

**Water systems  
underpinning  
sustainable  
development**



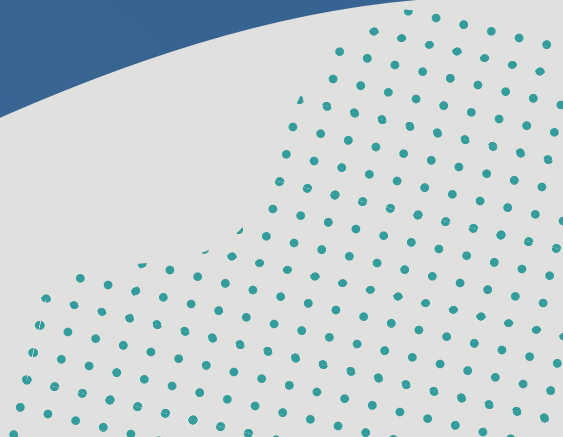


Photo: Ian Taylor / WLE



# Innovative water solutions for sustainable development

Food · Climate · Growth



# Message from the Board Chair and Director General



**Roberto Lenton**

CHAIR, BOARD OF GOVERNORS



**Claudia Sadoff**

DIRECTOR GENERAL

The year 2019 saw great progress across many of IWMI's impact pathways and also the launch of our new strategy, which sets us on a path to achieving the vision of 'a water secure world'. The new *IWMI Strategy 2019-2023* is focused on water solutions for sustainable, climate-resilient development.

At IWMI, we look at water as a system, because as it interconnects people, nature and the economy in countless and complex ways, we need to be mindful of the trade-offs, possible disruptions to supply and other uncertainties. Solutions for water need to take all of this into account.

Over the course of the year and starting from discussions at World Water Week in Stockholm, Sweden, in 2018, IWMI undertook a series of internal and external consultations to sharpen mission-driven research priorities, which position the Institute to make a meaningful contribution to the transformative 2030 Agenda outlined in the United Nations Sustainable Development Goals (SDGs), and also in the Paris Agreement, the Sendai Framework for Disaster Risk Reduction, and by the Global Commission on Adaptation.

Motivated by key global challenges, the strategy will guide IWMI's vision of a water secure world by focusing on three Strategic Programs – Water, food and ecosystems; water, climate change and resilience; and water, growth and inclusion. These new strategic programs will aim to solve global water problems by purposefully building bridges between science and water management, policy and practice. A significant investment has also been to ensure that IWMI is well positioned to become a digital leader and innovator by developing applications that can best leverage the massive amounts of water data at our disposal to promote informed policy and investment decisions at landscape up to government and international levels.

Underneath the Strategic Programs, mission-oriented research is organized to best reflect IWMI's problem-solving capabilities. The new strategy builds on a 35-year legacy and traditional strengths, including strong field

presence. Indeed, the strategy is designed to strengthen the presence that we have in the countries and regions we work in, with Country Representatives leading and driving strategic partnerships and program development.

This annual report includes highlights of progress on key research innovations that lay the groundwork for success in implementing the new strategy. We highlight the critical role of diverse public, private and civil society partnerships, and how these enable not only widespread adoption of new practices but also changes in policies and institutions necessary to deliver impacts at scale.

In 2019, we could not have foreseen the tragedy of the global pandemic of 2020, and in particular its impact on the developing world. A strong component of IWMI's strategy is to focus on building resilience to shocks – whether pandemics or climate change that is ravaging the world today. We will continue with this resolve after the combined forces of the global health system have been brought to bear for the development of interventions that will at least mitigate the damage wrought by Covid-19. There will be lessons learned and IWMI will apply collegial thinking to ensure that no effort is lost to 'build back better'.

Finally, 2019 also saw great advances in the CGIAR reform process with an agreed mission that focuses on transforming food, land and water systems in a climate crisis. The year saw a strong effort to ensure that IWMI's strategic direction is in line with that of 'One CGIAR' and central to meeting the most fundamental and urgent challenges facing our world today. One CGIAR thinking is now fully embedded in the Institute. And, as CGIAR transforms, a 'water' voice will be essential in the adoption of a full systems approach.

**Roberto Lenton**  
*Chair, Board of Governors*

**Claudia Sadoff**  
*Director General*

# Global relevance

The indispensable role of water management in building the future we want is captured in Goal 6 of the United Nations Sustainable Development Goals (SDGs), and recognized in a variety of ambitious international policy statements and initiatives.



Photo: Jeffery M Walcott / IWMI



Photo: Hamish John Appleby / IWMI

## Global Commission on Adaptation (GCA) - 2018-2019

IWMI wrote a [background paper](#) commissioned by the [GCA](#). The paper, titled *Adaptation's Thirst: Accelerating the Convergence of Water and Climate Action*, informed the GCA's 2019 flagship report.

The paper supports the four water action tracks for adaptation, which call for harnessing the power of nature and expanding water infrastructure, using water productively to combat scarcity, planning for floods and droughts, and improving water governance and scaling up financing.

## Sendai Framework for Disaster Risk Reduction 2015-2030

The United Nations Office for Outer Space Affairs (UNOOSA) [recognized IWMI](#) for the use of space technology to promote disaster risk reduction at the 9<sup>th</sup> annual United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) conference in Beijing, China, in September 2019. IWMI's space-based monitoring and mapping uses satellite data to predict floods and droughts, supporting disaster relief.

## High Level Panel on Water report 'Making Every Drop Count'

The [High Level Panel](#) on Water Action Plan calls for valuing water, building water data and improving water governance.

In 2019, a new [Digital Innovations](#) program was launched to capitalize on vast amounts of water data, and provide analysis and knowledge to promote informed policy and investment decisions.



Photo: Sharad Maharjan / IWMI



Photo: Hamish John Appleby / IWMI

## The Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC)

IWMI Director General Claudia Sadoff [addressed the high-level segment at the 2019 United Nations Climate Change Conference \(COP25\) in Madrid, Spain](#), highlighting the critical role water plays in climate change adaptation.

IWMI co-led the side event [“Action for Adaptation: How We Manage Water for Climate Change Resilience”](#) with the [World Water Council \(WWC\)](#), bringing together experts to discuss how smarter water management can deliver critical adaptation solutions. A key objective was highlighting findings from the GCA’s [water background paper](#).



Photo: Martin Seemungal

## Ramsar Convention on Wetlands – an international treaty for the conservation and wise use of wetlands signed in 1971

IWMI has been one of five International Organization Partners (IOPs) of the [Ramsar Convention](#) since 2005, promoting the wise use of wetlands and the critical role they play in supporting livelihoods throughout Africa and Asia.

Colombo, Sri Lanka – the location of IWMI’s headquarters – is the only capital city out of 18 ‘wetland cities’ recognized by the [Ramsar Convention](#) for protecting urban wetlands. Ahead of this formal recognition, IWMI worked closely with various government institutions of Sri Lanka to increase awareness of the importance of the Colombo wetland complex, to bring stakeholders together, and conduct analyses and an assessment of the ecosystem services provided by the wetlands.



Photo: Madeline Dahm / IWMI

## New Urban Agenda - UN General Assembly, 2016

The [New Urban Agenda](#) highlights the importance of safe drinking water and sanitation to urban development.

The Agenda commits to enhancing the conservation and sustainable use of water by rehabilitating water resources in urban, peri-urban and rural areas, reducing and treating wastewater, improving water reuse, and increasing storage and being mindful of the water cycle.

IWMI’s [highly regarded work in promoting a circular economy](#) mindset that regards ‘waste’ as raw material that can be converted into an economically valuable commodity progressed along several fronts in 2019.



# IWMI at a glance in 2019

## Website

169k  website visitors

5  million publications downloaded

30+  blog posts

15  videos

## Social media

31% increase in social media followers 

68k  engagements 2.3m  reach

## International media

180  Number of articles mentioning IWMI

## Publications

22  IWMI reports

2  Books

88  Journal articles

67  Open access journal articles

17  Book chapters

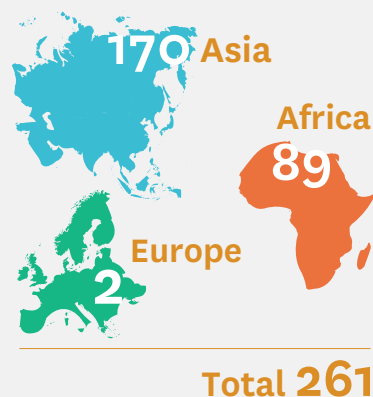
## Projects

190  Active projects

87  New projects

177  partnerships

## Global staff



## Gender balance

 Male 59.4%

 Female 40.6%

33  Nationalities



## Major trends shaping IWMI's strategic and operational context in 2019

### Food and Ecosystems

- 80% of farmland in sub-Saharan Africa (SSA) is managed by its 250 million smallholders
- 95% of agriculture in SSA is rainfed
- Only 7% of farmland in SSA is irrigated

### Climate Change and Resilience

- 4 billion people live under conditions of severe physical water scarcity for at least one month per year
- By 2050, ~685 million people living in over 570 cities will face an additional decline in freshwater availability of at least 10%, due to climate change
- Global floods and extreme rainfall events have surged by more than 50% this decade, and are now occurring at a rate four times higher than in 1980

### Growth and Inclusion

- Women comprise about 43% of the agricultural labor force in developing countries. If they had the same access to resources as men, women could increase farm yields by 20-30%. This could reduce the number of hungry people in the world by around 12 to 17%

### Digital Innovation

- Digitalization for agriculture is a fast-growing field, with at least 390 digitalization for agriculture (D4Ag) solutions across Africa, over 60% launched in the last three years
- 28.2% of the African population had access to the Internet in 2019
- 79% of the African population has access to 3G mobile broadband
- 4/5 connections globally will be smartphones by 2025. Smartphone connections in SSA will nearly double







# Stories of change 2019

Photo: Hamish John Appleby / IWMI



# Irrigation



Photo: Hamish John Appleby / IWMI



# Supporting sustainable and inclusive farmer-led irrigation

It is extremely gratifying when long years of evidence gathering and partnership building come to fruition with policy changes that will improve the lives of small-scale farmers. One such example is [Ethiopia adopting a tax reform bill](#) in 2019 that removed all import taxes on equipment for irrigation and other agricultural activities.

