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PARTNERING FOR ADAPTATION AND RESILIENCE – AGUA (PARA-AGUA) PROJECT

FINAL REPORT

DECEMBER 8, 2017

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PARTNERING FOR ADAPTATION AND RESILIENCE – AGUA (PARA-AGUA) PROJECT

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DECEMBER 8, 2017

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DISCLAIMER:

The authors' views expressed in this document do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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In Colombia, the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), the Ministry of Environment and Sustainable Development (MADS), the National Department of Planning (DNP), the Regional Autonomous Corporation of Caldas (CORPOCALDAS), the Regional Autonomous Corporation of Cesar (CORPOCESAR), Pactos por la Cuenca del río Chinchiná and the Chinchiná watershed council.

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RIO GUATAPURI, COLOMBIA
Photo By: Juliana Valencia

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ACRONYMS

AA	<i>Autoridad Administrativa del Agua (Peru)</i>	EMAS	<i>Empresa Metropolitana de Aseo</i>
AECID	<i>Agencia Española de Cooperación Internacional para el Desarrollo</i>	ENSO	<i>El Niño Southern Oscillation</i>
ALISOS	<i>Alianzas para la Sostenibilidad</i>	FEC	<i>Ecological Coffee Foundation</i>
ANA	<i>Autoridad Nacional del Agua</i>	FONAG	<i>Fondo para la Protección del Agua (Ecuador)</i>
CECOBOSQUE	<i>Central de Comunidades Campesinas del Bosque Seco de Piura</i>	FONIPREL	<i>Regional and Local Public Investment Promotion Fund (Peru)</i>
CHEC	<i>Central Hidroeléctrica de Caldas</i>	FORAGUA	<i>Fondo Regional del Agua (Ecuador)</i>
CHIRILU	<i>Chillón-Rímac-Lurín</i>	FORAM	<i>Fondo Regional Ambiental de la Región (Arequipa)</i>
CIIFEN	<i>Centro Internacional para la Investigación del Fenómeno de El Niño</i>	FORASAN	<i>Fondo Regional del Agua</i>
CIPAV	<i>Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria</i>	FMPLPT	<i>Fondo para la gestión del páramo y la lucha contra la pobreza en Tungurahua</i>
CONCYTEC	<i>Consejo Nacional de Ciencia Tecnología e Innovación Tecnología</i>	GCF	<i>Green Climate Fund</i>
CONDESAN	<i>Consorcio para el Desarrollo Sostenible de la Ecorregión Andina</i>	GCM	<i>Global Climate Model</i>
CONPES	<i>Consejo Nacional de Política Económica y Social</i>	GDP	<i>Gross Domestic Product</i>
CoP	<i>Community of Practice</i>	GI	<i>Green Infrastructure</i>
COR	<i>Contracting Officer's Representative</i>	GIS	<i>Geographic Information System</i>
CORPOCALDAS	<i>Corporación Autónoma Regional de Caldas</i>	IDEAM	<i>Instituto de Hidrología, Meteorología y Estudios Ambientales</i>
CORPOCESAR	<i>Corporación Autónoma Regional de Cesar</i>	IGP	<i>Instituto Geofísico del Peru</i>
CRHC	<i>Consejo de Recursos Hídricos de Cuenca</i>	IPCC	<i>Intergovernmental Panel on Climate Change</i>
DNP	<i>Departamento Nacional de Planeación</i>	IPI	<i>Institutos Públicos de Investigación</i>
EEP	<i>Main Ecological Structure</i>	INIA	<i>Instituto Nacional de Investigación Agraria</i>
		IWRM	<i>Integrated Water Resources Management</i>
		JU	<i>Junta de Usuarios</i>



CHANCAJ-LAMBAYEQUE WATERSHED, PERU
 Photo By: Mariela Rodriguez

K-NN	K-Nearest Neighbor	SECO	Swiss State Secretariat for Economic Affairs
LAC	Latin America and the Caribbean	SEDAPAL	<i>Servicio de Agua Potable y Alcantarillado de Lima</i> (Peru)
LFA	Logical Framework Approach	SEI	Stockholm Environment Institute
MADS	<i>Ministerio del Ambiente y Desarrollo Sostenible</i> (Colombia)	SENAMHI	<i>Servicio Nacional de Meteorología e Hidrología del Perú</i>
MGA	<i>Metodología General Ajustada</i>	SIAL	<i>Sistema de Información Ambiental Local</i>
MIMP	<i>Ministerio de la Mujer y Poblaciones Vulnerables</i> (Peru)	SIAR	<i>Sistema de Información Ambiental Regional</i>
MINAM	<i>Ministerio del Ambiente</i> (Peru)	SINIA	<i>Sistema Nacional de Información Ambiental</i>
NCAR	National Center for Atmospheric Research	SNIRH	<i>Sistema Nacional de Información de Recursos Hídricos</i>
PACTOS	<i>Pactos por la Cuenca del Río Chinchiná</i>	SUNASS	<i>Superintendencia Nacional de Servicios de Saneamiento</i> (Peru)
PAGCC	<i>Plan de Acción de Género y Cambio Climático</i> (Peru)	TMI	The Mountain Institute
PES	Payment for Environmental Services	TNC	The Nature Conservancy
PGRHC	<i>Plan de Gestión de Recursos Hídricos de Cuenca</i>	UNPRG	<i>Universidad Nacional Pedro Ruiz Gallo</i>
PNIA	<i>Programa de Innovación Agraria</i>	USAID	United States Agency for International Development
POMCA	<i>Plan de Ordenamiento y Manejo de la Cuenca</i> (Colombia)	UTP	<i>Universidad Tecnológica de Pereira</i>
PROFONANPE	The Development Fund of Protected Natural Areas of Peru	WEAP	Water Evaluation and Planning
RCM	Regional Climate Models	WMO	World Meteorological Organization
RCMC	<i>Red Colombiana de Mujeres Científicas</i>	WWF	World Wildlife Fund
RSD	Regional Sustainability Development	XLRM	Uncertainty factors (X), Policy levels (L), Relationships (R), Performance metrics (M)
RDS	Robust Decision Support		
SCWA	Sonoma County Water Agency		



EXECUTIVE SUMMARY

Climate change has negatively impacted water resources and ecosystems in many parts of Latin America and the Caribbean. In Peru and Colombia, rising temperatures and extreme hydrologic events such as prolonged drought and heavy flooding put livelihoods in downstream communities at risk. Many economically important sectors—especially water-reliant agricultural industries such as pima cotton, alpaca textiles and crops in Peru, as well as coffee in Colombia—are based in regions that depend on water supplied by glaciers and páramos (moorlands) that are rapidly receding due to climate change. According to global models captured in IPCC’s 2014 report, these problems will only grow, with many more exposed to floods and droughts that threaten their economic well-being and their lives.

To meet these challenges, the United States Agency for International Development (USAID) Office of Regional Sustainability Development (RSD) of the Latin America and Caribbean (LAC) Bureau

developed the Partnering for Adaptation and Resilience – Agua (PARA-Agua) Project. PARA-Agua partnered with scientists, decision-makers and communities across the region to strengthen their watershed management and planning capabilities, with the aim of improving water security and increasing resilience to the impacts of climate change.

Under USAID Washington’s guidance, PARA-Agua focused on all aspects of watershed management in the context of climate change. While a regional project, on-the-ground implementation took place only in Colombia and Peru, in watersheds identified in consultation with counterparts and USAID. PARA-Agua selected four vulnerable watersheds in Peru and two in Colombia found to have committed stakeholders, key watershed institutions, sound and robust climate data and functioning government systems.

PARA-Agua’s success is due to our counterpart and stakeholder’s interest in absorbing and applying the project’s technical assistance. More than 550



IN THE CHINCHINA WATERSHED, COLOMBIA
Photo By: Jose Narvaez

government officials and stakeholders received support to understand and use innovative climate change adaptation tools and practices. In addition, they adopted and/or tested 12 climate change adaptation tools, technologies and methodologies with PARA-Agua's support.

PARA-Agua also found success by facilitating meaningful coordination between local, regional and national stakeholders from the public and private sectors to better integrate research and decision-making for improved water resources management. These relationships were critical to PARA-Agua's efforts to engage stakeholders in incorporating specific climate change adaptation strategies into the regional water management plans in all target watersheds in Peru and Colombia.

It is important to note PARA-Agua's commitment to mainstreaming gender considerations across these and other project interventions. As the backbone of small-scale agriculture in targeted

watersheds, women should play an important role in watershed planning. The project strengthened the role of women in planning, helping them become agents of change in their communities. Moreover, PARA-Agua increased the capacity of 16 women's groups in Colombia and Peru to participate in climate change adaptation at the local level. These groups will continue to play an important role in decision-making in their respective watersheds.

Below we present some of PARA-Agua's key successes.

Strengthened institutional capacity to link research to policy-making. Through capacity building, the provision of toolkits and the creation of a virtual community of practice (CoP), PARA-Agua sought to increase the sharing of scientific information between researchers and decision-makers as well as international best practices. These activities supported informed local and regional decision-making and engaged stakeholders

in integrating research and best practices into management policies. PARA-Agua also linked science and policy to action at the watershed level through an integrated program to support informed and participatory planning, adaptation interventions and peer-to-peer partnerships.

Designed a hydro-climatological monitoring system. PARA-Agua, in collaboration with Universidad Tecnológica de Pereira (UTP), designed a hydro-climatological monitoring system for the Guatapurí watershed in Colombia. The system aims to reduce damage to the region by enabling better preparedness and stakeholder response. Thanks to PARA-Agua's support identifying financing options, the watershed stakeholders are currently exploring options for implementing, operating and maintaining the system.

Supported mechanisms to develop policy-oriented data. PARA-Agua strengthened governance systems to increase the production of policy-oriented data. As a result, in Peru, teams of government institutions, decision-makers, experts and academics assumed responsibility for prioritized research projects in three PARA-Agua watersheds. The teams developed 10 research proposals, which were designed for submission for financing to Ciencia Activa, CONCYCTEC's funding branch (all are pending submission). These projects will support local data needs and enable the development of policies to better adapt to climate change.

Promoted research on the gendered-impact of climate change. Due to PARA-Agua's support, there is growing interest in understanding the gendered-impacts of climate. In Colombia, for example, scientists are encouraging research on how climate change and water adaptation activities affect men and women differently.

Established two regional water funds. PARA-Agua supported the creation of the regional water funds in Chira-Piura (Peru) and Chinchiná (Colombia), from the establishment regional ordinances, required framework agreements and

governing rules, to securing fund administrators, developing work plans and obtaining a combination of pending and secured financing. In Peru, the FORASAN fund is expected to become fully operational upon the selection of its Board of Director members in December 2017 with financing from international donors and private sector investors estimated at over US\$1M. In Colombia, the *Corporación por el Río Chinchiná*, was officially created in November 2017 with an initial commitment of nearly US\$500K. Water funds are evolving into planning and action platforms to provide a more holistic investment approach in the watershed and demand for it is growing in Peru and Colombia. The mechanisms will facilitate local investments in adaptation interventions and create pathways for innovative financing for green infrastructure (GI) projects.

Conducted strategic analysis for GI planning and financing. In FY17, PARA-Agua expanded its reach into the Chillón-Rimac-Lurin (CHIRILU) watersheds in Peru to support GI planning. With the Peruvian National Water Authority (ANA), the Peruvian National Superintendent of Sanitation Services (SUNASS), the Water Resources Council of CHIRILU and the water utility (SEDAPAL), PARA-Agua developed guidelines for an integrated watershed management plan that incorporates available financing options for the watershed. Throughout this process PARA-Agua worked closely with SEDAPAL, who through its GI "Sembramos Agua" program plans to invest in key GI interventions to benefit Lima. Once the identified GI options are implemented, they will enhance the resilience of more than 9,800 ha of land in CHIRILU to climate change.

Coordinated the creation of payment environmental services (PES) projects. PARA-Agua coordinated a priority national government initiative to design 5 PES projects; one in each of five departments in Colombia (Caldas, Caquetá, Cundinamarca, Huila and Valle del Cauca), lending its expertise to the National Planning Department (DNP) and the Ministry of Environmental and

Sustainable Development (MADS). The projects are expected to impact more than 150,000 ha through 2019 and 1,000,000 ha by 2030. The projects are now being considered for financing by the Colombia Sostenible Fund.

Promoting sustainability. PARA-Agua sought to ensure the sustainability of its investments and technical assistance by encouraging stakeholder stewardship and adoption of the innovating tools and methodologies brought by the project. ANA, MINAM and SENAMHI in Peru and DNP, CORPOCALDAS, MADS and IDEAM, among others, in Colombia all have expressed continued commitment to the initiatives begun under PARA-Agua. To further support stakeholders, PARA-Agua helped set up watershed modeling groups that have replicated

on their own as well as a Legacy Consortium of two institutions—project partner The Mountain Institute (TMI) and the International Center for the Investigation of the El Niño Phenomenon (CIIFEN)—to continue promoting exchange of best practices as was done by PARA-Agua.

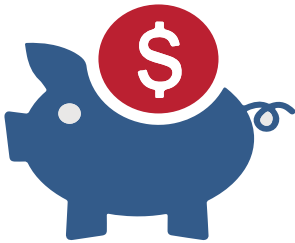
In conclusion, if targeted institutions continue to use the tools, methodologies and skills transferred by PARA-Agua, they can positively impact their local economies and more than 15 million people whose livelihoods depend on the effective management of water resources.

This final project reports details PARA-Agua's successes, challenges, lessons learned and opportunities identified for continued interventions.



KEY ACTORS IN THE FORASAN WATER FUND

PARA-AGUA PROJECT ACCOMPLISHMENTS



**\$82
MILLION**

Prepared \$82M in proposals for new projects in Colombia and Peru in research, green and grey infrastructure, system alerts and other technologies



\$24 MILLION

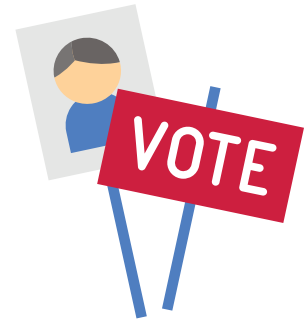
Supported the structuring of 5 PES projects valued at US\$24 Million under the CONPES.



16

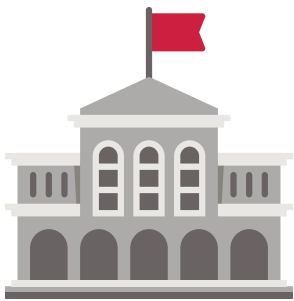
**WOMEN'S
GROUPS**

Improved the capacity of 16 women's groups in Colombia and Peru to adapt to climate change.



**CHAMPIONED
CHANGES**

Championed changes in regulations and policy planning documents to permit women to be elected to decision-making positions in Peru.



5

institutions

Confirmed US \$419,334 in financial contributions and participation from five local institutions in the development of the Chinchiná Water Fund.



**4
WATER
FUNDS**

Provided key support in the design and formation of four water funds.



**GENDER
ACTION**

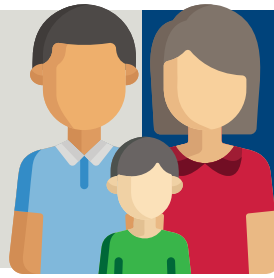
Influenced the first-ever National Plan for Gender Action for Climate Change in Peru (PAGCC Peru) and shifted socio-cultural gender norms.



**CERTIFIED
communicators**

Trained and certified 35 Water Resource Communicators to disseminate information on predicted rainfall, issue evacuation alerts, and care for populations impacted by the 2017 floods.

PROJECT REACH



PARA-Agua's work in strengthening the capacity of decision-makers to adapt to climate change across watershed management will improve the lives of more than **15.3 million people** who live within the watersheds' boundaries in Peru and Colombia.



institutions strengthened

Strengthened the capacity of 46 institutions to use climate adaptation strategies through innovative climate scenario modeling tools and methodologies, including down-scaled, high-resolution hydro-meteorological data.



10 research projects

Developed 10 watershed-specific research projects that address local data needs and provide information to support decision-making in Peru.



12 methodologies

Facilitated the development and adoption of 12 climate change adaptation tools, methodologies and technologies by government agencies and other stakeholders.



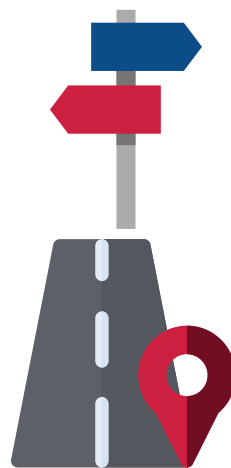
4 TOOLKITS created

Created and implemented four toolkits that provide strategies for narrowing gaps between the generation of data and decision-making.



LIFE SAVING

Finalized the design of a hydro-climatological monitoring system for the Guatapuri River watershed with the potential to save an estimated 500,000 people from the impacts of climate change.



roadmap

Developed a strategic roadmap for future investments in green infrastructure in the CHIRILU watershed.



550 beneficiaries

Presented innovative climate change adaptation tools and practices to more than 550 government officials, scientists, and other watershed stakeholders.



35,000 individuals

Disseminated best practices in adaptation to climate change through the Community of Practice, "Science for Adaptation," reaching more than 35,000 individuals in 50 countries.



RIO GUATAPURI, COLOMBIA
Photo By: Juliana Valencia

CONTEXT

Latin American countries, including Peru and Colombia, are at the forefront of finding ways to increase their resilience to the effects of climate change and minimize their negative impact on water resources. Devastating floods caused by the coastal El Niño phenomenon in early 2017 served as a reminder to the governments of Peru and Colombia that more must be done to improve the resiliency of their watersheds. While each country has made progress in addressing climate change, challenges remain, including inconsistent water management practices, lack of access to relevant climate and hydrological data, inefficient decision-making, outdated models and/or technical skills, poor communication among watershed and regional stakeholders, gender-based stereotypes that limit women's participation in decision-making and inadequate access to finance. Policymakers, researchers and water resource managers across the region can benefit from assistance in building resilience and adaptive capabilities.

