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Journey towards Water Security

Results to date

Natural Infrastructure for Water Security Project

February 2024

FOREST TRENDS | CONDESAN | SPDA | EcoDecisión | Imperial College London

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The author of this updated version of Journey Towards Water Security would like to acknowledge and thank authors of the first version published in 2021, Gena Gammie, Lucas Benites, Fernando Momiy and Renán Claudio Valdivieso, for their contributions to the foundation of this publication.

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2nd edition, February 2024

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This publication is made possible by the support of the American People through the United States Agency for International Development (USAID) and the Government of Canada. The contents of this publication are the sole responsibility of Forest Trends and do not necessarily reflect the views of USAID or the United States Government or the Government of Canada.

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SHARED IMPACT

Photo: Edith Lucinda Gonzales Ore

This report presents the principal results of the Natural Infrastructure for Water Security Project (NIWS) from its beginning in December 2017 through September 2023, which were achieved together with a large group of partners, including over 50 public entities (national, regional, local, public companies), over 7 private entities, and over 12 entities from civil society and academia.

We are grateful for their collaboration and leadership towards a sustainable and resilient future. These partners include:

- **Ministry of Agricultural Development and Irrigation of Peru (MIDAGRI)**
- **Ministry of Culture of Peru (MINCUL)**
- **Ministry of Education of Peru (MINEDU)**
- **Ministry of Environment of Peru (MINAM)**
- **Ministry of Housing, Construction and Sanitation of Peru (MVCS)**
- **Ministry of Women and Vulnerable Populations of Peru (MIMP)**
- **Regional governments of Piura, Tumbes, Lambayeque, La Libertad, Ancash, Ica, Arequipa, Cusco, San Martín, Moquegua, Ayacucho and Huancavelica**
- **Municipal Districts of Carumas, Calacoa and San Andres de Tupicocha**
- **National Center for Disaster Risk Estimation, Prevention and Reduction of Peru (CENEPRED)**
- **National Forestry and Wildlife Service of Peru (SERFOR)**
- **National Hydrology and Meteorology Service of Peru (SENAMHI)**
- **National Institute for Glaciers and Mountain Ecosystems Research of Peru (INAIGEM)**
- **National Authority for Reconstruction with Changes (ARCC)**
- **National School for Public Administration of Peru (ENAP)**
- **National Service for Natural Protected Areas of Peru (SERNANP)**
- **National Superintendence of Water and Sanitation Services of Peru (SUNASS)**
- **National Water Authority of Peru (ANA)**
- **Piuray-Ccorimarca Microwatershed Management Committee (CGMPC) and the Youth Association (AJOMPIC)**
- **Administrative water authorities (AAA) of Jequetepeque Zarumilla, Cañete Fortaleza, Caplina Ocoña**
- **Agrarian Productive Development Program of Peru (AgroRural)**

- **D.N. Batten Foundation**
- **Management Committee of MERESE Moyobamba**
- **Moquegua Crece collaborative development platform**
- **Regional Initiative for Hydrological Monitoring of Andean Ecosystems (iMHEA)**
- **Private sector partners including: Anglo American Quellaveco, Mitsubishi Corporation Foundation for the Americas and URBI**
- **Water utilities including in particular SEDAPAL (Lima), SEDACUSCO, EPS Moyobamba, EMAPA San Martin (Tarapoto), EPS Rioja, SEDAPAR (Arequipa) and EPS ILO.**
- **Watershed Councils of Chira-Piura, Quilca-Chili, Vilcanota-Urubamba, Chillon-Rimac-Lurin, Chancay-Huaral and Chancay-Lambayeque, as well as the Mayo Sub-watershed Committee**
- **Local water authorities (ALA) of Chancay Lambayeque, Caplina Locumba, Chancay Huaral, Jequetepeque, and Tumbes**
- **Special Binational Project Puyango Tumbes (PEBPT)**
- **Special Project Jequetepeque Zaña (PEJEZA)**
- **Special Project Olmos Tinajones (PEOT)**
- **Subsectoral Irrigation Program of Peru (PSI)**
- **Over 240 communities and local populations involved in NIWS activities and projects**
- **Non-governmental organizations (NGOs) including: Nature and Culture International, Descosur, Instituto de Montaña, CEDEPAS Norte, desco, Alternativa, Caritas Peru, Caritas Chosica, Aquafondo and Arariwa**
- **Universities: University of Engineering and Technology (UTEC), la Molina Agrarian University (UNALM) and Pontificia Universidad Católica del Perú (PUCP)**
- **Professionals and specialists from various public and private entities who participated in the development of studies, tools, plans, projects, and training courses**

These results have been achieved despite extraordinarily complex circumstances, including unprecedented health, economic, and social crises due to the COVID-19 pandemic. In under six years we have seen six Peruvian presidents, successive cabinet changes, and frequent changes in our counterparts at the national, regional and local levels. Our achievements to date have been the result of teamwork, adaptive management, and above all a shared commitment with our partners mentioned above, to work together for a water-secure, climate resilient, and inclusive future for Peru.

Photo: Forest Trends

INTRODUCTION

The droughts, floods, fires, and landslides of recent years are tangible evidence of Peru's vulnerability to water and climate risks. Natural infrastructure—such as forests, wetlands, grasslands, and shrublands—along with traditional practices to conserve water and soils, help reduce these risks. It also provides important co-benefits, like climate change mitigation and biodiversity conservation.

Over the last decade, Peru has garnered international attention for leading a paradigm shift to incorporate natural infrastructure as a central solution to address water risks. "Natural infrastructure" was recognized in the legal framework that governs Peruvian public investments, and the drinking water sector made significant policy and financial commitments to contribute to natural infrastructure conservation – complementing conventional funding sources for environmental conservation. Between 2008 and 2021, investments in natural infrastructure for water security in Peru grew from less than US$ 2 million to about US$ 21 million per year. In addition to these investments that are already reaching the ground, more are in the wings.[1] In the last 15 years, Peru's drinking water sector has increased commitments for nature-based solutions investment from zero to over US$ 50 million[2], through innovative financing mechanisms for restoring and conserving ecosystem services, called MERESE.[3]

Despite these extraordinary advances, the path to effective conservation of the natural infrastructure critical to Peru's water security has not yet been guaranteed. SThere have been numerous challenges to scaling up this new approach, including: the lack of a robust portfolio of quality projects; a lack of capacity, tools, and information; and critical gender and social gaps. Since 2017, NIWS has been working to chart this path by addressing obstacles and gaps along the way with Peruvian stakeholders, towards a more water secure future.

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[1] *Estrada et al (2023). Recuperando la Fluidez: Estado de Inversión en Acciones en Infraestructura Natural para la Seguridad Hidrica en Peru. Forest Trends. https://www.forest-trends.org/publications/ recuperando-la-fluidez- estado-de-la-inversion-en-acciones-en-infraestructura-natural-para-la-seguridad-hidrica-2022/*

[2] *SUNASS (2022). Boletín estadístico SUNASS en cifras. https://cdn.www.gob.pe/uploads/document/file/3205397/Sunass-en-cifras-5-1.pdf.pdf?v=1654384733*

[3] *Benites, Gammie (2021). Abriendo el Caño: Esttado del Financiamiento en infraestructura natural para la Seguridad Hídrica en Perú. Forest Trends. https://www.forest-trends.org/publications/abriendo-el-cano-estado-del-financiamiento-en-la-infraestructura-natural-para-la-seguridad-hidrica-en-el-peru-2021/*

The Natural Infrastructure for Water Security Project

Purpose: Increase investments in gender-sensitive natural infrastructure that strengthen water security and climate resilience of prioritized populations in Peru.

Implementing Partners:

- Forest Trends (lead)
- CONDESAN
- SPDA
- EcoDecision
- Imperial College London

Funding and support:

- USAID
- Government of Canada

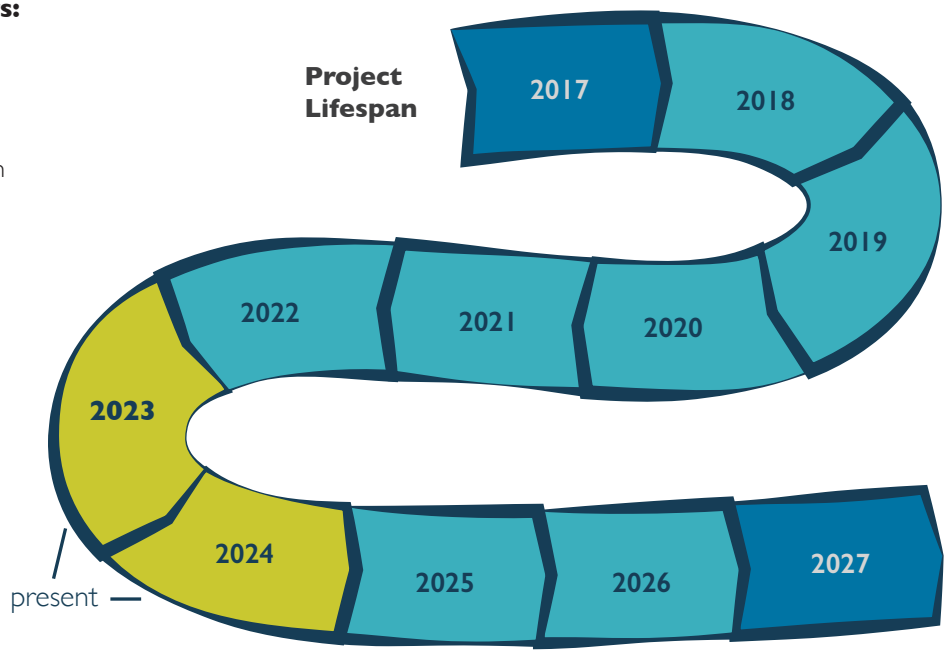


Photo: Forest Trends

Kick-starting the journey

NIWS has developed a robust portfolio of over US$ 370 million in natural infrastructure investments that respond to priority water risks, with US$ 36 million already mobilized.


