



Taking Care Of Our Mountains



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“When you drink water, remember the spring” – Chinese Proverb

Introduction



Home to 1.2 billion people and occupying nearly a quarter of the earth’s surface, mountains and their surrounding ecosystems provide a bounty of life-sustaining resources. UNESCO aptly named mountains the “Water Towers of the World” due to their vast reserves of freshwater that supply a range of services such as drinking water and energy production to downstream communities.¹ Over half of humanity relies on these freshwater reserves drawn from mountain ecosystems. In addition, mountains are home to a wide range of flora and fauna, comprising nearly half of the world’s biodiversity. Mountains are the backbone to life on Earth, and their conservation is critical to our survival.

Mountains, despite their vital importance, are one of the world’s most threatened ecosystems. Manmade ecological crises such as climate change and the overexploitation of resources are already degrading mountain environments with dire consequences for the people, plants, and animals reliant on their conservation. Communities living and surviving in mountain ecosystems are diverse, comprising small-scale farmers and pastoralists, indigenous groups, dense cities, and many more. Downstream towns and cities, even some hundreds of kilometers away, are also dependent on the ecosystem services mountains provide. Thus, mountain conservation should be a shared goal between even the most distant communities that are united in their reliance on the sustainability of highland natural resources. Despite these differences, these disparate groups are linked by common environmental and socio-economic risks. Mountain communities throughout the world often struggle with widespread poverty, poor infrastructure, lower education levels, and a dependence on agriculture.² Environmental crises only exacerbate these challenges – especially for marginalized groups such as women and girls and ethnic minorities. For example, as mountain glaciers melt from increased temperatures, people living in the highlands face greater difficulties in surviving due to flooding and landslides, threatening their livelihoods and exacerbating existing gender and social inequities.

¹ http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/SDGs_and_mountains_water_EN.pdf

² https://gridarendal-website-live.s3.amazonaws.com/production/documents/:s_document/412/original/SynthesisReport_screen.pdf

In recognition of the importance of mountain ecosystems, CARE is joining the United Nations and our partners throughout the world in celebrating International Mountain Day 2020. First established by the United Nations General Assembly in 2003, International Mountain Day is observed “to create awareness about the importance of mountains to life, to highlight the opportunities and constraints in mountain development and to build alliances that will bring positive change to mountain peoples and environments around the world.”³ This report contributes to the wealth of information and conversations around mountains by highlighting CARE programs that address the social and environmental threats to highland ecosystems, underscoring the disproportionate impacts of these threats on women and other marginalized groups, and drawing from their experiences to outline best practices for integrated, equitable, and community-centered approaches to mountain conservation.



³ <http://www.fao.org/international-mountain-day/en/>



Threats to Mountain Ecosystems

Climate Change

At the close of the historic Paris Agreement in 2015, climate justice advocates celebrated as policymakers reached consensus that the world should limit the increase of the global average temperature to 1.5 °C by 2100. Yet under the present policies in place, current projections estimate that in 2100 warming will increase by roughly 2.9 °C above pre-industrial levels.⁴ While the difference may seem small, warming of this magnitude is already having catastrophic effects on mountain ecosystems, “leading to major impacts on species abundances, community structure, and ecosystem functioning in high mountain areas.”⁵ According to the Intergovernmental Panel on Climate Change (IPCC), several indicators of highland ecosystem health have declined, such as snow cover, glacier extent, permafrost levels, and species composition and abundance. Though warming targets are typically expressed in global averages, increasing temperatures are not experienced uniformly throughout different mountain regions. For example, under high greenhouse gas emissions

CARE Spotlight 1: Mountains and Climate Mitigation

From wetlands to forests, mountains contain key natural resources that absorb CO₂ from the atmosphere, serving as important ‘carbon sinks.’ In Tanzania’s Uluguru Mountains, researchers studying the carbon mitigation impact of CARE International’s *Hillside Conservation Agriculture Project* found that conservation strategies such as agroforestry and diversified cropping can remove hundreds of thousands of tonnes of CO₂ from the atmosphere. Thus, mountain conservation solutions should be valued for promoting both climate adaptation and mitigation.