To meet these needs, USAID developed the Partnering for Adaptation and Resilience-Agua (PARA-Agua) Project, an innovative regional initiative that worked directly with scientists, decision-makers and communities to strengthen watershed resilience to the impacts of climate change. USAID awarded the project to AECOM on September 9, 2013, with a period of performance of four years, including two one-year option periods through December 8, 2017.

PARA-Agua had three main project tasks:

1. Strengthen the capacity of the research community to generate policy-oriented data on watershed management and climate change adaptation;
2. Mainstream and integrate climate data into decision-making related to watershed management; and,
3. Strengthen planning systems that optimize water use over the entire length of watersheds in the context of climate change adaptation.

This final project report details the final interventions and results of PARA-Agua.

GEOGRAPHIC FOCUS

As a regional project, PARA-Agua was originally designed to focus on three countries in Latin America: Colombia, Ecuador, and Peru. Shortly after award, changes in the political situation prompted USAID to refocus interventions on Colombia and Peru. Working with counterparts and USAID in Peru and Colombia, PARA-Agua identified and selected specific target watersheds in each country based on the following criteria: climate change impacts, stakeholder commitment, linkages to USAID/host country sub-tasks, well-functioning governance systems, sound and robust climatic data and population and diversity. In the final year of implementation, PARA-Agua also worked with the DNP in 5 departments in Colombia on a payment for environmental services pilot project.

CHIRA-PIURA

Area: 31,000 km²

Population: 1,700,000*

Vulnerabilities: Páramos, risk of flooding, lack of climate data, deforestation

Economic Sector: Mining, agroindustry, beverages

Key Counterparts: CRHC Chira-Piura, CECOBOSQUE, Junta de usuarios

CHINCHINÁ

Area: 1,050 km²

Population: 1,000,000*

Vulnerabilities: Glacial retreat, floods, unexpected temperature changes in mountains

Economic Sector: Coffee production

Key Counterparts: Corpocaldas, CHEC, Pactos por la Cuenca Chinchina, Alisos, IDEAM, DNP

CHANCAY-LAMBAYEQUE

Area: 5,555 km²

Population: 1,000,000*

Vulnerabilities: Risk of flooding

Economic Sector: Agriculture, commerce

Key Counterparts: CRHC Chancay-Lambayeque, Junta de usuarios SENAMHI, UNC, UNPRG

CHILLON-RIMAC-LURIN

Area: 9,384 km²

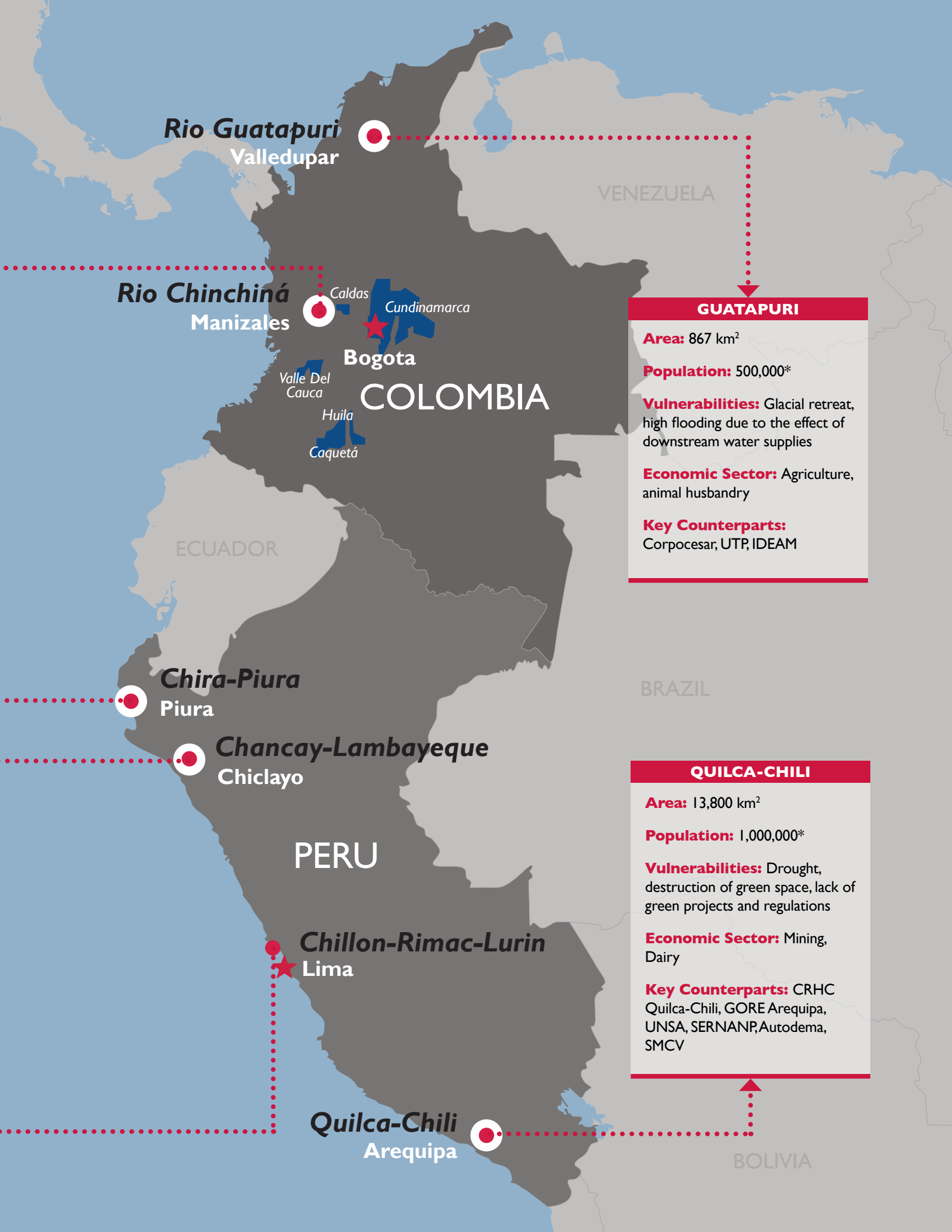
Population: 10,000,000*

Vulnerabilities: High population, scarce water supply, wetland destruction, deforestation

Economic Sector: Agriculture, hydroelectric power, beverages, food, milk

Key Counterparts: CRHC Chirilu, SUNASS, ANA, SEDAPAL, MINAGRI, Aaquafondo

* Approximate population based on most recent available data in 2017.



Rio Guatapurí
Valledupar



Rio Chinchiná
Manizales



Caldas
Cundinamarca

Bogotá

COLOMBIA

Valle Del
Cauca

Huila
Caquetá

VENEZUELA

GUATAPURI

Area: 867 km²

Population: 500,000*

Vulnerabilities: Glacial retreat, high flooding due to the effect of downstream water supplies

Economic Sector: Agriculture, animal husbandry

Key Counterparts: Corpocesar, UTP, IDEAM

Chira-Piura
Piura



Chancay-Lambayeque
Chiclayo



PERU

Chillon-Rimac-Lurín
Lima



Quilca-Chili
Arequipa



BRAZIL

QUILCA-CHILI

Area: 13,800 km²

Population: 1,000,000*

Vulnerabilities: Drought, destruction of green space, lack of green projects and regulations

Economic Sector: Mining, Dairy

Key Counterparts: CRHC Quilca-Chili, GORE Arequipa, UNSA, SERNANP, Autodema, SMCV

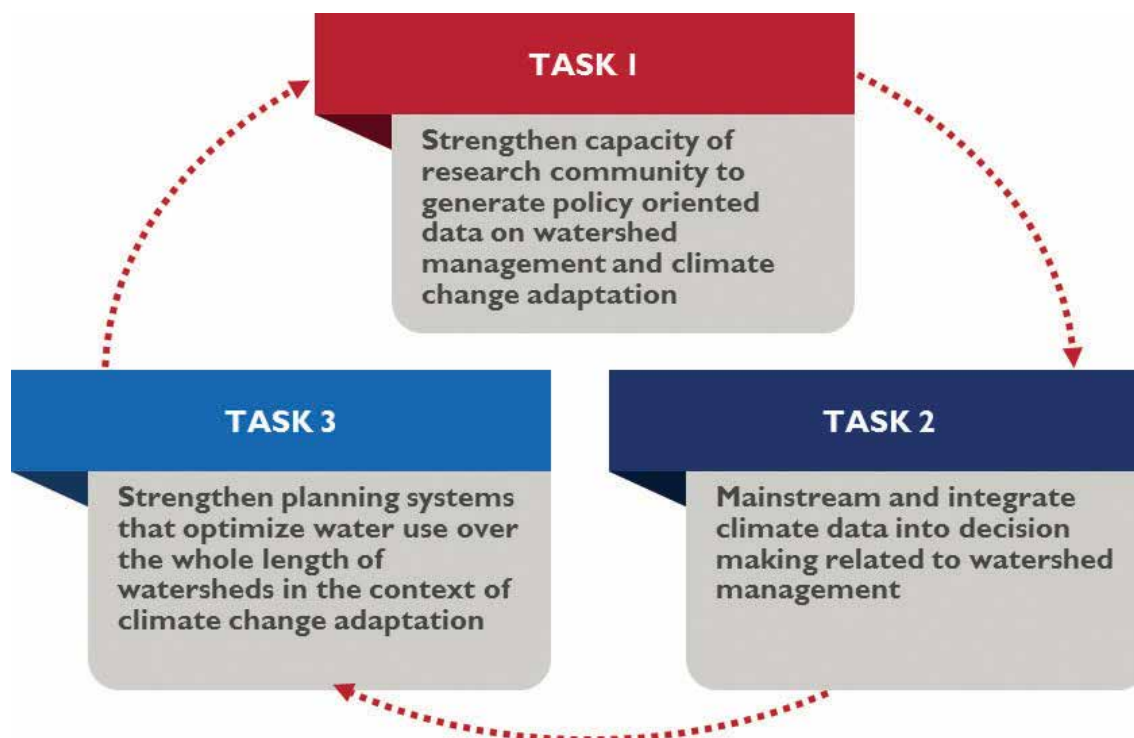
BOLIVIA

IMPLEMENTATION APPROACH

PARA-Agua's overall approach combined traditional capacity building activities in target watersheds with a dynamic exchange between policy and action. PARA-Agua built linkages and improved collaboration between researchers and decision-makers to enable the mainstreaming of hydrological, climate and socio-economic data into watershed management and planning in the target watersheds of Peru and Colombia. Key elements of our approach included:

- Full integration of the three principal project tasks in a continuous cycle where more policy-oriented research led to more informed watershed decision-making, which in turn led to better plans and investments and increased demand and thus led to better science (see **Figure I**).
- Sustained linkages between researchers and policy-makers to ensure that research priorities are driven by critical watershed needs and policies, which in turn create demand for and led to quality data;
- Fostering regional cooperation by replicating regional and international best practices adapted to the local context and catalyzing on sustainable models to scale up project initiatives;
- Access to world-class experts and deployment of proven tools, including risk and vulnerability assessments, modeling systems and planning methodologies for investment prioritization; and transition of these tools and necessary skills to capable local institutions for sustainability; and
- Gender mainstreaming in all activities to improve women's participation in watershed planning and equip women to become change agents in their communities.

Figure I. Fully Integrated Participatory Approach that incorporates a gender approach throughout all tasks



METHODOLOGY

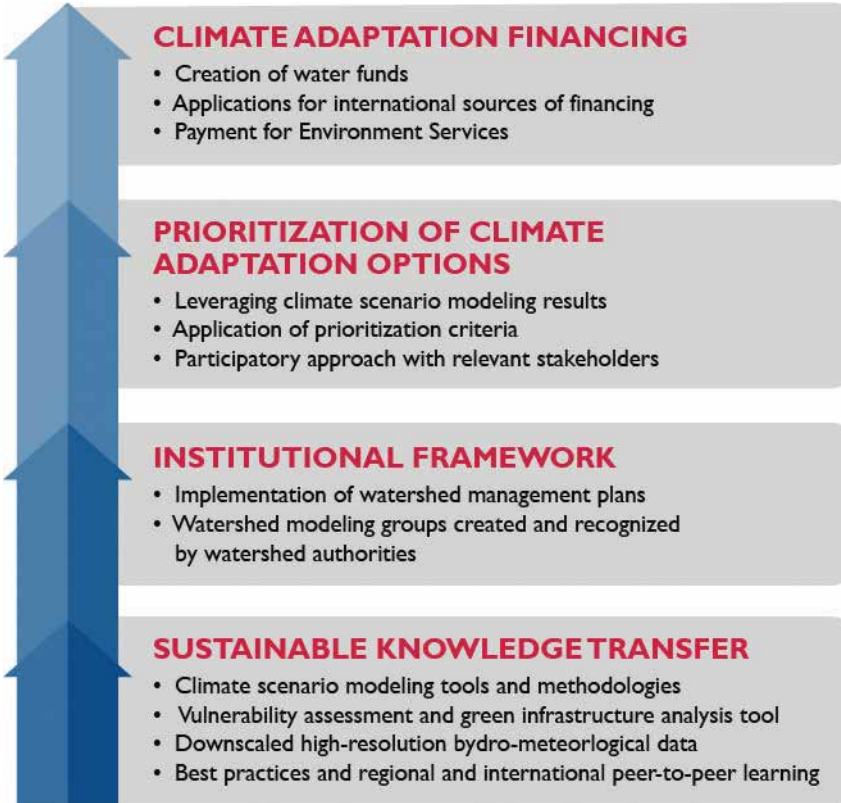
PARA-Agua’s interventions were built on a series of building blocks: sustainable knowledge transfer, institutional framework, prioritization of climate adaptation options, and climate adaptation financing (See **Figure 2**).

Sustainable knowledge transfer was the foundation of PARA-Agua. The project helped develop and transfer data, information and proven tools and methodologies. The project also applied best practices in water resources management in the context of climate change. Equipped with better data, tools and knowledge, stakeholders and decision-makers developed the capabilities to integrate them into an improved *institutional framework* for the watersheds. PARA-Agua’s interventions in this area focused

on supporting watershed or territorial management planning to better address the vulnerabilities of the watershed. These two pillars formed the basis of the three technical components of the PARA-Agua project.

PARA-Agua then moved on to the next two pillars: working with decision-makers to *identify and prioritize adaptation actions* and seek *climate adaptation financing*. The project supported the identification of green and gray infrastructure investments, using the results from various vulnerability analyses and climate-scenario modeling exercises. Central to this activity was the creation of capable watershed modeling groups to sustain PARA-Agua’s capacity building efforts. With increased capacity in water resources planning and a project pipeline in place in the watersheds, PARA-Agua’s focus turned to identifying financing for these projects, as well as establishing long-term financial and economic incentive mechanisms such as water funds and payment for environmental services (PES) for sustained investments in green infrastructure (GI).

Figure 2. PARA-Agua Building Blocks



ADAPTING TO COUNTRY-SPECIFIC NEEDS

PARA-Agua fine-tuned its implementation strategy to meet the needs of each country and watershed, as described below.

COLOMBIA

As Colombia moves toward an enduring peace, it aims to put in place more inclusive and strategic decision-making processes to improve livelihoods and adapt to climate change. Preparing for extreme weather events, such as flooding, and agro-climatic risks is particularly important.

As such, Colombia has prioritized a number of national and local policies to guide stakeholder actions and planning. Colombia has stressed the importance of integrating scientific data into decision-making, for example. It prioritized national interventions at the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) to advance a statistical downscaling procedure to develop future climate scenarios and explore the implications of climate change. These models will contribute to the goals outlined in the Third National Climate Change Communication. They will also inform decision-making in the watersheds, with governments and environmental management institutions responsible for integrating relevant data into their territorial and watershed planning documents.

Furthermore, Colombia's Department of National Planning (DNP) has prioritized the long-term sustainability of ecosystem services that will benefit watershed conservation actions throughout the nation. The "Policy and National Program for Payments for Environmental Services for the reconstruction of Peace" (CONPES 3886) provides guidelines to strengthen the current PES scheme in five strategic departments. These mechanisms provide economic incentives to local communities to engage in and improve the use and management of soil, forests and water resources. This national initiative will also help Colombia fulfill its international commitment to reduce carbon emissions by 20% through adaptation and mitigation of climate change activities. In coordination with national, regional, and local authorities, research

centers, the private sector, and international donors, the CONPES provides a 15-year agenda for developing actions that will reach one million ha of the country, requiring investments of nearly one trillion Colombian pesos. As a result, the country has also made access to climate finance a priority.

At the watershed level in Colombia, the *Plan de Ordenamiento y Manejo de la Cuenca* ("POMCA"), or the watershed management plan, is the guiding policy on environmental management of the watersheds. PARA-Agua supported two Autonomous Regional Corporations, CORPOCESAR and CORPOCALDAS, in incorporating climate change elements into their management plans. The POMCA of the Chinchiná Watershed, under the management of CORPOCALDAS, was approved in December 2016 and is currently in implementation; the POMCA of the Guatapurí watershed, under the management of CORPOCESAR, is in the diagnostic phase. PARA-Agua also partnered with local research institutions like the Universidad Tecnológica de Pereira (UTP) and Pactos por la Cuenca and Fundación Alisos, as well as various women's groups, to strengthen local capacity and promote sustainability of project initiatives within the watersheds.

