benefits to both ecosystems and the livelihoods that depend on them in an inexorably changing climate.

IN UGANDA, THE MOUNTAIN EBA PROGRAMME WAS IMPLEMENTED IN THE MOUNT ELGON REGION, WHERE THE ELEVATION RANGES FROM 398 TO 4,231 METRES ABOVE SEA LEVEL.

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ANNEX
ENDNOTES

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Annex 1: Interviews

The following interviews were carried out between 27 May and 2 June 2015 during the *3rd Global Learning and Technical Workshop for the Global Mountain EbA Programme held in Lunahuana (Peru) and the 2nd Global Workshop on Sharing Learning on Using Cost Benefit Analysis for Making the Case for Ecosystem-Based Adaptation* held in Lima.

Name	Position	Organization	Country
Keith Alverson	Head of the Climate Change Adaptation and Terrestrial Ecosystems Branch	UNEP	Global
Woodro Andia Castelo	Field Coordinator, Mountain EBA Project	UNDP	Peru
Maureen Anino	Senior Programme Officer	Ministry of Water and Environment	Uganda
Laura Avellaneda	Coordinator in Climate Risk Management	Ministry of the Environment	Peru
Edmund Barrow	Head, Ecosystem Management Programme	IUCN	Global
Eduardo Durand	Director General of Climate Change, Desertification and Hydrological Resources	Ministry of the Environment	Peru
Cordula Epple	Senior Programme Officer, Climate Change and Biodiversity	UNEP WCMC	Global
Edith Fernández-Baca	National Coordinator, Mountain EBA Project		Peru
Richard Gafabusa	Field Coordinator	IUCN	Uganda
Aneli Gomez	Field Coordinator	Instituto de Montaña	Peru
Rajendra Khanal	Programme Coordinator	IUCN	Nepal
Sophie Kutegeka	Head of Uganda office (Acting)	IUCN	Uganda
Walter Lopez	Regional Director of Natural Resources and the Environment	Regional Government of Junín	Peru
Paul Mafabi	Director of Environment Affairs	Ministry of Water and Environment	Uganda
Musonda Mumba	Programme Officer Ecosystem Based Adaptation Flagship Programme Coordinator	UNEP	Global
Paul Nteza	National Coordinator, Mountain EBA Project	UNDP	Uganda
Pragyajan Yalamber Rai	National Coordinator, Mountain EBA Project	UNDP	Nepal
Ali Raza Rizvi	Programme Manager, Ecosystem Based Adaptation	IUCN	Global
Felix Ries	Climate Expert (Adaptation)	International Climate Initiative	Germany
Angella Rwabutomize	Senior Economist	Ministry of Finance, Planning and Economic Development	Uganda
Antonio Tejada Moncada	Director, Natural Resources and the Environment	Regional Government of Lima	Peru

The following interviews were carried out via teleconference:

Name	Position	Organization	Country	Date
James Leslie	Technical Advisor on Ecosystems and Climate Change	UNDP	Peru	07.09.2015
Pauline Nantongo Kalunda	Executive Director	ECOTRUST	Uganda	03.09.2015

Endnotes

[1] Project activities largely concluded in 2015, when their results were analysed for this report. A six-month no-cost extension was granted into 2016 for administrative matters.

[2] Further details on the Panchase Protected Forest are available at http://www.forestrynepal.org/article/695/5665 Retrieved 12th October, 2015.

[3] Protected Area Category V is: "A protected area where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values".
http://www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/gpap_category5/
Retrieved 12th October 2015.

[4] Protected Area Category II: "Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities."
http://www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/gpap_pacategory2/
Retrieved 12th October, 2015.

[5] Population density was calculated as (population) ÷ (area in km^2) = population per km^2

[6] This is the initial definition provided by the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. See Secretariat of the Convention on Biological Diversity (2009), p. 41.

[7] Various definitions for 'no regrets' measures have been provided, including: "No-regrets actions are actions by households, communities, and local/national/international institutions that can be justified from economic, and social, and environmental perspectives whether natural hazard events or climate change (or other hazards) take place or not. No-regrets actions increase resilience, which is the ability of a system to deal with different types of hazards in a timely, efficient, and equitable manner. Increasing resilience is the basis for sustainable growth in a world of multiple hazards" (see Heltberg, Siegel, Jorgensen, 2009 Siegel and Jorgensen, 2011). The IUCN Paper *'Ecosystem based Adaptation: Building on No Regret Adaptation Measures,'* (Rizvi et al. 2014), further discusses different definitions and how the concept has been used by the Mountain EbA Programme.

