Impact assessment of Ecosystem-based Adaptation in Miraflores, Peru

Case study and way forward for a monitoring and evaluation methodology

Ecosystem-based Adaptation (EbA) uses biodiversity and ecosystem services – i.e. natural infrastructure – to help communities adapt to climate change. It is considered an alternative or complementary approach to more widespread 'hard' infrastructural and 'soft' socio-oeconomic adaptation methods. EbA measures are receiving growing attention for their promise of a cost-effective solution with multiple social-ecological benefits. However, while EbA projects have been increasingly implemented and studied, gaps in the evidence base for EbA effectiveness remain a barrier to its adoption as a mainstream policy option. Further case studies of impacts and the development of consistent, context-specific, and scalable methodologies will help to bridge this gap and support improvements in EbA measure design and evaluation. To this end, this thesis undertook an exploratory case study to attempt an evaluation of biophysical and social impacts of EbA measures designed to address risks to water provision and for pasture degradation in the community of Miraflores in the Nor Yauyos Cochas Landscape Reserve (NYCLR) in the Peruvian Andes, thus contributing to the discussion and development of a comprehensive evaluation methodology.

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The EbA Montaña project in Miraflores

Ongoing and projected changes in climate in the Peruvian Andes threaten water availability, livelihoods and food security. National ministries are increasingly looking for nature-based and green-grey options, such as EbA, to help local communities adapt, and rely on projects such as Mountain EbA/AbE Montaña to better understand, plan, and justify investing in natural infrastructure measures. The larger Mountain EbA program (2011 – 2016) was a collaboration between UNDP, UN Environment, and IUCN and financed by the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The aim was to improve ecosystem resilience, mainstream and promote EbA options, and reduce social vulnerabilities of affected communities.

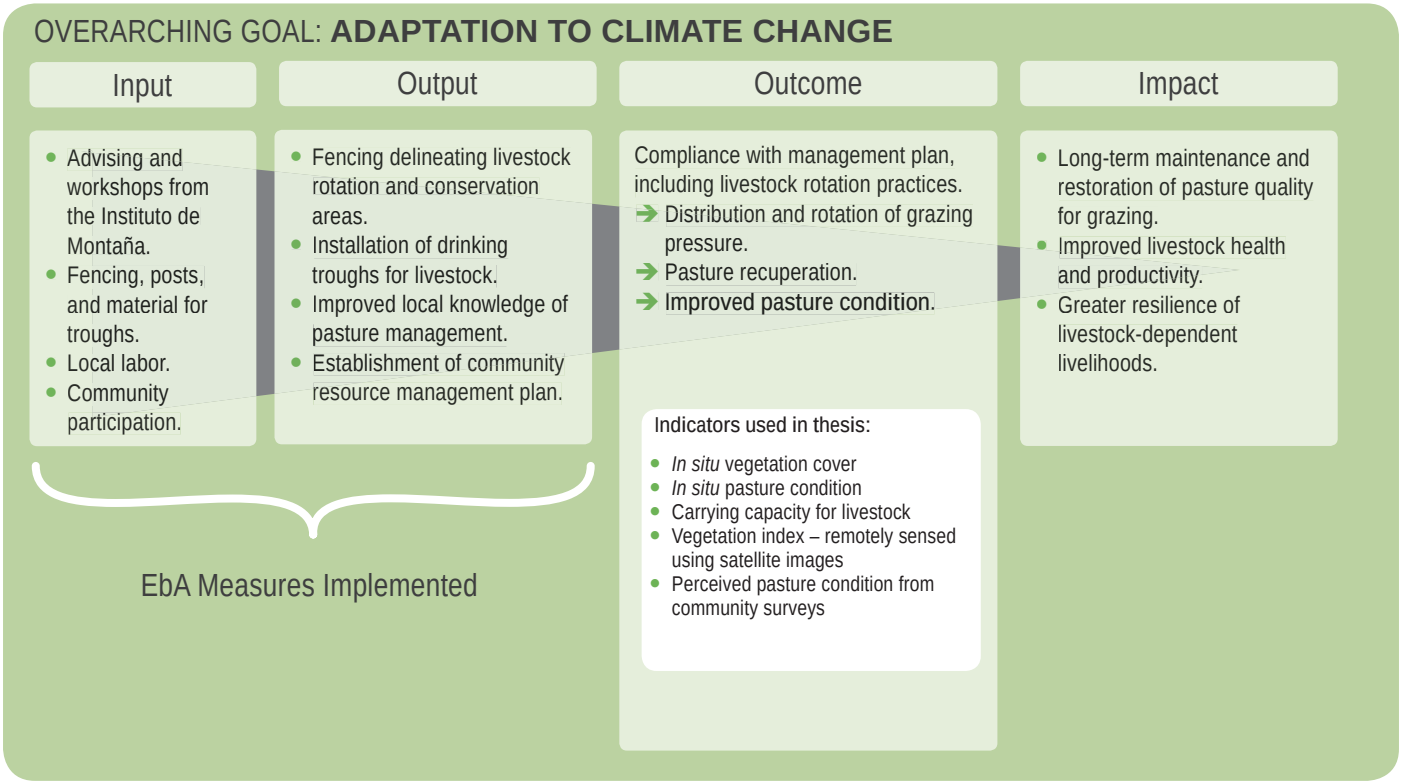
In Peru, the program – known as EbA Montaña – was conducted in partnership with the Peruvian Ministry of the Environment (MINAM), the Ministry of Economy and Finance (MEF), and the National Service of Natural Protected Areas (SERNANP) in the Nor Yauyos Cochas Landscape Reserve, with the Peruvian branch of The Mountain Institute, the Instituto de Montaña (IM), responsible for implementing the measures in Miraflores. The Peruvian pilot project was realized in four communities in the Nor Yauyos Cochas Landscape Reserve, one of which was Miraflores, situated in the high Andes and with a vast majority of its 210 inhabitants depending on agricultural livelihoods. Here, EbA Montaña interventions targeted natural resource management of mountain pastures and wetlands by strengthening community organization through the development of a local management plan, increasing local knowledge and capacity, and installing infrastructural measures.