PERU

Many upstream watersheds in Peru are at risk of deterioration due to poor land management, overdevelopment and water withdrawals and diversions. As a result, policymakers are beginning to understand that improved water resources management is critical. Constructing gray infrastructure to replace lost ecosystem services can be costlier than maintaining the ecosystems themselves. As a result, policy-makers, water utilities and the private sector have begun to view ecosystems as a type of infrastructure that generates economic services by maintaining the quantity and quality of water supplies and helping reduce water-related disasters.

While the Government of Peru (GOP) has enacted new policy and undertaken planning initiatives to improve water resources planning and management (including scaling up investment in GI as per the *Mechanisms for Retribution of Ecosystem Services*, in Spanish, MRSE) challenges remain. In particular, there is a disconnect between researchers and policy-makers. This is partly because the process for generating data and making decisions is fragmented. Sharing data between agencies is difficult, as is integrating planning between all levels of government to effectively address watershed needs. Moreover, in some cases data did not respond to government priorities, nor did it reflect the input of women and other vulnerable groups. In addition, project formulators in Peruvian watersheds have a weak capacity to develop bankable adaptation projects.

Coordination and integrated and participatory planning are key in Peru, where numerous GOP institutions are engaged in improving water resources management and green infrastructure investments as an adaptation strategy. Key institutions are: the Ministry of Environment (MINAM), Superintendent of Water and Sanitation Services (SUNASS), Ministry of Agriculture and Irrigation (MINAGRI), the National Water Authority (ANA), which falls under MINAGRI, and the Ministry of Economy and Finance (MEF).

Water resources councils (CRHC) and their corresponding technical secretariats also play a key role in water policy and management. They serve as stakeholder consultation platforms for coordinating the planning, implementation and monitoring of water resources interventions. Each council prepares a five-year watershed management plan or *Plan de Gestión de Recursos Hídricos de Cuenca (PGRHC)*, which often features priorities driven from the bottom-up. Developing plans for transboundary watersheds require coordination with

local and regional governments (as in Chira-Piura) or coordination with international actors (as in the Catamayo-Chira watershed with Ecuador).

Strengthening water resources councils with meaningful participation by the private sector and civil society, including women and vulnerable groups, was the focus of PARA-Agua. PARA-Agua worked with the ANA at the national level and locally with the CRHCs on developing climate change adaptation strategies through climate scenario modeling; including downscaled high-resolution hydro-meteorological data to improve watershed management and planning (the project also coordinated data generation and hydrologic monitoring with the National Hydrologic and Meteorological Service, or SENAMHI, and research centers and local universities). In addition, PARA-Agua worked closely with CRHCs to implement existing watershed management plans and identified weaknesses and gaps to be addressed in future revisions of these plans. The project also helped prioritize adaptation interventions, giving priority to GI and identifying corresponding financing options. The project used innovative planning tools to support this process, including the Disaster Resilience Scorecard and WEAP climate-scenario modeling exercises, as well as participatory decision-making methodologies.

REGIONAL AND INTERNATIONAL EFFORTS

In addition to working at the national and watershed levels in Peru and Colombia, PARA-Agua incorporated a regional and international focus, with the goal of widely sharing best practices. In all, PARA-Agua reached more than 50 countries through the online Community of Practice (CoP), facilitating dialogue on how to link science and policy into action in the face of climate change via international events, webinars, virtual courses, a resource library and discussion boards.



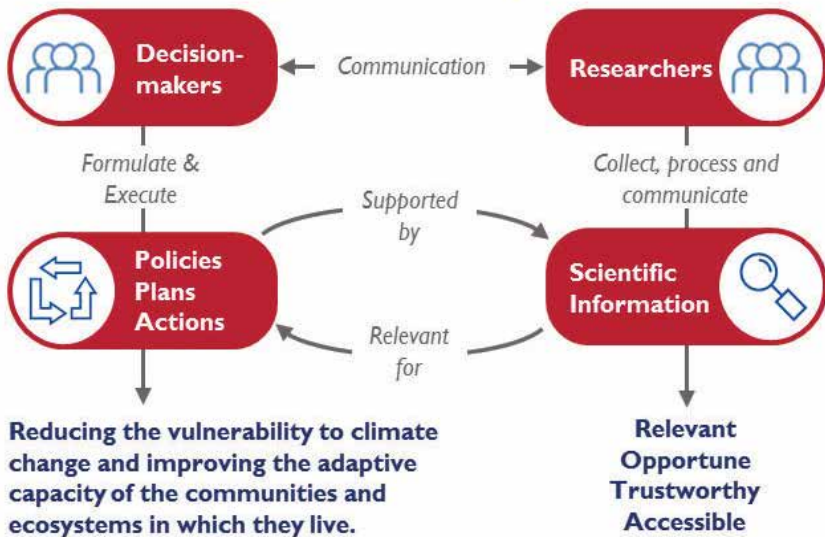
RESEARCHERS AND DECISION-MAKERS ATTEND WORKSHOP, MAY 2017
 Photo By: Jose Narvaez

STRENGTHENING THE CAPACITY OF THE RESEARCH COMMUNITY TO GENERATE POLICY-ORIENTED DATA ON WATERSHED MANAGEMENT AND CLIMATE CHANGE ADAPTATION

Despite the importance of policy-oriented data to good planning (see **Figure 3**), both Colombia and Peru face challenges in this area. This is partly due to the limited availability of scientific information; regulations on research and inattention to national research institutions, (the latter of which is a particular problem in Peru) exacerbate this issue. In Colombia, there are mechanisms in place for the production of scientific data. For example, the Autonomous Regional Corporations can engage local universities to produce the specific information needed to facilitate local decision-making. In addition, the national research institution, IDEAM,

Figure 3. Integrating Scientific Research into Policy

The integration of scientific research and its application facilitates well-informed policy decisions for socially relevant information.



provides free access to data (local institutions can also submit their data to IDEAM). Meanwhile, in Peru, while public institutions, larger universities and research centers conduct research, little of it is conducted in or at the watershed level. As a result, Peru lacks local data to make sound decisions at the watershed level.

PARA-Agua worked closely with researchers and watershed decision-makers in Peru and Colombia to identify data gaps and jointly develop needs-based research projects. PARA-Agua combined training programs and expanded professional linkages between national government agencies, research organizations and universities to generate policy-oriented data on watershed management and climate change adaptation and facilitated data and information sharing for watershed planning. The project introduced 12 new tools and methodologies to improve decision-making, including an online CoP with webinars and information sharing; improved practices for incorporating gender perspectives into data generation; and facilitated the sharing of data at the regional level.

FACILITATING EXCHANGE OF TOOLS AND METHODOLOGIES FOR IMPROVED DECISION-MAKING

THE COMMUNITY OF PRACTICE

PARA-Agua's CoP Science for Adaptation (www.para-agua.net) is a key tool to enhance collaboration at the local level and beyond. Launched in July 2015, the CoP facilitates the exchange of information on climate change adaptation and supports best practices in the region through open discussions, working groups, webinars and virtual courses (See **text box**). The CoP is also a key avenue for sharing PARA-Agua toolkits and other knowledge projects.

This virtual network, which attracts 30,000 visits monthly by 7,000 unique users, enables the sharing of best practices globally. Since its inception, the PARA-Agua CoP has connected and shared best practices with individuals in more than 50 countries. Moreover, the CoP has 1,400 individual members who receive monthly email newsletters and announcements of webinars, online courses and uploaded resources.

The CoP includes a range of tools for users. Open discussion feeds enable the community to discuss best practices, provide input to PARA-Agua knowledge products and exchange information. Webinars allow users to learn about specific topics in a short amount of time, while virtual courses provide more in-depth learning, with weekly modules and pre-and post-session work (See **Table 1** for more details on the webinars). (Note: the materials are still available on the CoP). Past training sessions taught users how to incorporate gender-inclusion principles in their work and how resilience to flood control could be built into infrastructure designs. Other knowledge products available on the CoP include facilitated conversations, discussion boards and toolkits (See **Table 2** for a list of toolkits developed by PARA-Agua).

PARA-Agua delivered 10 webinars and three virtual courses over 16 months, including three on gender-sensitive topics, sharing innovative best practices.

"The virtual course developed by PARA-Agua is a great contribution to the PAGCC Peru implementation process since it addresses the specialized issue of climate change and water resources management, unprecedented in the country, not only from the theoretical base, but with tools that promote action, which is the biggest challenge."

**--JESSICA HUERTAS,
MINAM**

TABLE I. PARA-AGUA FACILITATED WEBINARS

WEBINAR TITLE	
FY16	Scientific communication on climate in Latin America
	Gender and climate change
	Knowledge management for resilient infrastructure design for flood control
	The national program of environmental science and technology opportunities for researchers and managers
FY17	Macroinvertebrates as indicators of water quality
	Colombian Network of Female Scientists: Their Existence and Future
	Research, gender and climate change
	Ecosystem-based adaptation: tools to identify and prioritize measures – Part One
	Ecosystem-based adaptation: tools to identify and prioritize measures – Part Two
	Building resilience through the use and application of climate information: a case study of El Niño and La Niña in the Pacific oriental.

One virtual course, *Participation of Women in the Integrated Management of Water Resources*, provided tools for holistic integration of gender considerations into climate change programming, including gender analyses, the gender empowerment index, value chain analysis and socio-ecological scenarios, among others. More than 100 individuals participated in this course. It was so well received that the ANA in Peru expressed interest in implementing this course within its institution. PARA-Agua also shared the course contents with MINAM to support its role as leader of the *Plan de Acción de Género y Cambio Climático (PAGCC)*, and for replication, as it contributes to the national goal of improving the capacities of water resource management institutions.



GUATAPURI RIVER, COLOMBIA
Photo By: Juliana Valencia



“Communicating science to decision-makers is not an easy task but these tools provided by PARA-Agua offer structure, content and applicability for our use in the region.”

**VÍCTOR SANTA CRUZ FERNÁNDEZ
EXECUTIVE DIRECTOR,
IMAR NORTH COAST**

TOOLKITS DEVELOPED TO ADDRESS KEY GAPS IN SCIENCE AND POLICY

PARA-Agua developed four toolkits to promote collaboration between researchers and decision-makers and to improve the capacity of local decision-makers to respond to climate change threats through science-based policy and provide step-by-step guidance for improving linkages between science and policy and have enabled individual learning that professionals can apply in their day-to-day work. These Spanish-language toolkits are available to the public through PARA-Agua’s online Community of Practice (www.para-agua.net).

TABLE 2: TOOLKITS DEVELOPED BY PARA-AGUA TO IMPROVE SCIENCE-POLICY LINKAGES

TOOLKIT	OBJECTIVE	AUDIENCE	EXPECTED RESULTS
Communication of Science to Decision-makers	To explain how to communicate the results of scientific research to management authorities and political actors.	Professionals that generate scientific information that could be used for policy-makers for action.	The participants develop action-oriented communication products that support best policy decisions for changing climate conditions.
Integration of Institutions in Information Systems and Networks	To establish procedures for information exchange, promoting the adoption of standards and the establishment of cooperation agreements.	Institutions responsible for the generation and promotion of hydroclimatic information, and that carry out research that is relevant to the watersheds.	Institutions strengthen their networking capacity by identifying responsibilities, planning the generation of information, adopting and maintaining common standards, and establishing cooperation agreements.
Support for Robust Decision-making for Water Resource Management Using Climate Change Scenarios	To showcase a procedure for robust decision-making for water management, incorporating regional climate change scenarios as a form of uncertainty.	Professionals and specialists interested in the application of a method for supporting robust decision-making in water management actions. This applies to the watersheds modeled with WEAP.	The participants use the WEAP model and methodology for supporting robust decision-making to evaluate new management strategies.
Improved Monitoring Systems for Water Management in the Face of Climate Change	To guide a process for identifying aspects, variables, and monitoring indicators for measuring the effectiveness of actions toward adaptation to climate change.	Water authorities in Peru, Colombia and other Latin American countries.	The participants learn a procedure for designing monitoring systems to be applied through a variety of actions, such as the implementation of water resource management policy with emphasis on climate change conditions.

EMPOWERMENT OF WOMEN IN DECISION-MAKING PROCESSES

While women in the Andes region play important roles in developing strategies to cope with climate change, they have unequal access to resources and decision-making processes. Despite their knowledge of environmental patterns, traditional agricultural techniques and water resource strategies, women from the region face constraints to full and equitable participation in critical decision-making processes. Empowering women can have a significant impact on economies driven by the agricultural sector, a water-reliant sector that is extremely vulnerable to the effects of climate change. In Peru and Colombia, while women play a vital role in rural small-scale agriculture—in addition to managing household water demands--- they are seldom consulted and therefore their needs are inadequately considered. As a result, women in several of PARA-Agua’s targeted watersheds are disproportionately affected by climate change. PARA-Agua, therefore, saw the critical need to incorporate gender perspectives in data and research dedicated to the response of the degrading effects and vulnerability caused by climate change.

In Colombia, PARA-Agua partnered with the Red Colombiana de Mujeres Científicas (Colombian Network of Female Scientists, RCMC) to encourage research of the gendered impacts of climate change and water adaptation and to showcase female role models within the Chinchiná and Guatapurí watersheds of Colombia. PARA-Agua facilitated a roundtable for scientists conducting research on gender and climate change in Colombian watersheds, at which scientists shared their experiences with watershed managers and community leaders and discussed the constraints that prevent women from fully participating in community decision-making processes. As a result, watershed managers, community leaders and scientists, including 15 women from both the Guatapurí and Chinchiná watersheds, were linked to the national network. The roundtable also sparked an interest in forming a group of gender and environmental researchers within the network, which will help propel women into the climate change conversation. They agreed to carry on work in the future to build the capacity of rural women as part of an adaptive strategy for climate change; provide rural women’s organizations access to scientific information; and support processes that develop the ability of the women to participate in adaptation planning and implementation processes.

“We have always been interested in addressing gender issues, but we did not know how to incorporate it into our work. With the support of PARA- Agua, we have been able to assess what we are already doing that contributes to gender equality and we have identified what tasks are pending.”

**-AMELIA DÍAZ, SENAMHI
EXECUTIVE PRESIDENT**

PARA-Agua's leadership on gender and climate change has garnered positive attention throughout Peru. Through a series of conversations, SENAMHI and PARA-Agua agreed to work together to incorporate a gender perspective into SENAMHI's work, particularly as it relates to its CLIMANDES project. With PARA-Agua's assistance, SENAMHI implemented a new process to promote gender mainstreaming, particularly in how it provides meteorological information service to its diverse users throughout Peru. SENAMHI increased staff training, created a gender group in alignment with the World Meteorological Organization (WMO); promoted best practices of women-led decision-making in communities and promoted institutional incentive policies that support gender inclusion. SENAMHI is now better equipped to assume its national commitments under the PAGCC Peru climate action plan.



WOMEN LEARN NEWEST APPROACHES TO ADDRESSING CLIMATE CHANGE IN PERU, MARCH 2016

PARA-AGUA GENDER ANALYSIS INFLUENCES NATIONAL LEVEL POLICY

Peru's National Action Plan on Gender and Climate Change was published in January 2016



Peru's National Action Plan on Gender and Climate Change was presented by the National Commission on Climate Change on January 20, 2016 at the United Nations Development Program in Lima. The final version of this document has been sent to the United Nations Development Program as a part of the country's national action plan, following the Paris COP 21 agreement.

USAID's Partnering for Resilience and Adaptation-Agua (PARA-Agua) Project has been working closely with the Ministry of Environment and decision-makers from the scientific community in Peru to highlight the strategic importance of addressing gender considerations in climate change policy. The collaborative efforts achieved a significant goal: a unified national level policy addressing gender considerations in the face of climate change.

In 2014 and 2015, PARA-Agua conducted a targeted gender analysis in the Quilca-Chili and Chira-Piura watersheds to identify gender-specific needs of both women and men in adaptation strategies.

The damaging effects of climate change can be felt in the short-term through natural hazards, such as landslides, floods and hurricanes; and in the long-term, through more gradual degradation of the environment. In the face of these threats, women are more vulnerable to the effects of climate change than men—primarily because they constitute the majority of the world's poor and are more dependent for their livelihood on natural resources threatened by climate change.

Working with the Ministry of Environment, PARA-Agua submitted recommendations taken directly from the project's gender analysis, to which watershed stakeholders, including decision-makers, stakeholders, and community members, provided inputs and feedback. These recommendations, in turn, were directly incorporated into the National Action Plan on Gender and Climate Change, which was published in January 2016.

The National Action Plan on Gender and Climate Change provides an outline of how Peru, specifically at the watershed level, will begin to integrate a gender perspective into its climate change mitigation and adaptation research. The Plan also delineates how Peru will prioritize creating a pathway leading to equality between men and women in areas such as access to water resources, energy, food sources, waste management, climate change education and risk management.