[8] CRiSTAL is a project-planning tool that helps users design activities that support climate adaptation at the community level. A full overview of CRiSTAL is provided at https://www.iisd.org/cristaltool/ Retrieved 12th October, 2015.

[9] CVCA, developed by CARE, is a community-level analysis tool that integrates climate change into a wider participatory vulnerability assessment. It can be accessed at http://careclimatechange.org/tool-kits/cvca/ Retrieved 12th October, 2015.

[10] The PROFOR toolkit provides a framework, fieldwork methods and analytic tools to understand and communicate the contribution of forests to the incomes of rural households.
http://cmsdata.iucn.org/downloads/profor_iucn_toolkit_overview.pdf
Retrieved 12th October, 2015.

[11] A gravity flow scheme is a technology for gravity-fed water supply. "A gravity-fed supply from a small upland river, stream or spring, impounded within a protected catchment, is an example of a sustainable water supply technology requiring no treatment. An additional benefit is that, using the force of gravity, water can be transported by pipework to tapstands placed near to homes, reducing the work involved in carrying water. The usual components of a gravity-fed scheme are the source (stream, spring, catchment, dam or intake), main pipeline, storage and break-pressure tanks, distribution pipelines and tapstands." WaterAid. 2013. *Technical Brief: Gravity-fed Schemes.* Available online at www.wateraid.org/technologies. Retrieved 12th October, 2015.

[12] Presentation by Rob Munroe, *"VIAs – why do we want them?"*, 5th February 2015, Global Steering Committee Meeting, Berlin.

[13] Global technical and learning workshop of the Mountain EbA Programme. Lunahuana, Peru 28-30 May, 2015. Summary.

[14] The programme´s experience on the use of indicators is discussed in the following internal, unpublished documents: Dourojeanni, P (2013) *Taller para le identificación de indicadores de impacto para las medidas adoptada por el Proyecto EbA montana en la RPNYC, 10 y 11 de diciembre 2013, Memoria*

Descriptiva; Global Learning & Technical Workshop, 27th April-1st May 2014, Pokhara, Nepal. Workshop report; Rossing, T (2014) *Uganda Mountain EbA Pilot Project – Impact Indicators to Measure Changes in Adaptive Capacity;* Munroe, R (2014) Impact and context indicators for adaptation intervention impact on ecosystem functioning for 3 ecosystem services, July 2014 Workshop results and UNEP-WCMC comments.

[15] For more information on adaptation decision making under uncertainty see, for example: A. Patwardhan, R.N., et al. (2014) *Foundations for decision making.* In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 195-228. Also see Jones, L. et al. (2014) ***Planning for an Uncertain Future: Promoting adaptation to climate change through Flexible and Forward-looking Decision Making.*** London: ODI.

[16] According to the FAO (2010:7), women comprise an average of 43 percent of the agricultural labour force of developing countries. The female share of the agricultural labour force ranges from about 20 percent in Latin America to almost 50 percent in Eastern and Southeastern Asia and sub-Saharan Africa. There is a general trend for an increase in female labour share of agricultural labour force in most regions, although there is variation both between and within countries (see FAO (2010) *State of Food and Agriculture 2010-2011: Women and Agriculture.* Rome: FAO, p. 7-10). Research on the 'feminisation' of agriculture and natural resource management, undertaken by ICIMOD and supported by IFAD, illustrates this trend, whereby in some mountain regions in India women undertake 4.6 to 5.7 times the agricultural work men carry out. In Nepal, the range is skewed even more with women carrying out 6.3 to 6.6 times the agricultural work that men carry out (cited in Nellemann, C., Verma, R., and Hislop, L. (eds). 2011. *Women at the frontline of climate change: Gender risks and hopes. A Rapid Response Assessment.* United Nations Environment Programme, GRID-Arendal, p. 25).

[17] Monetary amounts are in US dollars.