Photo: Forest Trends

> ***We now know that natural infrastructure is a fundamental tool for Disaster Risk Management.***

Raúl Romero, *Regional Government of Piura*

In 2017, a significant part of the demand to address water risks with natural infrastructure could not be met with solid public investment projects. In addition, capacity gaps and bureaucratic obstacles meant that projects took an average of 4.5 years to begin execution after project design was approved.[4] These obstacles severely limited the execution of investments in natural infrastructure for water security.

Now, six years later, a robust, diverse portfolio of natural infrastructure projects has been developed with NIWS support—and these projects are beginning to benefit communities on the ground.

[4] *Ibid*

Together with public, private, local, and civil society partners, NIWS has developed a portfolio of natural infrastructure investments valued at more than US$ 370 million.[5]

Each of these investments are designed with stakeholder communities to align with local contexts. Together, the projects in the NIWS portfolio cover more than 240 communities, 26 watersheds, and 14 regions of Peru.

Through technical and financial assistance, capacity building, tool and information development, and strategic support to key institutions, NIWS has developed a project portfolio that largely responds to the demand for natural water infrastructure in Peru. The portfolio contains 80 projects designed to address water and climate risks through nature-based solutions that will improve water regulation and control erosion.

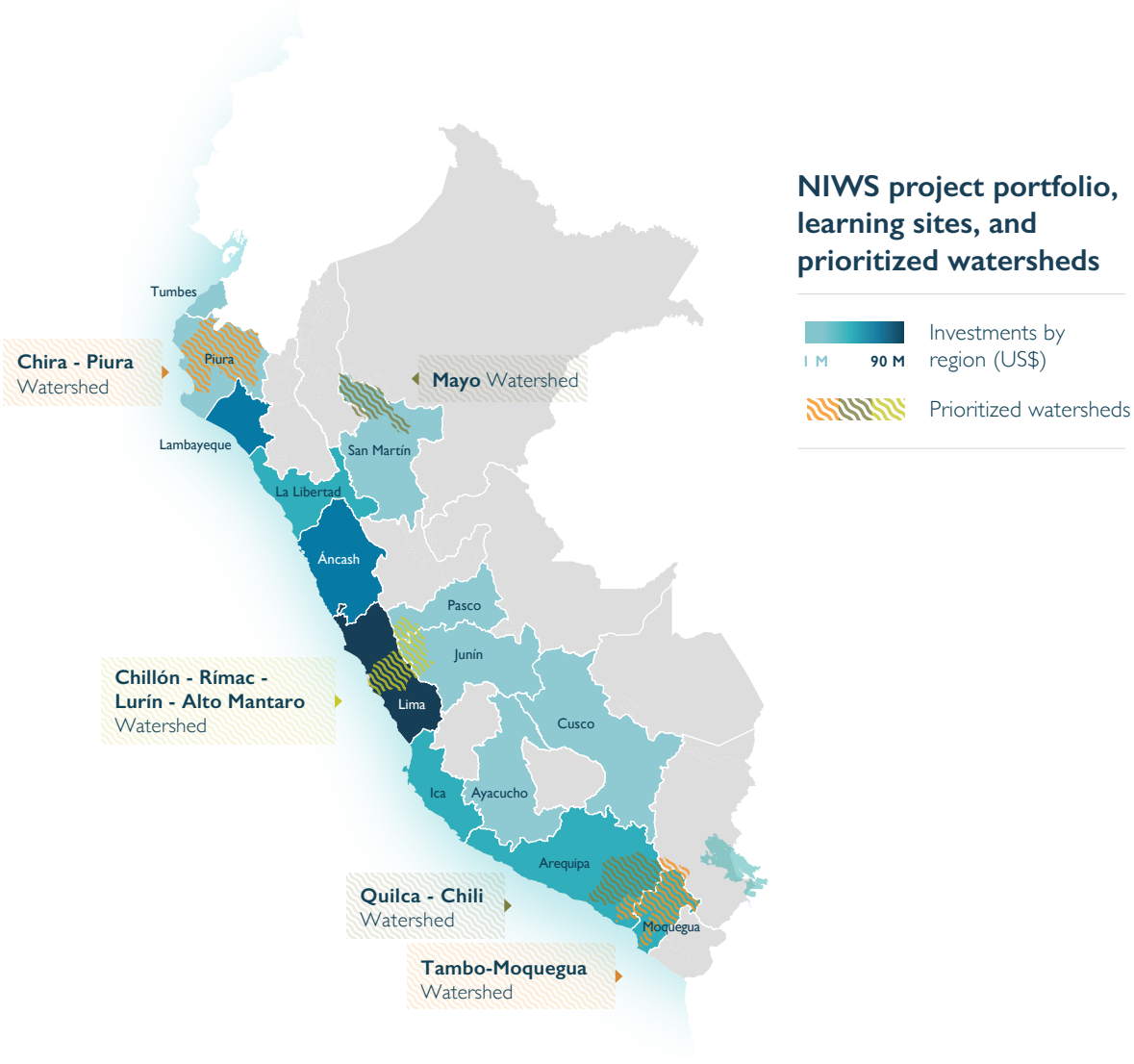
The portfolio was developed using a demand-driven approach, working with funding sources to design solutions to their priority water and climate risks. The NIWS consortium has found that the most important sources for financing for natural water infrastructure in Peru are currently:

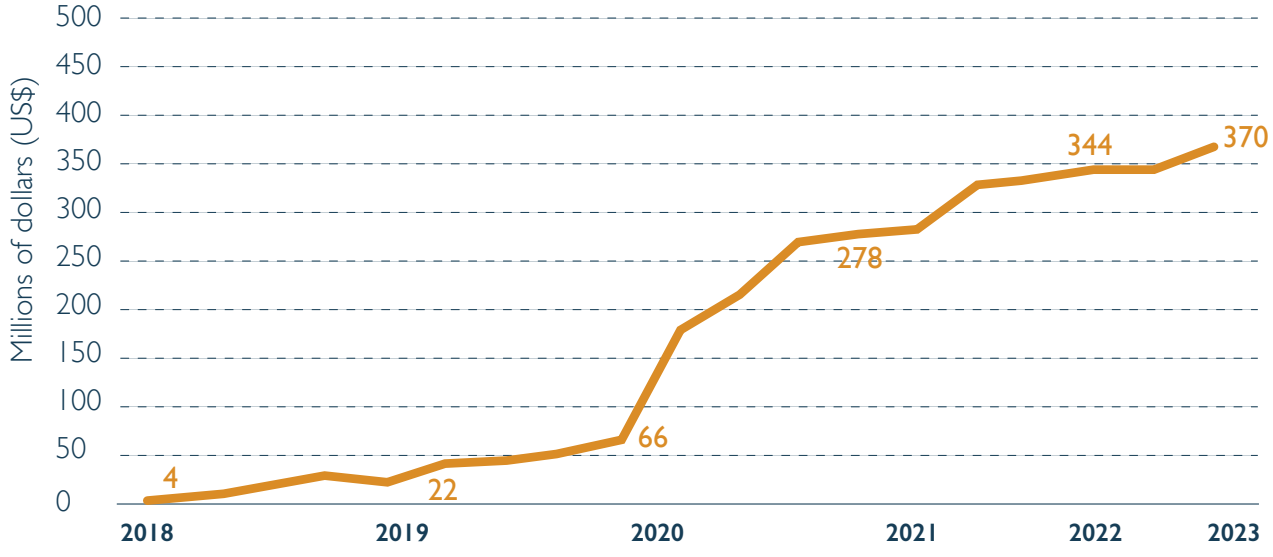
1. **Regional governments:** Regional governments have been leading investments in natural infrastructure for water security in Peru since 2017, and they continue to be a critical source of public investment in watershed services. The NIWS portfolio includes investments by the regional governments of Lima, Piura, Arequipa, Moquegua, Ayacucho, Cusco, and San Martín– together worth more than US$ 34 million (M). Of the 12 regional government projects in our portfolio, two have begun implementation: Pusmalca (Piura) and Huamanga (Ayacucho). Four others have been mobilized and are underway: Chancay Huaral (Lima), Tupicocha (Lima), El Faique (Piura) and Samanga (Piura).

2. **Water utilities:** Water utilities represent to the largest number of projects in development in the NIWS portfolio, the execution of which will be financed with revenues collected from MERESE tariffs. SEDAPAL, Lima's water utility, leads the financing with more than US$ 19 M in its natural infrastructure portfolio. With NIWS support, SEDAPAL has already started to execute its MERESE portfolio in the Carampoma wetlands; after wetlands the installation of a nursery in the Zárate Forest Reserve; maintenance of another forest nursery in the San Antonio community of Huarochirí; and the installation of fencing to support improved livestock management in the rural community of San Francisco de Asís de Yantac.

[5] *Conversions of our portfolio values from Soles (S/.) to Dollars (US$) are calculated using the Sept 2023 exchange rate (0.2708).*

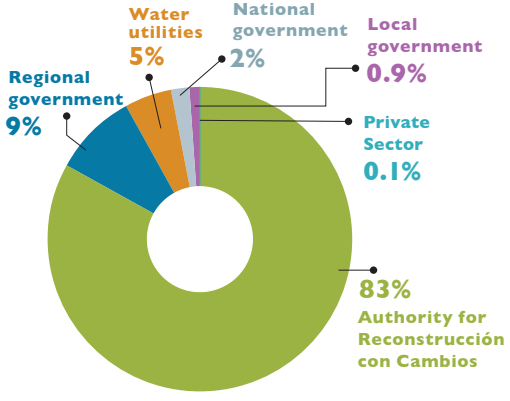
Additionally the utility has mobilized more than US$ 4 M and secured project design approvals for more than US$ 9 M in new investments in Lima's water sources. Arequipa's water utility, SEDAPAR, has also begun to implement its MERESE intervention plan. US$ 40 000 was executed in 2022, and ten times that amount was approved for 2023. The NIWS portfolio also includes investments from water utilities serving Moquegua, Moyobamba, Tarapoto, and Cusco.





Total value of portfolio of investments in natural infrastructure for water security developed with NIWS support (December 2023).