REAL-TIME DATA SHARING IN THE WATERSHED ENHANCED

WATERSHED OBSERVATORIES

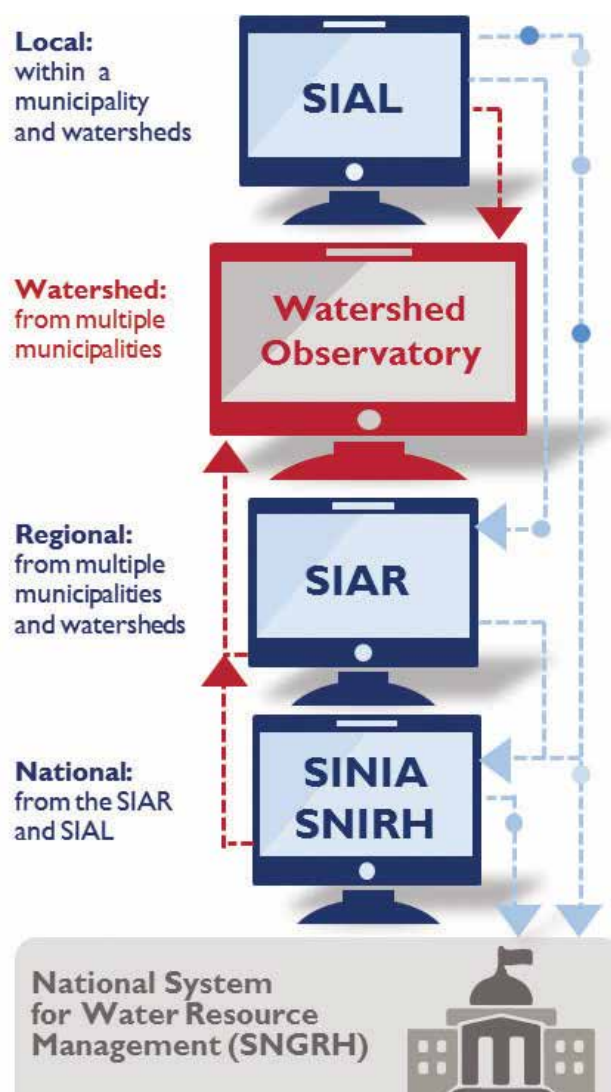
Building on the PARA-Agua toolkit “Integration of Institutions in Information Systems and Networks” and responding to the need to generate policy-oriented data, the Ministerio del Ambiente del Peru (Peruvian Ministry of Environment, MINAM) requested that the project facilitate the integration of multiple national (SINIA and SNIRH), regional (SIAR) and local (SIAL) information systems (See **Figure 4**). Each system houses hydrographical and environmental data for the geopolitical level at which it is located; however, the systems fail to account for watersheds effectively.

The existing system was inefficient in that it required users who needed watershed data to spend significant time searching through multiple systems to find the information they needed. Moreover, data could not be pulled at the watershed level (nor did it encompass information generated locally by governing institutions). In response, PARA-Agua worked closely with the institutions responsible for these systems to develop a single, online data repository for watershed information, referred to locally as a “watershed observatory” since it *observes* real-time data in one site.

The observatory marked a significant achievement for PARA-Agua and the stakeholders in the Chancay-Lambayeque watershed: for the first time, water management officials in Peru could access environmental, socio-economic, risk, hydrologic and other data from various local and national sources in one location. Moreover, they could exchange information with local, regional and national data management systems to enable better planning and analysis. The new system is more efficient as well: With the old systems, users might spend four days tracking down the data they needed; now, the data collection and processing of data can be done in just one day. MINAM has agreed to assume the responsibility to ensure long-term operation of the observatory and is currently in the process of signing an agreement with the ANA (SNIRH and SINIA) on this effort.

This observatory is now operating from MINAM’s computer servers. The expectation is that it will continue to grow, improve and serve as a key source for information on addressing and responding to emergency situations and planning and preparing for extreme climatological events for additional watersheds in Peru.

Figure 4. Integrating National and Local Information Systems in Peru



EARLY WARNING HYDRO-CLIMATOLOGICAL MONITORING SYSTEM

In Colombia, environmental deterioration and the spread of unregulated and irregularly distributed urban dwellings in the Guatapurí River watershed have created conditions conducive to torrential flooding and droughts in Valledupar city. In response, six years ago, decision-makers and scientists from the Guatapurí watershed and IDEAM developed a proposal for a project to collect climate data and issue warnings of pending dangers such as flooding to residents. PARA-Agua worked with CORPOCESAR and a local university, the Universidad Tecnológica de Pereira (UTP) in the Andean region of Colombia, on the portion of the project related to the design of a hydro-climatological monitoring system framework to collect and share the data with local decision-makers.

At the start of the activity, PARA-Agua, with support from the Stockholm Environment Institute (SEI), evaluated the risks associated with the loss of glacial water flows due to climate change on the Guatapurí watershed. Then, working closely with CORPOCESAR, local stakeholders and UTP (which operates the hydro-climatological monitoring system in the Risaralda Department in Colombia), PARA-Agua incorporated identified risks and finalized the design of a low-cost, early warning hydro-climatological monitoring system for the watershed. This monitoring system aims to reduce the magnitude of damage and losses by helping stakeholders prepare for and respond to floods and droughts. PARA-Agua aided in designing a system tailored to the hydro-climatological features and disaster risks of the watershed and selecting the equipment and suitable sites for the location of monitoring stations.

PARA-Agua also helped develop the budget to implement, operate and maintain the system. The project subsequently provided technical assistance

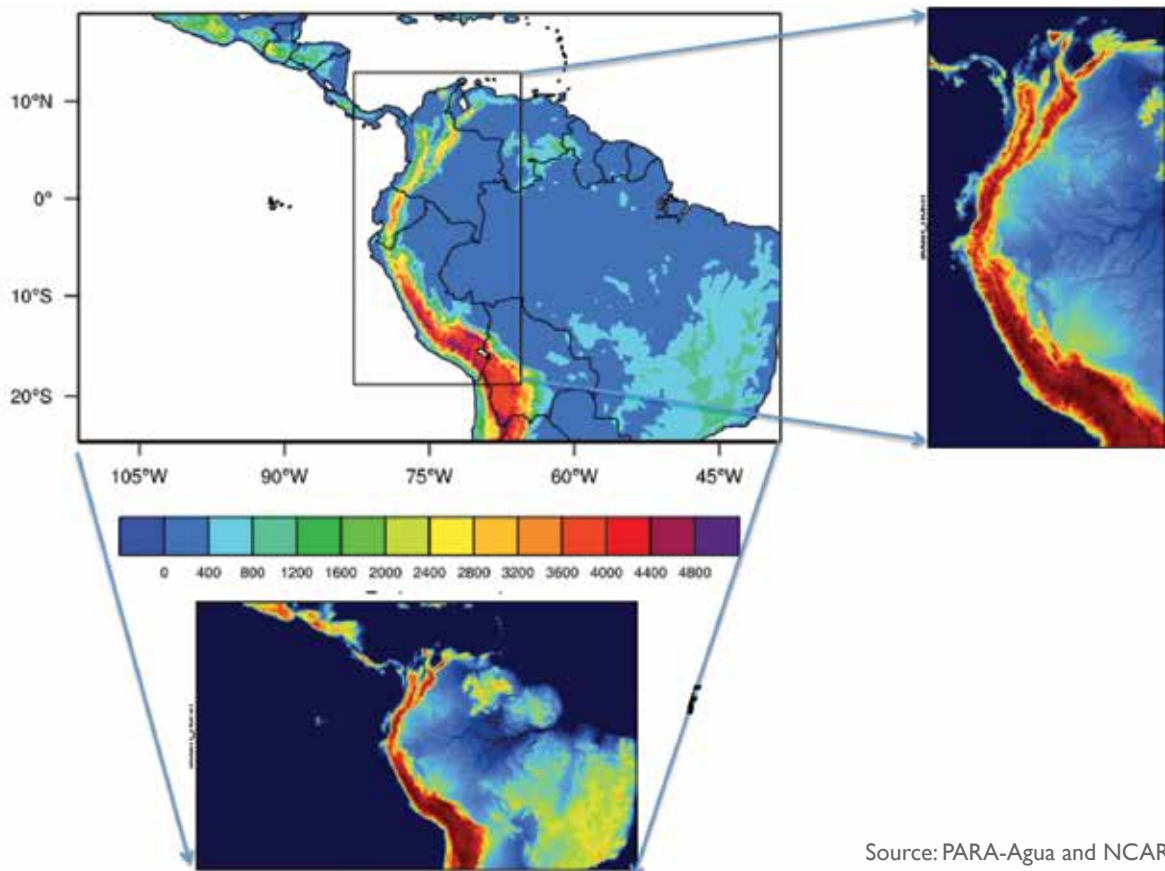
to help define a mechanism for financing the system, which we estimate will cost COP 521,000,000 (USD \$171,290). Once implemented, the system—which will provide emergency notifications to 500,000 citizens—will cost USD \$29,966 to operate annually. At present, the watershed stakeholders are actively seeking financing from national and other sources of funding for 2018. CORPOCESAR is also in negotiations with UTP to expand the design of the monitoring network to cover the entire department of Cesar.

BUILDING CAPACITY TO GENERATE CLIMATE DATA

For both Peru and Colombia, it was important that scientists have the capacity to develop accurate data that could be used in decision-making by watershed management and climate change adaptation communities. In particular, stakeholders emphasized the need for more accurate regional climate data to incorporate into their modeling. Regional data of this sort can be attained by ‘downscaling’ global climate models (GCMs) to regional climate models (RCMs). While many institutions were familiar with the general idea of downscaling, Colombian and Peruvian stakeholders expressed the need for more training on the methodology.

In response, PARA-Agua provided in-depth training to more than 100 scientists from Colombia’s IDEAM and Peru’s SENAMHI on a downscaling methodology. PARA-Agua facilitated access to international experts at the US-based National Center for Atmospheric Research (NCAR) who could offer the training. NCAR also granted access to the fastest supercomputers in the world and made vast quantities of data available to the IDEAM and SENAMHI. Initial training efforts enabled scientists to develop an RCM dataset for the

Figure 5. Sample of a Downscaling Model



Source: PARA-Agua and NCAR files

Northern Andes; the data set informed a statistical downscaling tool—the K-Nearest Neighbor (K-NN)—which was ultimately incorporated into models and watershed planning tools. This methodology will enable scientists in Peru and Colombia to more accurately evaluate historical and future models in their localities.

Building on the success of the downscaling training, PARA-Agua introduced a methodology for bias-correcting GCM data, which was used in RCM experiments with NCAR's Weather Research Forecast Model (WRF). PARA-Agua facilitated training on regional climate data in which professionals explored the impact of climate

warming and increasing sea surface temperatures on the climate of the Northern Andean region, with a particular focus on the El Niño Southern Oscillation (ENSO) phenomenon. Then, through a second experiment with SENAMHI of Peru, scientists created bias-corrected data from the UK Met Office's Hadley Global Climate Model. This bias-corrected data was then used to drive the WRF model and make more accurate long-range forecasts. With IDEAM, PARA-Agua fine-tuned this process to focus on the use of WRF for seasonal forecasting ranging from 14 days to 6 months. This model in turns helps better planning in the immediate term.

ADVANCING POLICY-ORIENTED RESEARCH IN UNIVERSITIES

A critical barrier to generating policy-oriented climate data is lack of funding. Through consultations with local institutions, PARA-Agua learned that many researchers did not understand how to propose and pursue funding for their research projects. This was not the case with one prominent institution in Peru, the Consejo Nacional de Ciencia Tecnología e Innovación Tecnología (National Council for Science, Technology and Innovation, or CONCYTEC), which understood the requirements, priorities and procedures for applying for research funding. PARA-Agua partnered with CONCYTEC to mentor other research institutions. CONCYTEC led peer-review sessions through the CoP for 10 consortia pursuing climate change adaptation projects, including the Universidad Nacional de Piura, Universidad Nacional de Cajamarca, Universidad Nacional de San Agustín, Universidad Nacional de Pedro Ruiz Gallo and the Universidad Nacional de San Pablo. As a result, the consortia accelerated the preparation of their project proposals and are now prepared to seek financing from funding sources, including CONCYTEC's own funding branch, Ciencia Activa.

OPPORTUNITIES FOR ADVANCING POLICY-ORIENTED DATA GENERATION AND SHARING

After four years of implementation, PARA-Agua made substantial progress in strengthening the research community's capacity to produce policy-oriented data for watershed management and climate change adaptation. PARA-Agua recommends that future programs in the region take advantage of the following opportunities to solidify and build on the progress made by the project:

Share information and best practices via the CoP. To produce policy-oriented data, researchers must have an ongoing dialogue with policymakers. PARA-Agua found that technology—specifically our online CoP and its webinars, virtual courses and online discussion groups—made this continual sharing of information possible. Moreover, it strengthened bonds in the scientific community on a regional level. PARA-Agua recommends developing alliances with research institutions that can continue and build on the project's online courses as a means of reinforcing key scientific concepts and linking researchers and decision-makers.

Strengthen relationships between researchers and decision-makers. In the Chira-Piura, Chancay-Lambayeque and Quilca-Chili watersheds, PARA-Agua exposed decision-makers to researchers, often for the first time. PARA-Agua found that decision-makers and researchers lacked mechanisms for sustained discussions. In response, PARA-Agua helped create working research groups made up of water managers and scientists within each water resource council. Discussions between members of the working group provided a framework for developing research projects that met local data needs. PARA-Agua recommends continued support to strengthen relationships between the research community and decision-makers to ensure the growth of policy-oriented data.

Furthermore, in Peru, PARA-Agua recommends prioritizing the development of procedures for accessing and using institutional research funds. Without access to information on funding agencies' requirements, researchers' ability to respond appropriately to funding opportunities will continue to lag. Research institutions should also be encouraged to develop professional competencies that promote the importance and value of communicating scientific information. Better skills in this area will strengthen the relationships between funding and management institutions and help promote evidence-based decision-making.

Scale up accurate climate models. Climate modeling is readily scalable given today's technology; in particular, researchers can set up and remotely execute climate experiments on clusters and supercomputers. Therefore, PARA-Agua recommends continued collaboration between NCAR and institutions such as SENAMHI and IDEAM on regional climate data analyses. Future work with SENAMHI and IDEAM could include additional training, resources and support for regional climate modeling. NCAR scientists are well placed to develop these skills and capacities in SENAMHI and IDEAM staff. For example, these institutions could jointly work on a project that would focus on a better understanding of how ENSO impacts the regional climate and how future climate change could increase the risk of flooding and drought conditions throughout the region. A natural follow-on project would be a collaboration of these institutions that explored current and future ENSO conditions.

Develop additional proposals and projects for funding to address local policy needs. PARA-Agua found that national research institutions in Peru such as the Instituto Geofísico del Peru (IGP), Institutos Públicos de Investigación (IPIs) and universities have the capability to produce data useful for decision-making. But they lack the resources to investigate at the local level throughout the country (though they do carry out research in some strategic locations). For researchers to produce high-quality and relevant data, PARA-Agua recommends that local research be undertaken in collaboration with the regional and watershed researchers who understand the context and have the resources to work at the local level.



HYDROCLIMATOLOGICAL MONITORING SYSTEM
Photo By: Juliana Valencia



LEARNED BEST PRACTICES THROUGH INTERNATIONAL EXCHANGE

MAINSTREAMING AND INTEGRATING CLIMATE DATA IN DECISION-MAKING RELATED TO WATERSHED MANAGEMENT

Through facilitated dialogue designed to share scientific data and best practices, PARA-Agua mainstreamed ideas, approaches and information into watershed-level decision-making. With the watershed modeling groups, access to international climate models, regional and international partnerships, dialogue between marginalized populations and knowledge of international best practices, watersheds in Peru and Colombia are now better prepared to make sound watershed management decisions.

“The group members have improved their knowledge of WEAP for the determination of flow rates as well as the method used for the treatment of aquifers in groundwater. Practitioners can use these tools to develop models that allow them to propose alternatives or improve the management of water resources in their sector based on the local water management model.”

**-- JORGE AGURTO
- GIS SPECIALIST OF THE
CHIRA-PIURA CRHC**

MAINSTREAMING DATA COLLECTION NEEDED FOR DECISION-MAKING

PARA-Agua has worked with local stakeholders to ensure they have the data (hydro meteorological, climate and socio-economic) to develop informed watershed policies and plans. At the level of watershed councils, PARA-Agua built stakeholder capacity to use Water Evaluation and Planning (WEAP) models for climate scenario modeling and evaluation of climate adaptation options. Participatory approaches that considered socio-economic data were also instilled during this process. Four capable technical modeling groups—one for each watershed council (Chinchiná, Chira-Piura, Quilca-Chili and Chancay-Lambayeque)—now assist in periodically reviewing WEAP models and analyzing their results. The modeling groups now apply what they learned to update annual water availability plans and support decision-making in alignment with the water resources management plans for each watershed. Stakeholders can now replicate these methodologies and develop sub-models of hydraulic sectors of interest. For example, the technical modeling group in Chira-Piura developed its own sub-model of the Middle and Lower Piura watershed to estimate water flow rates to incorporate into their water management plans.

“We had no idea that ownership of a water license was a barrier to having more women in decision-making spaces. It is a subject that could be seen as irrelevant but has it such a large impact. It is clear to us that this is a gender issue that we must work on and it is not easy when the majority still do not understand it.”

**FRANCY CÁRDENAS,
SPECIALIST, DGCCI
ANA**

INTEGRATING WOMEN IN WATERSHED DECISION-MAKING PROCESSES

The data that informs decision-making must reflect diverse perspectives; similarly, the decision-making process must be inclusive and accessible to vulnerable populations. Unfortunately, access to decision-making positions and representation on water management councils in rural Peruvian watersheds is often limited to landowners or owners of water licenses. People without land and licenses—many of whom are women—have no voice in decisions that affect their communities. And because women have historically not been recognized as agrarian users, they remain underrepresented in the water management committees, commissions and users’ boards. For this reason, PARA-Agua worked closely with Peruvian communities to identify and address barriers that prevent women from assuming decision-making roles.

Low participation of women in watershed councils in Peru was caused in part by a weak regulatory environment. Specifically, the regulations governing Peruvian water councils lack language that supports women’s representation. PARA-Agua advised the Quilca-Chili water resource council on incorporating gender considerations into its regulations. The revised regulations, which became permanent in FY16, include gender-inclusive language; in addition, they now allow women to be appointed as council representatives alongside men. Now, Quilca-Chili’s water resource council includes three women, making up 30% of the water board, which is unprecedented for both the watershed and Peru. With this new focus on gender, the water board will now be able to incorporate different perspectives and ways of thinking into their decision-making processes, allowing for more inclusive policies.