Previously, import duties represented 37% of the cost of a pump; removing these taxes was one of the first recommendations made by IWMI in 2009 through its [AgWater Solutions project](#). Early in 2018, Abiy Ahmed, the incoming Ethiopian Prime Minister, committed to “... implementing irrigation works extensively and in a coordinated manner ...” in one of his first important speeches. A little more than a year later, the new tax reform came



Photo: David Brazier / IWMI

into force – the culmination of more than a decade of hard work and effort. IWMI is now leading the irrigation advisory group for the Ministry of Water Resources, and is working with the Ethiopian Agricultural Transformation Agency to ensure that farmers who depend on irrigation benefit from the tax exemptions.

Elsewhere in Africa, we continue to support and advocate for sustainable and inclusive farmer-led irrigation. This is crucial because 80% of the farmland in sub-Saharan Africa is managed by 250 million small-scale farmers, but only 7% of the area is irrigated. Small-scale farmers, who depend on adequate rainfall for a successful harvest, are thus particularly vulnerable to the climate emergency. We want to ensure that small-scale farmers can influence the development of irrigation to meet their own needs.

One way IWMI is addressing this is through public-private partnerships. In Ghana, Mali and Ethiopia, echoing our work in Southeast Asia, we established ‘living labs’ with private sector partners to scale up farmer-led irrigation. We also offer innovation grants, scholarships and internships to develop capacities and skills that will further accelerate change.

A crucial difficulty is that small-scale farmers, particularly women, simply cannot afford many technologies and often have different technology preferences. Also, despite the benefits of decreased

emissions, greater food security and climate resilience, one problem with solar-powered irrigation is that running the pump is essentially free and this could lead to overpumping.

Recognizing these problems, [Futurepump](#) shares pumping data with IWMI via Internet of Things (IoT) technology ‘for the good of the agriculture sector’. These data contribute to the IWMI Real-time East Africa Live Groundwater Use Database (REAL-GUD). [REAL-GUD was a winner of the 2019 Inspire Challenge](#) of the [CGIAR Platform for Big Data in Agriculture](#). The project was awarded USD 100,000 for the purpose of using pumping data to build our evidence on current groundwater levels, and understand patterns of water abstraction and how they affect shallow groundwater tables.

This information can be used to understand potential risks of over-abstraction. We have already developed the [world’s first solar suitability tool online](#), which uses geospatial analysis and remote sensing to allow anyone to identify areas in Africa that are suitable for solar-powered irrigation. Several private sector actors are interested in using the solar suitability data to assess potential markets, which will also help to validate the tool’s predictions. As partners invest in solar-powered irrigation, IWMI will be working with the public and private sectors to ensure that overpumping does not derail the development of farmer-led irrigation.

# Myanmar farmers see incomes increase

The Central Dry Zone of Myanmar covers just 13% of the country and is home to about a third of its people. It is the **most water-scarce, least food-secure region** in the country. However, completion of an IWMI-led **project** in 2019 points to a better, more climate-resilient future.

Government investment in the past resulted in some 300 pump-based irrigation schemes across the Dry Zone, a few of which are meeting their potential. However, problems range from poor maintenance of distribution canals through the cost of pumping to inequities of distribution. To combat these problems and put water management on a more sustainable footing, **IWMI piloted a Water User**

Photo: Sanjiv de Silva / IWMI

**Association (WUA)** that gives farmers an important voice in **managing the government's Pyawt Ywar Pump Irrigation Scheme**.

Pyawt Ywar takes water from the Mu River near Myinmu Township in Sagaing Region, about 70 kilometers west of Mandalay. The river should be able to supply water for about 2,025 hectares. However, less than a third of this has been achieved in recent years. As part of the project, the United Nations Office for Project Services (**UNOPS**) undertook repairs of the irrigation infrastructure. While this was being done, IWMI worked with Myanmar's Irrigation and Water Utilization Management Department (IWUMD) and the local people to set up the WUA.

A succession of workshops across the area brought together canal representatives, community leaders, the government and, most importantly, farmers, ensuring that even the poorest and most marginal had a voice. One source of conflict that surfaced from the constructive discussions was power asymmetries among the villages, based partly on their location relative to the pumping stations and to one another.

The solution was a multi-layer set up, in which the WUA oversees three pumping station coordination committees and 18 Water User Groups that include 53 subgroups. At the end of the pilot project in 2019, the WUA comprised 693 registered members, who have together developed processes to negotiate outcomes that minimize conflict.

Managing the water supply, however, is only part of the solution. It is also important to ensure that the water is used efficiently. The cultivation of rice, in the Central Dry Zone, is not the most attractive option.

Farmers in the project learned how to improve the production of pulses, and to grow vegetables, fruit trees and other high-value crops such as chilies. These crops create a win-win situation in the water-energy-food nexus, as they require less water and energy, thereby reducing the pressure on irrigation infrastructure and preventing water-related conflicts. As a result, and with the shift to the cultivation of high-value crops within the season, many farmers have already seen their incomes increase.

This shift has just started and has a great deal of potential. If it continues, not only will farmers earn more, but the Pyawt Ywar Pump Irrigation Scheme could triple the irrigated area. The successful pilot allowed IWMI to publish **a set of guidelines**, currently used by IWUMD, to establish a WUA in other pump-based irrigation schemes in the Central Dry Zone of Myanmar and, quite possibly, beyond.

---

**The Pyawt Ywar Pump Irrigation Project is funded by the Livelihoods and Food Security Fund (**LIFT**). Implementing partners are the International Water Management Institute (IWMI) together with the CGIAR Research Program on Water, Land and Ecosystems (**WLE**), United Nations Office for Project Services (**UNOPS**), National Engineering and Planning Services (**NEPS**), Welthungerhilfe (**WHH**), and the International Crops Research Institute for the Semi-Arid Tropics (**ICRISAT**).**

---



# Digital innovation



*Photo: Faseeh Shams / IWMI*

## ● Big picture story

# A new digital agenda

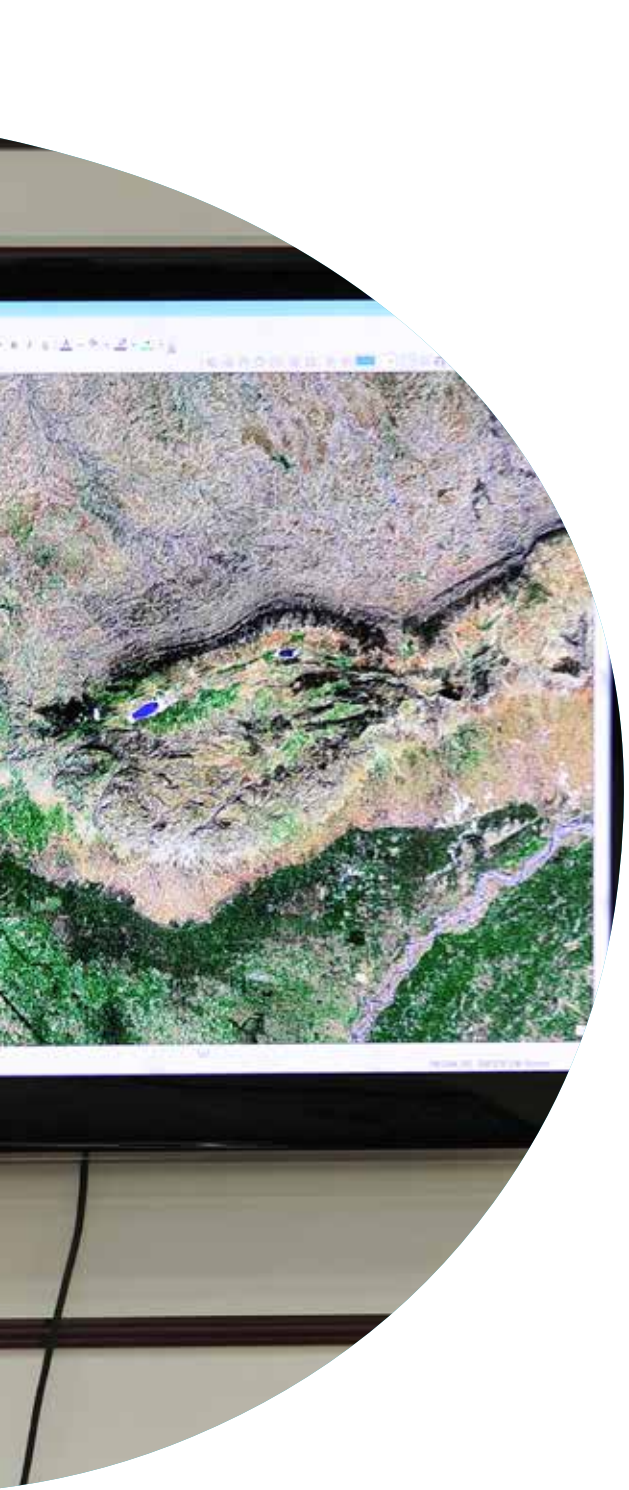
In 2019, IWMI launched a [new five-year strategy](#) that emphasizes science to support a transformative agenda for water through three Strategic Programs: Water, Food and Ecosystems; Water, Climate Change and Resilience; and Water, Growth and Inclusion. A fourth program, Digital Innovation, unites and supports the other three programs.

A glance at [IWMI's website](#) reveals a host of existing digital innovations developed over the years, some of which are highlighted in this report. Flood risk maps are the foundation of [index-based insurance](#) schemes in South Asia. Solar-powered pumps report on water extraction via inbuilt sensors and the Internet of Things. The [solar suitability tool](#) can guide sustainable irrigation decisions. The Digital Innovations program will build on these existing innovations to strengthen the ability of all stakeholders to make use of the information our tools provide for water management in agriculture.