Tanzania



⁴ <https://climateactiontracker.org/global/temperatures/>

⁵ https://www.ipcc.ch/site/assets/uploads/sites/3/2019/11/06_SROCC_Ch02_FINAL.pdf

scenarios temperatures in the Andes mountains are expected to increase up to 5 °C by 2100.⁶

The projected effects of climate change on mountain ecosystems also vary greatly depending on differing geographies and weather patterns. Projections of precipitation fluctuate between mountain regions, with rainfall expected to increase in East Africa, Central Asia, and the Hindu Kush Himalaya, and decrease in the Western Balkans.⁷ Similarly, heightened glacier melt has increased annual runoff in many glacier-fed rivers, while areas with smaller glaciers such as Western Canada and the Swiss Alps are already experiencing declines in annual runoff. In South America, glacial melt is evident, as countries such as Venezuela have lost nearly all their glaciers, and will likely become the first post-glacier country, followed by Colombia.⁸

These regional and local differences must be understood when designing adaptation solutions. Still, near-universal trends are anticipated in these distinct highland ecosystems. Nearly all mountain regions will face more intense rainfall (leading to more flooding) and reach a peak in average annual glacial runoff followed by a decline by 2100.⁹ In the High Mountain Asia region, home to 44% of the world's glaciers, ice loss by the end of the century could be as high as 67%. In Peru, which is home to 70% of the world's tropical glaciers, 53% have already melted. This is especially concerning since tropical glaciers are sensitive ecosystems, responding both to precipitation and temperature, making them a critical early warning system for climate change. With the thawing of the glaciers comes a temporary process of increased water availability and later a process of water scarcity. Since the ecosystem service of regulation that the glaciers used to provide is lost, water deficits increase in the surrounding basins, putting local and regional economies at risk and exacerbating dry seasons. Communities dependent on these water resources face severe challenges from these diminished freshwater reserves, especially in low latitude regions such as the Caucasus where glaciers will likely disappear.¹⁰

Biodiversity Loss

The unique and diverse topography of mountain regions create homes for an equally diverse and extensive range of plants and animals. According to the FAO, “a single mountain system such as the Alps, or the Pyrenees... hosts a few hundred (often 500–600) different species in the alpine belt alone.” The tropical Andes is the most biodiverse hotspot on Earth, containing roughly one-sixth of all plant life.¹¹ The biodiversity of the world's mountains is not only vast, but unique, as many of these species cannot be found anywhere else. Over a billion people rely on services provided by

⁶ <https://www.frontiersin.org/articles/10.3389/feart.2020.00061/full>

⁷ https://gridarendal-website-live.s3.amazonaws.com/production/documents/:s_document/412/original/SynthesisReport_screen.pdf

⁸ <https://www.theatlantic.com/science/archive/2019/01/last-glacier-venezuela/579613/#:~:text=In%202008%2C%20the%20Venezuelan,lose%20all%20of%20its%20glaciers.>

⁹ https://www.ipcc.ch/site/assets/uploads/sites/3/2019/11/06_SROCC_Ch02_FINAL.pdf

¹⁰ <https://climate.nasa.gov/news/3008/stunning-forecast-a-century-of-ice-loss-for-nearly-100000-glaciers/>

¹¹ <https://www.cepf.net/our-work/biodiversity-hotspots/tropical-andes#:~:text=The%20Tropical%20Andes%20is%20the,30%2C000%20species%20of%20vascular%20plants.>

mountain biodiversity, including erosion prevention from plant species, and basic resources like timber, food, and medicine. Biodiversity is the theme of International Mountain Day 2020 to highlight its importance and underscore the urgent threats to its conservation.

CARE Spotlight 2: Conserving Biodiversity through Agroforestry

Sustainable approaches to agriculture are becoming increasingly popular for their ability to support livelihoods and increase biodiversity. In the volcanic foothills of the Naranjo River Basin, [CARE Guatemala](#) is working to conserve and strengthen the biodiversity of mesophilic mountain forests by introducing agroforestry techniques, which incorporate native tree planting in farming. These techniques will not only maintain the ecosystem services generated by the rich biodiversity of these highland forests, but create more economic and social activities to empower women and youth.

Though humans have relied on the services provided by mountain biodiversity for thousands of years, traditional sustainable land use practices have rapidly been eroded by population increase and the mass exploitation of mountain ecosystems for profit. Industries such as mining, commercial agriculture, and tourism have all placed significant pressure on the survival of mountain species. In addition, increasing income inequality in cities has forced low-income communities further upslope, causing many to rely on unsustainable farming practices to survive. These new threats have led to increased erosion, reduced species variety, polluted waterways, and vegetation loss. Climate-induced changes in temperature and glacial extent have also affected biodiversity as animals are

forced to migrate to new habitats or face extinction, while temperature changes of 3 °C to 5°C can diminish even the most resilient highland plant species. In the Andes of Colombia and Venezuela, for example, the mortality of a species of puffins is increasing due to the spread of disease from insects and fungi, which have proliferated from climate-induced imbalances in local ecosystems.¹²