Case Study Findings

The case study capitalized on the existing monitoring framework and available data while also identifying and addressing gaps. The EbA Montaña program had previously developed a monitoring scheme including indicators with accompanying baseline data from 2013; however, these were insufficient to comprehensively assess the effectiveness of the EbA measures implemented, as the majority of existing indicators focused on inputs and outputs from the project rather than intended outcomes and impacts. Existing data on pasture condition was thus supplemented by a vegetation analysis of satellite images and *in situ* surveys with local community members. These various data sets were formatted into outcome indicators such as pasture carrying capacity, a vegetation index, and perceptions of community organization and knowledge. Additionally, a conceptual model was developed from the survey data to identify perceived linkages relating to the EbA measures, including driving factors and other possible explanations for observed changes as well as intended and unintended impacts of the project.

The expanded understanding of the local community and ecosystems can be used to develop a Theory of Change (ToC), or hypothesized causal impact chain, which can assist with monitoring and evaluation of EbA measure progress using indicators measuring inputs, outputs, outcomes, and impacts. A basic sample theory of change for the example of pasture condition in Miraflores can be found below.

Sample Theory of Change / Results Chain for the Example of Pasture Condition in Miraflores



While the case study yielded varying quantitative results and mixed responses of perceived changes by the inhabitants, the majority of the case study indicators showed some measure of improvement since project implementation. For example, pasture condition for cattle, knowledge of pasture management, the vegetation index in most areas, and livestock productivity all increased. Respondents often named EbA measures as a contributor to improvements, and survey participants' perception of the EbA Montaña project was high on average, suggesting a high overall acceptance and positive influence of EbA measures by the community – a prerequisite for the longer-term sustainability and success of the project.

Key Recommendations

The case study showed that existing monitoring schemes could be enhanced for a more comprehensive EbA evaluation methodology. By clarifying and designing intended impacts, project commissioners and implementers can select relevant indicators, optimising available resources for data collection and integrating consistent monitoring into project design during and after project implementation.

Understanding the local knowledge of interaction between people and their environment against the background of the climate change challenges they face is a first step to planning EbA measures and their intended impacts. Specific indicators to measure the output of the implemented project and the intended outcome

have to be derived in a targeted and participatory process including both local and national stakeholders in order to demonstrate the specific EbA measure contributions to the desired impacts as well as national policy and investment frameworks (such as the Peruvian Climate Change Law, the NDC and Invierte.pe).

Improvements in data collection to inform indicators will help bolster evaluations on EbA effectiveness, particularly given the long time horizon needed for adaptation outcomes to manifest. Short-term studies, like this one, produce preliminary indications; however, establishing a solid evidence base for effectiveness will require consistent monitoring following project implementation. As the EbA Montaña project transitions into its second phase, it could use a deep understanding of local human and ecological communities to devise an improved theory of change and expand its set of indicators for monitoring outcomes and impacts accordingly. To help inform these indicators, the program could develop additional data sources such as remote sensing data, which facilitates access to historical information and ease of longer-term monitoring, as well as *in situ* data collection through concrete partnerships with local stakeholders from the communities to optimize available resources and data sharing. Improving the monitoring scheme will greatly assist with a comprehensive and reproducible evaluation methodology, which will ideally be undertaken at each project site after implementation.

While challenges persist for monitoring schemes there are also numerous practical options for improving monitoring and evaluation for assessing the impacts of EbA measures. Consistent long-term monitoring and the application of methods facilitating outcome and impact indicator uptake will help build the evidence base for EbA effectiveness and thus contribute to the mainstreaming of EbA into national and global policy options.

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