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Ecosystem-based Adaptation

Adapting to climate change in mountain ecosystems

A flagship programme of UNEP, UNDP and IUCN

Supported by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)



Photo credit: Christopher Lutakome, IUCN

What is Ecosystem-based Adaptation?

Healthy ecosystems deliver critical goods and services, and people depend on them for their wellbeing and livelihoods. However, due to climate change and other impacts, many such ecosystems have become degraded or less useful for people.

Ecosystem-based Adaptation (EbA) 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. EbA uses sustainable management, conservation and restoration of ecosystems, and 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. EbA can be implemented at local, national and regional levels, be applied at project and programmatic levels, and contribute to climate change mitigation by conserving or enhancing carbon stocks, and by reducing emissions from ecosystem degradation and loss.



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based on a decision of the German Bundestag

Programme background

In response to the 2010 UNFCCC Cancun Agreements towards enhanced action on adaptation, Germany's Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) announced its support for an EbA Flagship Programme, jointly implemented by the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and the International Union for Conservation of Nature (IUCN). The Programme's approach is to support countries' overall local and national level adaptation strategies in helping rural vulnerable communities to adapt to the adverse impacts of climate change through conserving, restoring and maintaining ecosystem services and biodiversity across a range of ecosystem types, currently including mountain and coastal ecosystems, and enhancing adaptive capacities.

A collaborative approach

Working jointly with national, sub-national and local government authorities, centers of expertise, and local communities is central to the Programme. The EbA Mountain Ecosystems Programme (2011-15) is carried out in collaboration with the Governments of Nepal, Peru, and Uganda, and is implemented by national and district authorities (Box 1) responsible for the environment and for the identified mountain ecosystems. This is done in partnership with civil society organisations and communities, and collaborating with national research institutes conducting climate modeling and ecosystem monitoring.

The overall objective is to reduce the vulnerability of these countries to climate change impacts by promoting EbA options, with a particular emphasis on mountain ecosystems. There are four components: **a)** develop decision-making tools for EbA, including for monitoring and evaluation, and for assessing resilience; **b)** field test the tools; **c)** make investments in, and build capacity for EbA at demonstration sites; and **d)** make the case for EbA to guide national policies and investments.

Vulnerability and Impact Assessments (VIA) have been completed for the pilot areas of the 3 countries. Prior to that a number of "no-regret" measures were initiated in the 3 pilot areas. "No-regret" measures refer to measures that do not worsen vulnerabilities to climate change



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or decrease adaptive capacities, and those which will always have a positive impact on the livelihoods and ecosystems regardless of how the climate changes. Early lessons indicate that some "no-regret" measures, such as improved land management and restoring lands with climate resilient species, are indeed effective for adapting to the identified impacts.

Country details

Nepal, Peru and Uganda have mountain regions that are vulnerable to the impacts of climate change, yet these ecosystems are endowed with ecosystems upon which a multitude of communities and economic activities depend.

Nepal: Nepal's forest, rangeland, wetland and mountain ecosystems and agricultural areas are vulnerable to climate change, due to drought, increased temperature and intensity of rains, and glacial melt. Enhanced ecological services, e.g. soil and water conservation, community based forest and natural resource management can contribute to reducing climate change impacts, biodiversity losses, and enhance the adaptive capacities of vulnerable communities. Field implementation is being carried out in Panchase Region (17 Village Development Committees of Kaski, Parbat and Syangja districts). Predicted climate change impacts in the Panchase region include an annual temperature increase of between 0.04-0.06 °C per annum, with winter temperatures increasing faster. By 2060 it is expected to be 2°C warmer. Likewise, the average rainfall (and intensity) is likely to increase. This will result in the spread of invasive species, a shift of species from lower to higher altitudes, water stress, climate induced disaster, and threats to certain important species (orchid, rhododendron).