¹² <http://repository.humboldt.org.co/handle/20.500.11761/35402>



Justice for Mountain Communities



Living in mountainous areas is difficult and dangerous. Natural disasters tend to happen quickly, as storms and geological events can trigger floods, landslides, and avalanches with little advance warning.¹³ These catastrophic events compound a number of existing socioeconomic inequalities in access to education, markets, infrastructure and transportation, healthcare, employment, food and water, and political participation. Yet even with these risks, mountain communities are some of the most resilient, adapting to tough environments for generations while developing sustainable livelihoods and serving as stewards for their ecosystems. Meeting the UN's Sustainable Development Goals to eradicate poverty, hunger, gender inequity, and many more requires an understanding of the differential impacts endured by mountain communities, greater resources to address these impacts, and transforming the power dynamics that exclude these communities from deciding how and where to prioritize resources.

Women and Girls

Everyone in mountainous communities endures certain risks and challenges, but too often the ways in which these risks interplay with pre-existing gender inequalities are left out of interventions. For instance, women in the Indian Himalaya have reported more frequent droughts¹⁴, which often lead to increases in gender-based violence (GBV) for women who are unable to collect water and fulfill their domestic duties. There have also been recent trends of significant outmigration from rural mountainous areas as men seek better livelihoods in towns and cities – leaving women and girls to perform multiple roles in childcare, food preparation, and agriculture. Yet policymakers often fail to materially support this increased labor burden for women, “land tenure and employment policies undervalue rural women’s critical roles in food security, sustainable agriculture, and natural resource management despite women taking on the major role in these sectors.”¹⁵ Mortality rates for women and girls following natural disasters such as floods and landslides are also higher than men’s, and the surviving female members again face a greater threat of GBV and health issues as

¹³ https://gridarendal-website-live.s3.amazonaws.com/production/documents/:s_document/412/original/SynthesisReport_screen.pdf

¹⁴ https://link.springer.com/chapter/10.1007/978-3-319-92288-1_14

¹⁵ https://link.springer.com/chapter/10.1007/978-3-319-92288-1_14

food and water security suffers.¹⁶ All of these factors create distinct gender-based vulnerabilities in mountainous communities, and require not only addressing these risks and challenging gender norms but putting women and girls at the center of adaptation solution and decision-making. Studies have also shown that environmental outcomes improve when women and girls lead conservation activities such as community-level management of forests.¹⁷

Natives Peoples and Indigenous Groups

Indigenous communities have been stewards of mountainous regions for centuries, building up a wealth of ancestral knowledge and practice on how to sustain the agrobiodiversity of highland ecosystems. However, as isolation, lack of job assistance, poor access to water, and high income inequality leave 45% of rural mountain peoples food insecure, indigenous groups in these areas often suffer the most. In Ecuadorian mountain areas, roughly 60% of indigenous people are vulnerable to food insecurity, far higher than the national average.¹⁸ In the rural areas of the Hindu Kush Himalaya, indigenous groups and ethnic minorities, “have less access to wage employment and earn less when they engage in wage employment.”¹⁹ Many indigenous groups have also suffered the loss and degradation of their traditional land use practices following the exploitation of mountain ecosystems under colonialism. For example, studies have shown that highly developed pre-Colombian cultures such as Incas were able to sustain their grasslands and mountain forests through sustainable practices, while colonial and post-colonial land uses including industrial tree monocultures and coal exploitation are leading to potentially irreversible changes in mountain ecosystems²⁰. Agropastoral and agroforestry practices are often ancient traditions in indigenous communities, and protecting mountain ecosystems requires that we not only draw on these sustainable practices, but empower these communities by improving their livelihoods and centering their participation in adaptation.²¹ Communal and ancestral knowledge is a fundamental tool for building resilience and scaling sustainable forms of land use management.

¹⁶ Roehr, U. (2007). Gender, climate change and adaptation. Introduction to the gender dimensions. In *Both Ends Briefing Paper Series*.