3. **Reconstrucción con Cambios (ARCC):** More than 80% of the value of the NIWS portfolio corresponds to this new and powerful source of financing for natural infrastructure; this program leads a multi-billion dollar national strategy for disaster risk management. With NIWS' support, ARCC has included natural infrastructure measures in its integrated solutions for disaster risk management in 14 vulnerable coastal watersheds; to date, two riparian defense projects valued at more than US$ 540 000 have been mobilized and 20 projects valued at more than US$ 300 millions have secured project design approvals, with more in the pipeline. ARCC investments will be executed within the framework of the Government of Peru's Agreement with the United Kingdom. The aim of this partnership is to accelerate and strengthen ARCC investments an innovative partnership across countries to bring these solutions to the ground. The ARCC was a temporary institution that closed in 2023. NIWS' advocacy at the highest levels of decision making has ensured that ensured that, as of 2024, all of the projects in ARCC's portfolio are transferred to the newly established National Infrastructure Authority (ANIN) for implementation.



Investments in natural infrastructure for water security under development with NIWS support, by funding source

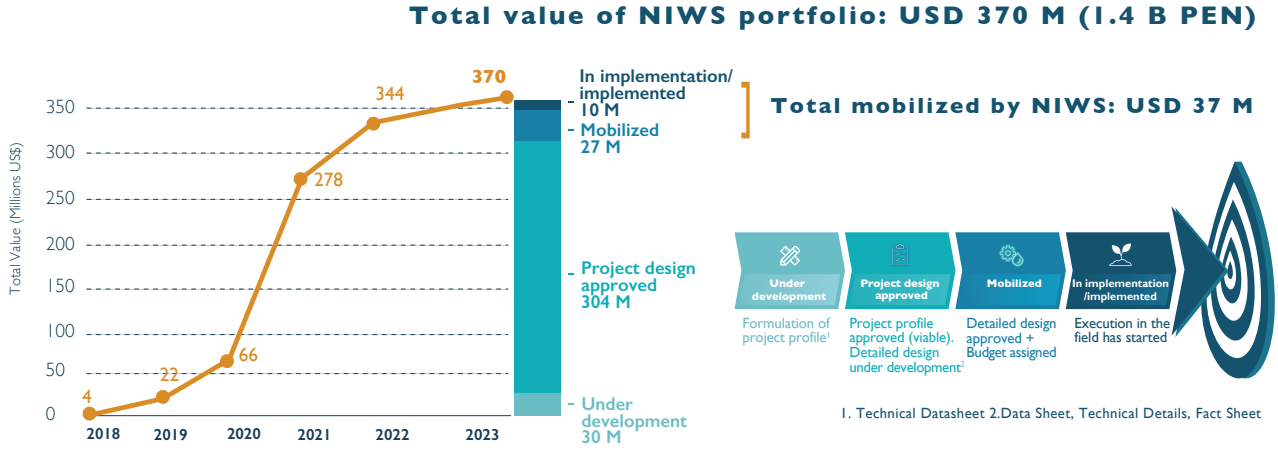
4. **Private Sector:** Although the total value of private investment in natural infrastructure is much lower public investment, the private sector has the ability to act swiftly, helping accelerate action and strategically support larger public investments. For example, in Moquegua, NIWS has developed an innovative model of public-private collaboration for natural infrastructure in which a private company, Anglo American Quellaveco, and a private foundation, Mitsubishi Corporation Foundation for the Americas, are each funding pilot investments. These investments are generating information, momentum, and capacities that will help accelerate and improve a regional portfolio of natural infrastructure funded by the regional government. NIWS has also developed proposals to finance and implement public investments through Peru's innovative Obras por Impuestos mechanism (OxI), which allows private companies in Peru to finance and execute public investments in exchange for reducing future tax payments. NIWS has secured significant interest in this mechanism (OxI) towards execution in the years to come.

Photo: Forest Trends


Photo: Forest Trends

As a result of NIWS' support, US$ 36 million of new natural infrastructure investments have been mobilized, of which US$ 10 million have already begun implementation.

NIWS has also secured project design approvals for US$ 304 million in new natural infrastructure investments. The value of these "viable" projects in the portfolio is six times the total value of viable investments in 2017.



Total value of projects supported by NIWS, by stage (December 2023).

HIGHLIGHTED PROJECT SUPPORTED BY NIWS: MILLOC

Milloc Project in the Rural Community of Santiago de Carampoma, Lima

With NIWS' support, Lima's water utility has implemented its first investment in its source watershed and is starting to rehabilitate of a vital wetland

Photo: Forest Trends

Since 2015, the residents of Lima, Peru have paid an additional fee included in their monthly water bill to the local water utility, SEDAPAL, for the conservation and protection of the watersheds that provide water to the metropolis. In March 2021, with NIWS' support, SEDAPAL began the implementation of the first project using these funds.

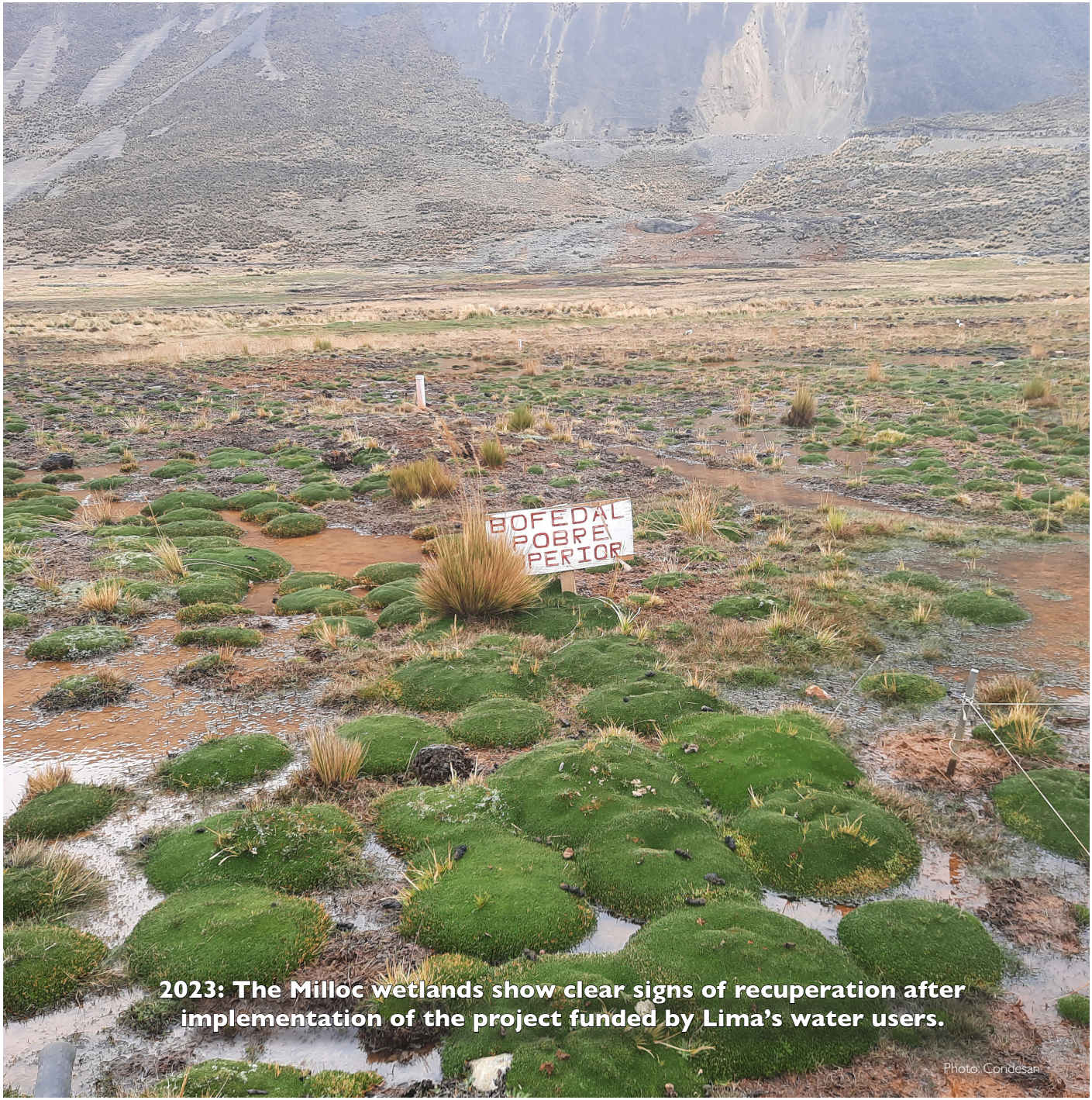
Through this project, approximately US$ 800 000 was invested in restoring the critical Milloc wetland, located 4,300 meters above sea level in the Santiago de Carampoma community. The project was implemented with local community members, providing much-needed employment opportunities in 2020 and 2021, when the COVID-19 pandemic had severely impacted the economy. Ongoing monitoring of the project area led by NIWS shows that the wetland has started to recover, after being decimated by peat extraction.

A city of over nine million people, Lima grapples with severe water deficit during the dry season, when the Andean rivers that supply water to Lima and the coastal region run low. Climate change is exaggerating this seasonal flow pattern, making water storage from the rainy season to the dry season even more important. In addition to human-made reservoirs, meeting Lima's water demand depends on maintaining and restoring the water storage in its natural infrastructure – the wetlands, grasslands, and forests located in the upper reaches of its watersheds.

Beyond supporting implementation of its first project in the Milloc wetlands, NIWS' support to SEDAPAL has helped to develop and mobilize a portfolio of watershed investments while strengthening the utility's institutional capacities and streamlining the processes. Overall, NIWS's support has reduced the time from project idea to agreement with local communities by 73 %. In addition to SEDAPAL, NIWS has supported water utilities serving the cities of Cusco, Arequipa, Moyobamba, Tarapoto, and Ilo to develop and implement similar investments in their source watersheds.

2019: Before project implementation began, the Milloc wetland was severely degraded as a result of drainage and peat extraction.

Photo: Condesan



2023: The Milloc wetlands show clear signs of recuperation after implementation of the project funded by Lima's water users.