In addition, PARA-Agua trained women from the water user boards in the Chira-Piura, Chancay-Lambayeque and Quilca-Chili watersheds on their rights to water use licenses and the path to exercise their rights.

In the eight communities of the Central Rural Communities of the Dry Forest (CECOBOSQUE) in Piura, Peru, PARA-Agua facilitated discussions that led to another milestone for Peruvian women: a revision of regulations to recognize women's rights to land ownership and to be elected into managerial positions. The revised language emphasizes the equal rights of men and women in the community; rights of family representation; rights to determined areas of lands; and rights to assume responsibilities on the Governing Board, specialized committees and/or other leadership opportunities. In June 2017, the eight communities voted to accept the regulation changes. In August 2017, the first woman was elected to the Board of Directors. CECOBOSQUE will repeat the process within the remaining 24 communities in hopes that women in all CECOBOSQUE communities will have an equal voice in decisions that affect their daily lives.

REGIONAL AND INTERNATIONAL BEST PRACTICE SHARING THROUGH FACILITATED DIALOGUE

PARA-Agua's success was made possible by its ability to facilitate meaningful exchanges between local, national and regional counterparts and to engage counterparts in data-driven decision-making. In addition, PARA-Agua played an active role in presenting critical issues to global audiences, facilitating knowledge sharing and engaging in dialogue, reaching audiences in everywhere from local events in Peru and Colombia to global audiences at the UN Climate Change Conference of the Parties (COP 20 and COP 21) events in Lima and Paris (see text box for other examples).

PEER-TO-PEER PARTNERSHIPS FOR CONTINUED BEST PRACTICE SHARING

To institutionalize the sharing of best practices and integration of climate data into watershed management planning, PARA-Agua developed strategic alliances between watersheds councils within the region and internationally. Designed to be mutually beneficial, partnerships between watersheds were developed on the basis of similar characteristics and challenges as well as a shared commitment to improving their capacity. The expectation is that these partnerships will allow for continued collaboration.

“We believe that women’s participation is important when decisions are made. Women contribute much to the provision and conservation of water, but they are hardly present when decisions are made. We hope that with these new regulations we can have more and more women on the Council. We are sure that we will all benefit.”

**- ROLAND VALENCIA,
FORMER TECHNICAL SECRETARY
OF THE QUILCA- CHILI WATER
RESOURCES COUNCIL**

PARA-Agua's involvement in international dialogue on climate change

- **INTERCLIMA**
- **COP 20 Lima**
- **COP21 Paris**
- **Innovative Tools Peru**
- **RALCEA Colombia**
- **UN HABITAT III, Quito**
- **World Water Week, Stockholm**
- **World Water Congress, Cancun**

DOMESTIC EXCHANGES

PARA-Agua brought together more than 100 agrarian women from the Junta de Usuarios (JU) in Quilca-Chili watersheds in Arequipa and the Chancay-Lambayeque watersheds in Lambayeque and Cajamarca. This one-day joint training brought together women from across the country to strengthen their capacity to actively participate in managing water resources and adapting to climate change in their communities.

PARA-Agua also provided an opportunity for JU members to learn more about innovative approaches to water management. The project facilitated visits to the electric authorities, agricultural areas and the wastewater treatment plant in the Quilca-Chili watershed. These visits gave the women opportunities to learn how hydroelectric dams manage water, discuss the importance of coordination for project management of water resource protection zones, and observe cooperation between the state and a private enterprise. The women now better in a better position to support their arguments during JU meetings, where decisions are finalized.

REGIONAL EXCHANGES

PARA-Agua paired the watershed councils of Chira-Piura in Peru with counterparts in the Chinchiná watershed in Colombia. These regional exchanges created opportunities for watershed councils to learn from each other and take lessons learned and best practices back to their communities. Exchanges took the form of tours and exhibitions. Councils also shared best practices for planning mechanisms, including the PGRHC in Peru and the POMCA in Colombia, and exchanged ideas for disseminating best practices, advocacy ideas and tools, including through the CoP platform. Finally, they discussed negotiation methods and how dialogue could be used to share best practices and data with stakeholders and communities; they also discussed how to share the strategy of the water fund, FORASAN. Water council members now better understand how to access traditional tools and information. Furthermore, they continue to exchange ideas online through the CoP.

Similarly, PARA-Agua facilitated an exchange between three water funds in Ecuador (FONAG, FMPLPT, and FORAGUA) and a group of twelve stakeholders from Pactos por la Cuenca in the Chinchiná watershed who are in the process of establishing a water fund. The group visited the Quito and Tungurahua water funds to understand how they were created and how they function; they also visited some of the GI projects they fund. Pactos por la Cuenca members had the opportunity to talk to colleagues in the hydroelectric companies and water utilities to understand the importance of having a water fund to protect water sources in their areas of intervention. As a result of this visit, the members of Pactos are now identifying potential funding sources and exploring legal arrangements within their institutions to set up the fund.

INTERNATIONAL EXCHANGES

At a global level and with the support of SEI, PARA-Agua developed partnerships between watershed stakeholders to create opportunities for peer-to-peer learning on water resources management. The project linked stakeholders whose watersheds share similar characteristics and vulnerabilities. Partnerships included the Chira-Piura CRHC of Peru and the District of Flood Control and Water Conservation of Yolo County, California, as well as the Chinchiná Watershed Council and the Sonoma County Water Agency (SCWA).

Both Chira-Piura and Yolo County faced the challenges of multi-jurisdictional water management agreements. Through the exchange, the Peruvian watershed council learned about negotiating with water users and other managers, using real-time monitoring systems to improve the management of surface water reserves and incorporating climate change considerations into watershed management. These conversations helped both watershed stakeholders find new ways to manage the influx of water so that it does not turn into floods that affect their communities. The Chira-Piura council intends to include these best practices and ideas into their future water resources plans.

Areas surrounding the Chinchiná River in Colombia and the Russian River in California, the latter managed by the SCWA, are home to widespread agricultural production. As such, both parties were interested in better understanding financial mechanisms for environmental services, how to effectively negotiate with water stakeholders and how to better define instream flow regimes to meet mandated and discretionary aquatic ecosystem restoration goals. In addition to a site visit, the Chinchiná and SCWA watershed councils spent time exploring best practices to apply to their respective watersheds.

OPPORTUNITIES FOR MAINSTREAMING AND INTEGRATING CLIMATE CHANGE DATA

Effective watershed management depends on access to complete and accurate data on which to make decisions. PARA-Agua's work over the last four years has helped improve the environment for scientists and decision-makers to generate more accurate data while integrating holistic approaches to watershed management. Below are PARA-Agua's recommendations on how to continue integrating and mainstreaming climate change data into decision-making.

Develop and maintain strong professional relationships. Developing new models for mainstreaming scientific data into policy-making and integrating climate data into decision-making require strong professional relationships among project leaders, researchers and local decision makers. For sustainability's sake, PARA-Agua recommends identifying stakeholders who are motivated and interested in pursuing relationships. Then, it is critical to formalize the relationship and its goals through agreements such as a memorandum of understanding or an agreement with watershed councils.

Use technology to reach greater audiences. The demand in the region for knowledge-sharing, training and capacity building opportunities continues to grow. Programs that wish to strengthen and empower water management and local actors should include training and tools to develop individual and collective capacity of the water managers. Training should be provided in such a way that acknowledges the time constraints faced by professionals. PARA-Agua, therefore, recommends that future programs continue to use technology for training, for example by recording training and developing WEAP tutorial videos. **These videos allow participants to receive training on their own schedule, and also make it easier for newly-hired staff to learn existing processes.**

Engage vulnerable populations and address barriers to decision-making. Women, especially in rural areas lack access to decision-making processes. As a result, decisions often fail to reflect women's needs and perspectives leaving them particularly vulnerable to the impacts of climate change. To make the decision-making process more accessible, it is important to review existing regulations and policies and suggest ways they can more clearly incorporate gender norms. Oftentimes, communities and community leaders do not realize that the existing regulations hinder women from participating in the decision-making process.



STAKEHOLDERS LEARN TO INCORPORATE GENDER INTO WATERSHED PLANNING

STRENGTHENING PLANNING SYSTEMS THAT OPTIMIZE WATER USE OVER THE ENTIRE LENGTH OF WATERSHEDS IN THE CONTEXT OF CLIMATE CHANGE ADAPTATION

PARA-Agua's ultimate goal was to move beyond awareness raising, capacity building and planning to actual implementation of appropriate adaptation measures at the watershed level. Implementation of adaptation measures proves the commitment and capacity of stakeholders and the strength of watershed planning systems. PARA-Agua achieved this goal through a multistep process that included identifying vulnerabilities, developing relevant data, improving the enabling environment, and, finally, supporting partners in identifying key priority projects, seeking sources of financing and establishing long-term sustainable partnerships.

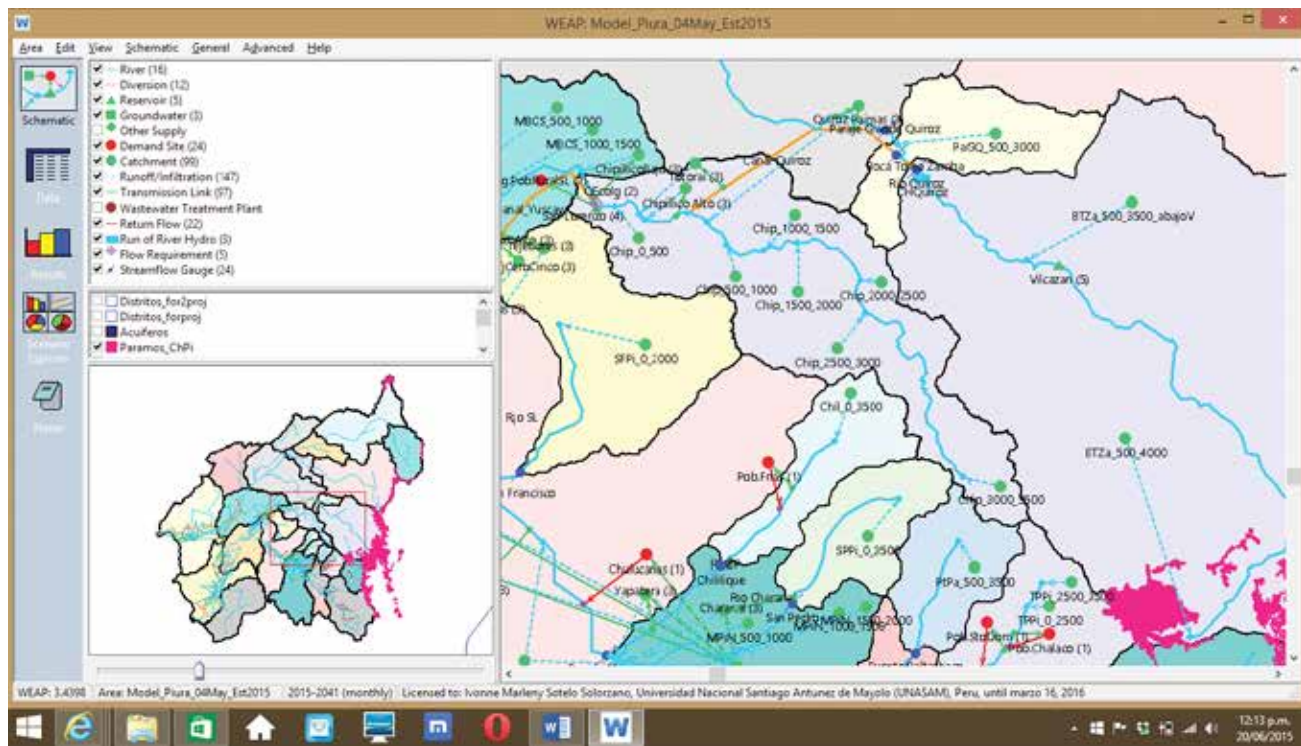
IDENTIFYING WATERSHED VULNERABILITIES AND ENHANCING WATER RESOURCES PLANNING CAPABILITIES

TRANSFER OF ROBUST DECISION SUPPORT METHODOLOGY (RDS) AND WEAP

To understand the complexities of each watershed, PARA-Agua first brought in world-class experts from SEI to introduce stakeholders to the Robust Decision Support (RDS) process. RDS is a formal, structured framework that uses watershed models to understand the implications of uncertainty in the decision-making process. Climate change, population growth, economic development and land use change can create uncertainty and serious implications for potential water management strategies. This framework includes participatory scoping and problem formulation; scenario analysis and evaluation of adaptation options through WEAP modeling; and refinement of adaptation strategies through iterative analysis of decision-making.

PARA-Agua also built stakeholder capacity to use WEAP, a water modeling tool used throughout the Andes. WEAP allows for the integrated assessment of climate change, shifting hydrology and water management in a single decision support framework. The WEAP modeling tool is designed to inform the whole-of-watershed management decision making and has historically been the subject of support from international experts. Through PARA-Agua, international experts built the capacity of local data researchers to become stewards of change and developed local modeling groups to own the WEAP modeling tools for their respective watersheds. With PARA-Agua support, WEAP model was applied in the Quilca-Chili, Chira-Piura, Chancay-Lambayeque and Chinchiná watersheds.

Figure 6. Sample WEAP Model for the Chira-Piura Watershed

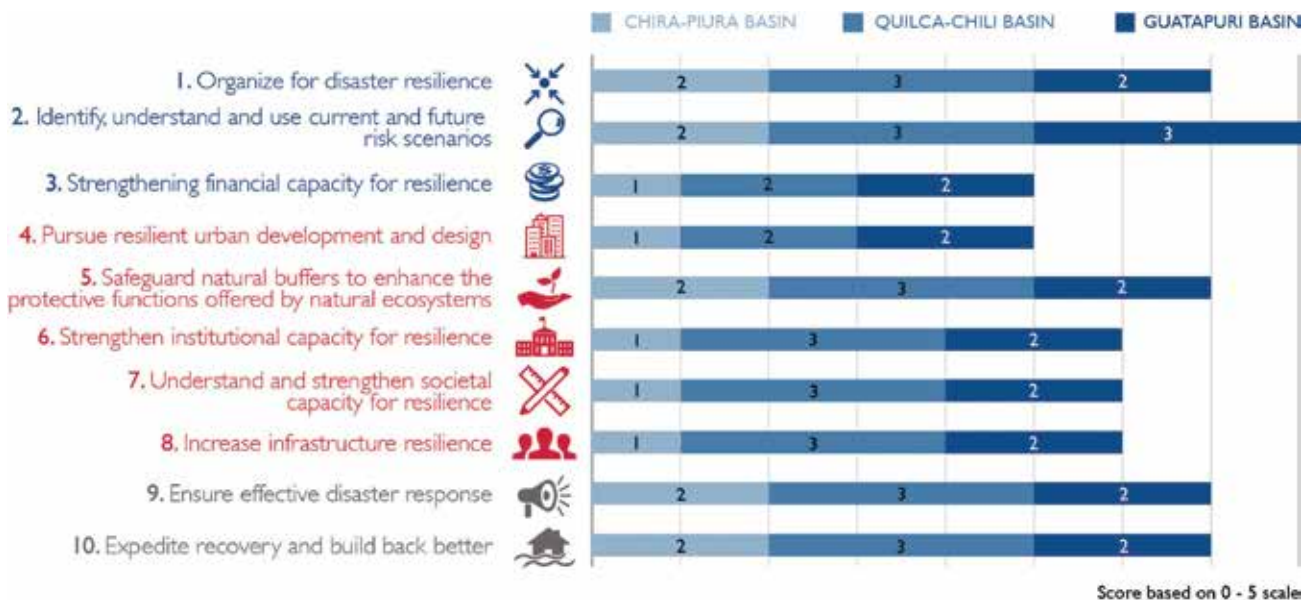


APPLICATION OF THE DISASTER RESILIENCE SCORECARD

To complement WEAP (which focuses on the variables that impact water flows)¹, PARA-Agua introduced the Disaster Resilience Scorecard, a tool developed by AECOM and IBM for UNISDR. The “Scorecard” is a structured survey with 10 key indicators that diagnoses adaptation and risk management capacity, allowing cities and communities to understand how resilient they are to climate change and natural disasters. The software is free and once trained, key actors can continually apply it as an analytical and planning tool. The Scorecard, which allows for the inclusion of social and economic factors, highlighted vulnerabilities across sectors in Guatapurí, Chira-Piura and Quilca-Chili. It also provides a basis for decision-makers to prioritize sectors for improvement against climate change impacts in their watershed management plans (e.g., the POMCAs in Colombia and PGRHC in Peru).

PARA-Agua engaged more than 195 key actors in the three watersheds to diagnose challenges and identify priority actions to address resilience in their respective regions. The Scorecard results revealed that of the 10 indicators, strengthening financial capacity to adapt to climate change and pursuing resilient urban development and design are critical priority areas in the three watersheds (see **Figure 7** for more details). Better access to finance requires a strong commitment from both private and public-sector decision-makers, as watershed climate adaptation is a long-term effort. Because of PARA-Agua’s work, the three watershed councils have adopted the Scorecard and will use the results to guide and adjust their respective watershed management plans.

Figure 7. Results from Scorecard Diagnosis



¹ Note: The Scorecard focuses on institutional development, improving water culture, and disaster risk management whereas WEAP focuses on improving the supply and demand of water. Each tool provides recommendations for the long-term planning in the watershed in its own right.

