The Mountain Partnership

SUBMISSION IN THE AREA OF ECOSYSTEMS, INTERRELATED AREAS SUCH AS WATER RESOURCES, AND ADAPTATION

IN RESPONSE TO A CALL BY NWP FOR CONTRIBUTIONS TO THE SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE (SBSTA) AT ITS 44TH SESSION

Introduction

On behalf of the members of the Mountain Partnership, we would like to raise the attention of the Subsidiary Body for Scientific and Technological Advice (SBSTA) about impact of Climate Change (CC) on mountain ecosystems and the role played by mountain communities in promoting adaptation to CC.

Human activities are profoundly affecting the world's climate, and mountains are a sensitive indicator of that effect. Because of their altitude, slope and orientation to the sun, mountain ecosystems are easily disrupted by variations in climate. Some of the most visible signs of climate change in mountains is glacier retreat, but impacts extend to the lowlands. The increased occurrence of extreme weather events, such as heat waves, drought, and heavy precipitation, lead to flooding and landslides in mountains and to extensive flooding in surrounding lowlands.

Changes in the volume of mountain glaciers and in their seasonal melting patterns have an impact on water resources in many parts of the world. Changes in water availability due to climate change are taking place at a time when pressure on water resources for irrigation and food production, industrialization and urbanization is increasing.

These threats are causing rapid -- and in cases irreversible -- changes to mountain environments and to mountain people, already amongst the world's poorest and hungriest. According to a study released by FAO and the Mountain Partnership Secretariat in 2015, one in three mountain people in developing countries is facing the threat of hunger and malnutrition.

The benefits derived from mountain regions were recognized as essential for sustainable development by the Rio + 20 United Nations Conference on Sustainable Development and by the Sustainable Development Goals through the inclusion of three targets dedicated to Mountains (Target 6.6; Target 15.1;Target 15.4).

Mountains serve as water towers on every continent, providing 60-80 percent of global freshwater resources, essential for drinking, sanitation, irrigation and energy production for billions. Mountains host 25 percent of terrestrial biodiversity and 25 of the 34 terrestrial

biodiversity “hotspots” on our planet are in mountains. Nearly a quarter of global forest cover is in mountain regions.

Mountain peoples are hugely disadvantaged compared to lowland peoples, as they live in harsh, often variable climates and inaccessible terrains with limited arable land. Mountain peoples, who are largely family farmers, have developed over centuries a system of practices deep rooted in tradition and heritage and are therefore capable of developing ways to manage finite natural resources and difficult living conditions basing their livelihoods on highly diversified activities. Yet climate and global change are altering the existing balance between mountain communities and their environments, affecting their capacity for adaptation and resilience. Mountain ecosystems are fragile and are overall not very well buffered. While they are forced to immediately adapt to changes, shocks and trends, they are often not able to cope and take time to recover and reach a new balance. This may trap the communities in a vicious cycle of poverty and resource degradation.

An integrated landscape approach can increase climate resilience, prosper economically valuable ecosystem services and reduce risks for the benefit of upland and lowland communities. Good water management in upland areas can ensure continuing provision of drinking water to lowland communities, support agricultural and industrial activities and promote prosperous livelihoods. Building on indigenous practices, innovative methodologies and tools, adaptation strategies, best practices and lessons learned, mountain communities can become more resilient and reduce their vulnerability to climate-induced shocks**.**

The Mountain Partnership

The Mountain Partnership (MP) is a United Nations voluntary alliance of partners (governments, inter-governmental organizations and civil society) dedicated to improving the lives of mountain peoples and protecting mountain environments around the world. Members join forces to undertake initiatives at national, regional and international level and help mountain communities overcome development challenges locally.

The Mountain Partnership has over 300 members from governments, intergovernmental organizations, civil society and the private sector. For a full list of members, visit www.mountainpartnership.org/members

The MP collaborates with an extensive network of government and non-government members, sharing knowledge, as well as raising awareness on the importance of upstream-downstream linkages from socio-economic and environmental perspectives. The Partnership’s main areas of work are: advocacy, capacity development, knowledge management and joint action on the ground.