The strategy for Digital Innovations was developed only after extensive consultations internally and externally at six globally important meetings on agriculture and water. The feedback we received made it clear that our strength lies in the design side, understanding a problem and its context, and working with stakeholders at all levels. In addition, however, we also need to ensure that 'tried and tested' approaches leave space for innovations that might



Photo: Neil Palmer / IWMI



eventually prove superior, and that all communities are able to make use of digital innovations.

To begin with, we will work largely in sub-Saharan Africa and South Asia, with a longer-term aim to make knowledge gained in those regions widely available and adaptable to other circumstances. The initial focus will be on high-profile issues such as water quality, water governance, gender and inclusion, and capacity strengthening.

Some digital innovation projects can move ahead quickly. For example, big investors have a good track record of supporting irrigation through capital investment, but too often no resources are set aside for maintenance. Systematic Asset Management Software for Irrigators ([SAMS](#)) captures infrastructure investments in a database, and can track performance and predict the need for maintenance. This process will enable stakeholders to audit investments and keep track of maintenance.

At the same time as advancing external developments, internally, IWMI as an organization will become more digitally minded. Some projects that are just getting under way provide good opportunities to move this forward. Phase I of the [Water Secure Africa Initiative](#), for example, will allow us to make use of Open Data Cube (ODC), a new structure that gives better access to the petabytes of data collected over Africa by orbiting satellites. We will be adapting our existing tools – Water Accounting Plus ([WA+](#)), and flood and drought monitoring – to make use of ODC while building the regional skills to apply and refine the approach across Africa.

Guided by the strategy for Digital Innovations, the next task will be to develop ambitious proposals to take advantage of IWMI's undoubted expertise in the use of digital data for water management.

IWMI will become a bridge between the technical experts – space agencies and others who provide technical tools and datasets – and end users (e.g., farmers, river basin authorities and investors), each with specific problems and managing their own solutions.



## ● Outcome story

# Voicing water visions

The theme for World Water Day 2019 was ‘Leaving no one behind’. World Water Week, in August, was dedicated to ‘Water for society - Including all’. Bridging the two events, digital innovations played a central part in IWMI’s **Voicing Water Visions** project.

Four communities, directly affected by issues related to water governance and sustainability, were able to share their stories with the world beyond their experience, including policy-makers, whose decisions can have tremendous impacts on their lives.

People thrive on telling stories; digital innovations – such as smartphones – provide new opportunities to document and share our lived experiences. Through a variety of participatory activities designed to build confidence and capacity, we sought to support participants in telling their stories using their own images and words. The aim was to also connect their stories with appropriate audiences, from the Voicing Water Visions website to meetings with policy-makers.

**In Western Nepal**, construction of a dam on the Karnali River was approved in 2008. Although no work has begun yet, two people from each of the three villages closest to the dam site – Ramaghat, Daba and Asaraghat – shared their concerns. Just downstream of the dam, fishing is the only source of income for people who are members of the most disadvantaged caste in Nepal. Construction of the dam will put an

end to fishing and have an impact on the livelihoods of these people. However, they have not been invited to any of the planning meetings, which could be because they do not have an official title to the land they live on. Villages upstream of the dam have additional concerns about losing land and displacement. In each case, participatory photos enabled them to put those concerns in front of policy-makers, media, practitioners and civil society representatives at IWMI’s **Digo Jal Bikas** project dissemination workshop.

**In Ghana**, two young men from the Upper East region shared some of their coping strategies during the dry season. One man lives in a village that has access to water for irrigation. He said that the dry-season harvests help all the families to survive. Vegetable sales pay for additional food for his family and school supplies for his younger siblings. His ambition is to attend agricultural college and return to help the community to improve the way they farm. The other man lives in a village without access to water for irrigation and explained how he wanted to get into dry-season farming to become more resilient, in addition to building up his own small herd of cows.

**In South Africa**, two communities – **Ga-Moela** and **Tshakhuma** – made videos about their experiences with the Multiple-Use water Services (**MUS**) project, designed to amplify community voices in efforts made by municipalities and nongovernmental organizations (NGOs) to supply water to people. Ga-Moela’s tracked the stages of the participatory design and construction of new storage and piping, which brings water to the community. Tshakhuma’s videos showed how they constructed their own water supply system to include the entire community of 12,000 residents. As in Nepal, the videos were shown to government officials, international donors, researchers and NGOs in South Africa. They were able to see how the MUS process connects municipalities to their communities, holding







Photo: Andrew Reckers / IWMI

the former accountable and backstopping the latter to facilitate good governance and sustainable water use.

**Laos provides a final example**, concentrating on the Laos-China railway that runs more than 400 kilometers through the heart of the country. Although it promises better transport and economic opportunities, construction of the railroad is taking land and polluting water supplies. Families in Nasang village used photos to explain how polluted water hurts their skin, poisons their poultry and reduces crop yields. When agricultural land is taken for the railroad, some families can no longer grow a surplus to sell. Also, the compensation they receive may not be able to guarantee their food security. However, their stories also convey hope for a better future, with opportunities for education and trade, access to electricity and, eventually, clean water.

Participatory media is just one of many opportunities – for research, storytelling, participation and collaboration – afforded by digital innovations.

---

**Nepal's Upper Karnali Hydropower Project was conducted through the *Digo Jal Bikas* project with funding from the United States Agency for International Development (USAID).**

**IWMI's research on Bhungroo Irrigation Technology in the Upper East region of Ghana was conducted in collaboration with the Conservation Alliance, with funding from USAID. It forms part of the CGIAR Research Program on Water, Land and Ecosystems (WLE), and is supported by Funders contributing to the CGIAR Trust Fund.**

**The MUS project is being implemented by the Water Research Commission, with funding from the African Water Facility of the African Development Bank. Tsogang Water and Sanitation leads the project's facilitation, while IWMI is responsible for its research component.**

**IWMI's research on compensation and agricultural land impacts from the Laos-China Railway in Chomphet district, Laos, forms part of the CGIAR Research Program on Policies, Institutions, and Markets (PIM), and is supported by Funders contributing to the CGIAR Trust Fund.**

---

# Climate adaptation and resilience

Photo: Neil Palmer / IWMI



# Integrating water into the international climate discourse

Water is one of the more immediate and direct manifestations of the climate emergency. Food systems around the world are having to cope with floods, droughts, and changes in growing seasons and patterns of rainfall. Global policy arenas, however, **do not seem to consider water a priority**. Even when climate summits have considered water, there is no acknowledgement that food security, human health, biodiversity, energy supply, industrial growth and urban development depend on this precious commodity.

During 2019, IWMI has given particular emphasis to the integration of water into the international climate discourse. Building on our reputation as a global leader in water research, we aim to influence a more holistic view of water in the climate change debates. This entails a shift from the current, sectoral, approach, which considers water for sanitation, health, agriculture and the environment as separate areas of discussion, to more systems-based thinking on resource management under increasingly stressed conditions. To achieve this goal, a better



Photo: Matthew McCartney / IWMI

understanding is needed of future climate conditions, including general trends and the prevalence of extreme weather events such as droughts and floods.

Global policy-makers were tasked with taking these issues into consideration when IWMI partnered with the [World Water Council](#) and the Alliance for Global Water Adaptation ([AGWA](#)) to lead a side event at the United Nations Climate Change Conference ([COP25](#)) in Madrid, Spain. A [background paper](#), prepared by IWMI and AGWA for the Global Commission on Adaptation ([GCA](#)), was launched at [the side event](#). The paper guides progress towards climate-resilient water management. Event participants provided inspiring examples that showcased water management solutions for climate change adaptation from around the world.

The paper for GCA provides an important summary of the water-related impacts of climate change, highlighting key areas for adaptation planning. Critically, it draws attention to a necessary shift in water management thinking. Previously, water planning has assumed that the climate – and thus water conditions – of tomorrow will be the same as yesterday, and that averages and probabilities of the past can guide action for the future. This is no longer true; the era of ‘stationarity’ is over. Against that background, the paper makes a series of recommendations that can be acted on at all levels of government and society. It calls for a change of mindset, making water a central concern of adaptation and resilience building. The paper concludes by stating that, “Every decision we make now about water management is also a chance to build resilience to climate change.”

IWMI is committed to supporting the delivery of GCA’s action tracks on water and agriculture. Under the ongoing [Two Degree Initiative](#) – from the CGIAR Research Program on Climate Change, Agriculture and Food Security ([CCAFS](#)) and partners across CGIAR – we are working with many countries to address climate change risks and shocks in their water, food and agricultural systems. The aim is to also support the development of climate-resilient river basin management plans.

Commitment to international initiatives also continues through IWMI’s contribution to the Intergovernmental Panel on Climate Change ([IPCC](#)) in helping to prepare the [Sixth Assessment Report](#) (AR6). During 2019, Aditi Mukherji, Leader of IWMI’s Research Group on Climate Change Adaptation and Resilience, was joint coordinating author on the water chapter of AR6, and several other researchers acted as expert reviewers for parts of the report. Here, too, we are stressing the central role of water in climate change.

IWMI’s position on water and climate change is essentially hopeful. In many cases, we have solutions that can help adaptation even in the face of uncertainty. Early warning systems coupled with flood or drought insurance can help protect people in affected areas to recover more rapidly. Also, mitigation efforts through nature-based solutions and climate-smart agriculture can help farmers and water managers to manage the impacts of shifting weather patterns.

IWMI will continue to champion water as a central element in all preparations for climate change adaptation and resilience building in 2020 and beyond.



# Reducing water competition in Central Asia

Developing sustainable river basin management under a changing climate is particularly important for transboundary rivers. The rivers that feed the Aral Sea provide a classic example, flowing through the five countries of Central Asia. Some countries, such as Tajikistan, are home to the snow and glaciers that are the source of the Amudarya and the Syrdarya rivers. Others, such as Uzbekistan and Turkmenistan are considered downstream countries and extract more water than they contribute to Amudarya.

IWMI aims to reduce transboundary competition for water by improving

Photo: Neil Palmer / IWMI

water-use efficiency while strengthening regional water cooperation and the means to adapt to and mitigate climate change. The effort is vital, because irrigated agriculture is the foundation of the region's economies, while at the same time, changing availability brings unprecedented challenges in meeting all the other growing demands for water.