Key activities include: **a)** supporting healthy ecosystems and restoring ecosystems along roads to reduce landslides; **b)** restoring wetlands, springs and ponds to ensure year-

Box 1: Main Partners for the Mt. EbA Programme

Nepal	Peru	Uganda
<ul style="list-style-type: none"> Ministry of Forest & Soil Conservation, Department of Forest; Ministry of Science, Technology & Environment; Government Authorities of Kaski, Parbat, & Syangja districts; Machhapuchhre Development Organization, & ASK (Aapasi Sahayog Kendra) Nepal 	<ul style="list-style-type: none"> Ministry of Environment; National Service of Natural Protected Areas; Ministry of Economy and Finance; The Mountain Institute; Nor Yauyos Cochas Landscape Reserve; Regional governments of Junín & Lima, & the municipalities of the communities in the Reserve. 	<ul style="list-style-type: none"> Ministry of Water and Environment; Uganda Wildlife Authority; Makerere University Institute of Natural Resources; National Forestry Authority National Environment Management Authority; Members of the Mt Elgon Stakeholders Forum; Kapchorwa, Kween, Sironko, & Bolambuli District Local Governments.

Tanka Prasad Gurung (resident of Bangebafadke in Panchase, Nepal) stated: *"During my childhood, the Dandapokhari area was surrounded by forest and the water was clean. Due to various human activities and other factors, the old pond is now polluted and it is much smaller. We now realize the importance of such ponds in water conservation and disaster control, and have renovated the pond. The renovated pond in the Dandapokhari, on a hilltop of Bangebafadke, has increased the capacity of the pond and this encourages groundwater recharge. Now this pond continues to support many natural water springs downstream, and people have seen an increase in bird species in the area since the renovation of the pond. The pond also serves as a rest stop to local people and pilgrims, a water hole for wildlife, and a catchment for eroded soil and silt during monsoon."*

long drinking water supply and improve water recharge; **c)** soil nutrient management to increase moisture in dry times; **d)** improving livestock management to make best use of manure for agroforestry and control open grazing; **e)** promoting the conservation of important indigenous species; **f)** raising awareness on the importance of EbA; **g)** building capacity at different levels; and **h)** carrying out studies related to climate change impacts, e.g. on hydrogeology and biodiversity inventory, impacts of invasive alien species, human wildlife conflict, and Payment for Ecosystem Services for forest restoration which will contribute to economic growth and environmental sustainability. All these activities contribute to improved livelihoods as well.

Early lessons include that **a)** efficient coordination is important for projects implemented through multiple partners; and **b)** building capacity about EbA is very important at different levels to make the links between healthy ecosystems, climate change and livelihoods clear.

Peru: The VIA for the Nor Yauyos Cochis Landscape Reserve and its buffer area, the pilot site for this project, indicate high levels of uncertainty regarding climate trends and future scenarios. The projections indicate that temperatures will increase between 0.61°C and 1.12°C between 2011 and 2030. There will be no changes in the amount of annual rainfall, but changes in patterns will occur, as well as a reduction of surface water runoff.

EbA measures are being implemented in the communities of Canchayllo, Miraflores and Tanta within the Reserve. In the first two communities a participatory process was carried out in partnership with The Mountain Institute with a team of local researchers, external specialists and the Reserve's SERNANP (National Protected Area Services) staff. The EbA measures which are now being implemented include: **a)** sustainable water management through restoring water channels and reservoirs to support upper micro-watersheds



Photo credit: Machhapuchhre Development Organization

and wetland services; and **b)** community-based sustainable native grassland management to enhance pastoral livelihoods and increase resilience to drought, frost and other extreme climatic events. Each measure is composed of three pillars: **i)** institutional strengthening and community organization; **ii)** capacity building to enhance local and traditional knowledge; and **iii)** green-grey infrastructure. The measures implemented in the community of Tanta entails Vicuña management to produce animal fiber and promote communal livestock management in natural grasslands. This measure responds to key stakeholders' interests, the results of the VIA and is aligned with a set of criteria formulated for identifying and prioritizing potential EbA options. Capacity building on EbA has also been carried out engaging different governance levels throughout the implementation of all the project's components.