Several MP members have addressed these themes and we are including the submissions of the following: the Environmental Research Centre of Khazar University, FAO Philippines, Global Mountain Action, the G.B. Pant Institute of Himalayan Environment & Development (GBPIHED), The Mountain Institute and the Mountain Partnership Secretariat:

1) **The Environmental Research Centre of Khazar University**

Theme 1) Lessons learned and good practices on adaptation planning processes addressing ecosystems and interrelated areas such as water resources:

Project title: A PES (Payment for Ecosystem Services) system for Azerbaijan

In view of growing concerns of related to ecosystem degradation, it is important to develop ways that enable to manage ecosystems in a more sustainable manner. In order to promote conservation and protection of natural resources and improve services provided by ecosystems, various types of market driven mechanisms can be designed such as payments for ecosystem services (PES). Through PES, landowners are supported financially to change their land use styles and provide ecosystem services to buyers.

The **objective** of the project is to secure the flow of multiple ecosystem services, including carbon storage and sequestration and water provisioning services, while ensuring ecosystem resilience to climate change.

The overall aim of this study is to collect valid and reliable information and identify opportunities for future PES markets in Azerbaijan, assess main opportunities for future PES markets and provide a roadmap to a full PES study. This is an initial or scoping study that will primarily identify main opportunities for PES.

- **Description of relevant activities and collaborating partner institution/s (if any)**

Specific objectives:

- Identify the existing ecosystem services of forest and high alpine grasslands in mountain districts of Azerbaijan and classify them
- Identify target groups, sellers and buyers for future PES markets
- Collect the needed data for PES
- Identify institutional and administrative functions/frameworks (who can be the body to manage the ecosystem services)

- Develop pro-poor benefit-sharing mechanisms (mechanisms piloted to reduce over-grazing and restore critical ecosystem services generated by healthy summer pastures (forests) in the Greater Caucasus Mountains.
- Prepare and submit the final draft report with the road map for the year 2017 to international expert and to UNDP
- Design WTP (Willingness To Pay) questionnaire of non-use values of ecosystems for potential buyers and pretest

Collaborating Partner Institution: Environmental Research Centre, UNDP Azerbaijan, Ministry of Ecology and Natural Resources.

- **Key results**

- Existing ecosystem services were identified
- Use and non-use values of ecosystems were identified
- Target groups (sellers, buyers) and markets were identified
- WTP (Willingness To Pay) questionnaire for potential buyers were designed and pretested
- Institutional and administrative functions/frameworks (who can be the body to manage the ecosystem services) Identified
- Several PES schemes were designed for grass lands and mountain forests of Azerbaijan. These schemes identify main ecosystem service buyers and sellers in Azerbaijan
- Creation of a National Ecosystem Foundation is considered. NEF will support environment friendly agricultural activities through PES
- Field Surveys for upstream and downstream communities, as well as, for local governments conducted. To design WTP (Willingness To Pay) questionnaire of non-use values of ecosystems for potential buyers.

Planned next steps (as appropriate)

- Government will support pilot PES projects for all types of ecosystem services in 2017-2020
- First PES projects will be implemented only in mountain regions
- All types of Ecosystem Services and their monetary valued will be identified
- PES schemes that support adaptation and mitigation measures will directly or indirectly support mountain communities
- Based on PES schemes, virtual water trade will be implemented

2) **FAO / Philippines**

Theme 2: Lessons learned and good practices in monitoring and evaluating the implementation of ecosystem-based adaptation;

Project title: Support to the development of the National Forest Monitoring System (NFMS) Action Plan and enhanced capacities for implementation

- **Description of relevant activities and collaborating partner institution/s (if any)**

The Philippines has signified its strong interest in getting involved with the REDD+ initiative and has demonstrated its commitment through the formulation and adoption of the Philippine National REDD+ Strategy. The NFMS will constitute the primary system for generating and managing information on the country's forest cover and status, as well as the backbone to the country's Measurement, Reporting and Verification (MRV) System for REDD+. The NFMS facilitates the enhancement of the national greenhouse gas inventory relating to land use, and of other documentation mandated by the UN Framework Convention on Climate Change (UNFCCC), which are required to report on REDD+. As a result, the project aimed to complement current efforts and resources towards the development of the NFMS in the Philippines. The NFMS Action Plan was formulated to enhance the capacity of various institutions in the operationalization of the NFMS as the primary system of the government for generating and managing information. The following key activities were: 1) national consultation on NFMS which generated components and elements to be included in the Action Plan; 2) series of regular meetings of the National NFMS Working Group in support of the NFMS and Action Plan; 3) national stakeholder consultation for final validation of the NFMS Action Plan; 4) review of available data, potential data sources and development of a plan under an operational NFMS; 5) review of available tools and systems and development of a plan under NFMS enhancement; 6) review of existing and related documents, policies and relevant issuances; 7) series of trainings on satellite land monitoring system: radar data processing; 7) training on emission factors development through data analysis from NFI and sub-national REDD+ field inventories using R-studio.