¹⁷ <https://www.wri.org/blog/2016/03/if-you-care-about-environment-you-should-care-about-gender>

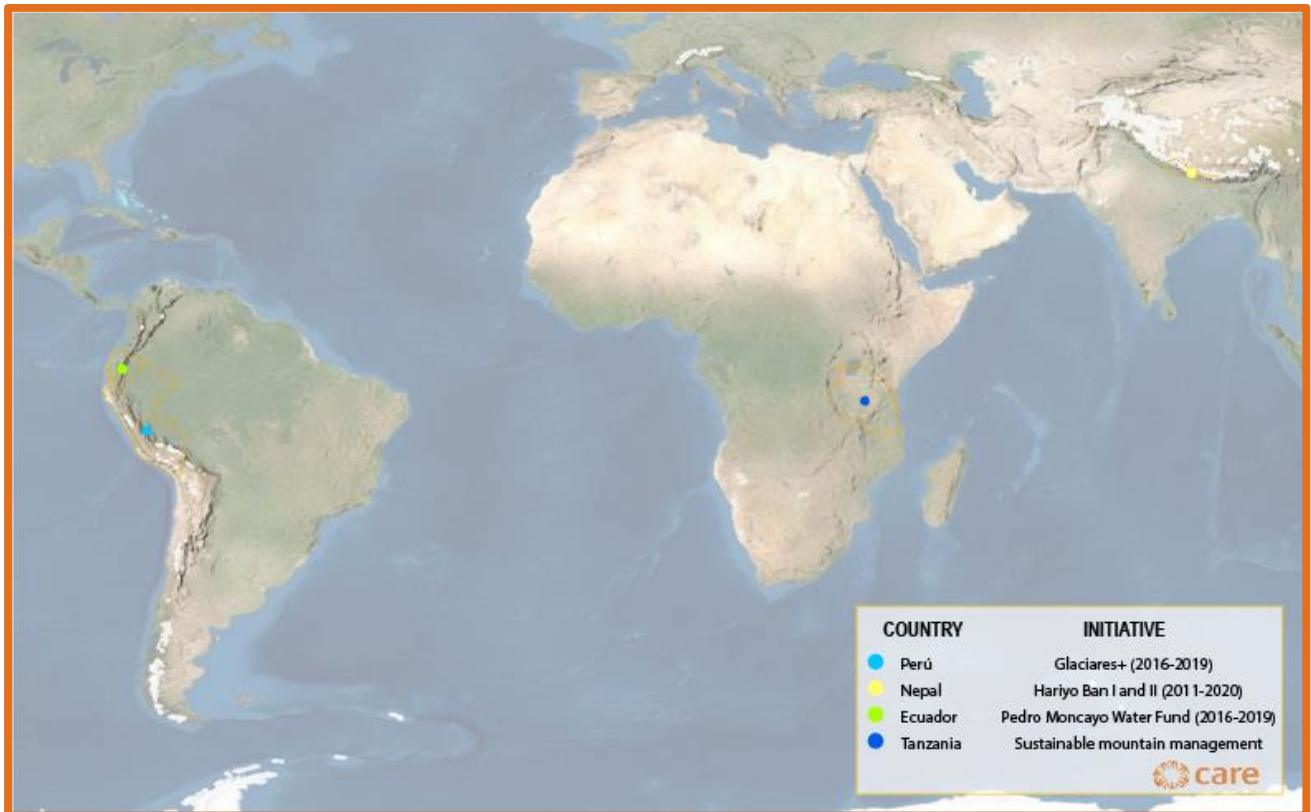
¹⁸ <http://www.fao.org/3/a-i5175e.pdf>

¹⁹ https://link.springer.com/chapter/10.1007/978-3-319-92288-1_14

²⁰ <https://www.sciencedirect.com/science/article/abs/pii/S027737911930277X>

²¹ <https://www.sciencedirect.com/science/article/abs/pii/S027737911930277X>

MAP: Scope of intervention of CARE in mountain ecosystems of the world



Case Studies



Glaciares+ - Peru (2016-2019)

The provision of water in Peru depends on the conservation of high mountain ecosystems that are responsible for the regulation, storage, and provision of water for consumption and irrigation by the entire country. In addition to providing a water source during the dry season, Peru's hydroelectric power plants and tourism in the Andes also depend on glacial lakes.

53% of Peru's glaciers have melted, forming more than 200 new periglacial lagoons while creating water shortages in surrounding basins. The high risk of ice and rock landslides from glacier melt generate waves that form deadly flash floods, inundating populated centers and displacing communities, with women and children most disproportionately affected. To adapt to this phenomenon, CARE Peru has led the implementation of the Glaciers+ project in partnership with the University of Zurich and financed by the Swiss Cooperation for Development – SDC. This initiative focused on the implementation of adaptation and risk management measures in the regions of Ancash, Cusco and Lima. Glaciares+ used community-based adaptation to integrate community knowledge into risk and water resources management, while strengthening governance by building collective management between the community, public, private, and academic institutions.