INCORPORATING CLIMATE CHANGE ADAPTATION CONSIDERATIONS IN THE DESIGN AND ENGINEERING OF INFRASTRUCTURE

To supplement the RDS process, PARA-Agua leveraged existing tools developed under the USAID “Global Climate Change, Adaptation and Infrastructure Knowledge Management” Task Order. The guide “Incorporating Climate Change Adaptation Considerations in the Design and Engineering of Infrastructure” presented a methodology for assessing current risk and vulnerability and evaluating engineering design options to increase the resilience of infrastructure with the goal of better positioning the watershed stakeholders for financing. The tool provides a comprehensive evaluation of design options that address climate change and flood risks. The evaluation can be appended or integrated into application packages for financing to demonstrate to investors that the project and engineering design have undergone careful evaluation and risk screening. Through the training, stakeholders received access to an interactive, Excel-based decision-making tool for assessing climate change risks and appropriate adaptation strategies. In particular, the tool incorporates GI strategies in the comparative evaluation of different options to address the risk of flood management. This tool is essential for the analysis of new climate situations and provided implementation measures to incorporate in the watershed management plans.

STRATEGIC OUTREACH TO RAISE AWARENESS OF POMCAS IN COLOMBIA

PARA-Agua’s partnerships ensured technical training delivered to Chinchiná stakeholders strengthened the watershed council’s role in the watershed. Council members and stakeholders gained a working knowledge of the legal and regulatory frameworks of the POMCA and watershed council as well as an understanding of the skills and abilities of active, committed and responsible council members.

PARA-Agua’s training on negotiation and engagement tactics (provided with the support of local partner Alisos) led to the development of an outreach strategy. This strategy aimed to increase the awareness of the importance of the POMCA in the community and influence cultural and local norms on environmental zoning and ecosystem preservation. Members of Pactos por la Cuenca participated in the training and designed a strategic outreach and education plan that commits watershed stakeholder organizations to the appropriation and implementation of the POMCA plans. The plan also provides a replicable model for the other watersheds within the department. Through this outreach, PARA-Agua strengthened the generation of knowledge and the implementation of concrete actions in the Chinchiná watershed to deal with the loss of biodiversity and its ecosystem services, use of resources, empowerment of actors to participate in management spaces, adaptation to variability and climate change, among others.

As a result of this outreach, PARA-Agua engaged local coffee farmers, CORPOCALDAS and others to discuss how to establish forestry zones to preserve the ecosystem in line with the goals set forth in the POMCA. Local partner, Alisos, developed a road map on how to continue engaging stakeholders in order to development a forestry zone pilot program in the region.

METHODOLOGY DEVELOPED FOR PRIORITIZING ADAPTATION INTERVENTIONS IN WATERSHEDS IN PERU

Methodology for Prioritizing Activities in Watersheds

1. Identify available resources
2. Define and validate criteria
3. Revise, prioritize and validate methods
4. Estimate the budget
5. Standardize the process

As a part of PARA-Agua's goal to strengthen planning systems in the watersheds, the project developed a methodology to help decision-makers evaluate projects and proposals (See text box). The methodology, designed to be both flexible and adaptable to different contexts, enables the decision-makers to rank adaptation measures based on priorities for future implementation.

Watershed council members in Peru have adopted the methodology. They are currently using it to guide their selection of climate change adaptation projects. In Chira-Piura, the CRHC used the methodology to rank 20 climate change adaptation projects valued at 424,297,329 Peruvian Soles. The process identified priority projects related to financing green and gray infrastructure, with emphasis on green and/or hybrid (green/gray) solutions.

AWARENESS-RAISING AMONG WOMEN'S GROUPS FOR INCLUSIVE PLANNING SYSTEMS

60 women from the Chinchiná River watershed increased their knowledge and understanding of the negative impacts of climate change and demonstrated their abilities to implement adaptation strategies for their family and voice their concern for their watershed by participating in decision-making conversations.

Building on the tools and vulnerability assessments developed by PARA-Agua, the project strengthened the enabling environment for greater participation of women and vulnerable groups in decision-making, with a focus on developing frameworks that could influence policies. PARA-Agua targeted women's organizations within project watersheds that could raise awareness of the importance of gender-inclusive adaptation strategies, which are critical in a region where women are particularly vulnerable to climate change and its effects on water resources. Despite their knowledge of the natural environment, traditional agricultural techniques and water resources, women are constrained from becoming agents of change due to prevailing socio-cultural attitudes and practices that limit their access to financial, social and educational resources and information. Despite this, women are well-positioned to be agents of change and contribute to adaptive livelihood strategies in relation to climate change.

COLOMBIA

In many parts of Colombia, women play a critical role in all stages of coffee production, giving them insight into local climatic conditions that is useful to watershed planning and management. But as elsewhere in the region, women are underrepresented in decision-making bodies, including the watershed council of Chinchiná. PARA-Agua provided training and support to women seeking to take on bigger roles in fighting climate change and managing water resources (See text box).

ASOCIACIÓN MUJER Y CAFÉ

PARA-Agua worked with the nonprofit organization Asociación Mujer y Café (Women and Coffee Association) to promote its participation in the local water resources council and elevate its role in local communities. Asociación Mujer y Café is made up of 43 female coffee growers and heads of households,

some of whom have been displaced by conflict, from 20 districts from the municipality of Manizales. Because coffee is under threat from extreme weather conditions, the women have a strong incentive to take on leadership roles in local decision-making.

Through a series of awareness and capacity building training sessions led by PARA-Agua in collaboration with CORPOCALDAS and the Central Hidroeléctrica de Caldas (CHEC), Asociación Mujer y Café members learned how climate change affects them and their crops, the importance of caring for water sources and strategies for recycling and reforestation activities. They saw firsthand the environmental impact of human activities that negatively impact water sources, including growing populations living closest to these sources, direct industry pollution and deforestation.

Because of PARA-Agua and in collaboration with the Mayor of Manizales - Rural Development Unit, the Asociación Mujer y Café initiated efforts to help reforest the Chinchiná watershed by planting seedlings. The reforestation initiative was also supported by the Fundación Ecológica Cafetera, a local NGO, and CHEC, which provided technical advice and seedlings. Association members feel empowered to continue their work—and to network with other women in Chinchiná. Furthermore, seven women from Asociación Mujer y Café formed a separate environmental committee to provide oversight of community activities, with an emphasis on initiatives that protect and preserve water and other renewable resources.

PERU

In Peru's rural communities, low educational levels, scarce economic resources and social-cultural norms often prevent women from contributing as decision-makers in water management. In response to the absence of female leaders in the water management positions, PARA-Agua built the capacity of rural women's groups to understand climate change adaptation concepts and discussed barriers to women's participation in decision-making. Common issues of concern were: women's rights to land ownership, ownership of water licenses, the differential impact of climate change on women and men, and the need to access more training to improve their knowledge of adaptation measures. By addressing these barriers, women would be able to have a say in the planning and decision-making related to climate change on the watershed councils.

FEMALE JUNTAS DE USUARIOS

PARA-Agua developed the potential of female Juntas de Usuarios (JU) members in the Chancay-Lambayeque and Quilca-Chili watersheds to play a more active role in decision-making and develop initiatives to respond to climate change. (See text box for more details on JUs). Through a series of capacity building programs, PARA-Agua supported women from Peru's largest JU (of which 9,000 of its 29,340 members are women) in campaigning for increased enrollment in the Administrative Register of Water Rights and more decision-making positions on the board in their communities in Chancay-Lambayeque. They are also advocating the use of low-cost technology to minimize the consumption of wood.

Meanwhile, in the Quilca-Chili watershed, the women from the Santa Rita de Sigwas and Pampa de Majes User Boards asked PARA-Agua to train them in constructing low-cost technology for household tasks. The

The Spanish term Juntas de Usuarios (JU) refers to a group of individuals that represent a specific watershed, utilize water resources (i.e. "water users") and are organized according to criteria established by ANA. JUs are responsible for the operation and maintenance of the infrastructure, distribution of water and the collection and administration of water rates. While women may participate in JUs, often they do not speak up due to prevailing socio-cultural norms or a lack of information.

“This network is an extremely important human resource for the implementation of the Chira-Piura Water Resources Management Plan. They have the voice to disseminate the information, sensitize the population and reach all water users to improve the use and management of water resources.”

**CONSTANTINO MATEO
PACHECO,
ENGINEER AND AAA
REPRESENTATIVE**

trained women subsequently built efficient kitchens that minimized biomass consumption and solar-powered food dehydrators that increased their resilience to drought and frost. They have committed to replicating the experience in Santa Rita de Siguas with the sponsorship of the municipality.

CHIRA PIURA NETWORK OF COMMUNICATORS

To promote the culture of water, the value of women in decision-making and the management of resources in accordance with the Dublin Principles, PARA-Agua launched an educational training program in collaboration with the ANA in Peru and the local Technical Secretariat. This training for the Water Council of Chira-Piura aims to develop a group of communication professionals to create radio spots, television ads and print media to share good water practices; disseminate water management decisions to the community; promote the empowerment of women in non-traditional roles; motivate women to take on decision-making roles within their communities; and use gender-inclusive language to shift prevailing norms and thus create a new, gender-sensitive, culture of water for the watershed. In FY17, 35 individuals received communicator certification from the Water Council of Chira-Piura, the local Technical Secretariat, the regional Administrative Authority for Water (AAA-Jequetepeque Zarumilla) and the ANA.

Furthermore, the communicators—who come from various public and private institutions and community organizations—formed a permanent working group within the Water Council. The working group played a significant role in the recent response to the coastal El Niño phenomenon, reporting incidents and emergencies for the Peruvian National Center for Emergency Operations and to local government. This working group has also taken on the task of sharing updates on the implementation of the Water Resources Management Plan and the FORASAN local water fund. It also develops radio spots to encourage women’s roles in water management.

NATIONAL CONTRIBUTIONS

PARA-Agua has positively influenced Peruvian views on the inclusion of women in decision-making, especially in the context of adaptation to climate change. PARA-Agua’s gender analysis outcomes were shared with the committee developing the Peruvian National Action Plan on Gender and Climate Change (PAGCC Peru) and, as a result, water resources became one of eight priorities areas within the document. Peru is the first country in South America to develop a national gender and climate change policy, which was approved by the Peruvian government in 2016 and directly cites PARA-Agua’s recommendations.

PARA-Agua also provided guidance on how to integrate gender into integrated water resource management plans to ANA, MINAM, MIMP and the Defensoría del Pueblo. The goal is for the plan, which is still in development, to formally acknowledge women’s rights to express themselves and participate in decisions that affect their lives.



TRUCK CLEANING DEBRIS AFTER FLOODING IN PIURA, PERU
Photo By: Mariela Rodriguez

FACILITATING WATERSHED-LEVEL INVESTMENTS AND FINANCING

The next step in strengthening planning systems in Peru and Colombia is to help stakeholders find financing for their priority projects. Using the POMCAs and PGRHCs as a guide, PARA-Agua worked with stakeholders to identify and prepare 11 projects in Peru and one additional project in Colombia, all of which have been submitted or are pending submission to various entities for financing, cumulatively totaling US\$56.4 million. Please see **Table 3** for a list of these proposals. (Note: This table does not include the totals for the PES and Hydroclimatological Monitoring System in Colombia which are discussed elsewhere in this report.)

In Peru, female representatives of the Chancay-Lambayeque JU prioritized for funding four projects poised to help women diversify their income: the production of organic fertilizer, domestic minor animal husbandry, reforestation of vulnerable areas and organic crops. Each project directly responds to vulnerabilities to drought and flooding, which heavily impact the agricultural sector on which women rely.

In Colombia, PARA-Agua supported CORPOCALDAS in preparing a proposal to the Green Climate Fund (GCF). The proposal incorporates the Main Ecological Structure (EEP), which is a network of spaces and corridors that sustain and drive biodiversity and essential ecological processes across the territory. A central aspect is to implement a model of environmental management adaptive to the needs and challenges the Chinchiná watershed. The proposal also incorporates adaptation strategies and a gender focus to address climate change issues in Caldas. The watershed faces instability in the quantity of water, as well as changes in frequency and flow of precipitation. Both changes contribute to extreme climatic events, which happen with greater frequency and intensity, such as the 2010-2011 La Niña and the 2015-2016 El Niño phenomenon. This proposal has a total cost of USD \$3M.

TABLE 3. PROPOSALS SUPPORTED BY PARA-AGUA

PROPOSAL NAME	VALUE	FUNDING SOURCE	DESCRIPTION
Irrigation Advisory System (Peru)	S/ 372,000 USD 108,233	Status: Approved, under implementation Funding Source: Junta de Usuarios from Chili, La Joya Antigua, Rio Yura and Santa Rita de Siguan, with contributions from Cerro Verde Mining Company	The Quilca-Chili Water Resources Council proposes to apply technology towards the use of water in irrigation and the implementation of an integral, sustainable and consistent water culture in the agricultural sector to adapt to climate change.
Improvement and Regulation of the Water Availability of the Irrigation System in the Yura River Watershed, Province of Arequipa (Peru)	S/ 58,227 USD 17,479	Status: Submitted, pending approval Funding Source: Public Investment from the Municipality of Yura	A public investment project that includes the construction of a storage reservoir at the Casa Blanca Dam including water intake, management and distribution infrastructure, and training on management and awareness of efficient water use to stakeholders to prepare for potential future droughts.
Forestry and Ecotourism in the Pampa La Escalerilla Zone (ECOPARQUE) in the City of Arequipa (Peru)	S/ 36,422 USD 10,933	Status: Submitted, pending approval Funding Source: Public Investment from Municipality of Arequipa	An innovative green infrastructure initiative in the city with potential for national replication that aims to develop a plantation of 500,000 trees by reusing wastewater from the La Escalerilla treatment plant, resulting in a recreational tourism park with environmental educational programs.
Improvement of the Pocsi Wastewater Treatment Plant (Peru)	S/ 254,163 USD 76,295	Status: Submitted, pending approval Funding Source: Public investment from the Municipality of Pocsi	To develop the infrastructure, services and management of the treatment plant; as well as to improve the existing business model to provide surplus treated wastewater for forestry and agribusiness purposes in the rural community of Pocsi in Arequipa. The residual water can contaminate and can reduce the water sources to keep the water available in times of need. This would guarantee the economic, social, environmental and legal viability of the plant in its projected 15 years of operation.

PROPOSAL NAME	VALUE	FUNDING SOURCE	DESCRIPTION
The Association for the Genetic Improvement of Alpacas and Breeding of Irolaca Trout (Peru)	S/ 211,148 USD 63,383	Status: Prepared. Pending the call for proposals for submission. Funding Source: PROCOMPITE	The Association for the Genetic Improvement of Alpaca and Breeding of Irolaca Trout is proposing to improve the quality of alpaca fibers and the weight of the animals destined for meat sales by improving the quality of the pastures, constructing channels for irrigation of grasslands and micro-regions in the highlands of Arequipa and the construction of management fences so that they are less vulnerable to climate change.
Availability of fodder for domestic livestock and vicuña populations (Peru)	S/ 304,305 USD 91,346	Status: Prepared. Pending the call for proposals for submission. Funding Sources: PROCOMPITE	The rural community of Carmen de Chaclaya near Arequipa proposes to ensure the availability of fodder for domestic livestock and vicuña populations by implementing fertilization practices that promote soil fertility and implementing water management practices related to the distribution and management of surface irrigation through the construction of channels as well as the capture and storage of water from surplus surface runoff during the rainy season through intakes and natural dams.
Improvement and Conservation of Degraded Soils under an Agroforestry System in the Middle and High Zone in the District of Sapillica, Province of Ayabaca-Piura (Peru)	S/ 2,692,607 USD 898,150	Status: Submitted, Pending approval for a rate increase prior to implementation. Funding Source: EPS Grau	Identified by the Technical Secretariat from Chira-Piura, this green infrastructure project was incorporated into the master plan of EPS Grau, a Peruvian company operating in Piura that functions as a private entity and provides wastewater collection services and produces and distributes drinking water. The five-year Master Plan of EPS Grau includes a budget for ecosystem services compensation.
Management Model for the Sustainable Use of Water Resources and Adaptation to Climate Change in the Chira-Piura Watershed (Peru)	S/ 178,726 USD 54,764	Status: Submitted, pending approval. Funding Source: FONDAM	Developed with the Technical Secretariat of the Chira-Piura water resource council to implement the major lines of work for FORASAN: conservation and water culture. FORASAN will leverage dollar per dollar from other stakeholders.

PROPOSAL NAME	VALUE	FUNDING SOURCE	DESCRIPTION
Improvement and extension of the service of potable water and basic sanitation (Peru)	S/ 3,868,060 USD 1,199,000	Status: Prepared. Pending the call for proposals for submission Funding Source: FONIPREL	The project aims to reduce contamination and protect water sources in high-Andean forests in the rural highlands of the Chira-Piura watershed in the Culcas and Annexes, El Molino, Oak, Arrayan Alto, Chucapiz, Huasipe, Limón, Tucaque and annexes, Loma Andina, Parihuana and annexes, Las Aradas, Chabicar, Chupicarume, Liza, Laureles de Chaye, San Antonio, Linderos de Chaye, Czech, District of Frías - Ayabaca – Piura.
Genetic improvement of cotton cultivation in a context of climate change in the of Irrigation Sub-sector of Muy Finca - Distrito de Mochumí - Lambayeque Region project (Peru)	S/ 269,633 USD 80,939	Status: Pending submission once the call for proposal opens. Funding Source: Programa de Innovación Agraria (PNIA)	In Chancay-Lambayeque, priority has been given to the development of projects for the resilience to climate change for water users in the Chancay-Lambayeque valley.
Financing Strategies for Reducing the Impacts of Climate Change in Prioritized Watersheds of Peru (Peru)	S/ 166,500,000 USD 49,980,000	Status: Pending submission. Funding Source: Green Climate Fund	After collaboration among professionals from Chira-Piura, Chancay-Lambayeque, Jequetepeque-Zaña and Quilca-Chili, they agreed to seek funding actions to reduce climate change through the activities prioritized for their respective water funds.
Environmental Management Adapted to the Main Ecological Structure and Effects of Climate Change on Water Resources of the Hydrographic Subzone of the Chinchiná River (Colombia)	COP 11,500,000 USD 3,891,369	Status: Pending submission. Funding Source: Green Climate Fund	Designed to strengthen the development and implementation of an adaptive environmental management model in Chinchiná based on the transformation of ecological and social systems, in the watershed for the recovery and conservation of the functionality of the Main Ecological Structure.