[18] BARDAN (2013). Biodiversity Associates for Research, Development and Action. The studies for Nepal are available from: http://www.np.undp.org/content/nepal/en/home/operations/projects/environment_and_energy/eba/publications/ Retrieved 12th October, 2015. The study for Peru was being finalized at the time of going to press.

[19] In Nepal, the protected forest model is new, and therefore regulations are yet to be developed and enforced.

[20] The TSA approach is available from: http://www.undp.org/content/undp/en/home/librarypage/environment-energy/environmental_finance/targeted-scenario-analysis.html Retrieved 12th October, 2015.

[21] Babatunde Abidoye personal communication with MEF representatives, during Global Workshop on Sharing Learning on Using Cost Benefit Analysis for Making the Case for Ecosystem-based Adaptation, Bratislava, Slovakia, 28 February-1 March 2014.

[22] For the purpose of this analysis, the business as usual exercise was carried out for ease of comparison with the EbA scenario only. It is understood that an optimizing agent will not continue to operate in a loss, if the discounted present value is negative within each period. However, the EbA project by itself is profitable with the return higher than the economic cost of capital.

[23] For futher information, please see http://www.policysupport.org/waterworld

[24] This follows the practice of the Government of Peru on the use of 4 percent discount rate for the evaluation of climate change mitigation projects, the prescription of the UN Economic Commission for Latin America and the Caribbean (ECLAC) and other countries globally.

[25] This is the usual discount rate used by the Government of Peru, for non-climate change mitigation projects.

[26] The sum of the values in the figures is the NPV in this case. For ease of presentation, the annual discounted value is presented.

[27] https://www.cbd.int/doc/meetings/cop/cop-12/information/cop-12-inf-40-en.pdf Retrieved 12th October, 2015.

[28] FCCC/SBSTA/2011/INF.8

[29] For more information on UNEA, please visit http://www.unep.org/unea/about.asp Retrieved 12th October, 2015.

[30] 2063 in Nepali calendar is the year 2006 in the Western/Gregorian calendar

[31] Terms of Reference of the EbA High Level Technical Committee

[32] Regional Government of Junín (2014).

[33] Unofficial translation. Original Spanish version: *El departamento de Junín se habrá adaptado a los efectos adversos y habrá aprovechado las oportunidades que impone el cambio climático, sentando las bases para un desarrollo sostenible bajo en carbono con un enfoque de adaptación basado en ecosistemas*

[34] This section is written based on interviews with Maureen Anino, Richard Gafabuse, Sophie Kutegeka and Paul Nteza, carried out in May/June 2015 (see Annex 1).

[35] *Workshop to train district technical officers on integration on EBA integration, 2nd-4th December 2014,* Workshop Report.

[36] Ministry of Water and Environment (2015) *Concept Paper for the development of the EBA Action Plans for Sub-counties adjacent to Mount Elgon Ecosystem in the districts of Kapchorwa, Soronko, Kween and Bulambuli districts.* Draft.

[37] Maladaptation, as defined by the IPCC: *"any changes in natural or human systems that inadvertently increase vulnerability to climatic stimuli; an adaptation that does not succeed in reducing vulnerability but increases it instead."* IPCC, 2001 (Third Assessment Report, Glossary).

[38] Projects defined as relevant for climate change adaptation were: i) protection and restoration of watersheds to ensure provision of ecosystem services; ii) reforestation and forestry; iii) riverbank protection; iv) conservation and restoration of diverse ecosystems; v) conservation and restoration of wetlands. The projects are not necessarily framed directly in the context of climate change, but, for the purpose of this analysis, were regarded as being climate smart conservation and natural resource management options.

[39] Resolución Ministerial N° 199-2015-MINAM

[40] http://www.biodiversityfinance.net/
Retrieved 12th October, 2015.

[41] Ministerial Policy Statement, Water and Environment Sector, Financial Year 2014-15.

[42] Amounts are in US dollars. USh. 4,950,000 and USh. 5,000,000, respectively.

[43] *Workshop to train District Level Officers on EBA Integration, 2nd-4th December, 2014.* Workshop Report.

[44] http://www.planvivo.org/project-network/trees-for-global-benefits-uganda/
Retrieved 12th October, 2015.

[45] The studies can be accessed through the following link:
http://www.np.undp.org/content/nepal/en/home/operations/projects/environment_and_energy/eba/publications/
Retrieved 12th October, 2015.

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