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CASE STUDY

Maintaining Water Security in Peru Through Green Infrastructure

Projects at a Glance

Although much of Peru has abundant sources of freshwater at certain times of the year, increasing temperatures and irregular rainfall patterns have led to droughts, floods, landslides and the retreat of mountain glaciers in recent years. For instance, the number of floods in the country has increased by 60 percent since 1970 while intense rainstorms, forest fires and mudflows have doubled over the last decade. Furthermore, ecosystem degradation due to unsustainable land-use practices such as overgrazing and the conversion of forests to pasture has reduced water regulation. The combined impacts of climate stressors and ecosystem degradation have led to more water insecurity for both rural and urban communities. Increasingly, communities are experiencing floods during the rainy season and water scarcity at other times of the year. The USAID/Peru mission assisted vulnerable communities to adapt to climate change by supporting three sub-national projects that focused on building local community and government capacity for improved environmental governance and implementing green infrastructure approaches to strengthen ecosystems and stabilize the provision of water.

Project Donor:
United States Agency for International Development (USAID)

Project, Implementing Partner and Period of Performance:
1) Securing Mountain Water and Livelihoods, implemented by The Mountain Institute (2014–2017)
2) Climate Change Adaptation for Communities of the Lima Watershed, implemented by The Nature Conservancy (2015–2018)
3) Adapting Together: Strengthening Local Capacity for Climate Change Adaptation in the Hualgayoc High-Andes Ecosystems, implemented by Lutheran World Relief (2014–2017)

Funding (by project):
1) $2.9 million, 2) $1 million, 3) $1.1 million (USAID: Global Climate Change Adaptation)

Climate Stressors:
Increased temperatures, drought and irregular rainfall

Ecosystem Services:
Maintenance of mountain, grassland and wetland ecosystem services, particularly water provision and regulation

Project Focal Areas:
1) The Cordillera Blanca mountain range, 2) the Lima Watershed and 3) the Hualgayoc district in the Cajamarca region

What's the Situation?

Peru is an ecologically diverse country with three distinct climatic regions: the semi-arid subtropical desert climate along the Pacific coast, the Andean highland climate that varies by elevation and the tropical climate of the Eastern lowlands and Amazon rainforest. Climatic changes since the 1960s include an increase in average temperatures of one degree Celsius, prolonged dry seasons and greater intensity and frequency of rainfall events in some regions. Climate change is projected to increase average maximum temperatures in Peru by two to three degrees Celsius by 2065.

Peru is home to over 70 percent of the world's tropical glaciers, which have traditionally provided water for many of the country's rural communities. Glaciers play an important role in regulating water supply by storing water during the rainy season and releasing it during the rest of the year. For example, glaciers supply about 80 percent of the river flows during the dry season for the Santa River, which feeds the Ancash region in northwest central Peru. Temperature increases due to climate change have accelerated glacial melt and retreat in Peru. Since 1970, tropical glacial volume has decreased by 40 percent, reducing the availability of fresh water for local communities. Accelerated glacial melt and subsequent water scarcity have a host of impacts including decreased access to water for household consumption, sanitation and irrigation, and reduced hydropower potential.

In response, the USAID/Peru mission supported three pilot projects that focused on green infrastructure as an **ecosystem-based adaptation (EbA) approach** to help local communities adapt to the adverse impacts of climate change. According to a 2014 publication from the United Nations Environment Programme, International Union for Conservation of Nature and others, "the green infrastructure approach refers to the natural or semi-natural systems that provide services for water resources management with equivalent or similar benefits to conventional (built) 'grey' water infrastructure." USAID's 2017 Green Infrastructure Resource Guide defines green infrastructure as "any engineered intervention that uses vegetation, soils and natural processes to manage water and create healthier built environments for people and the natural resources that sustain them."

The three green infrastructure projects were:

- Securing Mountain Water and Livelihoods, implemented by The Mountain Institute (TMI)
- Climate Change Adaptation for Communities of the Lima Watershed, implemented by The Nature Conservancy (TNC)
- Adapting Together: Strengthening Local Capacity for Climate Change Adaptation in the Hualgayoc High-Andes Ecosystems, implemented by Lutheran World Relief (LWR)

Over the course of five years, these three projects piloted a range of EbA and hybrid adaptation activities, generated notable results and contributed valuable lessons learned in the design and implementation of EbA approaches.