Total USD - \$56.4 Million

GREEN INFRASTRUCTURE PLANNING SUPPORTED IN PERU

In Peru, through the MRSE mechanism, the water utility of Lima, SEDAPAL, collects of 1% of total incomes for ecosystem services-- and in coordination with SUNASS, established the ‘Sembramos Agua’ program to channel that funding towards GI investments to help protect and restore ecosystem services in the CHIRILU watershed. Simultaneously, the newly established watershed council of CHIRILU is in the process of developing its water resources management plan. Given the need to orchestrate ongoing watershed planning and GI investment in the CHIRILU watershed, PARA-Agua centered its support on the watershed management council in coordination with the ANA and with active participation from the SEDAPAL “Sembramos Agua” program. PARA-Agua responded by developing a proposal for interventions in the watershed that will serve as a guiding tool for the watershed council in the development of their water resources management plan. This involved the identification of key actors and development of a criterion to assist in prioritizing projects. To develop the criteria, PARA-Agua assessed the legal framework and reviewed previous studies on project prioritization methods. Next, PARA-Agua held workshops, conducted field visits and utilized Geographic Information System (GIS) tools to identify locations for GI initiatives. This process resulted in the development of prioritized criteria for selecting GI initiatives for implementation (See text box). It also resulted in the identification of the types of GI projects that should be implemented to develop specific activities for GI in Huaros and Huamantanga, Laraos and San Andres de Tupicocha.

PARA-Agua later presented a portfolio of GI interventions and potential sources of financing to the CHIRILU water resource council. This included priority investments that would focus on seven local governments in the CHIRILU area, totaling 9,852 ha accounting for nearly 40% of the surface area of the watershed: Huaros and Huamantanga (Chillón basin), Laraos (San Mateo, Carampoma and San Pedro de Casta) and San Andrés de Tupicocha (Lurín-Chilca basin). The Huaros district contains the largest area of proposed initiatives—3,575 hectares, of which 1,368 hectares (38%) are wetlands. The implementation of the prioritized GI proposal reflects an estimated total investment of S/. 55,493,617 (approximately USD \$17M). Alternative financing mechanisms such as public-private partnerships, AQUAFONDO, Agrorural and Tierra Azul were identified for the implementation of GI projects and activities within the CRHC CHIRILU watershed.

Through these projects, PARA-Agua raised awareness of the importance of integrating GI into water resource plans and provided watershed actors with a roadmap linking GI activities to government, community and sustainable financing sources. Results of this effort should inform integrated planning in CHIRILU and contribute to the development of the Water Resources Management Plan.

KEY CRITERIA TO PRIORITIZE GREEN INFRASTRUCTURE INTERVENTIONS

- a. **Cost Efficiency: the marginal cost and the potential impact of each intervention.**
- b. **Specific local benefit generated by the project.**
- c. **Cumulative effect of projects, due to the interdependence of the system.**
- d. **The project is in priority areas for the conservation of water resources**
- e. **The project is developed at the level of a public investment project or has a file for execution by private sources.**
- f. **Project present multiple benefits including, in addition to hydrological, services such as recreation, risk mitigation, landscape, among others.**

ESTABLISHMENT OF WATER FUNDS

Water funds are a financing mechanism whose end goal is to protect natural ecosystems containing sources of water. Water funds are part of a sustainable strategy to support integrated water resource management (IWRM). One strength of the water fund mechanism is its ability to adapt and evolve according to local realities. In response to local stakeholders' growing interest in water funds, PARA-Agua provided on-site technical assistance and virtual training on establishing water funds in Peru and Colombia. As part of this training and to promote sustainability, PARA-Agua helped stakeholders consider the institutional and financial aspects of creating a sustainable water fund.

LOCAL WATER FUND DEVELOPMENT - COLOMBIA

In response to strong local demand for a water fund, PARA-Agua supported Chinchiná in designing and developing a water fund scheme – a process that normally takes several years – in just under a year. PARA-Agua began by presenting potential designs and structures for the water fund. The project sought agreement from the member institutions of Pactos por la Cuenca before moving forward with the process. In addition, PARA-Agua helped devise the water fund's constitution, enshrining equitable decision-making rules and committed financial contributions from CORPOCALDAS, Aguas de Manizales, CHEC, the Ecological Coffee Foundation (FEC) and EMAS. PARA-Agua also facilitated the development of an operational strategy for the fund that included financial projections, a technical document delineating lines of action for the fund, the operating structure, general indicators to monitor the progress of actions and internal regulations for the management of the fund.

As a result of PARA-Agua's efforts, the Chinchiná water fund—*Corporación por el río Chinchiná*—was officially created in November 2017, with an initial commitment of nearly \$500K USD. The municipalities of Manizales, Chinchiná and Villamaría have expressed their interest in joining the fund; their participation is awaiting the approval of each municipal council.

LOCAL WATER FUND DEVELOPMENT - PERU

The water fund model established in Peru with PARA-Agua's support is unique in that it involved local water authorities and watershed councils from the start. This model can be replicated as future water councils seek to set up water funds to finance GI and other activities.



Key stakeholders met regularly to discuss the framework and to visit important conservation areas in the region.

“With FORASAN, we are better prepared to assist our community in the conservation and management of the water resources of the basin in the face of climate change.”

—RONALD RUIZ,
PRESIDENTE DEL CONSEJO DE
RECURSOS HÍDRICOS DE LA CUENCA
CHIRA-PIURA

Regional Government Officials Unite Communities in Northern Peru by Establishing a Local Fund for Water

The Chira-Piura Watershed has an approximate area of 29,853 km², and its waters mainly come from the Andean highlands known as the páramos. The watershed supports primarily agriculture, which boosts the economy and employs 60% of the population. However, climate change, poor irrigation practices and inadequate instrumentation for the control, distribution and measurement of water in agriculture contribute to significant water losses for the entire community.

The Piura Regional Government recently approved a local decree officially creating FORASAN, the Regional Fund for Water in the Chira-Piura Watershed in Peru. The decree commits all water users to the integrated management of water resources in the watershed.

FORASAN is a compensation mechanism for ecosystem services whereby the business sector, user organizations and international players (among others) contribute resources to fund upstream actions that improve water management. This design generates a shared responsibility between those using the water resources in the middle and lower basins and those who live in the upper basin. The fund will invest in priority actions, with emphasis on water conservation, pollution control, risk management and protection of natural areas. These actions will benefit the communities as they cope with climate and environmental changes now and in the future.

“We are grateful to USAID’s assistance to help us create and establish an important financial instrument—a water fund—for water conservation, culture and climate change adaptation in Piura,” commented Ronald Ruiz, President of the Water Resources Council (“*Consejo de Recursos Hídricos*”) in Chira-Piura, “and with FORASAN we are better prepared to assist our community in the conservation and management of the water resources of the basin in the face of climate change.”

The PARA-Agua project has been a key player in the design and formation of FORASAN. The project was instrumental to the fund receiving official recognition from the regional government and to the development of the fund’s operational strategy. PARA-Agua also helped garner the support of key players from the private and public sectors. The commitment of seed capital—of CHF300,000—is a direct contribution of the Swiss State Secretariat for Economic Affairs (SECO). By the authority of the National Water Authority (ANA) and the Piura Regional Government, the administration of resources will be provided by PROFONANPE (the Development Fund of Protected Natural Areas of Peru).

“The support of the international cooperation and PARA-Agua has been and is fundamental, it catalyzes the process, it gives credibility, provides opportunity to share experiences and learnings from other countries, it puts the local teams to work and it strengthens the organizations.”

**SANDRA LONDOÑO,
AGUAS DE MANIZALES, MEMBER
OF THE PROMOTER GROUP FOR
THE CREATION OF THE WATER
FUND FOR THE CHINCHINÁ
RIVER WATERSHED**

PARA-Agua played a key role in creating the Piura Regional Water Fund, FORASAN, and provided technical assistance to develop the fund’s operational strategy and helped obtain financing from the private and public sectors. FORASAN has signed formal agreements for financing with the water users’ board and the Aguas sin Fronteras Project, totaling \$34K. In addition formal commitment from the Swiss Cooperation for 300,000 Swiss Francs (\$300K) was committed through an agreement with the water utility in Piura- EPS Grau. The Central America Bottling Company (CBC) and The Nature Conservancy (TNC), formally expressed interest in contributing financially and wants to be part of the fund. Two applications for funding have been submitted and are in evaluation with FONDAM totaling \$54K. The EPS-Grau master plan is to be approved by SUNASS for investments in GI to be channeled through FORASAN. This is an estimate of \$898K of funding from EPS-Grau that would go through the fund.

Today, FORASAN enables local investments in climate change adaptation interventions and creates pathways for innovative finance within and for the watershed.

Elsewhere in Peru, PARA-Agua assisted stakeholders in the Quilca-Chili and Chancay-Lambayeque watersheds in laying a foundation for the creation of water funds. It provided assistance to develop operational tools for the watershed councils including legal ordinances; technical lines of actions, financial projections and scenarios; an operating structure; performance monitoring plans to track progress; and internal regulations to identify and select project activities in each watershed. Moving forward, these private funds will establish their funding commitments and cycles for each watershed council.

In Quilca-Chili, PARA-Agua per request by the watershed council began by supporting an existing environmental fund, FORAM, led by the regional government. This approach proved unfruitful, and Quilca-Chili subsequently undertook its own process to develop a water fund, separate from the regional government. PARA-Agua developed operational tools for the water council’s proposed water fund and supported a private sector workshop to present the water fund proposal. Overall, the private sector is interested in supporting efforts but has requested additional information from the watershed council before it decides how to support the fund. PARA-Agua has assisted the watershed council to develop a presentation for the private sector on its objectives and internal regulations.

In Chancay-Lambayeque, the watershed council received final approval from ANA to establish a water fund for the watershed. With ANA’s approval, Chancay-Lambayeque began its formal process to establish the fund and is now awaiting comments on the legal documents from the two regional governments (Lambayeque and Cajamarca) and the ANA. Private companies were also presented with the water fund and are ready to become part of the fund once the legal procedures are in place.

BUILDING CAPACITY IN THE DEVELOPMENT AND USE OF WATER FUNDS

PARA-Agua launched its first 40-hour online course, “Key Elements for the Design and Sustainability of Water Funds,” in response to the growing demand for guidance on creating water funds. The objectives of the training were to educate participants on (1) the minimum conditions needed to design a water fund and (2) how to manage the fund as a sustainable financial mechanism for watershed water management. The positive response to this course propelled PARA-Agua to collaborate with CapNet (a United Nations Development Programme virtual platform), TNC, AquaNature and FONAG (the Quito Water Fund) to provide a second edition of the course in 2017 on a larger scale. More than 80 individuals from 15 countries in the region participated in the second course.

To complement the second course, PARA-Agua offered a week-long workshop in Antigua, Guatemala, co-hosted with the Spanish Cooperation Agency (AECID), CapNet, TNC and AquaNature, in September 2017. Twenty-five participants from 10 Latin American countries attended the course. The participants were eager to reinforce methodologies and concepts learned during the virtual phase and to exchange knowledge and experiences with their peers. At the end of the workshop, attendees created an action plan to promote water funds to execute upon returning to their respective countries.

Carrying out a virtual and face-to-face water fund course was fundamental in reaching a regional audience. The course allowed PARA-Agua to position the water fund mechanisms more broadly and generated a group of local actors equipped to promote these types of mechanisms. In addition, a regional network of colleagues and water fund promoters was created through the CoP platform. More than 150 professionals from the region now share information, tools and experiences. The high participation of so many countries confirmed the genuine interest to establish water funds as a financial long-term tool for watershed protection.



FORASAN WATER FUND STAKEHOLDER FIELD VISIT
Photo By: Cristina Portocarrero

STRUCTURING FIVE PES PROJECTS IN COLOMBIA

As a part of CONPES 3886, the DNP developed a policy on the implementation of PES activities, directed toward public institutions, the private sector and civil society. The overarching goal is to make investments that guarantee the maintenance and generation of environmental services for the country's strategic ecosystems. PARA-Agua, in collaboration with Ministry of Environment and Sustainable Development (MADS) and the DNP, structured PES projects for the departments of Caldas, Huila, Cauca Valley, Cundinamarca and Caquetá.

CHINCHINÁ PES PILOT PROJECT

After confirming through pre-feasibility and feasibility studies that PES development in Chinchiná would work, PARA-Agua assessed the technical, financial and legal feasibility of executing the project. The project also obtained early consensus on design methods from stakeholders.

PARA-Agua formulated five PES projects that will positively impact 87 municipalities and contributes 20,000 hectares towards the national objective.

After the initial assessment, PARA-Agua supported the creation of a PES pilot to reverse the alteration of ecological processes related to water regulation in strategic areas and ecosystems in 13 micro-basins in Chinchiná, in collaboration with the DNP. This intervention would cover 1,715 ha (or 1.67% of the total area of the Chinchiná River watershed) and 20% of micro-basins. The DNP will be responsible for seeking financing for implementation of the projects, and each territory will be responsible for the implementation of the projects.

PARA-Agua designed the institutional framework for planning, managing, monitoring and supporting the PES implementation in the watershed. The framework was accepted by key actors and institutions in Chinchiná, including CHEC, Aguas de Manizales, CORPOCALDAS, Manizales Municipality, Chinchiná Municipality, Villamaría Municipality and Neira Municipality. At the helm of the implementation is the local environmental organization, Pactos por la Cuenca del río Chinchiná, which is also leading the development of the local water fund. In the long-run, the intent is for the water fund to implement the PES schemes, though this is still pending approval.

REPLICATION AND SCALE-UP

In addition to the work in Chinchiná, PARA-Agua supported four other organizations in charge of formulating the PES proposals in the regions of Huila, Caquetá, Cundinamarca and Cauca Valley in their design and development. All five PES projects were designed using the Logical Framework Approach (LFA), a methodology used for designing, monitoring and evaluating international development projects, in conjunction with the DNP's General Adjusted Methodology (MGA), which guides the process for identifying, preparing, evaluating and implementing investment projects. Please see below for reasons for using both tools.

PARA-Agua further developed the projects through dialogue that focused on identifying and addressing challenges, setting objectives, agreeing on activities and estimating costs. In each department, various agencies lead the charge on preparing the investment projects. Each of these formulating agencies had an opportunity to have its project reviewed by influential organizations such as TNC, the World Wildlife Fund (WWF), Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria (CIPAV), Optim-UNDP, South Pole, USAID's Natural Wealth project, Gobernación de Nariño, Fondo para la Acción Ambiental, Universidad de los Andes, Corporación Autónoma Regional de Cundinamarca and Ministerio de Medio Ambiente. This multi-agency dialogue ensured the viability of these proposals and should continue for future policy development.

These projects (**Table 4**) are now submitted to the Sustainable Colombia Fund and are pending approval, with the exception of Cundinamarca which will be submitted to a separate fund. And, because the projects were developed using both LFA and MGA, they can respond to other funding opportunities such as Petroleum Royalties Fund. These formats will also facilitate the incorporation of these projects into future national and local development plans, which are expected to be developed following local and national elections in 2017.

TABLE 4. FORMULATED PROJECT’S LOCATION, TOTAL COST AND FUNDS NEEDED (USD)

Department	Ha	Total amount (million USD)	Funds needed (million USD)	Number of properties or families	Years
Caquetá	5,500	\$4.33	\$2.88	250	5
Huila	1,405	\$1.66	\$0.52	214	4
Caldas (<i>Chinchiná</i>)	1,715	\$2.32	\$0.99	210	5
Cundinamarca	9,700	\$11.76	\$5.87	270	5
Valle del Cauca-Cauca-Risaralda	9,229	\$5.18	\$3.15	1,500	3
Total	27,549	\$25.26	\$13.40	2,444	

Source: based on PES project documents.

The DNP requested a proposal to replicate the PES projects’ development. In response, PARA-Agua generated a six-month plan to strengthen and implement PES programs at the subnational level with local private and public organizations (municipalities, departments, local environmental organizations and NGOs, among others). This proposal will positively impact 16 of Colombia’s 32 departments and will allow DNP and MADS to advance their 2019 and 2030 PES hectares goal.

“As a formulation process, we have learned a lot and have fulfilled the expectations of having a program in Cundinamarca that can work for the benefit of communities and the environment. The support demonstrated by inter-institutional coordination was very important, as was the action led by PARA-Agua. It was very important to be able to unite different entities in the formulation of a project that is important for the government, and that it complies with its development plan.”

**MARLENY URBINA,
TECHNICAL STAFF FROM ENVIRONMENTAL SECRETARY,
GOBERNACIÓN DE CUNDINAMARCA**

OPPORTUNITIES FOR STRENGTHENING PLANNING SYSTEMS THAT OPTIMIZE WATER USE

Moving from generating and mainstreaming climate change data for decision-making to implementing adaptation activities is a cyclical process. Over the life of PARA-Agua, the project made substantial progress in identifying priority actions and adaptation strategies and seeking out funding to implement national and local level watershed management plans. To support the continuance of this cycle, PARA-Agua recommends the following:

Implement tools for enhanced planning systems. The use of the Scorecard in the Guatapurí, Chira-Piura and Quilca-Chili watersheds gave stakeholders a thorough understanding of their vulnerabilities and priorities for responding to climate change. The next step is to use the Scorecard as a diagnostic lens and planning tool in other watersheds in Colombia and Peru, enabling an evaluation of resilience to watershed impacts from climate change and disaster risk management capabilities. PARA-Agua recommends continued use of this highly-participatory tool, which unlike many other vulnerability analysis tools, is easily understood by both technical and non-technical audiences, thereby minimizing the training needed to use the tool. The only commitment stakeholders must make is to periodically update the open-source tool to ensure an accurate diagnosis of each watershed.