The implementing agency is Forest Management Bureau under the Department of Environment and Natural Resources (DENR). Collaborating partner institutions included the Climate Change Service, Regional Offices, Ecosystem Research and Development Bureau, National Mapping and Resource Information Authority of DENR; Non-Government Organizations (NGOs) such as Center for Conservation Innovations of the

Philippines, Foundation for the Philippine Environment, Non-Timber Forest Products; development partners like Deutsche *Gesellschaft für Internationale Zusammenarbeit* (*GIZ*), United States Agency for International Development; and University of the Philippines Los Baños College of Forestry and Natural Resources.

- **Key results**

The project supported the development of a National Forest Monitoring System (NFMS) Action Plan in the Philippines that served as the blue print for NFMS implementation. By supporting this primary monitoring system, the NFMS Action Plan described in detail all activities required to operationalize the system, including the tools, data, and human capacity requirements, as well as institutional arrangements. Specifically, the key results of the project included the following: 1) complete and finalized NFMS Action Plan for the Philippines, articulating monitoring and MRV functions for REDD+; 2) review of current data and data systems including a data/data systems plan under NFMS; 3) enhanced capacities on the Satellite Land Monitoring System (SLMS) and National Forest Inventory (NFI) components of the NFMS; 4) results of the capacity-based needs assessment for the NFMS; and 5) results of assessment of institutional and organizational arrangements of the NFMS.

- **Description of lessons learned and good practices**

- Capacity building is important for institutions such as FMB which is responsible for monitoring and analysis under the REDD+. The areas of GHG inventory, assessment of degradation and deforestation, including identification of hotspots are difficult procedures.
- Several ongoing projects in FMB are being implemented in the long term scheme in partnership with academic institutions and development agencies.
- There is a need to value the ecosystem since public funds are being invested in the development and rehabilitation of the forests, watershed and river basin.
- Data sharing and integration is useful for carrying out a systematic process in mapping and land cover analysis. There must be a common data which is independent and transparent to users, including development partners and other related agencies.
- On REDD+ project sites, GIZ has only focused into the deforestation component and not on forest degradation.

- **Description of key challenges**

  - lack of recognition of the importance of the NFMS in DENR top management and other agencies
  - suitability of datasets to be used including reference year under the Satellite Land Monitoring System
  - the need for frequent assessment of forest and land cover maps based on annual or biennial basis and clarification on the description between land use and land cover
  - institutionalization of the NFMS in the Philippine Development Plan (2011-2016) in support of the forestry sector

- **Planned next steps (as appropriate)**

  After the validation workshop during the National Stakeholder Consultation in December 2016, the draft NFMS Action Plan will be revised by the national consultant and submitted to FAO for review and finalization. This will be submitted to FMB as part of the completion report and project closure. Training activities will continue as defined in the work plan.

3) Global Mountain Action

Theme 1) Lessons learned and good practices on adaptation planning processes addressing ecosystems and interrelated areas such as water resources:

Project title: Measuring ecosystem health and functionality of the Peruvian Andes. The role of macrofungal diversity.

- **Partners:** Universidad Peruano Cayatano Heredia (UPCH), Universidad Nacional San Antonio Abad de Cusco (UNSAAC), Servicio Nacional Forestal y de Fauna Silvestre (SERFOR)

- **Key results**
- Six years of study and analysis of the Peruvian Andes (excluding as yet most of the Eastern slopes) showed that:

  - Macro fungal diversity is reduced when puna grassland is converted to simplified grass pasture systems.