Photo: Condesan

HIGHLIGHTED PROJECT SUPPORTED BY NIWS: CALACOA

Building capacity for the restoration economy in San Cristobal de Calacoa, Moquegua

An innovative partnership with the private sector in Moquegua is preparing for large scale ecosystem restoration projects

Photo: Huarango Nature

The Regional Government of Moquegua, together with partners like Anglo American Quellaveco and a private foundation, Mitsubishi Corporation Foundation for the Americas, recognize the importance of natural infrastructure for the region's future water security and sustainable development. That recognition, coupled with rapidly increasing revenue available to the regional government from mining rents and NIWS' technical assistance, is driving a growing portfolio of investments in development for natural infrastructure currently valued at US$ 10 million.

When those investment projects are approved, they will require significant new capacities to implement including the need to produce native plants on the order of one million seedlings per year.

To help to address this looming capacity crunch and ensure that upstream communities are included in Moquegua's burgeoning restoration economy, NIWS partnered with the Mistubishi Corporation Foundation for the Americas (MCFA) in 2020, which contributed US$ 300 000 through a grant made to NIWS' lead implementing partner, Forest Trends. With this support from the private foundation, the NIWS team has worked with local communities in the San Cristobal de Calacoa district to build capacities to produce native seedlings that will be in demand for natural infrastructure restoration investments. The project has invested in infrastructure improvements to local nurseries to support expanded projection, including the installation of two water reservoirs for irrigation, establishment of nursery beds and structures, and providing materials and tools. The project has also trained 97 community members (52 women) in a range of technical and management skills necessary to effectively operate the nurseries. As a result, the San Cristobal de Calacoa nurseries can now produce 45 000 plants/year, including 19 species of trees, shrubs, and cacti. The first plants produced by the nurseries are now being used by the project in local pilot restoration sites, which will provide valuable information for selecting species mixes in future projects.

The Calacoa project, financed by MCFA, is one of two pilot projects financed by private companies in Moquegua mobilized with NIWS' support. In 2020, the mining company Anglo American Quellaveco financed and implemented a US$ 180 000 natural infrastructure investment in the Tumilaca community. Through these pilots, local actors are gaining experience, gaining skills, and generating information and momentum that will help accelerate and improve a greater regional portfolio of natural infrastructure funded by the regional government.

HIGHLIGHTED PROJECT SUPPORTED BY NIWS: PUSMALCA

Reforesting seasonally dry montane forests in the Pusmalca watershed, Piura region

The regional government's reforestation efforts will improve water security for 22 communities.

Photo: Condesan

Peru's northern region of Piura faces severe water stress, with large agricultural producers and populations centers in the region's arid coastal area increasingly competing for its scarce water resources. At the same time, the region is highly vulnerable to extreme events, like floods and landslides, that bring too much water. Increased rises and falls in water sources, as seen in El Niño years in Piura and increasingly expected with climate change, makes each of these risks even more prominent. Historical deforestation in the Piura basin further exacerbates the region's lost capacity to regulate water flow.

To address this, the Chira-Piura Watershed Council, composed of the regional government, the local water authority, and a range of water users, began to prioritize the restoration of critical natural infrastructure in the region's higher elevations using their watershed management plan. In 2018, NIWS began supporting the watershed council and regional government to implement the plan by finalizing the design and technical documents for a public investment to restore seasonally dry hill and montane forests in the upper reaches of the Piura watershed. With NIWS' support, the project was approved and mobilized in 2020.

In 2022, the regional government of Piura began implementing this US$ 2.1 million public investment project to recover watershed services in the Pusmalca watershed in the province of Huancabamba, Piura. The project will reforest 744 hectares with native species in order to better store rainwater during the rainy season to be released slowly during drier weather, improving water security in 22 communities and their residential and agricultural uses of water increasing resilience in the entire watershed. The project will also provide carbon capture and reduce forest fires.

Since implementation began in 2022, the project has also contributed to reactivating the local economy from the pandemic induced recession by providing jobs for residents and municipal staff. Over the course of the five year project implementation period, an estimated 41 000 daily wages will be paid.

Over 220 community members and technicians will receive training on forest and nursery management, monitoring, and watershed management. The project also includes establishing four forest nurseries to provide plant material for reforestation efforts, two hydrological monitoring stations, fire controls, a fire alarm system, and a surveillance system. A local committee will be formed and trained to provide surveillance.

In addition to the Pusmalca project, NIWS has also supported 11 other projects by regional governments in Peru, representing a total value of US$ 32 million. In total, US$ 22 million of those projects by regional governments have been mobilized, of which US$ 8.3 million have already begun implementation.

Charting the path along the way

NIWS has generated new tools, knowledge, and capacities needed to design, justify, and sustain effective investments in natural infrastructure for water security.

> ***Peru is privileged to have a national geospatial database, but we professionals don't take advantage of it. This course has shown the need to use it and how we can make even greater use out of it by using CUBHIC.***
>
> ***Hugo Oré,*** *Head of the Integral Project Formulation Consortium contracted by Reconstruction With Changes Authority in the Mala Watershed and participant in NIWS course.*

For investments in natural infrastructure to contribute substantially to water security, quality is as important as quantity: investments must be designed and managed to be effective, sustainable, and equitable, especially by gender.

At the beginning of the NIWS project, there was a lack of capacity, guidance, and sufficient knowledge to prioritize, develop, justify, evaluate, and monitor natural infrastructure projects in accordance with these criteria.

Now, project developers, decision-makers, and stakeholders have new tools, information, and skills that enable them to make better decisions about natural infrastructure. More than 700 individuals from over 400 organizations report using NIWS tools and information.

NIWS has developed new tools that guide the identification, design and management of effective, equitable and sustainable interventions in natural infrastructure

NIWS has developed and widely disseminated 17 tools to improve the quality of investments in natural infrastructure and has created an online Project Design Toolbox to make these tools available along with additional resources created by other institutions. More than 17 additional tools are currently being developed and piloted. The three tools most valued by users are the Manual for Developing Natural Infrastructure Projects for Water Utilities, Rapid Opportunity Identification Tool (HIRO), and Benefit Quantification Tools (CUBHIC).[6]

[6] According to 640 users of information and tools generated by NIWS, surveyed by Forest Trends in April 2023.

Photo: Forest Trends


Photo: Forest Trends

IDENTIFYING OPPORTUNITIES TO INVEST IN NATURE-BASED SOLUTIONS

The Rapid Opportunity Identification Tool (HIRO) is an innovative Geographic Information System (GIS) tool, developed by NIWS, that uses official information from different sectors to quickly identify critical areas for natural infrastructure interventions to address priority water risks within an specific area. The HIRO tool helps to answer questions like: Where should natural infrastructure interventions be located? Which areas will benefit most from interventions to reduce a given water risk? How do I choose prioritized areas? What is the most appropriate intervention for a specific area? There are three adaptations of HIRO:

#2 most valued tool by NIWS' stakeholders

HIRO for Disaster Risk Management User Guide

This document guides users to implement the HIRO methodology using GIS, specifically to identify priority areas for disaster risk management. It was produced with MIDAGRI to support the ARCC's portfolio of natural infrastructure investments.

3 482 downloads

HIRO-Ambiente Platform for DRM

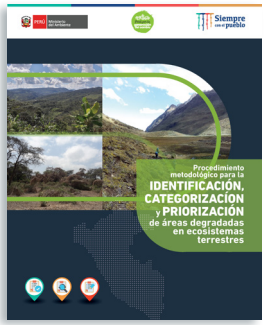
MINAM implemented this online platform, based on an adaptation of the HIRO for DRM methodology.

HIRO for Water Supply Platform

This online platform uses HIRO to focus on ecosystem services related to the sustainable provision of water supply by Peruvian water utilities. It was developed in collaboration with MVCS and was used by MVCS in the update to the National Sanitation Plan in 2021.

Guide for the Identification, Categorization, and Prioritization (ICP) of Degraded Areas

NIWS and MINAM published this guide to help public entities involved in regional planning, especially regional and local governments, identify intervention areas more precisely. The guide has already been used by MINAM to update the national map of degraded areas.



Ecosystem Evaluation Guides

NIWS and MINAM published two guides to assess the health of ecosystems of hydrological importance (for in-tact forests and paramos), to inform decision making related to restoration and conservation.