To follow up on the success of these pilots, the USAID/Peru mission launched a new project in December 2017 to scale up green infrastructure to address water insecurity in Peru. This Green Infrastructure for Water Security project is implemented by a consortium with expertise on the design, policy and financing aspects of green infrastructure and includes Forest Trends, Consortium for Sustainable Development of the Andean Ecoregion (CONDESAN), Sociedad Peruana de Derecho Ambiental and Imperial College London, among others. The project focuses on addressing technical and institutional constraints to the effective implementation and scaling up of green infrastructure.

Above: Reforestation with native species.

Key Ecosystem-based Adaptation Activities

- **Implement reforestation measures with indigenous drought-resistant tree species such as *quenuales* (*Polylepis spp.*).**
- **Plant live fences using native species such as the *quenual* to decrease soil erosion.**
- **Sponsor field trips for community members to learn about EbA practices aimed at improving soil and water conservation, such as rotating grassland pastures and planting native tree species in afforested areas, and support small projects to pilot these practices.**
- **Build capacity among communities for hydrological monitoring to assess effectiveness of EbA measures such as prairie restoration.**
- **Provide training for local communities and government officials on EbA measures that conserve water and decrease soil erosion, such as agroforestry and the construction of terraces in agricultural areas.**

Key Hybrid Adaptation (green infrastructure + hard infrastructure) Activities

- **Restore traditional water conservation systems, such as the 1,500-year-old structures known as *amunas* that capture and channel rainwater during the rainy season to recharge aquifers, increasing the availability of water during the dry season.**
- **Build a small holding wall for a lake that allows it to store more rainwater and recharge a local shallow aquifer.**
- **Support the development and piloting of bioremediation technologies such as sediment traps and filtration systems to reduce mineral contamination of water impacted by glacier recession.**

Strategies to Support and Sustain Ecosystem-based Adaptation

Coordinate project activities with other adaptation efforts in the region: When strategic, project implementers coordinated with and supported other organizations and initiatives with similar goals. For example, TNC worked with Aquafondo, CONDESAN and HELVETAS Swiss Intercooperation in the Lima watershed on a range of activities. These included promotion of community participation in project activities, development of communications materials and the creation of the first "green" public investment project titled "Recovering the ecosystem service of water regulation in the watersheds of Milloc, Carampoma District in the province of Huarochiri, Department of Lima."

Implement non-EbA approaches that complement EbA approaches to maximize impact: The projects complemented green infrastructure with non-EbA measures such as the construction of hard infrastructure when relevant. For instance, LWR supported the construction of forty structures to capture and store rainwater in Maraycucho village. In conjunction, they also provided training to local communities on EbA practices such as agroforestry and the construction of live fences.

Collect and use accurate and up-to-date biophysical data to inform EbA strategies: TMI provided a range of support to the Regional Environmental Information System (SIAR) of the Ancash region. This included facilitating cooperation between SIAR and other information providers in the region such as the Center


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of Environmental Research for Development, developing a program to train students at the National University Santiago Antúnez de Mayolo on data collection and designing a telephone app for students to collect and report water quality information.

Diversify revenue sources to support and scale up EbA implementation: Both TMI and TNC focused on securing funds for public investment projects as a way to expand and diversify funding for adaptation efforts in the region. For instance, TMI secured millions of dollars from national funding agencies such as GORE Ancash (the regional government of Ancash) and Programa Nacional Sierra Azul (Ministry of Agriculture) to support EbA practices like the restoration of grasslands. TNC's sub-awardee Aquafondo focused on working with private sector downstream water users in the region to secure funds for the conservation and restoration of river basins that supply water to Lima.

Sources

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About This Series

This case study is part of a series of products highlighting the potential role of biodiversity and ecosystem-based adaptation in addressing climate vulnerability. This series is produced by USAID's Biodiversity Results and Integrated Development Gains Enhanced (BRIDGE) activity and can be found here: https://rmportal.net/biodiversityconservation-gateway/resources/projects/bridge

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