- Retaining cloud forests or reforestation increase fungal diversity

- Native cloud forests systems have greater fungal diversity than plantations or grasslands.

- Highest macrofungal diversity was found in threatened northern cloud forests.

- **Description of lessons learned and good practices**

  - Overuse and mismanagement of fragile native highland 'puna' grassland ecosystems through burning practices and uncontrolled overstocking as encouraged by current economics and lack of effective policies has created a downward spiral of fertility and diversity. This in turn affects ecosystem functionality and in the end human wellbeing.

  - Unless enabling national policies and strong incentives/controls are enacted the pending extinction of northern cloud forests, especially in the northern regions Kañaris and Colasay regions will result in a marked reduction of fungal diversity and ecosystem functionality that will likely affect climate and in the end wellbeing of people.

- **Description of key challenges**

  - Inclusion of fungi as key ecosystem components and indicators in National Environmental Plans and Policies.

  - Funding of non-streamline 'in vogue research' of key importance such as this research.

- **Planned next steps (as appropriate)**

  Continued analysis of the work, further collection on the east side of the Andes, write up and promotion of the work, subject to funding.

4) The G.B. Pant Institute of Himalayan Environment & Development (GBPIHED)

Theme 3: Lessons learned and good practices in monitoring and evaluating the implementation of ecosystem-based adaptation;

Project title: Ecosystem Based Adaptation in Indian Himalayan region- Initiatives under National Mission on Himalayan Studies

The National Action Plan on Climate Change (NAPCC), among others, recognizes the Himalayan ecosystem as vital for preserving the ecological security of the country. Also, it underlines intense vulnerability of this ecosystem towards both anthropogenic and environmental perturbations. The sensitivity of the region is likely to be exacerbated by the impact of climate change. With this realization, NAPCC sets out 'Sustaining the Himalayan Ecosystem' (NMSHE) as one and the only area-specific missions among the eight National Missions. NMSHE consists of six task force or thematic study groups viz. (i) Natural and Geological Wealth, (ii) Water, Snow and Glaciers, (iii) Forest Resources and Plant Diversity, (iv) Microflora and Fauna, and Wildlife and Animal Population, (v) Traditional Knowledge System, and (vi) Himalayan Agriculture.

Considering the relevance of mandate, G.B. Pant National Institute of Himalayan Environment & Sustainable Development (GBPNIHESD)* has been identified as the coordinating institution for task force 3: Forest Resources and Plant Biodiversity.

This Task Force aims to: (i) develop a coherent database, (ii) establish effective monitoring system, (iii) validate climate model projections, and (iv) sensitize and build capacity of stakeholders towards climate change adaptation and mitigation. Our approach revolves around (a) enhanced monitoring through observational and monitoring network, (b) promoting community based management, and (c) strengthening regional cooperation. These aims are fulfilled through following objectives:

- Development of coherent database for forest resources and plant diversity of Indian Himalayan Region

- Establishment of effective monitoring system for forests resources and plant diversity in relation to changing climate
- Validation of Climate Model Projections with reference to forest resources and plant diversity in Indian Himalayan Region
- Sensitization and capacity building of inhabitants towards climate change adaptation and mitigation

Following activities were carried out so far:

a) Development of coherent database for forest resources and plant diversity of Indian Himalayan Region through (i) network partners & protocol development, (ii) data sharing and updating mechanism (iii) establishment of representative Long Term Ecological Monitoring (LTEM) Sites, (iv) development of monitoring indicators & criteria, (v) data set generation, integration & interpretation.

b) Pilot studies for revalidation and vulnerability assessment through (i) baseline studies in indigenous communities with respect to climate change perception and adaptation capabilities, (ii) knowledge & information review – approaches, expertise, and infrastructure, (iii) vulnerability indicators of forest resources with respect to climate change.

c) Capacity Building & Forecasting through (i) capacity building of stakeholders and partners, (ii) awareness & sensitization on climate change issues, (iii) participatory mechanism for information generation & dissemination.