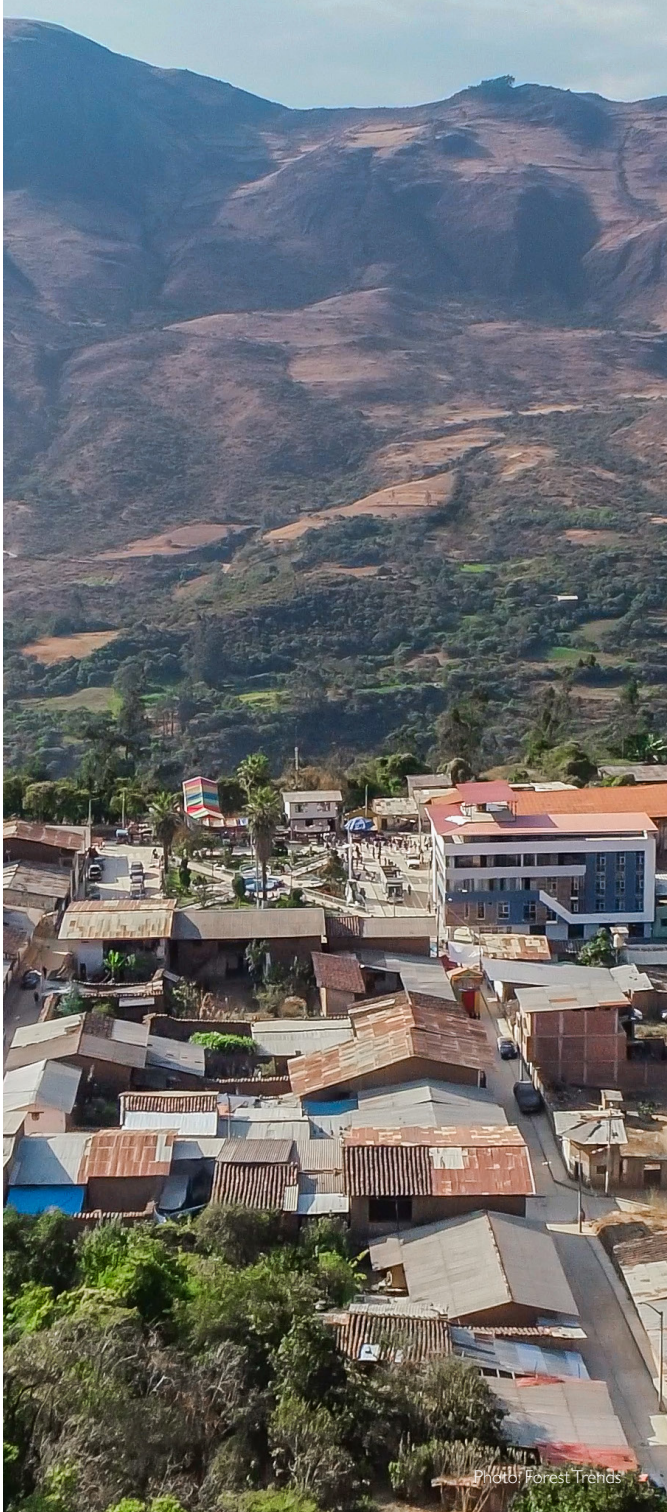


Photo: Forest Trends

DESIGNING QUALITY INTERVENTIONS

In addition to improving the technical basis for natural infrastructure, NIWS has prepared guidance to ensure interventions are effective,equitable, and sustainable. The following resources help answer questions like: How can we design equitable interventions? How can we improve the sustainability of an intervention? How should we evaluate success? How can we engage communities in the process?

CUBHIC: Methodologies for the Quantification of Hydrological Benefits of Watershed Interventions

The CUBHIC toolbox responds to a critical need for the rapid, ex-ante quantification of expected hydrological benefits of a natural infrastructure intervention. The methodologies use local data such as precipitation, temperature, and characteristics of soil, land cover, and natural infrastructure interventions to estimate the benefits of the most common interventions, such as infiltration ditches, forest conservation and reforestation, permeable micro-reservoirs (qochas), wetland restoration, grassland management, and ancestral infiltration canals (amunas).

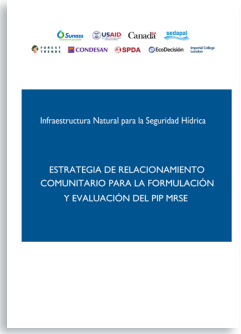
3 933 downloads

Effectiveness, Equity, and Sustainability Scale

The Guide for the Evaluation of Natural Infrastructure Interventions for Water Security: Effectiveness, Equity, and Sustainability Scale presents a scale for evaluating natural infrastructure projects these three critical dimensions for investment quality. The guide helps project developers identify opportunities and specific actions to improve the quality of natural infrastructure projects throughout the project development cycle and promotes a spirit of continuous improvement and learning.

994 downloads

#3 most valued tool by NIWS' stakeholders



Community Relations Strategy for the Design and Evaluation of Public Investment Projects under Peru's Rewards for Water Ecosystem Services Mechanisms (MERESE)

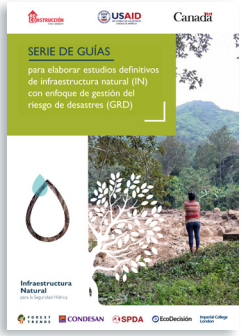
This strategy establishes a roadmap for community relations related to designing and evaluating payment for ecosystem services projects between Lima's water utility (SEDAPAL) and the communities within its source watersheds. The strategy highlights two key approaches:

1. Effective communications channels, and
2. Capacity building for community members

EXECUTING INTERVENTIONS IN NATURAL INFRASTRUCTURE

Technical specifications for natural infrastructure measures (in development)

NIWS is developing a catalog of technical specifications for natural infrastructure measures, with the objective of streamlining and improving quality control of project development in the final design phase. These technical specifications are divided into three different intervention types: i) infiltration trenches, amunas, andenes, and qochas, ii) reforestation and afforestation, natural regeneration, and agroforestry systems, and iii) terraces, wetland restoration, revegetation with native species, fencing, and soil enrichment. These documents will provide important guidance on the design of interventions for natural infrastructure, standardizing information across various actors.



Guidelines for disaster risk management projects (in development)

Forest Trends is developing 14 guides for the development of natural infrastructure for disaster risk management projects, with ARCC and the United Kingdom Delivery Team (UKDT). These include methodologies and standards that provide guidance for the preparation of project design documents for the projects in ARCC's portfolio.

TOOLS FOR THE INVESTMENT CYCLE

Manual for the Design and Evaluation of Investment Projects in Natural Infrastructure

Developed and published with SEDAPAL and SUNASS, this manual provides guidance for water utilities developing projects in the framework of Peru's MERESE programs. It outlines each step of project development, offering a clear process to avoid and address common bottlenecks, and helps utilities consider socio-economic aspects of project design from the beginning.

3 770 downloads

#1 most valued tool by NIWS' stakeholders

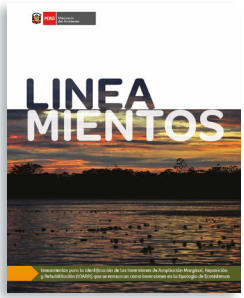
Guide for gender mainstreaming in the design and implementation of MERESE programs

In partnership with SUNASS, NIWS developed these guidelines to support mainstreaming a gender approach in the natural infrastructure investment cycle, specifically by promoting participation of women in the design and implementation of water utilities' MERESE projects.

Guide to Hydrologic Modeling of Natural Infrastructure

This guide provides criteria for the selection and use of hydrological models aimed at quantifying the expected benefits of natural infrastructure projects. It creates a bridge between decision makers and technical specialists in order to generate relevant results for water resources management. The guide is divided into two volumes: the first is aimed at selecting appropriate hydrological models for the policy questions at hand, and the second provides guidelines for hydrological modeling.

3 529 downloads



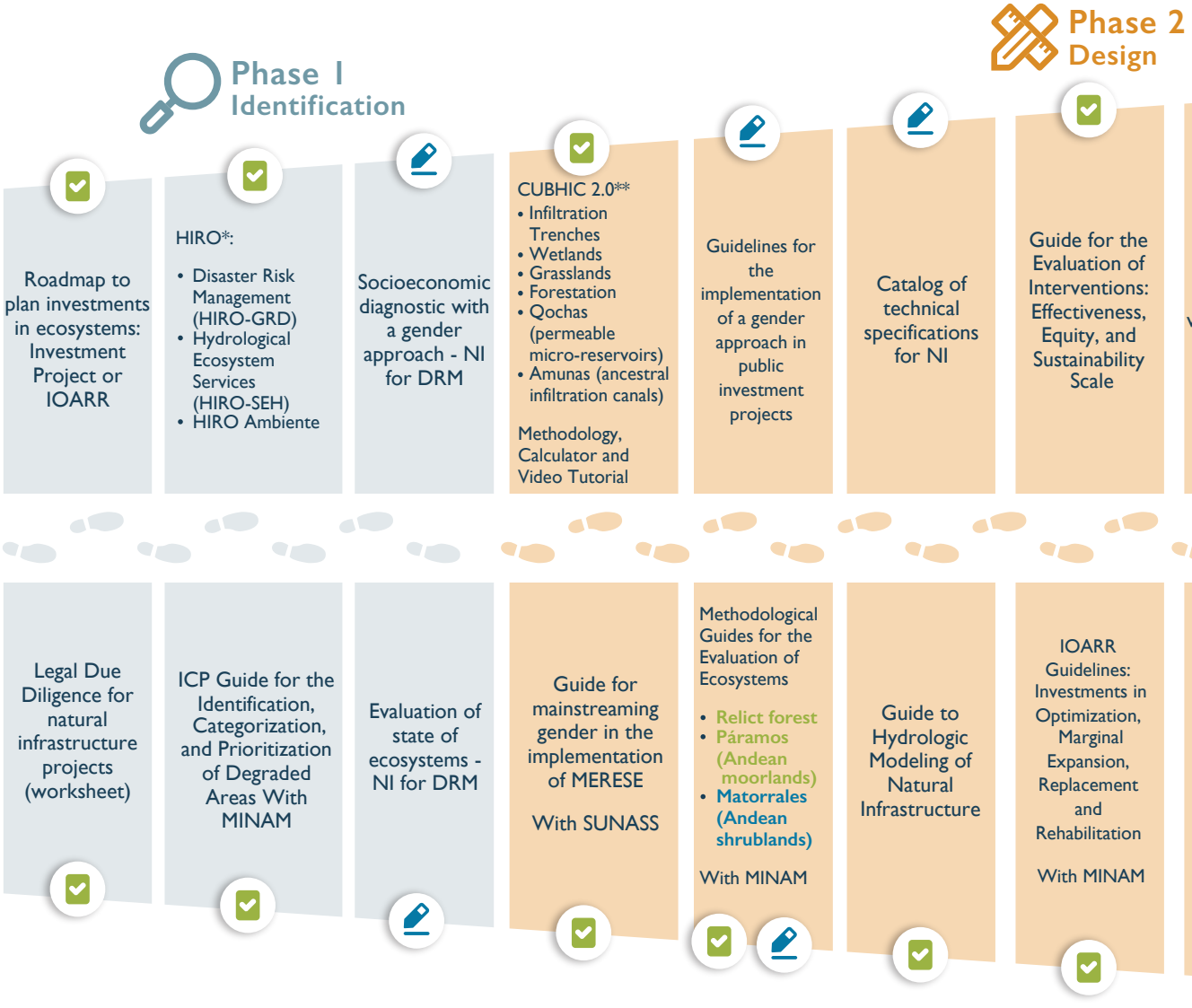
Guidelines for the Identification of Investments in Optimization, Marginal, Expansion, Replacement, and Rehabilitation (IOARR) for Ecosystems

Developed and published with MINAM, this document provides guidelines for applying IOARR – a mechanism under the Peruvian public investment system that traditionally allows for streamlined investment to repair or maintain gray infrastructure – to projects that aim to restore and conserve ecosystems, or natural infrastructure. The guidelines include the regulatory framework, key definitions, a list of strategic assets to be considered in IOARR for Ecosystems, criteria for applying IOARR, and case studies.