Integrated river basin planning depends crucially on sound data about water availability and use. One of IWMI's main activities in 2019 was to produce a better model of the hydrology of the entire Aral Sea Basin. The new model uses a combination of ground-based measurements of water flows with remotely sensed land-use maps and soil data, along with climate information. During testing, it proved accurate enough to improve predictions that could form the basis for future water resources management.

An important element in these models is the rate of water loss through evaporation and transpiration by plants. The standard method for estimating evapotranspiration requires several measurements, such as solar radiation, air temperature, wind speed and humidity. As there are few weather stations in Central Asia that can provide the necessary data, we investigated a simpler method, which uses only air temperature, in southern Uzbekistan. During most of the year, the method provides a sufficiently accurate estimate, except in the summer when the figures were too low. A simple modification to the calculation, however, makes it considerably more accurate.

In addition to models, we have also provided evidence to improve irrigation. In 2019, we reported

on experiments to compare the impacts of three different methods of irrigation on cotton yields in the Karshi Steppe, Uzbekistan: traditional flooded furrows, gated irrigation pipes and drip irrigation. At the end of the season, drip irrigation had used less than half the water of flooded furrows. It had also produced a larger cotton crop from fewer seeds in a shorter time. Overall, the efficiency of drip irrigation was almost three times greater than conventional flood irrigation, with additional benefits such as lower fertilizer use and reduced runoff.

Clearly, cotton and wheat farmers would benefit more by using drip irrigation. However, that requires substantial investment. The water for irrigation is raised about 135 meters from the Amudarya River by a series of seven pumping stations. Currently, the pumping stations consume 70% of the budget of Uzbekistan's Ministry of Agriculture and Water Resources and generate 420 kilotons of carbon dioxide (CO<sub>2</sub>) equivalent per year. Part of our advice to the government is to support better irrigation technology rather than the provision of water. This shift would help adaptation to climate change while also mitigating 120 kilotons of CO<sub>2</sub> equivalent.

As a result of IWMI's research, the Government of Uzbekistan agreed to expand the area of drip irrigation. It is offering a subsidy of 50% of the cost of drip irrigation equipment, and farmers who install drip irrigation are exempt from the land tax for five years. The government is also withdrawing energy subsidies from farmers who do not adopt drip irrigation, a further incentive. It is also planning other changes to improve water-use efficiency in the Karshi Steppe.

The sharing of reliable and agreed data is a crucial aspect of transboundary water management for informed decision-making and evidence-based management. To support this, in 2019, we released a series of [Digital Diagnostic Atlases](#) for three administrations in the area. The atlases compile biogeographic, economic and social information with predictions of a changing climate, and offer a sound basis for improved water planning and management.

IWMI's research in Central Asia continues to provide the evidence needed to support climate change adaptation practices and resilience building throughout the region. Research objectives also include smarter agricultural water management bringing increased yields, freeing more water to restore ecosystem services and meet domestic water needs.

---

This work is carried out under the United States Agency for International Development (USAID) Partnerships for Enhanced Engagement in Research (PEER) Cycle 4 project: 'Mitigating the competition for water in Amudarya River Basin, Central Asia, by improving water use efficiency' and is funded by [USAID](#).

---



Photo: Neil Palmer / IWMI





Photo: Metro Media / IWMI

# Groundwater management



# IWMI support for making groundwater visible

The importance of water is enshrined in [Goal 6](#) (clean water and sanitation) of the [United Nations](#) Sustainable Development Goals (SDGs). Groundwater, however, often suffers from being out of sight and therefore out of mind. As long as the water is coming out of a well or borehole now, long-term changes in what is happening underground in aquifers may be [ignored](#).

To address this challenge, in January 2019, [UN-Water](#) agreed that the [theme for World Water Day in 2022](#) would be *Groundwater: Making the Invisible Visible*. Subsequently, they also announced a Groundwater Summit to be held in 2022 in connection with World Water Day, which would give even greater attention to the topic.



Photo: Hamish John Appleby / IWMI

This priority focus on groundwater is something IWMI has been working towards for years. So, in 2019, one of our priorities was to continue strengthening alliances to build on the momentum of the enhanced focus on groundwater in 2022.

We were one of five globally representative authors who published a [call to action](#) on Global Groundwater Sustainability in the journal *Nature*. By the end of 2019, the [Global Groundwater Statement](#), which calls for “...action to ensure groundwater benefits society now and into the future,” had received support from more than 800 global scientists, practitioners and experts in more than 80 countries.

In September, the Groundwater Solutions Initiative for Policy and Practice ([GRIPP](#)) published a [timeline of the past 7,000 years of groundwater development and management](#). The timeline is another part of our strategic effort to draw attention to the issue of groundwater.

IWMI also launched a strategic initiative in September – the Groundwater for Resilience in Africa Network ([GRAN](#)) – to strengthen the evidence base for sound groundwater policy, and to work with partners to ensure that groundwater is included in broader water resources development and management policies across the African continent. This aligns with the concurrently established African Ministers’ Council on Water ([AMCOW](#)) Pan-African Groundwater Program ([APAGroP](#)). APAGroP offers IWMI and research and practitioner organizations collaborating in GRAN a unique opportunity to provide the evidence-based

information, policy advice and networking that will support the achievement of sustainable groundwater development in Africa.

In Southeast Asia, the longstanding work of IWMI and partners [in Laos](#) has informed government policy around groundwater. Although considered as having abundant water resources, changing climates are affecting water cycles in the country, which up to now has been more concerned with surface flows through the Mekong Delta. For four years, we worked with farmers to show how their livelihoods could be improved through the use of groundwater to cultivate high-value crops, as long as the resource was carefully managed.

It was the first multidisciplinary research effort to look at groundwater issues in the country, and when it ended, communities and policy-makers came to appreciate that groundwater management and capacity building at all levels are good for development. The Lao government started to emphasize sustainable groundwater development in its national priorities. A [case study](#) published in 2019 highlighted the lessons learned during project implementation, which may help others working on groundwater under similar conditions.

Groundwater is finally recognized as an integral element of sustainable development. Even beyond Goal 6, water is so closely entwined in so many other SDGs, including food security, sustainable cities, climate adaptation, health, and environmental protection, that it is imperative that IWMI continues to do whatever possible to facilitate the good governance of this vital resource.



Photo: Tom van Cakenberghe / IWMI

---

The **Groundwater Statement** has no formal funding with participants freely volunteering time and support.

The Groundwater Solutions Initiative for Policy and Practice (GRIPP) partnership, led by the International Water Management Institute (IWMI), will strengthen, expand and connect current groundwater initiatives.

The **project** ‘Enhancing the resilience and productivity of rainfed dominated systems in Lao PDR through sustainable groundwater use’ was carried out by IWMI and partners. Project partners from the government and academic institutions included the Lao Department of Water Resources (DWR), the Natural Resources and Environment Institute (NREI) of the Ministry of Natural Resources and Environment (**MoNRE**), Lao Department of Irrigation (DoI) from the Ministry of Agriculture and Forestry (**MAF**), and the Faculties of Water Resources (FWR) and Environmental Sciences (**FES**) of the National University of Laos (**NUOL**). Other partners included Khon Kaen University (**KKU**), Thailand, home to a national groundwater research center, and the regional Institute for Global Environmental Strategies (**IGES**), Japan, a partner of **GRIPP**. The project was funded by the Australian Centre for International Agricultural Research (**ACIAR**) and the CGIAR Research Program on Water, Land and Ecosystems (**WLE**), and supported by Funders contributing to the **CGIAR Trust Fund**.

---





Photo: Maheder Haileselassie / IWMI

## ● Outcome story

# Charting the groundwater resource

Around 70% of Africa's people depend on water stored in soil and rocks, i.e., groundwater, for their drinking water. This situation is not limited to the countryside, but is also the case in rapidly growing urban areas. Groundwater is the foundation of water security and climate resilience across the continent. This is why IWMI will be working closely with member states of the African Ministers' Council on Water ([AMCOW](#)) to identify knowledge gaps together, and then set about filling those gaps and sharing information with key stakeholders across the continent.

For example, the Groundwater for Resilience in Africa Network ([GRAN](#)) is pulling together the [Africa Groundwater Atlas](#), an online tool that makes it easier to access information on the groundwater resources of 51 African countries. The Atlas can be used for groundwater assessments, planning sustainable development, training programs and anything that requires open access to information on groundwater.

A paper in the highly-respected scientific journal *Nature* further exemplifies the kind of evidence and advice IWMI and partners can offer AMCOW and others. Most climate models predict that Africa will become drier as a result of climate change, and that has understandably prompted concern about the recharge of aquifers. Together with a large number of colleagues, we investigated long-term data series from 14 areas across sub-Saharan Africa, looking for patterns in rainfall and recharge.

Some areas were as one might expect; the level of groundwater rises and falls in sync with rainfall, at least above a certain minimum amount of rain. In others, such as the humid tropics, there is constant recharge every year, effectively independent of rainfall. A third group, mostly in arid areas, was particularly interesting; groundwater levels are not related to average rainfall over the year. Rather, sporadic intense precipitation, occurring perhaps only once in a decade, recharges the aquifers.

This information can help to plan for climate change. The first type of aquifer might deplete more rapidly if, as predicted, rainfall generally declines. The second type might not be affected by a drier climate. Importantly, the third type might not be affected by climate change over a medium-term perspective, because although total precipitation is predicted to decline with climate change, climate models also predict a greater frequency and intensity of extreme weather events, which would maintain aquifers in these arid areas.

Much remains to be done to understand patterns of groundwater use and recharge in detail. At a local scale, IWMI and partners have been working

to empower concerned citizens to contribute to knowledge generation and management. A project funded by the Danish International Development Agency (*Danida*) is centered on the Hout catchment in the Limpopo River Basin of the Republic of South Africa. Groundwater has been a valuable resource since the 1960s supporting the livelihoods of multiple farmers, and from space, parts of the catchment can be seen as a green oasis in an otherwise arid landscape.