Glaciares+ impacted nearly 70,000 people through the establishment of the first early warning systems for glacier melt alluviums in Peru, strengthening local governance, and increasing funding in multipurpose public investment projects for water resources management. One multipurpose project proposed the damming of glacier melt water to increase electricity production, water storage for consumption and irrigation, fishing production, and tourism. The strengthening of productive systems was also a fundamental component of the project's goal of improving livelihoods of the most vulnerable. Glaciares+ used disaster risk management and climate adaptation to create new coalitions of private, public, and community stakeholders, while building the capacity of civil society and local public institutions to better support communities, households, and individuals in their adaptation efforts. For example, the public sector's technical capacities in glacier monitoring and research were improved by bringing scientific knowledge closer to communities, training local professionals in glaciology, and integrating scientific and indigenous knowledge to improve disaster risk reduction. Likewise, Glaciares+ improved the disaster risk management capacity of regional governments and their knowledge of climate risks and

opportunities, ensuring buy-in to finance the multi-purpose projects and keep the early warning systems funded. These interventions are urgent for Peru, as flooding and landslides from heavy rains and glacial melt routinely displace and threaten the lives of highland communities.

The initiative seeks to be replicated throughout Peru to reduce risks from glacial runoff and landslides, and contribute to closing the water supply gap, especially in areas facing glacial melt and periods of extreme drought. The Glaciares+ model of mountain governance works to improve people's quality of life, particularly those facing poverty and other vulnerabilities, while maintaining communal and ancestral knowledge to preserve the Peruvian agrobiodiversity that provides food for the country and the world. Now in its 50th year of operation, CARE Peru has learned that conservation and governance processes go hand in hand to ensure gender-inclusive sustainable and climate-smart value chains, and that guaranteeing water quality and quantity will always be the starting point for initiating a process of transition towards sustainability.

The Glaciares+ project was led by Karen Price and a team of 7 CARE Peru staff based in Lima, Cusco and Ancash. For more information, please visit: <https://proyectoglaciares.care.org.pe/> CARE Peru's mountain conservation programs are supported by the small, but mighty Climate Change, Amazon and Water Resources team led by Maria Mercedes Medina and support by Jim Vega. CARE Peru has active programming in many regions supported by 108 staff in the Lima office and 6 regional offices.



Hariyo Ban I and II (2011-2020) - Nepal

In Nepal, a consortium of CARE, World Wildlife Fund, Federation of Community Forest Users in Nepal (FECOFUN), and the National Trust for Nature Conservation (NTNC) have worked through the USAID-funded Hariyo Ban program to protect the country's rich forests and highland ecosystems. Named after the famous Nepali saying, "*Hariyo Ban Nepal ko Dhan*," which translates to, "Healthy green forests are the wealth of Nepal," Hariyo Ban works to mitigate the impacts of climate change and threats to biodiversity and livelihoods by working with government, communities, civil society and the private sector. In Phase 1 of Hariyo Ban, CARE Nepal implemented a Payments for Sedimentation Retention (PSR) scheme in Nepal's Mid-Marsyangdi watershed to improve water quality through the adoption of sustainable land use and road construction practices in hillside communities. In the watershed, unmanaged infrastructure development, land degradation, and unsustainable agricultural practices in upstream areas had resulted in siltation and sedimentation that severely impacted downstream hydropower production. The pilot scheme was commissioned to see if payments for upper catchment activities that reduced downstream sedimentation in the hydropower dam could generate economic and environmental benefits to benefit small scale farmers, women, poor and the most marginalized communities.