386 downloads

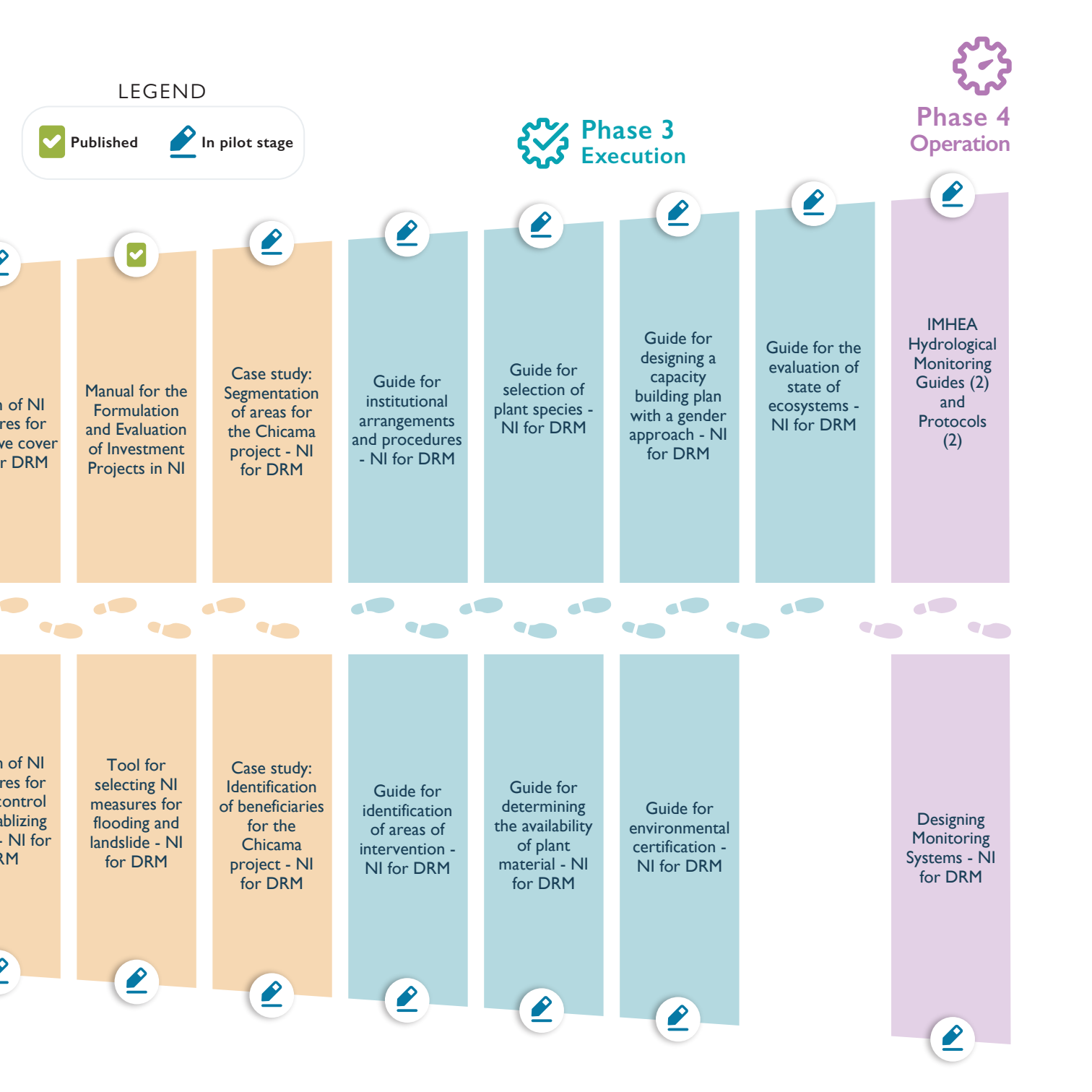
Photo: Forest Trends

Roadmap of Tools for Natural Infrastructure (NI) for Water Security Projects



*__HIRO:__ *Tool for the Rapid Identification of Natural Infrastructure Opportunities*

**__CUBHIC:__ *Methodologies for the Quantification of the Hydrological Benefits of Watershed Interventions*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Manual for the Formulation and Evaluation of Investment Projects in NI
Case study: Segmentation of areas for the Chicama project - NI for DRM
Guide for institutional arrangements and procedures - NI for DRM
Guide for selection of plant species - NI for DRM
Guide for designing a capacity building plan with a gender approach - NI for DRM
Guide for the evaluation of state of ecosystems - NI for DRM
IMHEA Hydrological Monitoring Guides (2) and Protocols (2)
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Tool for selecting NI measures for flooding and landslide - NI for DRM
Case study: Identification of beneficiaries for the Chicama project - NI for DRM
Guide for identification of areas of intervention - NI for DRM
Guide for determining the availability of plant material - NI for DRM
Guide for environmental certification - NI for DRM
Designing Monitoring Systems - NI for DRM

NIWS has increased credibility and clarity for decision makers regarding the water benefits of natural infrastructure interventions.

State of knowledge on natural infrastructure for water security

NIWS has improved the knowledge base supporting natural infrastructure interventions, providing stakeholders with research-based evidence to make better decisions. NIWS' systematic reviews of the literature and original research has increased clarity and credibility regarding the water benefits of natural infrastructure interventions, answering questions like: How do ecosystems contribute to water security in the Andean context? What impacts do human interventions on the landscape have on the water cycle? How can we use natural infrastructure to manage disaster risks like flooding and landslides?

NIWS has published seven reports on the state of knowledge on natural infrastructure for water security: reforestation, pre-Inca infiltration infrastructure, land use, Andean terraces, disaster risk management, Andean grasslands, and infiltration ditches. Five of these have also been published as scientific articles in the SOIL, Science of the Total Environment, Nature Sustainability and Forest Ecology and Management journals. NIWS has also supported scientific articles on hydrologic models, ecosystem services of wetlands, and evapotranspiration reference data.

Direct dissemination

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people

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institutions

14
countries

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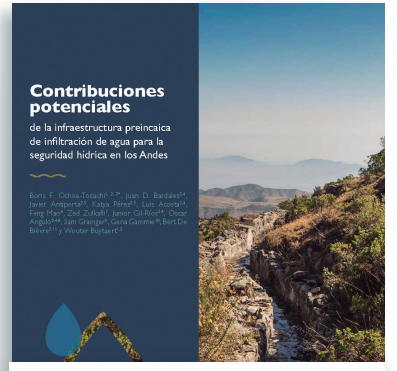
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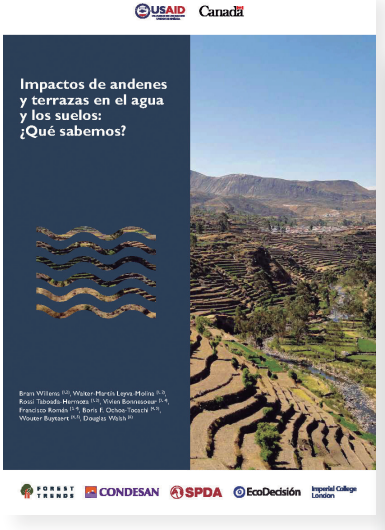
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Hydrological monitoring network strengthened to address knowledge gaps

NIWS helped to reactivate and strengthen the Regional Initiative for Hydrological Monitoring of Andean Ecosystems (iMHEA), a regional network that seeks to increase and strengthen knowledge on the hydrology of Andean ecosystems. In coordination with key information users – including Peru's national hydro-meteorological service and regulators from the environmental and drinking water sectors – NIWS has supported iMHEA to develop a roadmap for the initiative during the next decade (2021-2030). The objectives are to strengthen its coordination through a board of directors in which NIWS partners participate; to convene six general assemblies of iMHEA members; to develop an information system for managing iMHEA's hydrometeorological data; and to update and expand the monitoring protocols that iMHEA partners implement in the field. Since NIWS has begun supporting IMHEA, the network has grown from 21 to 26 partners and from 12 to 22 monitoring sites. NIWS has provided equipment and technical assistance to five iMHEA monitoring sites.

Photo: Forest Trends

Implementing monitoring systems and generating useful information

NIWS has designed and implemented several monitoring systems to provide useful information about natural infrastructure interventions. In the Tupicocha community of Lima's upper watersheds, NIWS implemented the first comprehensive monitoring site of ancestral water management systems, which provides information about how amunas and qochas affect Andean watersheds. NIWS has also implemented a sediment monitoring system for Tarapoto's water utility, and supported the National Park Service in the operation and maintenance of their monitoring system in Cañete. NIWS also worked with Cusco's water utility (SEDACUSCO) to design a social monitoring system for its MERESE program in Piuray-Ccorimarca – the first system of its kind for MERESE in Peru.


Photo: Forest Trends


Photo: Forest Trends

Photo: Andrés Abril Orellana Olmedo

27 young researchers address key knowledge gaps on natural infrastructure for water security

In 2021, NIWS partnered with the National Water Authority (ANA) to provide research scholarships for natural infrastructure as part of ANA's National Water Culture Award. NIWS provided extensive supervision and dedicated support for the 13 research projects and 10 academic publications supported through the award. Prior to the National Water Culture Award, NIWS provided support for four university students' thesis projects in 2020.

> *"I was quite surprised by the National Water Culture Award because there are not that many awards that encourage science in our country. In my case, the research I carried out reveals contamination in the Villa swamps, specifically the impacts of eutrophication on the water body."*

Álvaro Sánchez, *researcher, National Water Culture Award*

NIWS has strengthened capacities of more than 5 600 professionals (including 2 400 women) to plan, develop, evaluate, and communicate investments in natural infrastructure for water security.

NIWS has strengthened the capacities of professionals from more than 15 regional governments, 72 local governments, 37 water utilities, and 25 consulting firms. Among those trained are 500 public investment project developers and evaluators.