Early lessons include: **a)** building trust and understanding with local communities is key; **b)** ensuring local ownership of the EbA measures and build local adaptive capacities is important for long term success; **c)** that multi-disciplinary teams and the dialogue among local and external experts are essential for identifying EbA measures and their potential social and environmental impacts; **d)** that participatory approaches and methodologies in the planning, design, and implementation phases of the measures are vital to deliver bottom-up activities that empower and enhance commitment of the local communities; **e)** EbA has a lot to do with local and traditional knowledge and its revival; **f)** the VIAs produced valuable background information on the population state, socio-economic activities, ecosystems, ecosystem services, biodiversity and climatic trends; and **g)** engaging governmental actors from the beginning is important since they, together with the local communities, will be the end users of the information generated by the project.



Photo credit: Aneli Gomez, The Mountain Institute

Abdón Cochachis, (local researcher and park ranger of the Nor Yauyos Cochis Landscape Reserve in the Andes, Peru) : *“Our main livelihood is livestock farming, so we need good pasture and water availability. Local researchers were selected from the communities, and with external researchers (from Universidad La Molina), we analyzed different measures, e.g. to restore water channels to improve pastures and to have watering troughs. In the Yanacancha area there are three small lagoons, and here we will expand a conservation zone (as we had good experience with another NGO years ago, where animals could not enter, and grasslands have grown). This will help improve the wetlands and have more water infiltration during summer time. We also want to restore a channel that our ancestors had to bring water to areas that are important for our livestock.”*



Photo credit: Anu Adhikari, IUCN

Yeko Sabila Swaib, (land owner in Mt Elgon, Uganda) remarked: *“..... Ever since I started implementing the climate smart interventions, especially the contour trenches and mulching, I can see that my soils are now stable and not being washed away. The quality and size of my banana bunches has greatly improved, and with increasing prices, I am now getting more money. I earned close to one million shillings (USD 450) in 2013, compared to four hundred thousand shillings (USD 165) that I used to get in previous years. With this money, I am planning to buy a cow for zero grazing next year since I now have a lot more pasture from the Napier grass that I planted to stabilize the contour trenches.....”*

Uganda: Uganda is vulnerable to climate change, particularly increasing temperature and rainfall, which are impacting the intensity and occurrences of hazards in Uganda's mountain areas, through floods and landslides which, in turn, impact on health, food security and the economic development potential of the people. Enhancing ecological services, such as catchment and natural resource management, could reduce such vulnerabilities and enhance livelihoods. Implementation is taking place in the Mt Elgon Ecosystem, in the catchments of the River Sippi (29 villages), River Sironko (40 villages), the River Ngenge (38 villages), and the River Kaptokwoi (25 villages), covering 6,161 households. Predicted climate change impacts include steady and uniform temperature increases in all the seasons at a rate of about 0.5°C per decade leading to an approximate temperature increase of 2°C by 2100. However it is also likely to get wetter, with greater seasonal differences.

Key activities that have been implemented include: **a)** linking the science to practical adaptation options through undertaking the VIA; **b)** supporting local platforms for local knowledge sharing and communications; **c)** use of mulch and organic fertilizer to protect and enrich the soils; **d)** improved water retention through roadside drainage bunds, and run-off retention drains; **e)** a gravity flow irrigation scheme as a nature based solution to drought, that benefits over 1,000 formerly water stressed community members in three villages; **f)** soil and water conservation including contour and ridges, check dams, and infiltration ditches; **g)** tree planting for stabilizing the soil with appropriate species and contour grass strips; **h)** the management and protection of existing forests and trees on-farm; **i)** up to 600 households have received training in climate smart interventions and are implementing them on their land; and **j)** local natural resource governance has been strengthened including a framework for managing the funds for a community adaptation fund.