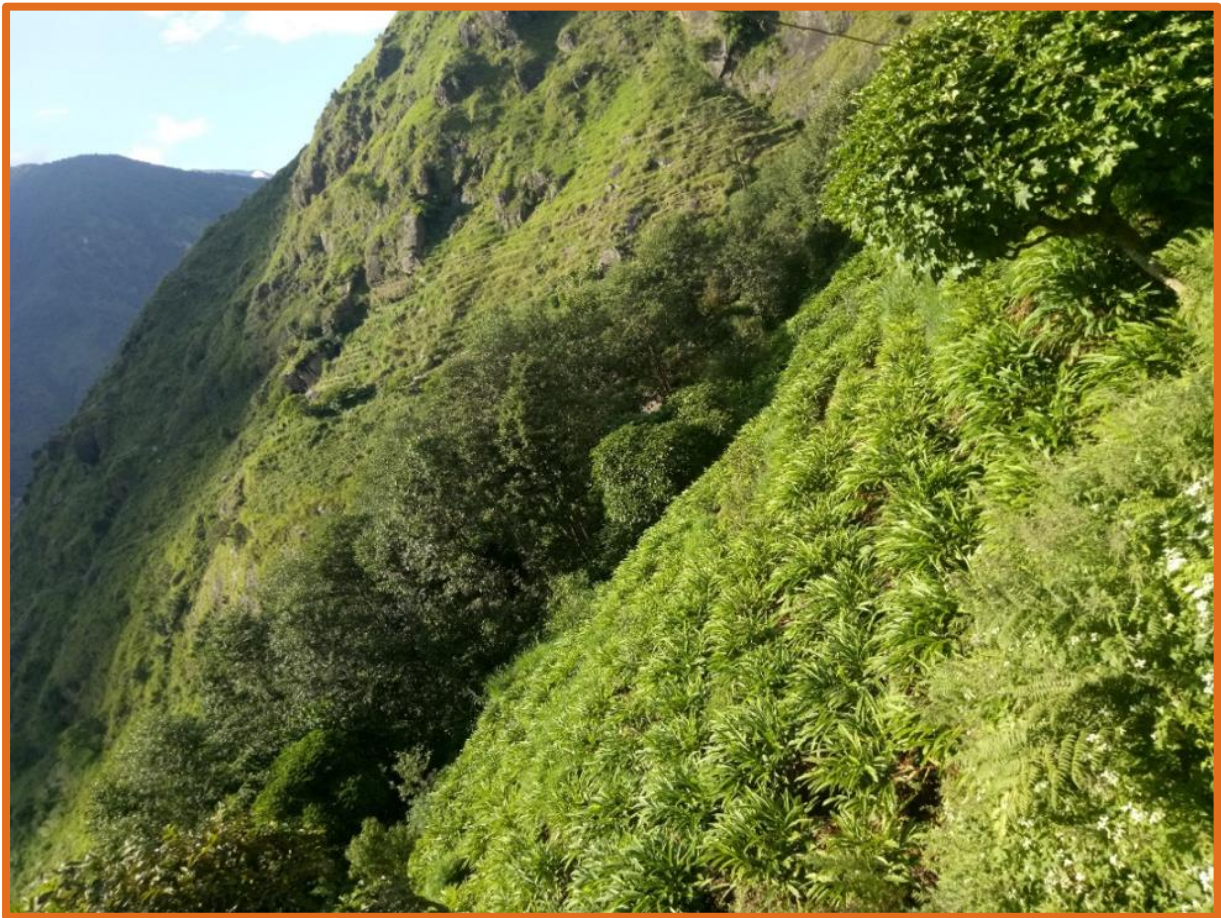
In addition to benefiting hydropower companies, these conservation projects funded through the PSR pilot helped to improve livelihoods, conserve biodiversity, increase climate resilience, and promote sustainable watershed management. In one conservation program, small-scale farmers in hillside provinces of the watershed were given support to introduce cardamom farming and replace traditional cropping practices for rice and maize that were labor-intensive, unsustainable, and not profitable. In 2012, cardamom farming only covered roughly 40 ha of their land, which has since expanded to almost 1600 ha thanks to government support and community mobilization. One farmer reported that cardamom farming had increased his income by more than five times due to its high monetary value and easy market access. Moreover, its environmental impact has helped increase greenery, maintain soil moisture, and reduce soil erosion to the benefit of downstream communities and hydropower producers. A framework for incorporated gender and social inclusion (GESI) strategies also helped to produce measurable benefits for women and excluded groups. CARE and Hariyo Ban partners implemented GESI field-level interventions that shifted gender norms by building capacity for women to participate in community forest groups and increase decision makers' engagement in promoting the leadership of women and marginalized groups as change agents for social and environmental transformation.

Policy scaling and systems strengthening were also major components of Hariyo Ban and contributed to institutionalization and reach of project gains. The establishment of sediment retention demonstration plots generated evidence for policy makers and service providers, which enabled a more receptive environment for the implementation of similar PSR schemes in the Mid-Marsyangdi watershed. CARE Nepal has worked with the Government of Nepal to develop a national policy on Payments for Ecosystem Services (PES), which builds capacity across all levels of government to create an enabling policy environment for future PES schemes. Financing mechanisms, such as a stipulation that 5% of royalties from hydropower generation will be

allocated for environmental conservation and ecosystem services, have also ensured that successes from Hariyo Ban will be sustained longer after implementation.