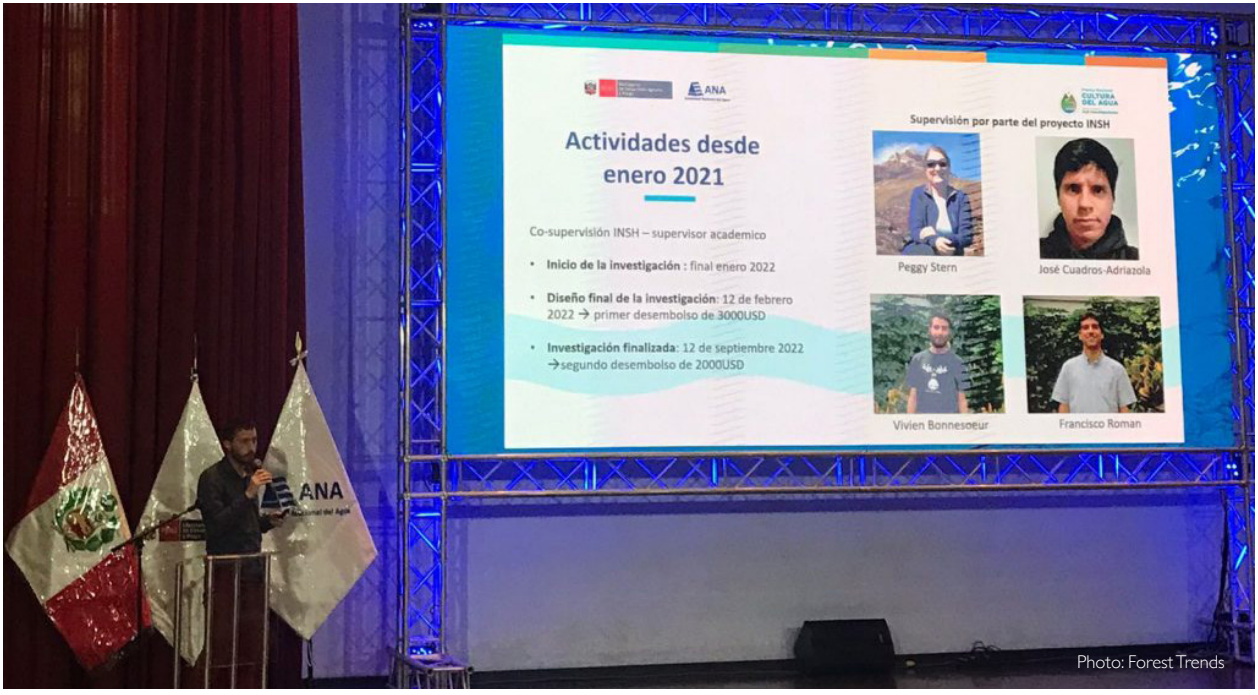


Photo: Forest Trends

Main capacities strengthened by the NIWS Project (2017-2023)		
Topic	**Number of people**	**Courses/trainings**
Sustainable Water Management	**3597** people (1530 women)	Massive Online Open Course with National School of Public Administration (ENAP) and the National water regulator (SUNASS). The course has been incorporated into ENAP's offerings for future use.
Natural Infrastructure projects	**1033** people (338 women)	Investment Management Tools and strategies for design and implementation Identification, Formulation, and Evaluation Investment system (INVIERTE.pe) Introduction to NI
Natural Infrastructure and Productive Conservation	**275** people (99 women)	Agricultural production (w/ Avanzar Rural) Vicuña fiber Guinea pigs High Andean crops Ecotourism Beekeeping Artisans
Hydrologic Monitoring	**64** people (19 women)	Objectives, methods, and uses for decision making Evaluation of the impact of MERESE in mountain ecosystems
Communication and Journalism	**325** people (198 women)	Training and workshops for journalists Training and workshops for water communicators Specialized communications trainings for ANA, Chira Piura water communicator network, and journalists from Urubamba and Calca
Women's Leadership in Water Management	**117** women	For local and regional authorities, public officials, and young academics (2020) For women from local organizations (2022) For women leaders in organizations, young academics, public officials, and authorities (2023)

Photo: Forest Trends

Photo: Víctor Idrogo

Joining efforts to advance together

NIWS has advanced a common vision for natural infrastructure and the institutional changes necessary to implement it.

To go far travel on the road towards water security, all sectors need to walk together.

All sectors depend on water resources and natural infrastructure, and all sectors have a role to play in its conservation. However, sectoral silos inhibit potential synergies of multisectoral action and tend to generate obstacles, delays, gaps, and duplication of efforts.

After a multi-year process, NIWS has been able to direct political and public awareness on current needs and build a preliminary multi-sector roadmap for natural infrastructure and water governance. NIWS has also made progress on specific normative and institutional changes, which are already improving the path for the next generation of water managers, users, and decision makers.

“This wetland regulation marks a change from our tendency to ignore ecosystems and the valuable benefits they have for human beings. The approval of these regulations is a result of multisectoral work and positions us well as a country. Thanks to SPDA, CONDESAN, and Forest Trends of the NIWS Project for their enormous support in the elaboration of the technical proposal [of Supreme Decree No. 006-2021-MINAM for wetland protection] with ambitious objectives and goals.”

Gabriel Quijandría, *former Minister of the Environment.*

NIWS has increased political and public awareness of the importance and urgency for natural infrastructure and gender equality, thereby growing the demand for equitable nature based solutions.

NIWS has reached millions of people with important information about natural infrastructure

The dissemination of original content from NIWS has grown year on year, reaching a record of over 8.8 million views between 2022 and 2023 across Facebook, Instagram, Twitter, Youtube, and Flickr. In addition, on at least 14 occasions, our press campaigns have reached over 3 million Peruvians through print media, radio, television, local and national media.

NIWS has reached over 146 000 stakeholders through webinars

NIWS has held a series of webinars featuring over 30 panelists from the public sector, international development agencies, academia, and civil society organizations, covering a diverse range of issues from research to policy. Webinars became an especially effective way of engaging our audiences during the COVID-19 pandemic.

NIWS has supported storytelling about natural infrastructure

NIWS co-produced "Water Guardians," a documentary which showcases traditional Andean knowledge that contributes to climate change adaptation. The documentary, produced with NGO Caritas and the Municipality of Huarochiri, was launched nationally and internationally, reaching over 5 000 views. Through NIWS' Journalist Fund and support to water communicators, we've supported original journalism, documentaries, podcasts, songs, and multimedia campaigns on natural infrastructure.

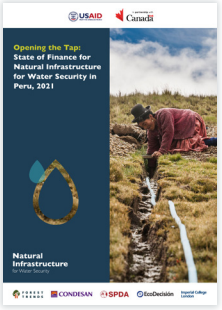
NIWS has convened leaders at forums that have drawn public attention, generated institutional commitments, and strengthened networks of natural infrastructure champions

- **The National Water Summit (2018)** convened more than 122 people (27 women and 95 men), including 39 directors and general managers of 24 water utilities that provide water to almost 50% of the country's population. The Declaration of Piuray was signed, securing institutional commitments to work on the implementation of MERESE and gender equality.

- **The National Forum for Gender Equality and Water Security (2019),** convened 386 people (288 women and 98 men) from 16 institutions, 15 water user boards, 15 community organizations, and 8 universities, securing commitments from key water management entities such as MINAM, SUNASS and ANA to mainstream a gender approach in water resource management.

- **The National Forum on Natural Infrastructure (2019)** brought together 307 people (162 women and 145 men), including national authorities, technical specialists, community leaders, and private sector leaders. The forum recognized the urgency of concerted action and made agreements to reduce bottlenecks that hinder the mobilization of natural infrastructure investments.

- **Mountains: Our Future Symposium (2022)** brought together over 500 people (150 in person and 350 virtually), including national and international experts who presented advances in the state of knowledge on the impacts of climate change on glaciers and mountain ecosystems. The event was organized with the National Institute for Glaciers and Mountain Ecosystems Research (INAIGEM) and UTEC's RAHU initiative.



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NIWS has documented the state of finance in Peru, showcasing Peru's transformation in valuing and investing in nature.

NIWS has published two State of Finance for Natural Infrastructure for Water Security in Peru reports that describe Peru's transformation in valuing and investing in nature as an asset for water risk management over the last 10 years. The most recent report, Recuperando la Fluidez (2022), was produced in collaboration with INAIGEM, and is the first time a state authority in Peru has published an analysis of this nature and scope. The report shows a strong trend of recovery after a dip in expenditures in 2020 during the pandemic.

NIWS has contributed to build a multisectoral vision for the protection and restoration of natural infrastructure critical to water security, and we have secured regulatory changes that contribute to realizing that vision.

I 059 downloads

The OECD prioritized natural infrastructure in its recommendations for water governance in Peru

NIWS participated extensively in the OECD's Water Governance and Policy Dialogues, convened in partnership with the Peruvian Government in 2019-2020. As a result of this process, the OECD's report emphasized the importance of natural infrastructure for water governance and included several key recommendations promoted by NIWS to streamline and increase local community benefits from investments in natural water infrastructure.

NIWS published "The role of Natural Infrastructure in the OECD recommendations for Water Governance in Peru," which summarizes the OECD recommendations related to natural infrastructure to highlight the urgency of implementing actions to conserve and restore strategic ecosystems for water security in the country. This publication summarizes the NIWS team's analysis of OECD recommendations on natural infrastructure, adding context and identifying opportunities to move forward in areas identified as priorities by the OECD.

MVCS incorporated natural infrastructure into the National Sanitation Plan

In 2021, the National Sanitation Plan (2022-2026) was approved, including natural infrastructure for the first time—a direct result of NIWS' collaboration with the Ministry of Housing, Construction and Sanitation (MVCS). NIWS worked closely with MVCS to develop a new version of our rapid-focus GIS tool, HIRO, to identify priority areas for conservation and restoration of ecosystems that provide watershed services in catchments that supply water utilities. The results applying HIRO nationally for the catchments of all 50 water utilities were included in the National Sanitation Plan. The Plan orients priorities for investments in the sector by the three levels of government, water utilities, and private concessionaires that were valued at approximately US$ 1 billion annually between 2014-2021.