- **Key results**

The project is in its early stages of implementation and data / information is being generated on following aspects through various R&D activities:
(i) Forest Resources and Plant Diversity, (ii) Establishment of Long Term Ecological Monitoring (LTEM) for impact of CC on Forest Resources and Plant Diversity in identified locations across

the region, (iii) Soil sampling along the altitudinal gradient, (iv) Assessment of changes in the summer monsoon rainfall climatology and Intra-seasonal Oscillations (ISO) over the IHR during 2020-2070 for IPCC representative concentration pathways 4.5 and 8.5 (RCP 4.5 and RCP 8.5), (v) People's perception on climate change, its impact, and adaptation strategies, and (vi) Capacity building activities of mountain communities.

- **Description of lessons learned and good practices:**

The indigenous mountain communities have employed a range of practices to conserve and utilize water resources for drinking and irrigation. There are complex systems of coping mechanisms in the face of water scarcity. In these mechanisms community organizations (both formal and informal) judiciously manage the water resource keeping in view of sustainability and societal equity. The water sources earmarked for irrigation of cropfields from the mountain watersheds had a perfect schedule / roster of irrigation of the community land.

Similarly, the forest ecosystems lying in the jurisdiction of the local inhabitants are managed through both formal and informal Institutions such as Forest Councils (Van Panchayats; VP), which present an excellent and one of the oldest surviving examples of community based management of forests. The community people consciously craft their own rules and regulations for management of the VP forest and equitable use of the resources. The practice of harvesting of fuelwood, fodder, NTFPs etc. from the VP forest is done on a rotation basis. For example, in Uttarakhand, a mountainous state in north India there are 12089 VPs managing some 16% forest area of the state. However, with increasing Govt. participation in the management of the VPs has curtailed the customary rights of the community people that may disturb the age-old management practices of these community forests. However, many VPs are still in very good condition and contributing significantly to the environmental conservation and providing a range of ecosystem goods and services to the stakeholder communities.

- **Description of key challenges:**

- Lack of long-term meteorological data set to discern trends of key climatic variables such as rainfall, snowfall, temperature and humidity.
- There is a key challenge as to how to upscale these good practices in the want of suitable policy, technical and financial support.
- Inaccessibility, fragility, marginality and low level of technological inputs is the major constraint behind the upgradation of livelihood activities and natural resource management.

- **Planned next steps**

(i) Long-term data base generation on various aspects of water, forests, socio-economic aspect, (ii) Repeated study on vegetation sampling and analysis of LTEM sites, (iii) Field work on plant invasion pattern in selected sites, (iv) Vulnerability assessment of forest resources and plant diversity, (v) Dendroclimatic studies of climate change indicator tree species (*Pinus wallichiana, Abies spectabilies, Abies pindrow and Betula utilis*), (vi) Pilot studies on validation of people's perception on climate change and adaptation strategies throughout the selected sites in Indian Himalayan Region (IHR), and (vii) Capacity building and awareness programme in other part of IHR.

5) The Mountain Institute

Theme 1). Lessons learned and good practices on adaptation planning processes addressing ecosystems and interrelated areas such as water resources;

Project title: Identification of the most effective EbA measures for the NorYauyos Cochas Landscape Reserve (NYCLR), Peru.

- **Key results**

Through the application of methodologies and tools at the ecosystem level, the project identified the specific areas within the NorYauyos Cochas Landscape Reserve (NYCLR), Peru for which to implement EbA measures and selected the specific EbA measures that would be most

effective for the areas identified. The identified measures and zones were carried out using tools developed during the first project component as well as a vulnerability and impact assessment (VIA).

The VIA was designed to analyze the context of the NYCLR and measure the impact of climate change on social vulnerability and the vulnerability of ecosystems. This component reveals several important results: (1) the identification of ecosystems and services that are most vulnerable to climate change; (2) an analysis of the dependency of communities and important livelihood activities on vulnerable ecosystem services; (3) the identification of the spatial distribution of vulnerable ecosystems, communities, and livelihood activities; and (4) a description of measures to address vulnerability.

In preparation for the implementation of EbA measures the project carried out an integrated analysis of supply and demand for ecosystem services, considering the pressure on natural resources. This study looked at climatic data from the last 30 years, primary information collected during field visits, ecosystem services maps, group interviews, and a socio-economic survey of more than 330 participants. This information yielded a profile of the past and current climate situations and a visualization of a future scenario of ecological processes, hydrology, economic processes and livelihoods. The study aimed to analyze vulnerability to climate change within the NYCLR to identify which specific zones are most vulnerable. The study showed that of the 15 ecosystem services provided by the NYCLR, grasslands and wetlands contribute directly to 8 of them, and indirectly to 4.