Local people are concerned that water use is becoming unsustainable, partly as a result of climate change. We are *training citizen scientists* to measure groundwater levels, streamflow and rainfall, and to upload their observations via a smartphone app. The data will help us to understand water in the Hout catchment, for example, through *modelling*, and return information to the community so that they can jointly decide how best to use the limited, but highly valuable, shared groundwater resources.

---

The Groundwater Solutions Initiative for Policy and Practice (*GRIPP*) partnership, led by the International Water Management Institute (IWMI), will strengthen, expand and connect current groundwater initiatives.

‘My Citizen Science’ is an online application tool to promote citizen (volunteer)-collected water resources data from the Hout catchment, Limpopo River Basin, Republic of South Africa. The application has been built in association with *IWMI*, Pretoria, South Africa, as a part of the *Danida*-funded project Enhancing Sustainable Groundwater Use in South Africa (*ESGUSA*).

---



# Circular economy



Photo: Nana Kofi Acquah / IWMI



## ● Big picture story

# Wastewater as a resource

At the heart of our work to promote the circular economy is a mindset that regards ‘waste’ as raw material that can be converted into an [economically valuable commodity](#) for agriculture or energy. This has the twin benefits of reducing the cost of dealing with the waste and increasing its value in the local economy. This approach is the essence of Resource Recovery and Reuse (RRR), a subprogram under the Rural-Urban Linkages Flagship that the International Water Management Institute (IWMI) manages for the CGIAR Research Program (CRP) on Water, Land and Ecosystems ([WLE](#)).

In 2019, our work on RRR in Ghana and Sri Lanka was the subject of an Outcome Evaluation of Research for Development. The evaluation was “very positive overall,” and the [published report](#) goes on to describe the work as “a very successful pioneering research-for-development program which offers lessons for other CRPs and WLE Flagships.”

In Ghana, we have been developing three public-private partnerships (PPPs) to



Photo: Neil Palmer/ IWMI

build sustainable businesses using waste streams as resources. Two of these PPPs are increasing production of the innovative product *Fortifer™*, a clean and safe agricultural fertilizer produced from fecal sludge, which is available in various formulations, e.g., the conversion of solid organic waste into briquettes to be used as a low-cost fuel. The third PPP is using treated domestic wastewater to hatch the brood stock for aquaculture in separate freshwater ponds. The waste stream thus creates additional value in the form of an important food source.

In July 2019, building on our experience in Ghana, IWMI joined the Food and Agriculture Organization of the United Nations (FAO) to assist what is now the Ministry of Urban Development, Water Supply and Housing Facilities of Sri Lanka in a project to explore innovative approaches to reduce, recycle and reuse food waste. Approximately 60% of the 700 tonnes of solid waste generated in the capital city, Colombo, each day is organic waste, and food waste is the largest portion. The main focus of the project is on reducing the amount of food that is not eaten, in order to complement IWMI's earlier emphasis on composting the waste, which will inevitably remain. In November 2019, this work was summarized in [a video on YouTube](#).

In addition to our efforts to promote the conversion of 'waste' into a valuable resource, we will also be contributing to an [evidence-based national strategy](#) on food waste for the Government of Sri Lanka.

A [pilot project](#) was launched in September 2019, together with [CGIAR](#) colleagues at World

Agroforestry ([ICRAF](#)) and the International Center for Tropical Agriculture ([CIAT](#)), to reduce land degradation around refugee settlements and their host communities in Ethiopia, Kenya and Uganda. This is a new focus for CGIAR projects, recognizing that meeting the energy needs of refugee settlements leads to severe deforestation, which can in part be addressed through RRR. For example, waste briquettes will provide an alternative energy source. The project will also aim to recycle resources to improve soil fertility and resilience in the plots that supply refugees with nutritious fruits and vegetables, while also improving sanitation. We will be exploring many other technologies to improve the lives of people in the settlements, including the safe use of 'gray' water for irrigation, all with an eye on the circular economy.

Sharing information is crucial if we are to enable others to build their own circular economies. Therefore, we feed lessons learned into our technical reports on RRR. In 2019, these reports included [Guidelines and regulations for fecal sludge management from on-site sanitation facilities](#) and [Global experiences on waste processing with black soldier fly \(\*Hermetia illucens\*\): From technology to business](#).

Overall, our research on the circular economy produces a virtuous circle of its own. Successful projects generate a revenue stream that enhances the management of the resource and adds to its sustainability. That, in turn, directly improves the urban environment. The additional products created from 'waste' contribute to the city's resilience and food security.

## ● Outcome story

# IWMI curriculum adopted by international universities

Enhancing the ability of local people to take advantage of research conducted by IWMI and build their own parts of the circular economy has long been a focus of our work. In 2019, this effort reached [a new level](#) with a university curriculum that has been adopted by seven institutions and is under active consideration by several more.

The curriculum is based on [the book](#) we published in 2018, which details a series of empirical business models to address the challenges of waste management and sanitation. The curriculum came about through a conscious decision to broaden the range of people who are able to make use of IWMI's research results, while also being able to influence future thinking on RRR.



Photo: Neil Palmer/ IWMI



To ensure that the curriculum meets the needs of students and teachers, an intensive course was conducted at IWMI's headquarters in Colombo, Sri Lanka, in the summer of 2018. For two days, we worked with 25 university teachers who would be using the material. After this workshop, we welcomed about 50 undergraduate and graduate students to an intensive seven-day summer school to fine-tune the course material.

As a result, seven institutes of higher education formally agreed to use the curriculum in their degree courses in 2019 - Asian Institute of Technology, Thailand; Makerere University, Uganda; Birla Institute of Technology and Science, India; Open University, Sri Lanka; University of Moratuwa, Sri Lanka; Technische Hochschule Köln, Germany; and Ghent University, Belgium. Several other universities remain interested and are continuing discussions.

So far, the universities that are using the course material cover mostly technical topics, such as sanitation and wastewater management. To gain broader involvement, in 2019, we compiled a list of business schools around the world which might be interested in using the course materials and case studies we have developed. We will be pursuing opportunities to interest them in our work. Broader adoption of the curriculum would benefit global communities because our work has shown that sustainable recycling schemes often offer jobs to

women and youth, for whom there are few other opportunities in large cities.

We also recognize that not every student or potential entrepreneur is able to attend a university course. To that end, we worked with the International Centre for Water Management Services (cewas) in Switzerland to develop an [online course](#) that any potential entrepreneur can take to prepare themselves to launch a business based on RRR in the sanitation-agriculture interface.

Together, [the online course](#) and the university curriculum, which continue to increase their reach, are making the case for sustainable waste management businesses around the world, in support of crop production and our environment.

---

**The Resources Recovery and Reuse (RRR) Entrepreneurship course was developed by researchers at the International Water Management Institute (IWMI) / the CGIAR Research Program on Water, Land and Ecosystems (WLE), and business development experts at cewas – coaching entrepreneurs in water and sanitation. Funding was provided by Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) (Federal Ministry for Economic Cooperation and Development), Germany.**

---

# Risk management



Photo: Metro Media / IWMI



Photo: IWMI

## ● Big picture story

# IWMI partnerships extend insurance offerings

Natural disasters such as floods hit smallholders disproportionately hard. These farmers have very little savings and often need to borrow money for house repairs and to replant damaged crops. Even if offered, insurance is out of reach for most farmers. Therefore, disasters often push poor farmers deeper into debt, as they cannot repay existing loans while also having to borrow more money. Over the past three years, IWMI has successfully tested new, high-tech index-based flood insurance (**IBFI**) products. The products are simple, flexible and affordable, and increase the resilience of farmers to climate change. Governments have responded enthusiastically.

Index insurance is a relatively new tool that farmers can use to help manage risk. It uses an objective index, such as rainfall, which can be measured at a local weather station or by satellite, to determine the payout, rather than using some consequence of weather, such as crop yield. It is important to assess the damage from afar, in order to avoid costly field visits by insurance experts. For floods, this has meant assessing the risk of flooding in particular areas by examining decades of images gleaned from the Moderate Resolution Imaging Spectroradiometer (**MODIS**) of the National Aeronautics and Space Administration (**NASA**) and the European Space Agency (**ESA**) Sentinel-1 satellites, and others. These data are combined with hydrological and rainfall data to construct a model of the likelihood of inundation. When an area floods, researchers can use current weather data and satellite images to quickly calculate the extent of flooding and trigger rapid insurance payouts.

The other important feature of IBFI is to ensure that farmers understand the insurance product



being offered and can afford the premiums. This has required working closely with microfinance institutions (MFIs), which have strong ties in communities, understand their cultures and are well trusted by farmers.

MFIs organize meetings to enable farmers to learn how the insurance works. It is important that farmers understand the scheme and how it operates in some detail, so that they do not have unrealistic expectations. MFIs can also offer loans specifically to pay the premiums, and can remit this in bulk to the IBFI scheme. Although MFIs can reduce the cost of collecting premiums from individual farmers, government subsidies may still be needed to make the premiums affordable. Nevertheless, for the government, insurance subsidies can be more cost-effective than disaster relief.

Weather index insurance has proved valuable in empowering women in pilot studies in Bangladesh. In addition to the threats of flooding, women face further difficulties due to the migration of men in search of better employment elsewhere. Even after men have left the farm, women still have little say over how to spend household money. With premiums paid through the mutually supportive self-help groups established by MFIs, women can be confident that their family will be able to survive a flood. Rapid payouts help to maintain food security by allowing women to purchase food for their families when their own harvest has failed.

IWMI has also used the IBFI model to develop products for droughts. By using satellite images and remote measures of soil moisture to assess the extent of the drought, IWMI developed the South Asia

Drought Monitoring System ([SADMS](#)), an index that integrates information on vegetation, soil moisture and temperature. In 2019, IWMI and the Indian Council of Agricultural Research (ICAR) shared weekly drought maps with agricultural extension services and state authorities to assist with the preparation of drought contingency plans to help farmers manage drought risks and to also trigger insurance payouts.

In 2019, IWMI launched the Bundled Solutions of Index Insurance with Climate Information and Seed Systems to manage Agricultural Risks (BICSA) project. The [BICSA project](#) offers insurance against floods and droughts as well as seed varieties developed for their tolerance to flooding and drought. Through the project, farmers also receive short message service (SMS)-based weather information, and advice on crop and water management. The BICSA package trial covered 1,000 households, of which 450 benefitted from an insurance payout that totaled approximately USD 12,500. Therefore, the project offers an [effective strategy](#) to build climate resilience.