CARE Nepal supported the WWF-led Hariyo Ban consortium by leading on climate change adaptation, governance and GESI along with significant contributions for watershed management, biodiversity conservation, earthquake recovery and reconstruction (ERR), REDD+ and Payments for Ecosystem Services initiatives. To learn more about Hariyo Ban, please visit:

<https://www.wwfnepal.org/hariyobanprogram/>



Pedro Moncayo Water Fund – Ecuador (2016-2019)

In Pedro Moncayo, a canton in northern Ecuador, the unique highland ecosystem known as the páramos plays a critical role for local livelihoods and cultural pride. This high-altitude shrubland ecosystem, situated in the Andes range between the forest edge and the permanent snow fields, is a massive water reservoir that feeds many of Ecuador’s most significant rivers – “both those that flow into the Pacific Ocean and those that water the Amazon lowlands and finally flow into the Atlantic Ocean.”²² Roughly five million people in the greater Quito area rely on the health of páramos mosses and grasses to retain water in the rainy season and partially pump it in the dry season, avoiding water shortages. The páramos is unique from glaciers in that it's not prone to avalanches, allowing its predictable water storage capacity to also mitigate flooding. Yet the páramos are under threat, not only from climate change but from the migration of small farmers and the use of unsustainable agricultural techniques that lead to soil damage and erosion.²³

In 2016, CARE Ecuador and the decentralized autonomous governments (GAD) of Pedro Moncayo created a water fund as part of the broader ACCRE (Climate Change Adaptation of Andean Populations) project to protect the region’s páramos. Through the Pedro Moncayo Water Fund, CARE Ecuador worked to reduce the vulnerability of 200 families situated within the páramos to the impacts of climate change and water scarcity on their livelihoods. In addition to technical assessments of the area’s hydrological characteristics, the Pedro Moncayo Water Fund was created through a participatory process between local public sector actors, agricultural producers, community organizations, CARE Ecuador, and other local stakeholders. The participation of female-led households and entrepreneurs was also critical to the development of this financial mechanism in order to ensure the long-term economic and social autonomy of women agricultural producers.

Techniques for restoring the ecosystem of the páramos such as agroforestry, silvopastoral and related forestry systems were financed through the Water Fund following an environmental assessment of sustainable agriculture, climate change, and community-based risks in the area. Due to the adoption of these techniques and other policies that support the conservation, restoration, monitoring, and adequacy of local water recharge areas, 137 ha have been reforested to protect connectivity corridors between agricultural plots and páramos-based water sources. Disaster risk reduction was also a program priority as climate emergency plans were developed along with community brigades and early warning systems. CARE Ecuador's participation as a process facilitator was instrumental in enabling local governments and social organizations to engage in the design and implementation of the Water Fund, contributing to stronger political advocacy for water resource management and climate resilience, the participation of women and small-scale farmers, and financial sustainability.

Another key outcome was the establishment of the Conservation and Sustainable Use Area (ACUS - Mojanda), which protects 6,000 ha between grassland moors and remnants of high mountain

²² <https://news.mongabay.com/2020/05/in-the-ecuadoran-andes-protectors-of-the-paramos-guard-their-water-source/>

²³ <https://www.fondationensemble.org/en/projet/adaptation-au-changement-climatique-des-populations-andines-par-la-gestion-la-conservation-et-la-restauration-de-paramos/>

forests. This government-protected area is the water recharge zone for the 35,000 people living in the Pedro Moncayo canton.

The ACCRE project was implemented by CARE Ecuador with the support of Fondation Ensemble and was led by Andres Cordova and 2 staff. For more information, please visit

<https://www.care.org.ec/nuestras-acciones/programas-de-exito/proyecto-adaptacion-al-cambio-climatico-de-poblaciones-andinas-mediante-el-manejo-conservacion-y-restauracion-de-paramos-en-el-canton-pedro-moncayo/> CARE Ecuador's mountain ecosystem programs are supported by Andres Cordova as part of CARE Ecuador's Climate Change and Conflict Resiliency program. CARE Ecuador is supported by 41 staff in a main office in Quito and 3 regional offices.



Best Practices



Learnings from these case studies and the experiences of adaptation in mountain regions all over the world reveal best practices that practitioners and communities alike can use to protect these ecosystems and improve the lives of the people that rely on them.