Between April and July 2013 The Mountain Institute carried out a consultancy for project partner IUCN to (i) identify potential sites to implement robust adaptation measures, (ii) propose measures for each site, and (iii) develop a work plan for implementation of the selected measures.

With input from all the partners and the head of the NYCLR, TMI developed criteria for the selection of sites. Using these criteria, two communities were identified, Miraflores and Canchayllo, that met certain desired conditions: low levels of conflict, having relatively strong social organizations, inhabitants that depend on the main ecosystems (wet grasslands) of the NYCLR, and communities which have good relationships with the head office of the NYCLR. Each of these communities depend principally on livestock activity in NYCLR pastures as their main source of income.

In order to select and prioritize which of 20 specific EbA measures for implementation should be implemented, the project carried out an analytical assessment to understand which EbA measures were the most relevant to the local population and for the reserve. The assessment included: theoretical identification of best options; dialogue with various stakeholders through field visits, meetings, workshops, interviews, and the VIA study; and direct engagement with organizations, local authorities, and the general population using a Participatory Rural Development approach (DRPI).

The results of the above analysis, recommended measures 1. Application of a governing structure to manage livestock grazing activity, as this is the most critical threat to ecosystem health and sustainable livelihoods, with and without incorporating climate change threats, 2. Incentivize vicuña management through commercialization of vicuña fiber, 3. Demarcate and protect natural resources that are particularly important for sustaining livelihoods, 4. Promote agroforestry and traditional Andean production, 5. Investments in production and sustainable management of medicinal and aromatic plants (MAPs).

- **Description of lessons learned and good practices**

The Mountain EbA Flagship project's implementation of activities benefitted from the perspectives and expertise of multiple stakeholder groups, including local community members, national park management authority, academics, etc. The project was guided by the following principles:

- Multi-sectoral approach
- Work at multiple geographical scales
- Integration of flexible management structures
- Alignment of benefits with development and conservation goals
- Use of scientific and local knowledge
- Provision of benefits to the local population, especially those most vulnerable
- Participatory and culturally appropriate approach that considers gender equity

- **Description of key challenges**

- **Planned next steps (as appropriate)**

The focus of the Mountain Ecosystem based Adapatation (EbA) Flagship Programme is expected to be expanded during a second phase of implementation through a BMUB-IKI award to TMI and IUCN. This second phase will concentrate on up-scaling mountain EbA through greater evidence on the effectiveness of mountain EbA, expansion of implementation nationally within Uganda, Nepal, and Peru as well as internationally to Kenya, Colombia, and Bhutan, and advocacy to facilitate uptake of mountain EbA solutions. With regard to planning processes, this second phase will push to incorporate mountain EbA into local adaptation plans for action. Using lessons-learned from the first phase TMI plans to initiate implementation of EbA measures in new communities across Peru and Nepal.

<u>Theme 2) Lessons learned and good practices in monitoring and evaluating the implementation of ecosystem-based adaptation.</u>

- **Description of relevant activities and collaborating partner institution/s (if any)**

Baseline information using the socio-economic and environmental indicators selected in the first component of this project (see section C). The impact of the project was then assessed comparing these initial baselines to the indicators after the project period of implementation.

As above, partners included IUCN, UNEP, UNDP, TMI, the communities of Miraflores and Canchayllo, the head of the NYCLR, and research and science institutions.

- **Key results**

In terms of water and grasslands, project activities have noticeably improved the condition of pastures and wet grasslands through project implementation. Biodiversity in the project areas has also improved. These results are largely attributed to a change in pastureland management of livestock.

Another positive result of the project is the increased capacity of the communities and other stakeholders. There is increased recognition of the value of natural resources amongst community members and that actions taken to manage natural resources can reduce vulnerability to climate change.

Individual community members also sited many benefits of now being part of the communal groups or committees formed through the project. Participants felt a sense of motivation from working in groups. Despite some duplicative roles and a substantial time investment of community leaders, the communal committees successfully ensured the continuation and community participation in the implementation of the proposed EbA measured.