Support the development of water funds for integrated investments in the watersheds. Creating a water fund is a long-term process that must be undertaken only after stakeholders determine it is the best solution to local challenges. International experiences demonstrate that water funds can serve as effective investment platforms to consolidate efforts through one channel and that way have a more integrated approach for investing in the watershed to achieve PARA-Agua recommends future programs help stakeholders determine whether a water fund is right for them; at a minimum, support to conduct feasibility studies should be provided.

The adaptive management strategy used by PARA-Agua has the potential for regional upscaling. PARA-Agua provided guidance on how best to construct a water fund (while considering sustainability requirements) and provided support suited to the requests and unique needs of local stakeholders. In Peru, for example, each of the supported funds has a different structure and the project tailored its support accordingly.

Furthermore, local leadership and ownership are critical to sustainability. When possible, local water users should create the water fund around existing institutions and government entities within a watershed. In Colombia, the water fund was aligned with ongoing governance platforms and became part of an existing management scheme. The presence of enabling conditions in Chinchiná, where governance and coordination mechanisms were in place, enabled the water fund to be created in only a year.

In addition, implementing participatory tools and live exchanges among water fund experiences in the region and with upstream water users was an appropriate strategy to raise interest and begin the process in each watershed. This allowed water users to understand how a water fund works and personally experience the types of GI actions that can be supported by a water fund.



CECOBOSQUE MEMBERS AT GENDER WORKSHOP
Photo By: Mariela Rodriguez

CROSS-CUTTING: GENDER

Neither the impacts of climate change nor the responses to it are gender-neutral. In areas ranging from health to water resources to transport, women are more vulnerable to climate change than men—primarily because they constitute the majority of the world’s poor and are more dependent on natural resources that are threatened by climate change for their livelihood. Risks associated with climate change threaten to reinforce gender inequalities and even erode progress toward gender equality that has been made in Peru and Colombia.

PARA-Agua sought to consult with women—including female thought leaders in the science and policy-making communities—in order to generate broad-based, policy-oriented data that responds to both men and women’s challenges. Through these discussions and our Gender Analysis, the project gained a deeper appreciation of the factors that influence women’s vulnerability, from access to resources to restricted rights, migration patterns and participation in community and household decision-making. The project took into consideration how certain factors that limit women’s participation in and contribution to the climate change agenda—both in policy and practice

In response, PARA-Agua sought to incorporate contextually-relevant gender considerations into project activities. The project deemed this especially important given the unique role women play in the stewardship of natural resources. With their knowledge, they can shape adaptive mechanisms in the watersheds where PARA-Agua works.

PARA-Agua succeeded in streamlining gender considerations into its activities and developing institutional networks to carry on the project’s work. In doing so, the project celebrated its successes and noted its challenges and lessons learned, as discussed below.

First and foremost, gender-considerations must be incorporated into core project activities and contribute to overall objectives. Gender considerations should be integral to the implementation of the program. Similarly, the project should solicit from stakeholders a commitment to address gender issues with the same seriousness as other project activities.

Second, PARA-Agua saw the importance of working at both the community and national levels. Working with community stakeholders provided an opportunity to ensure project activities acknowledge and responded to the constraints to women’s full participation in decision-making processes. Working at the national level enabled the project to identify local issues—like water license ownership—that likely affect women across the country, in hopes it can drive policy discussions. In addition, national-level work has the potential to amplify and expand local best practices.

Third, PARA-Agua learned that incorporating gender approaches into climate change adaptation tools varies in complexity. Tools linked to social processes, such as the Scorecard, can easily be adapted to include gender considerations. Tools grounded in the hard sciences, like WEAP, take more time and research to adapt.

Fourth, PARA-Agua found that close coordination with national counterparts contributed to the sustainability of the intervention. In the case of Peru, activities developed with the Technical Secretariats of the watersheds have contributed to the improvement of gender understanding. In Colombia, results of project activities were shared with partner institutions in order to provide continuity. These and other national partners are equipped to continue advocating social changes that will increase the use of gender approaches in water resource planning and climate change adaptation in the long run.

In sum, although PARA-Agua has raised awareness of the importance of engaging women in climate change adaptation efforts, the efforts must continue with local leadership and ownership. Some additional gender-related work completed by PARA-Agua follows.

ASOCIACIÓN ARTESANÍAS LA POLA

PARA-Agua partnered with Asociación Artesanías La Pola, an organization created by an internally displaced victim of conflict, to provide training on the impacts of climate change and its potential effects on coffee production. The training was also designed to help women recognize their potential to lead and participate in decision-making processes. Until PARA-Agua, these women acknowledged that they were not aware of how they could take steps towards adaptation and resilience to climate change for their families or their community.

Members now have at their disposal strategies to respond to the risks of climate change, including diversifying their sources of income so that they rely less on agriculture, which is particularly susceptible to the impacts of climate change. As a result, the association is developing a range of eco-friendly handicrafts to sell in ecotourism communities, complete with their own logo. To date, these new ventures have increase members’ income approximately 10%. They also joined efforts with Asociación Mujer y Café to reforest water sources to demonstrate the importance of preserving and caring for the Chinchiná River watershed to all generations.

“We have received a lot of information and knowledge regarding environmental responsibility. We as women can create awareness and build commitment to care for our environment and share this with our family members.”

**YENYYOHANA ORTIZ,
MEMBER OF ASOCIACIÓN
ARTESANÍAS LA POLA**

MUJERES POR UNA CIUDAD VERDE

In FY17, Empresa Metropolitana de Aseo (EMAS) Manizales (Manizales Metropolitan Sanitation and Public Services) launched the social-environmental program *Mujeres por una Ciudad Verde* (Women for a Green City). This initiative promoted female environmental leaders and the roles they play in preserving environmental and natural resources and promoting sustainable development to maintain the community of Puertas del Sol and the city of Manizales. Through targeted capacity building and environmental awareness training, PARA-Agua empowered women to understand their environment, culture and the important role they play in using and conserving water resources.

In addition, PARA-Agua coordinated a tour of the Blanco River Reserve, where women saw firsthand the source of nearly 40% of drinking water for the local population. The women also had the opportunity to tour the Emerald Sanitary Landfill, where they learned about the process of waste disposal and the importance of environmental management. Because of the tour, the women committed themselves to reducing their impact on the environment, in part by paying attention to how they use water and dispose of garbage and toxic waste. They also have initiated efforts to create and sell accessories from recycled materials.

DEVELOPING YOUTH

The Red Agua Joven (“Network of Water Youth”) is a volunteer program promoted by the regional water authority (AAA) Caplina Ocoña in the Quilca-Chili watershed. This group consists of students from various universities in Arequipa who raise awareness of water culture. PARA-Agua has trained more than 60 students on gender gaps in water resources management and the vulnerability of women to climate change. Network members have also been trained on how to construct ecological and low-cost technology devices (solar cookers, efficient cookers and hand pumps for water transport). As a result of PARA-Agua’s workshops, a small committee of students is now planning to introduce and implement these technologies among poor Andean communities as part of their social outreach efforts. In addition, the group has indicated their commitment to conducting a study of the water footprint in universities, differentiated by gender, in the coming months.



WATER METER, CHANCAY-LAMBAYEQUE, PERU
Photo By: Meg Findley



FORASAN WATER FUND TOUR, PIURA, PERU
Photo By: Cristina Portocarrero

THE WAY FORWARD

LESSONS LEARNED

Throughout the implementation of project activities, PARA-Agua has celebrated its successes and noted its challenges and lessons learned. Below, we present both overarching and country-specific lessons learned that we hope will help inform future interventions in Peru and Colombia.

OVERARCHING

Anchor project activities to the priorities of the government.

In both Peru and Colombia, PARA-Agua introduced tools and methodologies that complemented water resources management plans (Peru) and territorial plans known as POMCAs (Colombia). By aligning to official government actions, PARA-Agua strengthened institutional commitments and achieved better results.

Recognize and strengthen existing policies and procedures for the sustainability of assistance.

Both countries—which have already received significant international technical assistance—have sophisticated processes and policies in place, some of which simply need fine-tuning. Future program assistance should be strategic and focused on refining existing policies, filling in gaps and/or addressing bottlenecks. Such streamlining of existing procedures can help jumpstart project activities.

Institutionalize professional growth and use technology in capacity building efforts.

The demand for training, knowledge sharing and capacity building in the region is strong and growing. Institutions should be encouraged to incorporate project training offerings into their professional growth systems; at a minimum, institutions should be encouraged to give employees the time to attend training sessions and to create space for employees to apply what they have learned. Similarly, projects should provide training materials in a form—e.g., tutorial videos or videos of training sessions that can be viewed as time allows.



Promote local stewardship in counterpart institutions to ensure the scaling up of best practices. Projects should identify and target counterparts with the potential to become leaders and/or mentors in their communities. Targeting these individuals fosters stewardship and the scaling up of best practices. This approach's success is evidenced in the watershed modeling groups established in Peru and the leadership role assumed by Universidad Tecnológica de Pereira on hydrological modeling in Colombia.

Identify sources of financing at the beginning of the planning process. Projects should stress to counterparts the importance of understanding funding requirements before beginning the planning process. Funding requirements might influence what projects are developed or how they are designed. Projects should assist stakeholders in understanding the guidelines on how to access public and/or international financing to avoid duplicative or wasted work.

Promote the establishment of water funds to increase financing options in the watersheds. Water funds are innovative vehicles for channeling private sector investments designated for water resources management. These mechanisms have proven to help protect and restore upstream watersheds and improve long-term governance of water resources by creating a vested interest among various stakeholders in conservation efforts. The use of water funds should be continued when analysis shows it to be the best solution for stakeholders.

Empower vulnerable populations for long-term sustainability of interventions at the community-level. Women and other vulnerable groups can be effective agents of change and support implementation of adaptation actions at the community level. With the proper support and empowerment, these groups could make significant contributions to improve water resources management. Peer exchanges and training can equip these groups with skills and help them find strength in numbers. In addition, working through women's organizations can help projects expand their reach.



CHANCAY-LAMBAYEQUE WATERSHED, PERU

Review regulations that prevent participation from vulnerable populations in decision-making processes. Women, especially in rural areas, lack access to decision-making processes. As a result, decisions tend not to reflect women's needs or perspectives, leaving women particularly vulnerable to the impacts of climate change. To make the decision-making process more accessible, it is important to review existing regulations and policies and suggest ways they can more clearly incorporate gender norms. Oftentimes, communities and community leaders do not realize that the existing regulations hinder women from participating in the decision-making process.

Anticipate and leverage responses to extreme weather events during the watershed planning and infrastructure design phases. In Peru, the coastal El Niño phenomenon caused flood disasters and infrastructure damage. In Manizales, Colombia, a water shortage left the urban center without clean drinking water for 15 days. Such events highlighted the need for more resilient institutional management and response

frameworks, as well as better designed infrastructure systems to withstand extreme weather events. While needs for disaster preparedness and response are urgent, it is also important to prioritize and invest in measures to incorporate climate resilient approaches to infrastructure development and/or rehabilitation. Incorporating such considerations during early watershed planning and infrastructure design phases can help minimize disaster impact and save capital costs and human lives.

Promote stakeholder collaboration with other donors. Both Colombia and Peru should further strengthen their ties with the AECID, the Spanish Cooperation Agency. AECID developed an understanding of the project through collaboration with PARA-Agua on two very important meetings, one on watershed councils in Cartagena de Indias, Colombia, and the other on water funds in Antigua, Guatemala. AECID has also been instrumental in advancing further meetings amongst watershed councils in Latin America and the Caribbean to share lessons learned and knowledge in water management. It can provide a source of continuity for stakeholders.



PERU

Promote greater coordination and dialogue between key government entities in Peru to synchronize planning and investment efforts in the watersheds. Because numerous agencies play a role in water resources management in Peru, promoting coordination and information between key institutions at the national, regional and municipal levels is key. In particular, more dialogue is needed during formal planning processes that relate to investments for conservation and protection of the watersheds. Better coordination and more dialogue will not only help agencies avoid duplication of efforts but will also identify synergies that save costs, accelerate results and scale up impact.

Continue to emphasize the importance of policy-oriented data to researchers. Continued efforts are needed to convey to research institutions in Peru that a key part of their mission is to generate data that can be used for planning and incorporated into policy-making. Future programming should not assume that this role is fully understood or embraced by research institutions. In addition, while data (i.e. hydrological, climatological,

socio-economic) generation and sharing are important, future programming should help research institutions put data into language that policymakers can understand and use in policy development.

Facilitate the adoption of tools that help evaluate design options for resilience to climate change and flood risk. The flood risk management tool piloted in the Chancay-Lambayeque by PARA-Agua introduced stakeholders to climate-sensitive approaches for the comparative evaluation of infrastructure design options as a means of increasing resilience to climate change and flood risk. Although the intervention was limited to introducing such tools, the project found there was a significant demand by watershed stakeholders in Peru for tools that can help them make requests for funding more attractive by demonstrating to investors that the project and engineering design have been carefully evaluated and screened for risks.

Promote increased coordination between watershed councils and water utilities on GI planning for implementation of the national Framework for Ecosystem Services Compensation (Mecanismos de Retribución de Servicios Ecosistémicos, or MRSE). Under the SUNASS, through the Modernization law, various water utilities in Peru, with SEDAPAL leading the way, have been authorized to allocate a percentage of the water tariff for investments in GI and have developed or are developing GI investment plans. Watershed councils, where they exist, and other institutions with resources to invest in GI should engage in a holistic planning process to achieve a fully-integrated GI implementation strategy for the watersheds.

Strengthen the capacity of stakeholders and the local governments to formulate and evaluate GI projects and to access existing financing mechanisms. Project formulators and evaluators within the government (national, regional and municipal) and water utilities have limited capacity to formulate and evaluate GI projects in the new Invierte.PE system. Establishing partnerships with experienced organizations in Peru such as the SEDAPAL Sembramos Agua program, AQUAFONDO, The Nature Conservancy, ONG Alternativa and others could prove fruitful in strengthening government and project formulator capacity.



COLOMBIA

Facilitate coordination between national and regional government institutions during the implementation of the PES and water funds mechanisms.

Effective communication and coordination between the DNP, Ministry of Environment and Sustainable Development and Regional Autonomous Corporations should be strengthened. Ensuring that there is clarity between stakeholders on their roles, responsibilities and jurisdiction limits will be critical to the sustainability of the financial mechanisms.

Build project fomulators' capacity to develop bankable projects. Project formulators in the region (e.g.,Autonomos Regional Corporations) lack the capacity to formulate projects that meet requirements for financing through the PES and water fund mechanism. Developing guidelines on how to structure projects for financing through these mechanisms should be a priority for stakeholders in the Chinchiná watershed. Technical assistance from the donor community will require emphasis in this area.

Jumpstart implementation of PES projects. Stakeholders claim that Colombia is overflowing with assessments and research and that they are ready for implementation. Future projects should support the implementation of the five PES projects structured by PARA-Agua. If successful, these projects would generate real evidence of the effectiveness of the PES mechanism and facilitate buy-in from key institutions such as the Ministry of Agriculture. Such evidence and support could then help promote the use of PES as a viable platform for investments by the productive sectors and other groups such as coffee grower associations.

Facilitate strategic alliances between watershed councils and local mentor organizations to strengthen governance processes in the watershed. Build on the partnership between the Chinchiná watershed council and organizations such as Alisos to strengthen the capacity of council members in participatory governance processes and negotiation and trade/off analysis skills.

SUSTAINING PARA-AGUA'S SUCCESS

STAKEHOLDER DRIVEN INTERVENTIONS

PARA-Agua's success is largely attributable to the commitment by local counterpart institutions to embrace and adopt the tools, methodologies and skills provided by the project. Throughout implementation, the project aimed to anchor activities to the priorities of key local institutions. Central to PARA-Agua's sustainability approach was also the promotion of local stewardship by beneficiaries, allowing the replication of best practices and peer-to-peer exchanges that have now taken a life of its own. To make any type of assistance sustainable, it is a fundamental prerequisite that the institutions themselves find the assistance useful so they are willing to allocate resources and continue to build on these experiences in the long-term.

As mentioned previously, the main take away from having worked in emerging economies such as Peru and Colombia is that institutions in these countries, though with some challenges, operate effectively, and so future program assistance should be strategic and focused on refining existing policies, filling in gaps and addressing bottlenecks, which in turn will guarantee sustainable investments in these countries.

LEGACY CONSORTIUM

The PARA-Agua project facilitated the creation of a Legacy Consortium to strengthen the sustainability of the work carried out by the project. This partnership is between project partner The Mountain Institute (TMI) and the International Center for the Investigation of the El Niño Phenomenon (CIIFEN). These entities are permanently established in Peru and Ecuador and share common interests. They have agreed to continue promoting key PARA-Agua initiatives that align with their organizational mission objectives and future programming. In order to provide robust contributions in the long-run, both have submitted and will continue to submit proposals and cultivate relationships with potential donors to finance future activities, including continued operation of the Science for Adaptation CoP established by PARA-Agua.

After more than four years of implementation, the PARA-Agua project is pleased to have worked with highly skilled counterparts and partners in the field. The project is hopeful that all assistance and support will be sustained for years to come.



CHANCAY-LAMBAYEQUE WATERSHED, PERU

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