In December 2019, we [shared the experience gained in the various pilot projects](#) during a regional consultation with the South Asian Association for Regional Cooperation (SAARC). Participants were given details about how the schemes work and results to date, along with practical next steps to encourage the uptake of weather index insurance in their own countries.

The IBFI project is funded by the CGIAR Research Programs on Climate Change, Agriculture and Food Security ([CCAFS](#)) and Water, Land and Ecosystems ([WLE](#)), and the Indian Council of Agricultural Research ([ICAR](#)).

## ● Outcome story

# Insurance payouts to smallholders

Bihar in northeast India is the state most prone to flooding and it also suffers from droughts. Together, natural disasters cost the state around USD 3 million a year. Over the past three years, IWMI has worked closely with the Indian Council of Agricultural Research (ICAR) to develop the Bundled Solutions of Index Insurance with Climate Information and Seed Systems to manage Agricultural Risks (BICSA) project. **BICSA** offers rural smallholders a package of insurance against floods and droughts along with improved varieties of seeds that can withstand too much or too little water.

In 2019, in Muzaffarpur district, 269 farm families enrolled in the scheme. Bihar and much of India were flooded that year, but 150 of the affected farmers **received a rapid payout** totaling USD 10,000. The insurance payout allowed them to repair their homes and replant their crops without getting further into debt.

The pilot scheme specifically indicated that half of the participants should be women. As it turned out, 67 of the 150 households that received a payout were in fact headed by women, who would have otherwise found it difficult to get the resources they need to

rebuild their livelihoods. The BICSA project, thus, helps to empower women.

The **index-based flood insurance (IBFI) pilot project** continued into its third year in 2019. The project has clearly demonstrated that the package it offers



Photo: Metro Media / IWMI



promotes climate resilience among the poorest farmers. The Government of India's countrywide crop insurance scheme, *Pradhan Mantri Fasal Bima Yojana*, has also shown interest in making IBFI part of its products.

While India has developed good policies for agricultural insurance, this has not been the case in neighboring Bangladesh, which is among the most vulnerable to flooding in the world. An extension of weather index insurance to Sirajganj district that started in 2019 is helping to change attitudes in Bangladesh.

In Bangladesh, as in India, IWMI partnered with local microfinance institutions to educate farmers about crop insurance and to collect premiums, of which 50% was subsidized through the project. When flooding occurred, 750 households, many of them headed by women, shared a total payout of USD 31,500 that was transferred directly to their bank accounts within two weeks. This was the first time that satellite-based insurance had been used in Bangladesh.

Farmers were naturally pleased with the outcome, despite having experienced flood damage, and so too were parliamentarians and government officials. Some called for Bangladesh's Department of Disaster Management to pay insurance premiums as a way of reducing the suffering of vulnerable people after disasters. The pilot [in Bangladesh](#) is now being extended to three additional districts in the northern part of the country.

---

**The Bundled Solutions of Index Insurance with Climate Information and Seed Systems to manage Agricultural Risks (BICSA) project and related work is carried out in collaboration with Weather Risk Management Services Private Limited (WRMS), with support from the CGIAR Research Programs on Climate Change, Agriculture and Food Security (CCAFS) and Water, Land and Ecosystems (WLE), and the Indian Council of Agricultural Research (ICAR). Flood- and drought-tolerant seeds were provided by the Borlaug Institute for South Asia (BISA) and an insurance partner from Reliance General Insurance Company Limited (RGL).**

---



# Awards and events



Photo: UNOOSA

## Major awards in 2019

Details	Awardee
IWMI's Dr. Miriam Otoo is the Winner of the 2019 International Water Association (IWA) Development Award for Research	Miriam Otoo
United Nations recognizes IWMI's innovative satellite-based disaster risk management	Giriraj Amarnath
IWMI's Alok Sikka receives prestigious achievement award	Alok Sikka



Photo: Prachi Patel / IWMI

## Key events in 2019

World Water Week 2019

Third World Irrigation Forum (WIF3)

Budapest Water Summit 2019

IWA Water and Development Congress & Exhibition 2019

United Nations Climate Change Conference (COP25)



Photo: Jim Holmes / IWMI

# Contribution to CGIAR Research Programs

**A sustainable  
agricultural future?  
WLE brings us  
closer to some  
answers**

The world is experiencing a range of intertwined crises: health, climate, environment and poverty. These crises all link to the choices we make in our food production. How do we navigate these risks and balance the trade-offs? How can we enhance our environment and build equity through better agricultural decisions? How can we build a sustainable food future?

The IWMI-led [CGIAR Research Program \(CRP\) on Water, Land and Ecosystems](#) (WLE) and its 12 [core partners](#) are making real progress in finding [answers](#) to these questions. In 2019, WLE worked toward stronger food systems through better management of land, water and biodiversity – and the ecosystems that sustain people and planet. Through WLE, IWMI collaborates with a network of partners to transform agriculture from being a driver of environmental degradation to part of the solution.

In 2019, WLE was able to address all CGIAR impact areas through major policy, innovation and capacity contributions. These include evidence-based results that were documented in WLE's rigorous [Annual Reporting](#) process:

**Environment:** WLE's primary focus is on providing evidence and tools to ensure smarter agricultural decisions that enhance our environment. Results in 2019 include directly influencing national water management policies in [Laos](#) and [Nepal](#) to better manage trade-offs; increased capacity in resource recovery and reuse through [curriculum uptake](#); [improving water governance](#) by bringing [experiential games to 245,000 Indian households](#); supporting a policy that helps Ethiopia improve landscape health through [data-driven fertilizer decisions](#); scaling [soil spectral technology](#) from Africa to global use to improve restoration strategies; and influencing the [Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services](#) (IPBES) to focus on interdependencies of biodiversity and food production. *(Partners: IWMI, International Food Policy Research Institute [IFPRI], International Crops Research Institute for the Semi-Arid Tropics [ICRISAT],*

*World Agroforestry [ICRAF], International Center for Tropical Agriculture [CIAT], Bioversity International)*

**Climate:** WLE's work improves agroecosystems and carbon management. Results include leading a soil carbon [sequestration report](#) for the United Nations Convention to Combat Desertification ([UNCCD](#)), which generated policy recommendations [accepted by 197 country parties](#); bundling [effective satellite data-based insurance](#) products [with climate information and seed systems](#) to help farmers facing climate-related extreme weather events; and [expanding solar irrigation innovations](#) to more communities and countries. Also, harnessing the power of [goats against climate change!](#) *(Partners: IWMI, ICRAF, ICRISAT)*

**Poverty:** WLE's solutions enhance opportunities for smallholders and reduce [poverty](#). The Laos and Nepal water management policies will likely benefit thousands of community livelihoods; watershed restoration is bringing prosperity to [Indian communities](#), and up and down a [mountain watershed in Ethiopia](#). Also, WLE is assisting [city regions](#) such as [Quito, Ecuador](#), and [Cali, Colombia](#), with [food security](#) strategies and tools, and combining agricultural social networks with [smart water management tools to increase incomes](#) in rural Zimbabwe. *(Partners: IWMI, ICRISAT, RUAF Global Partnership [RUAF], CIAT, Food and Agriculture Organization of the United Nations [FAO])*

**Gender:** WLE interventions highlight why gender-equal and socially inclusive food solutions are critical to addressing poverty and hunger. Projects informed by [Gender Transformative Approaches](#) have [influenced discourse](#) to put social equity at



the heart of [restoration](#). Globally, parties to the UNCCD adopted a gender- and youth-inclusive recommendation to achieve the Land Degradation Neutrality target; gender dimensions now inform the [Milan Urban Food Policy Pact](#) (UNFPP); and WLE developed [guidance to help South Asian policy-makers](#) target satellite-based climate risk insurance to the [most marginalized](#). (*Partners: IWMI, RUAF, CIAT*)

**Nutrition:** WLE solutions are also helping farmers produce sufficient nutritious food for increasing populations. Results include leading the development of [World Bank guidance](#) on nutrition-sensitive [irrigation and water management](#); and taking a lead role in the [EAT Lancet Commission study](#) to transform dietary guidelines. (*Partners: RUAF, CIAT, IFPRI, Bioversity International*)

These results are only a few highlights from across the WLE portfolio. However, as the program readies itself for a transition after 2021, how can we weave these impact areas together? Well, WLE is establishing a [Commission on Sustainable Agriculture Intensification](#) (CoSAI). Key global experts are set to chart the course for decision-makers to better invest in the right innovations. Pulling together years of WLE's work with the best of global expertise, CoSAI will help define the legacy of WLE and its partners.

“WLE has built a powerful legacy and helped IWMI bring its water expertise into an array of sectors, improving the work of partners across the globe,” says Izabella Koziell, Program Director - WLE. “These next two years will cement that legacy and drive

forward some real solutions for more and better food systems, healthier landscapes and increased equity.”

It was a year of impacts in 2019, and 2020 is asking us to rise to new challenges. WLE will make some pivots towards addressing our global health issues. We will also continue to connect researchers, farmers, implementers and policy-makers to help find answers to address these impact areas, and to address the biggest question of all – How can we feed more people, more equitably, with a more positive impact on our environment? The world must move forward on agricultural solutions that do not just solve one problem, but consider ecosystems, people and the planet as a whole.

## CGIAR Platform for Big Data in Agriculture

For the past few years, IWMI has participated in the [CGIAR Platform for Big Data](#) in Agriculture aimed at both data innovations and making CGIAR research data more [FAIR](#) (Findable, Accessible, Interoperable and Reusable), in order to solve resource management problems faster, better and at greater scale.

As part of the Big Data Platform's ‘[Organize](#)’ component, IWMI has developed new internal policies for managing and organizing project data, devising standards for project data management planning, data documentation, naming conventions, backups, and privacy and ethics. IWMI's research data, as well as library listings, have also been linked to a new CGIAR-wide metadata search engine called [GARDIAN - the Global Agricultural Research Data Innovation and Acceleration Network](#).