Finally, both SERNANP and the NYCLR authorities benefited from the information generated by the project, especially through the VIA. The park authorities use the project's information to prioritize areas for action. Information from the VIA will contribute to the elaboration of the park's Master Plan to serve as an example for prioritizing action in other protected areas.

- **Description of lessons learned and good practices**

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 shortterm 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.

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.

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 NYCLR provided an entry point 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.

- **Description of key challenges**

It took a considerable amount of the total project time to establish the indicators and collect baseline data. This presented a challenge in that the project had to evaluate the implementation during a very short period of performance. The pilot project was designed to facilitate monitoring beyond the project period. This aspect was important due to the fact that impact of EbA may take many years of implementation before it is evident.

The additional of performance indicators and their use during the project presented an additional challenge. In some cases it was the teams were able to use knowledge gained from the documented progress and use this information to adjust planning and implementation. However, there were also cases where this was not possible, and some teams concluded that there was very little to know. Some partners acknowledged having felt like outsiders during the implementation of various activities, and that, as a result, contributed less than they may have otherwise.

Despite these difficulties, the project produced convincing evidence of the effectiveness of EbA measures.

<u>Theme 3: Tools for assessing the benefits of mitigation and adaptation to enhancing resilience and emissions reductions that ecosystem-based adaptation provides.</u>

- Description of the tool/method or tool kit

The methodologies and tools created by the project were developed to help conceptualize the focus of mountain EbA and were thus essential for mountain EbA planning processes.

<u>Criteria for the definition, prioritization, and principles for the selection of EbA measures</u>

The project began by defining EbA to help the internal project team and external stakeholders, including researchers, scientists and other specialists, to understand what the project considers EbA, what is the goal of EbA, and importantly, what the project does not considered EbA. The definition of EbA linked closely to vulnerability to climate change of communities and ecosystems. It was concluded that EbA action should reduce exposure, reduce sensitivity, or increase adaptive capacity.

Next, the project developed a series of principles for the selection of EbA measures and the subsequent monitoring and evaluation of their implementation. This involved input from multiple stakeholders, including the local communities in the hope that community members could use the same indicators in their own management plans. A set of principles were created

to help in the prioritization and selection of EbA measures. These principles were used to analyze some of the EbA measures that had been proposed in the communities. Participants worked in groups to analyze the structure of the ecosystems of the project areas, their functions and the services they provide, as well as, the impact of climate change on these functions and services. The potential effectiveness of each measure could then be validated through a list of indicators.

Social and economic indicators included:

- Level of technical knowledge in pastureland management
- Level of application of pastureland management practices
- Level of compliance with the pastureland and water management plans
- Community initiatives for pastureland and water management
- Income from communal farming due to the implemented measure (both in the medium and long term)
- Number of families per communal farm linked to profitable markets (Camelid and sheep fiber)

Environmental Indicators included:

- Area of pastureland available in conditions of drought (hectares)
- Flow from the lake, Jutupuquio (at the mouth of the canal in the communal farm Canchayllo)
- Number of puquiales (underground water channels) in use per time of year
- Grassland condition
- Vigor of the plant growth
- Pasture productivity
- Number and population composition of vicuñas
- Number of palatable plant species (for grazers) per square meter

<u>Vulnerability Impact Assessment</u>

The project developed a VIA as a tool 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 were developed and applied to facilitate the assessments, with the support of appropriate data and information.

- **Partner institution/s (if any)**

TMI was a local implementing partner of the IUCN/UNDP/UNEP Mountain EbA Flagship Programme in Peru.

- Key results if the tool has been tested and challenges (as appropriate)

Criteria for the definition, prioritization, and principles for the selection of EbA measures

This exercise of exploring the definition of EbA allowed the project to plan the location and scale of implementation, as well as the selection of which measures should be implemented. Through this exercise, it was concluded that activities in the NYCLR could serve as pilots that, once proven, could be up-scaled. However, the analysis showed that despite action at local scales, a broader ecosystem context must be considered, including size, relative fragmentation, anthropogenic uses, and habitat for endemic or endangered species.