MINAM strengthened wetland protection through multisectoral and decentralized management

In close coordination with MINAM and the National Wetlands Committee, NIWS contributed to the conceptualization, technical and legal development, support, and dissemination of the first detailed regulation on wetlands in the country, approved by Supreme Decree 006-2021-MINAM. The new regulation introduces specific prohibitions and penalties for the most critical threats to wetlands, including commercial peat extraction previously documented by NIWS. In addition, it clarifies the roles and responsibilities of various sectors and organizations (including MINAM, PRODUCE, SERFOR, INAIGEM, SERNANP, ANA, OEFA, OSINFOR, regional and local governments) in the management and conservation of wetlands. NIWS has since developed three new proposals for regulatory instruments to implement the new regulation with counterparts in MINAM, ANA, and SERFOR.

MINAM approved guidelines to streamline investments in natural infrastructure

In 2019, supported by strategic technical contributions from NIWS, MINAM approved new guidelines that allow the use of investments for optimization, marginal expansion, replacement, and rehabilitation (IOARR) for natural infrastructure. This enables a new mechanism to channel investments in natural infrastructure that can reduce the time it takes for a project to advance from idea to implementation by up to 80%.

SUNASS approved a directive to clarify the route for MERESE within the sanitation sector

NIWS submitted technical contributions to the Ecosystems Services Compensation Mechanism (MERESE) directive implemented by the sanitation utilities, which was approved by the National water regulator (SUNASS) with several recommendations made by NIWS in 2019. The directive clarifies pathways for implementation of MERESE projects by water utilities and is the first regulatory instrument to incorporate a gender approach.

National Water Authority strengthened multisectoral water management

In 2018, with support from NIWS, the National Water Authority (ANA) and the Ministry of Agriculture approved Supreme Decree 012-2018-MINAGRI, which requires participation of a representative of water users in watershed resource councils. This regulation strengthened integrated water resource governance and increased the probability that MERESE funded by water utilities will be included in watershed resource management plans.

NIWS has strengthened institutions and leaders to address gender gaps in water management.

Advancing Towards Gender Equality in Water Management report published with the Ministry of Women and Vulnerable Populations (MIMP).

In partnership with MIMP, NIWS published this report summarizing progress in creating a favorable environment for gender equality in the water sector. From influencing public policies to strengthening local leadership, men and women shared a common vision: participatory, fair, and efficient water governance, in which water security and gender equality go hand in hand to contribute to development and sustainability in Peru.


Photo: Forest Trends

NIWS has provided decision makers with access to systematized information on gender gaps

Through the development and dissemination of the "*Gender Gaps in the Management of Natural Infrastructure and Water in Peru*" report, NIWS highlighted the critical roles that women play in the daily management of water and natural infrastructure, as well as the marked gender inequalities in decision-making regarding these resources. The report highlighted the importance and urgency of working with institutions and leaders in these sectors to address gender gaps that are incompatible with a water secure future.

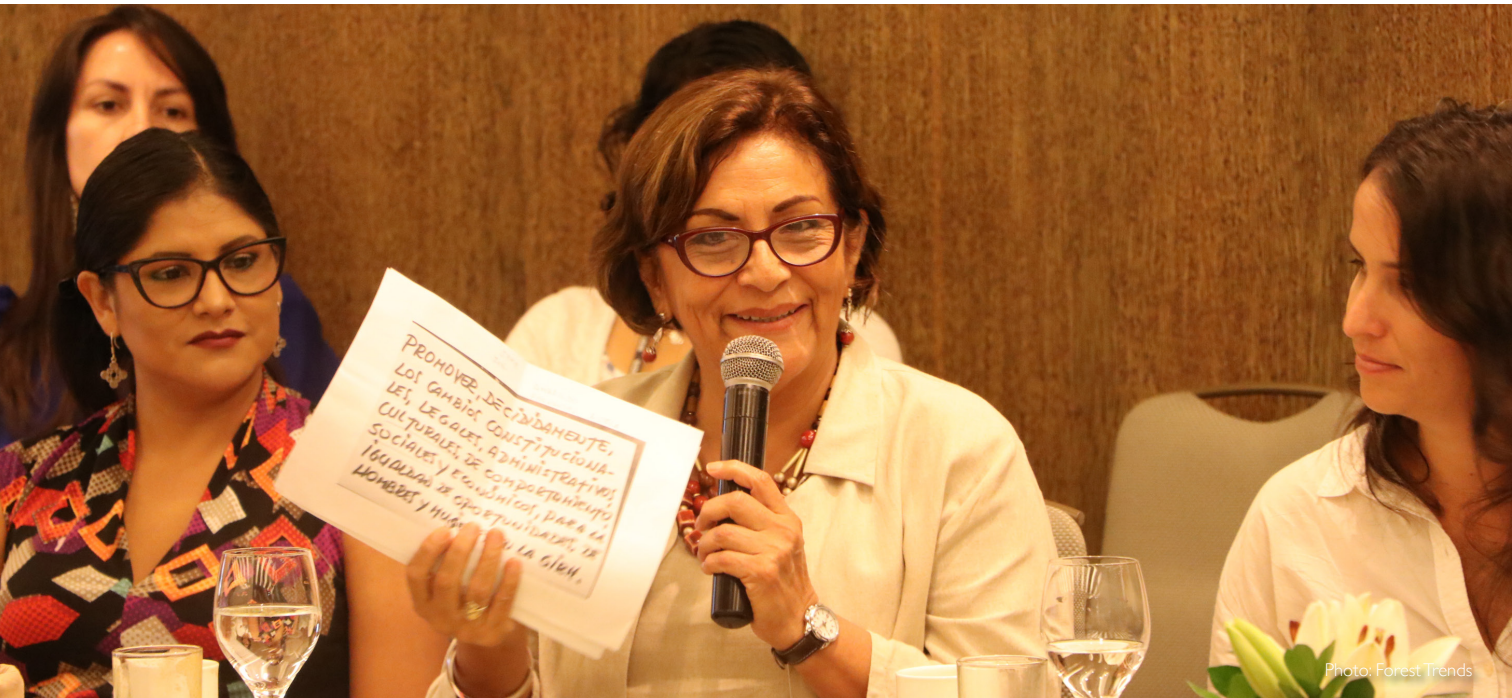

Photo: Forest Trends

NIWS achieved institutional commitments to close gender gaps in the water sector

NIWS has put gender equality on the national agenda by promoting public commitments for gender equality in the water sector from institutions such as MIDAGRI, MINAM, ANA, and SUNASS. It consolidated commitments from ANA and SUNASS into concrete actions such as the development of institutional gender diagnoses and Gender Mainstreaming Plans for both entities developed with MIMP.

> ***The Ministry of Women and Vulnerable Populations is extremely pleased to collaborate to increase the participation of women in water resource management, and fully exercising their rights to access and use water and land as economic and productive resources.***
>
> ***María Pía Molero,*** *Former Minister of Women, Ministry of Women and Vulnerable Populations.*

SUNASS published a guide for incorporating gender in MERESE

This guide, developed with NIWS' support, was published by SUNASS in July 2023. The publication provides detailed guidance for water utilities on how to mainstream gender in the development of MERESE programs, with an emphasis on recognizing the impact of gender gaps on the MERESE program's objectives and increasing women's participation in the design and benefits of the programs.

SUNASS approved the first Gender Equality Policy in the Peruvian water sector

In 2021, supported by NIWS, SUNASS became the third Peruvian institution to approve an Institutional Gender Equality Policy, which contains specific commitments to prevent sexual harassment, prioritize training and development for women, and promote equal pay. NIWS has also supported SUNASS in developing a guide for including a gender approach in the design and implementation of MERESE by water utilities, developing a study on gender gaps in access to water and sanitation, and training its specialists to include a gender approach.

ANA approves Gender Mainstreaming Plan

In 2022, supported by NIWS, ANA approved its Gender Mainstreaming Plan and began implementing its own Gender Action Plan, which includes reviewing the protocol for assigning water rights in Peru to include a gender approach – a potential game changer for increasing access to water resources and decision-making for women. NIWS also supported ANA to train 40 specialists on mainstreaming gender in water resources


Photo: Forest Trends

management, develop guidelines for incorporating a gender approach in Water Resource Management Plans (PGRHC), and conduct a survey on gender stereotypes within the workplace.

Ministry of Environment approved guide to mainstream gender, intercultural, and intergenerational approaches in adaptation measures

With technical assistance from NIWS, four ministries (of Environment, Women, Education, and Culture) developed a general guide to mainstreaming gender, interculturality, and intergenerational approaches in the National Determined Contributions (NDC). The guide aims to improve the number of NDCs that include these approaches by targeting public officials and specialists involved in the design, implementation, monitoring and reporting of the NDCs, as well as non-state actors involved in the NDC process including non-profit organizations and private companies. The guide was approved by MINAM in 2022.

NIWS increased the recognition of women leaders and strengthened their capacities to influence water management

Through the development and implementation of the innovative Women's Leadership Program for Water Management, endorsed by the Ministry of Women and Vulnerable Populations, NIWS strengthened the technical and leadership capacities of 117 women authorities of local and regional governments, civil servants of public entities, and young academics involved in water resource management. NIWS worked with participants of the program to form the Yaku Warmikuna network of Woman Guardians and

Photo: Forest Trends

Defenders of Water, which is made up of 53 women from different backgrounds and regions of the country, and serves as a space for knowledge exchange.

NIWS helped women organize to take action on climate change

NIWS supported MINAM in establishing the National Committee for Women and Climate Change (CONAMUCC), which aims to integrate gender equality in the development of climate policies in Peru. This commission has wide representation, including 36 women's organizations from the coast, the Andes, and the Amazon. NIWS also worked with MINAM to ensure a representative from women's organizations was included as part of the National Commission for Climate Change.

> ***"I have found it wonderful sharing experiences, emotions, feelings, and memories – being transported in space and time to understand the motivations that make us women of water, and that makes us feel we can pass this on to other women as well."***
>
> ***Josefa Mesía,*** *Chairperson of the Management Committee for the Ecosystem Services Mechanism in Moyobamba, San Martín.*

Photo: Forest Trends

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