Guadalupe Beraún, (community member and local researcher of Canchayllo in the Nor Yauyos Cochas Landscape Reserve in the Andes): *"We have been working with pasture and water since the time of our ancestors, but we have been losing the traditional knowledge of our parents and grandparents. The community is now committed to strengthening the grassland management for our livestock. We are organizing ourselves through a management plan that includes women, men and leaders from the community, to equitably maintain and restore the grasslands. To improve and restore these grasslands, we are focusing on the higher part of Canchayllo, where we are organizing to restore the water channel from the Chacara Lake (which was abandoned). This will provide benefits for all the community... Although we have lost ancient customs, we will now get them back!"*



Photo credit: Christopher Lutakome, IUCN

Early lessons include: **a)** communities take on interventions, which have immediate and direct impacts on both ecosystems and livelihoods; **b)** contour trenches have proved to be very effective, with immediate results in reducing the effects of soil erosion and floods, as trapped water and soil are visible, unlike land management interventions that take time to show results; and **c)** in only six months of implementation, combined with other good management practices on farm, there is already a clear and visible difference between those implementing climate resilient measure and those not, in terms of quantity and quality of crops and yields.

Informing adaptation policy

The project provides examples of adaptation actions through climate resilient and sustainable management of natural resources. The actions under the Mountain EbA Programme are expected to inform national climate change and development policies, and support their delivery. Lessons will be learned on integrating EbA into policies at district and national levels, and these lessons can be scaled-up and out as policy examples at regional and global levels. The programme has convened and facilitated a number of side events at UNFCCC Conferences of the Parties (COP in Durban, Doha and Warsaw), as well as the COP to the Convention on Biological Diversity. In addition, the Programme participated in the Nairobi Work Programme workshop on EbA, the report of which was ratified by the Parties at the Warsaw COP in November 2013. The project in Peru is also supporting the preparation of the adaptation strategy at the regional level.

Scaling-up learning

In addition to the four original project components, from 2014 the Mountain EbA Programme includes the development of a learning and knowledge management framework. This will provide a good basis for further EbA activities in other mountain areas around the globe, and in other ecosystems, as the Flagship Programme expands. The programme is creating new opportunities for learning between regions, and among countries within the same region. The application of methodologies and tools, and the implementation of pilot activities are enabling the programme to shorten the learning curve for local and national institutions, and fast-track the transfer of knowledge and experience in building ecosystem and social resilience to climate change.

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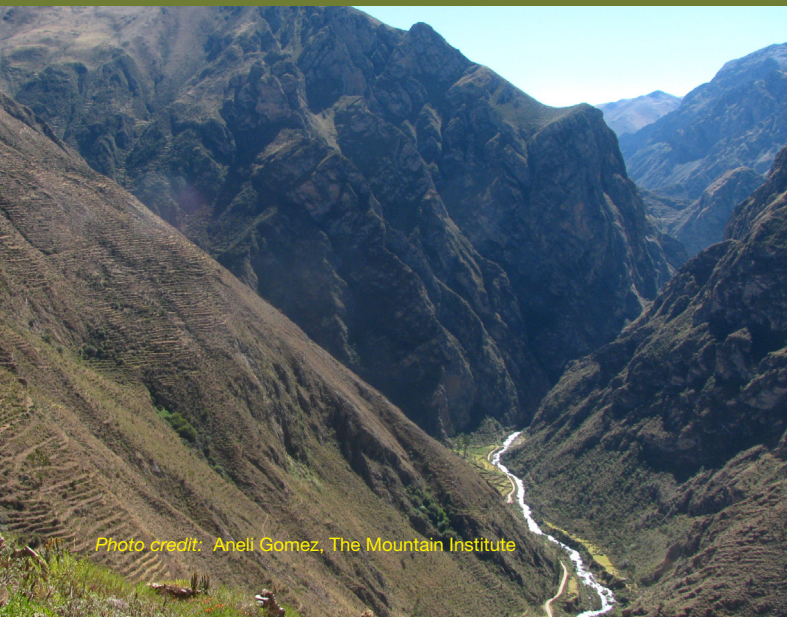


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