Vulnerability Impact Assessment

Once developed, the VIA study took almost a year to complete (August 2012-August 2013). The analysis was exhaustive, drew from the expertise of professionals from multiple disciplines, and took considerable time to develop the results. Despite criticism of the time lost during the long duration of the analysis, the study provided crucial information to guide implementation component of the project and was thus a worthwhile and critical step to precede implementation. The analysis served to support, with clear and detailed scientific evidence, the selection of ideal sites for measures implementation. It also yielded very valuable information for regional governments and for the head of the NYCLR.

- **Planned next steps (if any)**

The principles for selection of EbA measures and VIAs will be used for planning for the second project phase of Upscaling in new communities.

6) **The Mountain Partnership Secretariat/FAO**

Theme 3: Tools for assessing the benefits of mitigation and adaptation to enhancing resilience and emissions reductions that ecosystem-based adaptation provides.

Project title: Development of biodiversity monitoring tools for REDD+ in Papua New Guinea

- **Description of the tool/method or tool kit**

  The aim of this project is to fully integrate the new Multipurpose National Forest Inventory of Papua New Guinea (being developed under the arrangements for Reducing Emissions from Deforestation and forest Degradation, REDD+), with an appropriate methodology to assess and monitor forest biodiversity at national scale, in line with UNFCCC's Cancun safeguards (COP 16, 2010) and subsequent indications.

  The inventory will be a key component of Papua New Guinea's first Forest Monitoring System and will include, not only activities for measuring timber volume and estimating carbon stocks and greenhouse gas emissions, but also the a survey of the nation's forest biodiversity, the first ever developed.

  The combined carbon-biodiversity inventory will enable the assessment of trade-offs between protecting biodiversity and reducing emissions, with the aim to maximize both objectives.

  Reducing risks to damage the biodiversity of forest ecosystems aims to protecting their resilience and improve their capacity to provide goods and services to a population that is highly dependant on forest resources and services for its livelihoods (80% of the population of PNG).

  The data produced by PNG's National Forest Inventory aims to support the implementation of REDD+ activities to enhance the sustainability of forest management and the development of sound government policies to sustainably manage national biodiversity, with additional benefits for livelihoods and food security.

  REDD+ initiatives that protect existing forest carbon stocks will not automatically protect other forest values. Making biodiversity a core component of REDD+ is a critical factor to enact policies that reduce the risk of unsustainable logging and other land use changes (including inter-ecosystem leakage), and in order to discourage those who would prefer to interpret REDD+ as an incentive to replace primary forests with plantations as a way to sequester more carbon.

- **Partner institutions**

  1. Papua New Guinea's Forest Authority (PNG): NFI overall coordination;
  2. University of Queensland (Australia): vertebrate survey methodology;

3. Sapienza University of Rome (Italy): non-tree floral survey methodology;
4. Binatang Research Centre (PNG): invertebrate survey methodology;
5. Forest Research Institute (PNG): biodiversity survey and data analysis;
6. University of Papua New Guinea (PNG): biodiversity survey and data analysis;
7. University of Technology (PNG): biodiversity survey and data analysis.

- **Key results if the tool has been tested and challenges**

  To date, the project has:

  - Designed a specific methodology to assess forest biodiversity of PNG at national scale as part of the National Forest Inventory;
  - field-tested all biodiversity protocols;
  - Trained the Forest Authority staff on the implementation of the biodiversity survey.

  Main challenges:

  - How to translate the REDD+ policy recommendations into forestry practice, with specific focus on the feasibility of a concrete application of the biodiversity safeguards' recommendations;
  - There are no standardized protocols and techniques for the integration of biodiversity issues in REDD+ activities in tropical forests at national scale, because of the lack of consensus about what to monitor and the fact that there is, so far, no single reliable metric of biodiversity;
  - The forests of PNG have an extremely high biodiversity with wide knowledge gaps;
  - Constraints related to integrating a biodiversity assessment protocol into the design of a traditional forest inventory, in terms of costs, timing, number and type of indicators, logistical arrangements.

- **Planned next steps**

  Implementation of the National forest Inventory has started and will take approximately three years to be completed.

  The project will assist PNG on data collection, quality control, data analysis and research strategy during the field activities for the NFI implementation, while increasing the autonomy of the national forest Authority in implementing the biodiversity survey and consolidating the existing international partnership.