Centering Gender Justice, Equity, and Community

The environmental challenges threatening mountain ecosystems are often highly localized, and the global effects of climate change are mediated through each region's unique climate and geography. Likewise, the social vulnerabilities of mountain peoples are mediated and exacerbated by existing disparities faced by marginalized communities. Solutions for mountain conservation and

Principles for Community-Based Adaptation

- Promote inclusive and informed participation and decision-making
- Integrate gender equality and women's empowerment
- Tailor programming to reflect local realities and cultural practices
- Work within existing systems and institutions
- Integrate local and scientific knowledge
- Promote social learning
- Ensure flexibility in community plans to respond to changes in environmental, political, and socioeconomic conditions

adaptation need to consider these disparities and operationalize them through approaches that facilitate the long-term participation of women and girls, indigenous groups, and vulnerable communities throughout each stage of programming. The participation of academic institutions in local adaptation solutions is especially important to ensure that scientific knowledge on mountain ecosystems is accessible, readily understood, and usable for community programming.

CARE has worked with its partners and local communities throughout the world to develop community-centered approaches for disaster risk reduction such as [Community-based Adaptation](#), [Participatory Scenario Planning](#), and [Community](#)

[Vulnerability and Capacity Assessments](#). Effective adaptation provides numerous opportunities for empowering marginalized communities, such as in understanding risk and developing water and natural resource management plans. Giving these communities the resources and capacities to lead these processes benefit their livelihoods, while conservation outcomes are improved through the leadership of women and indigenous communities.

Using a Landscape Approach for Mountain Conservation and Basin Management

Crafting natural resource management plans and adaptation solutions for mountain regions is often difficult as mountains cross many countries, creating the need for transboundary cooperation. Using a landscape approach, which examines the entire landscape in which risks originate and manifest themselves, is necessary to transcend political and administrative boundaries and create interdisciplinary, cross-sectoral, and holistic solutions. Applying the landscape approach helps to overcome sector silos and contribute to effective risk management by connecting all stakeholders involved, starting with the communities at risk in the landscape.²⁴ This approach focuses on the upstream catchment and water sources, such as glaciers, as the defining geographic area of interest, but also recognizes the area downstream to avoid unintended consequences of planned interventions.

Key for creating acceptance, fostering ownership and a willingness to continue to invest in progress, are the establishment of self-sustaining multi-stakeholder platforms, communities who experience actual changes in livelihoods and ecosystems, and the reduction in disaster risk. In most cases, a programmatic approach involving more than one project is needed to make a difference in a landscape, especially one as geographically and ecologically diverse as mountains. The landscape approach also demands a long-term perspective (10-20 years) to ensure lasting impact. Integrated and long-term approaches help to identify solutions that are robust enough to deal with uncertainty, which is critical in mountain regions when natural disasters can often occur with little warning.

Strengthening Governance Systems

Conserving mountain regions is as much an issue of politics, policy, and governance as it is of ecology. Effectively planning for the vast scale and diversity of mountains requires coordination and capacity building across multiple levels of government, from local committees to municipalities and national agencies. In addition, resources need to be allocated to educate policymakers and other sectors on the connection between mountain ecosystem services and downstream communities. Forming partnerships and mainstreaming capacity for disaster risk reduction and climate adaptation between the private, public, and nonprofit sectors strengthen the environment in which interventions are introduced and creates the enabling conditions for programming to transform into policy. Addressing the water and natural resource challenges in mountain regions requires understanding the people, structures, and policies that are fundamental to sustaining positive environmental change.

Strengthening governance systems should start from the bottom up by providing mountain communities with the resources to advocate for their own rights and needs, while INGOs and civil society organizations work with governments to integrate community adaptation plans in local budgets and programming. Creating an enabling policy environment is similarly critical for allowing

²⁴ https://careclimatechange.org/wp-content/uploads/2019/06/CARE_WI-A-Landscape-Approach-for-DRR-in-7-Steps-1.pdf

partners to replicate programming across other areas of a country or region. Innovative and community financing mechanisms such as Payments for Ecosystem Services and Bio-Rights, where a community receives small loans that turn into donations after the community implements successful conservation practices, can create sustainable funding opportunities while building capacity for other actors to implement similar models.²⁵ Integrating scientific knowledge, cross-sector collaborations, and climate adaptation capacity throughout all levels of government ensures the sustainability of mountain conservation initiatives.



²⁵ <https://www.sciencedirect.com/science/article/abs/pii/S027737911930277X>



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