Also, out of more than 100 submissions, IWMI and its private sector partner [FuturePump Ltd.](#) wrote one of four proposals to win the Big Data in Agriculture's [Inspire Challenge](#) in 2019, for its proposed development of the Real-time East Africa Live Groundwater Use Database ([REAL-GUD](#)). Inexpensive and autonomous solar pumps offer the potential for East Africa's farmers to increase productivity, but groundwater data needed to best locate the pumps, judge the sustainability of these solutions and plan appropriate policies have not been available. This project aims to reduce information gaps by turning the network of solar pumps developed by Futurepump into Internet of things (IoT) devices linked to an open online water information platform at IWMI. The system will provide near real-time information on water withdrawals, area irrigated and energy use. A link to [WLE's Land and Water Solutions \(LWS\) Flagship](#) has been formed to merge the analysis with [solar suitability mapping](#) and also merge the interfaces into IWMI's integrated spatial data interface (code-named Online Water Security Information System [OWaSIS], currently in development).

### **CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)**

IWMI's collaboration with the [CGIAR Research Program on Climate Change, Agriculture and Food Security \(CCAFS\)](#) progressed along several fronts with key strategic events and achievements, including the following:

- A [successful pilot](#) on bundling solutions with seed systems, index insurance and climate information services covering 1,000 smallholder

farmers in flood- and drought-prone districts in Bihar, India.

- Scaling up [index insurance in Bangladesh](#) and Sri Lanka through partnerships with [Oxfam](#) and the [World Food Programme \(WFP\)](#), Sri Lanka.
- Adoption of IWMI's knowledge solutions on Bundled Solutions of Index Insurance with Climate Information and Seed Systems to manage Agricultural Risks ([BICSA](#)) in the smallholder agribusiness and resilience project ([SARP](#)) funded by the International Fund for Agricultural Development ([IFAD](#)).
- A joint regional workshop and training on the *Utilization of Space-based and Geospatial Information for Achieving the Targets of the [Sendai Framework for Disaster Risk Reduction](#)* was held in Beijing, China, in September 2019.
- Participation in the fourteenth meeting of the Conference of the Parties to the UNCCD ([COP 14](#)) held in New Delhi, India, in September 2019. The meeting provided the opportunity to present the drought risk management framework and engage in consultations with stakeholders from Asia and Africa.
- United Nations Office for Outer Space Affairs ([UNOOSA](#)) recognition of IWMI's best practices on disaster risk management at the [UN-SPIDER United Nations International Conference on Space-based Technologies for \*Disaster Risk Reduction\*](#) – 'A Policy Perspective' held in Beijing, China, in September 2019.

- Second agricultural insurance forum convened jointly with Oxfam and held at IWMI headquarters in Colombo, Sri Lanka, in September 2019. The forum provided the opportunity for wider consultation with stakeholders in Sri Lanka on agricultural risk management, and to develop a strategy for the climate insurance program.
- Inception workshop *Scaling Up Climate-smart Technologies, Practices and Services in Indian Agriculture* was held in Delhi, India, on May 8, 2019.
- International Solar Alliance (ISA)-IWMI-ICAR Policy Consultation on *Solar Irrigation – Solarization of Agriculture - Risks and Opportunities* held in New Delhi, India, on June 26, 2019.

## CGIAR Research Program on Fish Agri-Food Systems (FISH)

IWMI leads the research cluster on *fish in multifunctional landscapes* under the CGIAR Research Program on Fish Agri-Food Systems (FISH).

In 2019, working in collaboration with WLE and FISH, IWMI forged a close partnership with FAO to investigate how fisheries productivity can be improved in man-made water bodies, in relation to both water storage (reservoirs) and conveyance (irrigation). During 2019, FAO, IWMI and WorldFish developed guidelines for water planners, managers and engineers on how to increase the benefits of integrating fisheries into irrigation systems. These guidelines will be published in 2020.

IWMI was co-convenor of a session titled *Inland Fisheries, Freshwater Governance, and the 2030 Agenda at the World Water Week in Stockholm*, Sweden, in August 2019, and presented on *Inland Fisheries in Multifunctional Landscapes*. IWMI also co-organized a session titled *Modernizing Irrigated Agriculture to Protect and Restore Aquatic Biodiversity and Inland Fisheries in Asia* at the International Commission on Irrigation and Drainage (ICID) Third World Irrigation Forum (WIF3) held in Bali, Indonesia, in September 2019, and presented on *Global Trends in Irrigation Modernization and Expansion – From an Inclusive Growth Perspective*. This resulted in a key publication on *Rethinking irrigation modernization: Realizing multiple objectives through the integration of fisheries* in the journal *Marine and Freshwater Research*.

Furthermore, to enable closer cross-center and cross-CRP collaboration, in April 2019, a *five-year tripartite Memorandum of Understanding (MoU)* was signed between the International Rice Research Institute (IRRI), WorldFish and IWMI. The agreement provides a framework for cooperation on research-for-development initiatives focused on the sustainable intensification and management of rice-fish production systems in irrigated landscapes and wetlands in Southeast Asia. The agreement aligns with the CGIAR 2030 Plan, which calls for transformations of its research programs to usher in a ‘food systems revolution’.

Under FISH, IWMI also leads the crosscutting theme on ‘youth’, and published a report titled *Youth participation in small-scale fisheries, aquaculture and value chains in Africa and the Asia-Pacific*, which provides an important foundational piece



towards understanding the equitable engagement of youth in the fisheries and aquaculture sectors. The report, thus, suggests four interlinked research areas in the context of youth, i.e., understanding the impact of economic, political and social shifts at global to local levels; analysis of policy architecture that impacts youth involvement; understanding the diversity of youth engagement; and building a youth-oriented approach.

### CGIAR Research Program on Policies, Institutions, and Markets (PIM)

IWMI's collaboration with the [CGIAR Research Program on Policies, Institutions, and Markets \(PIM\)](#) progressed along several fronts with key strategic events and achievements, including the following:

- Participation in the [PIM Political Economy workshop](#) held in Washington, DC, USA, in September 2019. IWMI presented key research findings at the [session](#) on *Natural Resource Governance and Conflict*.
- Participation in the [XVII Biennial International Association for the Study of the Commons \(IASC\) Conference](#) in Lima, Peru, in July 2019. IWMI presented research findings at two sessions – *Politics, Law and the Commons*, and *Multi-stakeholder Platforms to Strengthen Natural Resource Governance*.
- IWMI co-hosted a workshop on Special Economic Zone and Infrastructure Investment. Land Information Working Group, in Vientiane, Laos, in June 2019.

IWMI was part of an expert panel on land, migration and gender at a seminar held on [Migration, Women's Land Tenure Rights and Security in the Mekong Sub-region](#) in Bangkok, Thailand, on January 31, 2019.

### CGIAR GENDER Platform

IWMI participated in the first meeting of the Generating Evidence and New Directions for Equitable Results ([GENDER Platform](#)), which was held in Rome, Italy. The Institute is now part of the core group that coordinates the process of setting the Research Agenda for GENDER. Through this engagement, IWMI facilitates a number of [WLE](#)-funded projects and partnerships with several CGIAR centers. Some key developments in 2019 included the following:

- A special session on *Restoration for Whom, by Whom?* was co-organized by the CGIAR Research Programs on Forests, Trees and Agroforestry ([FTA](#)) ([Bioversity](#)), [PIM](#) ([IFPRI](#)) and [WLE](#) ([IWMI](#)) at the [8<sup>th</sup> World Conference on Ecological Restoration](#) in Cape Town, South Africa, in September 2019. The conference presentations and other invited articles are being included in a special issue of the journal *Ecological Restoration* to coincide with the launch of the [United Nations Decade on Ecosystem Restoration 2021–2030](#).
- IWMI/WLE co-authored two chapters for the IFPRI upcoming publication *Advancing gender equality through agricultural and environmental research: past, present and future*.

# Financials

IWMI completed the first phase of implementation of the new Enterprise Resource Planning (ERP) software. This implementation included review and improvement of existing business processes. The Institute implemented the new management structure, which included restructuring the research programs and hiring of new country representatives. IWMI received an unmodified audit opinion on its 2019 annual financial statements. During 2019, the Institute contributed to a total of five CGIAR Research Programs and one CGIAR research support Platform, and managed 123 bilateral projects. IWMI complied with donor regulations and compliance requirements of its country offices.

# Statement of Activities and Other Comprehensive Income

For the years ended December 31, 2019 and 2018

(In US Dollars '000)

	2019	2018
Windows 1 & 2	8,719	8,435
Window 3	1,869	2,780
Bilateral	11,705	11,938
<b>Total Grant Income</b>	<b>22,293</b>	<b>23,153</b>
Other revenue and gains	521	596
<b>Total Revenue</b>	<b>22,814</b>	<b>23,749</b>
Research expenses	21,846	21,754
General and administration expenses	2,418	3,711
<b>Total Expenses and Losses</b>	<b>24,264</b>	<b>25,465</b>
<b>Operating Deficit for the Year</b>	<b>(1,450)</b>	<b>(1,716)</b>
Financial income & disposal gains	594	739
Other comprehensive income	4	1,014
<b>Total Comprehensive (Deficit) / Surplus for the Year</b>	<b>(852)</b>	<b>37</b>



## Statement of Financial Position

As of December 31, 2019 and 2018  
(In US Dollars '000)

	2019	2018
Current assets	20,948	22,470
Non-current assets	2,215	2,277
<b>Total Assets</b>	<b>23,163</b>	<b>24,747</b>
Current liabilities	9,990	10,533
Non-current liabilities	2,175	2,364
<b>Total Liabilities</b>	<b>12,165</b>	<b>12,897</b>
Designated net assets	1,578	1,640
Undesignated net assets	9,420	10,210
<b>Total Net Assets</b>	<b>10,998</b>	<b>11,850</b>
<b>Total Liabilities and Net Assets</b>	<b>23,163</b>	<b>24,747</b>

## Expenses by Function

For the years ended December 31, 2019 and 2018  
(In US Dollars '000)

	2019	2018
Personnel costs	12,005	12,103
CGIAR collaboration expenses	3,302	3,570
Non-CGIAR collaboration expenses	1,959	2,624
Supplies and services	5,248	5,315
Travel	1,397	1,284
Depreciation	122	170
Cost sharing percentage	231	399
<b>Total Expenses and Losses</b>	<b>24,264</b>	<b>25,465</b>

# Principal investment partners

IWMI research receives support from Funders contributing to the **CGIAR Trust Fund** as well as grants from various organizations. We gratefully acknowledge their support for our collaborative efforts to achieve water security across the developing world.

African Development Bank (AfDB)

Asian Development Bank (ADB)

Asian Infrastructure Investment Bank (AIIB)

Australian Centre for International Agricultural Research (ACIAR)

Australian Water Partnership (AWP)

Austrian Development Agency (ADA)

Bajaj Allianz General Insurance Company Limited, India

Bill & Melinda Gates Foundation

Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) (Federal Ministry for Economic Cooperation and Development), Germany

CGIAR Trust Fund

Danish International Development Agency (Danida)

Department for International Development (DFID), United Kingdom

Department of Agriculture, Forestry and Fisheries (DAFF), South Africa

Department of Foreign Affairs and Trade (DFAT), Australian Government

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), Germany



Economic and Social Research Council (ESRC), United Kingdom  
European Bank for Reconstruction and Development (EBRD)  
European Commission (EC)  
Food and Agriculture Organization of the United Nations (FAO)  
Government of the Netherlands  
Green Climate Fund (GCF)  
International Development Research Centre (IDRC)  
International Fund for Agricultural Development (IFAD)  
ITC Limited, India  
Livelihoods and Food Security Fund (LIFT), Myanmar  
Millennium Challenge Corporation (MCC), USA  
Ministry of Agriculture and Farmers' Welfare, India  
Ministry of Agriculture and Rural Affairs, China  
Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan  
Natural Environment Research Council (NERC), United Kingdom  
Netherlands Enterprise Agency (RVO)  
Norsk institutt for bioøkonomi (NIBIO) (Norwegian Institute of Bioeconomy Research), Norway  
Sir Dorabji Tata Trust and Sri Ratan Tata Trust  
Swedish International Development Cooperation Agency (Sida), Sweden  
Swiss Agency for Development and Cooperation (SDC), Switzerland  
United Kingdom Research and Innovation (UKRI)  
United Nations Children's Fund (UNICEF)  
United Nations Environment Programme (UNEP)  
United States Agency for International Development (USAID)  
United States Department of State  
Water Research Commission (WRC), South Africa  
World Bank

**HOST COUNTRIES:** Sri Lanka, Egypt, Ethiopia, Ghana, India, Laos, Myanmar, Nepal,  
Pakistan, South Africa, Uzbekistan

# Board of Governors

*66<sup>th</sup> Meeting of the IWMI Board of Governors, November 20-23, 2019, Colombo, Sri Lanka.*

*From left: Claudia Sadoff, David Grey, Roberto Lenton (Chair), Chemutai Murgor, Syon Niyogi (Board Secretary), Simi Kamal and Letitia Obeng.*



**Dr. Roberto Lenton**, Chair, IWMI Board of Governors, Daugherty Distinguished Fellow, Robert B. Daugherty Water for Food Global Institute at the University of Nebraska; and Independent Consultant/Advisor, USA

**Ms. Chemutai Murgor**, Chief Financial Officer Kenya & East Africa, Finance Division, Standard Chartered Bank Kenya Ltd., Kenya

**Prof. David Grey**, Visiting Professor of Water Policy, School of Geography and the Environment, University of Oxford, UK; and Honorary Visiting Professor, University of Exeter, UK

**Prof. Gebisa Ejeta**, Executive Director, Center for Global Food Security, Purdue University, USA

**Dr. Letitia Obeng**, Alternate member, International Consultant

**Ms. Simi Kamal**, Head of Grants Operations, Pakistan Poverty Alleviation Fund (PPAF); and Voluntary Chair, Academic Committee, Hisaar Foundation, Pakistan

**Mr. Dominic Waughray**, Head, International Institutional Agenda, World Economic Forum, Switzerland

## EX OFFICIO

**Ms. M. Ann Tutwiler**, Chair, WLE Independent Steering Committee

**Mr. K. S. Ruwanchandra de Silva**, Secretary, Ministry of Agriculture, Rural Economic Affairs, Livestock Development, Irrigation and Fisheries & Aquatic Resources Development, Sri Lanka

**Dr. Claudia Sadoff**, Director General, International Water Management Institute (IWMI), Sri Lanka

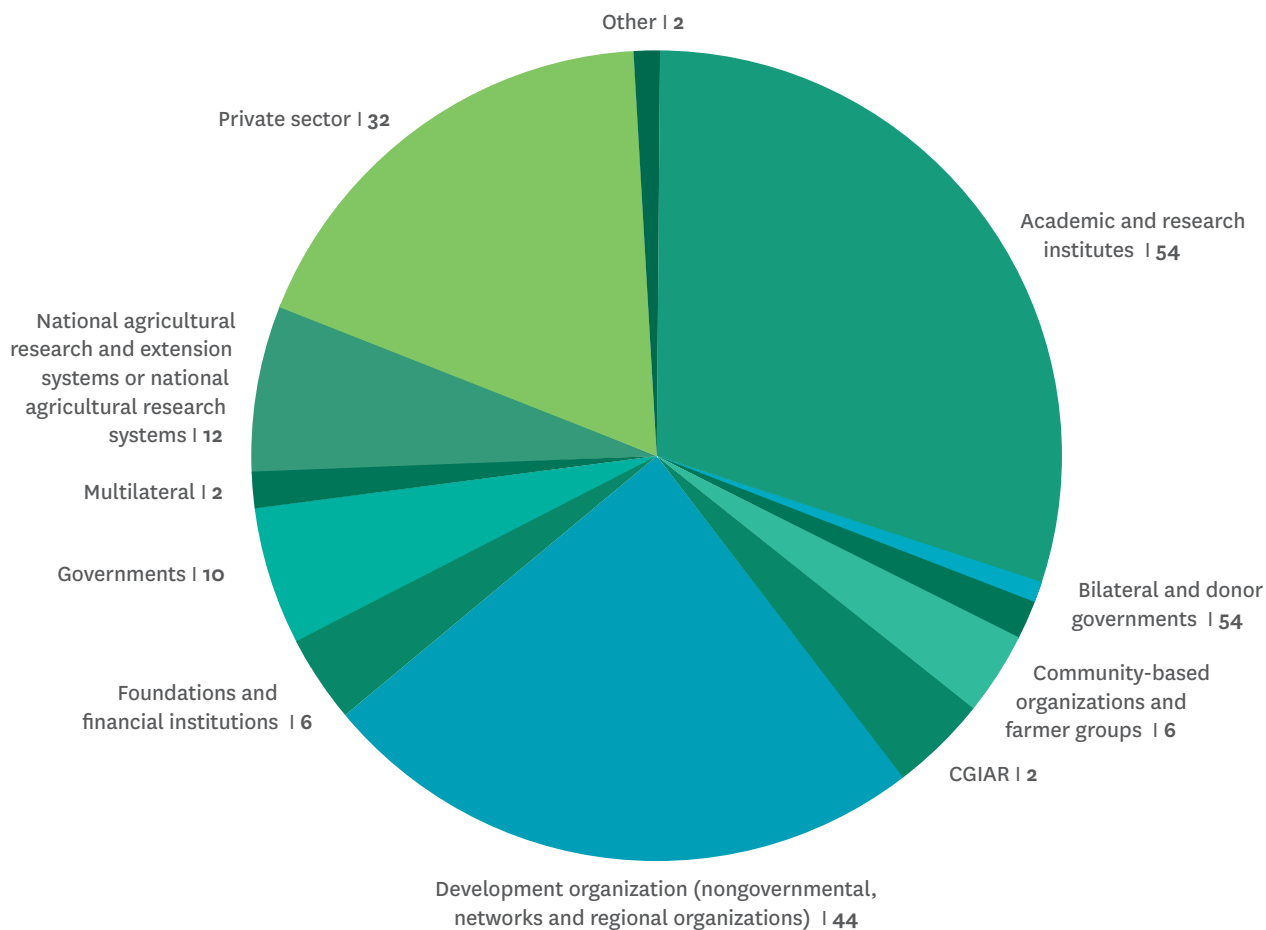
# Partnerships

Our priority is to deliver research and knowledge services to, and through, partnerships.

Over decades of experience in research for development, IWMI has learned that no one achieves impact at scale by acting alone. Research contributions to innovation systems are only possible through partnerships. IWMI prioritizes partnerships that put in place the relationships needed to link research to local change and innovation, and to policy and institutional change at national, regional and global levels.

IWMI uses its unique and extensive field-based presence of water scientists, its long-term partnerships with governments, researchers, nongovernmental organizations (NGOs), the private sector and development practitioners, as well as its membership in CGIAR, to identify key partners and prioritize cooperation with coalitions at local, basin and national levels.





# Our locations



International Water Management Institute (IWMI). 2020. *IWMI Annual report 2019*. Colombo, Sri Lanka: International Water Management Institute (IWMI). 6op. doi: <https://doi.org/10.5337/2020.208>

ISSN 1017-5954

Copyright © 2020, by IWMI. All rights reserved. IWMI encourages the use of its material provided that the organization is acknowledged and kept informed in all such instances.

Front cover photograph: Nabin Baral / IWMI



**IWMI**  
International Water  
Management Institute

**IWMI Headquarters**  
127 Sunil Mawatha  
Pelawatte  
Battaramulla  
Sri Lanka

**Mailing address:**  
P. O. Box 2075, Colombo, Sri Lanka  
  
Telephone: +94 11 2880000  
Fax: +94 11 2786854  
Email: [iwmi@cgiar.org](mailto:iwmi@cgiar.org) | Web: [www.iwmi.org](http://www.iwmi.org)

  
**CGIAR**  
IWMI is a CGIAR  
Research Center