



OUR WORK IN BANGLADESH

In Bangladesh, IWMI supports climate-resilient water and agricultural systems, and improving water security, agricultural sustainability, and livelihoods across the country.

IWMI works with its partners to advance integrated approaches to water management, promote solar-powered irrigation to reduce diesel dependence, ensure sustainable and equitable access to water, and enhance agricultural resilience in the face of climate change.

Alongside technology solutions, IWMI focuses on capacity building, gender-budgeting, strengthening institutions and empowering communities to adopt climate-resilient practices.

IWMI has a long-standing presence in Bangladesh since 1988, working closely with government agencies, research institutions, development partners, and farming communities. In March 2024, IWMI and the Bangladesh Agricultural Research Council signed a Memorandum of Understanding, and we established our office in Dhaka, reinforcing collaboration in irrigation, water management, and agricultural research.

WATER MANAGEMENT IN BANGLADESH

Bangladesh's deltaic geography and heavy reliance on climate-sensitive sectors such as agriculture — which contributes **around 11% of GDP** and employs **one third of the workforce** — make the country one of the world's most climate-vulnerable nations.

Water resources are central to livelihoods, food security, and climate resilience across the country's diverse hydrological hotspots. Bangladesh receives **nearly 80% of its annual rainfall** during the monsoon season, creating severe seasonal contrasts between floods and dry-season water scarcity. Climate change is increasing the frequency and intensity of cyclones, floods, droughts, and salinity intrusion, affecting **more than 30 million people in coastal areas**.

As a lower riparian country, Bangladesh depends on **57 transboundary rivers**, making it highly vulnerable to upstream water variability. Groundwater **supplies nearly 79% of irrigation water**, but over-extraction in northwestern districts is causing declining water tables. Around **20 million people** are exposed to arsenic-contaminated groundwater, while salinity affects **over 1 million hectares in the southwest coastal zone**. Industrial pollution and untreated wastewater further degrade river systems, while fragmented monitoring and weak enforcement continue to challenge integrated water resource management.



2.1

million people **don't have access to clean water** close to their home.



6.5 to 24.4

million people are **exposed to combined risks of groundwater depletion, arsenic, and salinity**.

AREAS OF WORK

Coastal sustainability

IWMI strengthens coastal resilience in Bangladesh by improving polder management under rising salinity and climate risks. We apply socio-hydrological modelling for salinity and river forecasting, support integrated agriculture-aquaculture systems, and strengthen community-led water governance. These efforts enhance adaptive capacity, balance water use among stakeholders, and improve livelihoods in vulnerable coastal regions.

Under the CGIAR Asian Mega-Deltas Initiative and the CGIAR Scaling for Impact Program, IWMI and partners supported farmers in coastal Bangladesh's polders facing rising salinity and related agricultural losses. AI-based advisories guided farmers' decisions on crop choice, irrigation, and water management, improving their resilience and helping protect livelihoods.



Water and climate governance

IWMI enhances water and climate governance by supporting partners, such as Water Resources Planning Organization, Bangladesh Water Development Board, and Bangladesh Agricultural Research Council, to improve institutional coordination, data-driven decision-making, and data systems and planning. IWMI advances polycentric governance tools and provides evidence to support climate finance and the implementation of national adaptation and delta plans.

In partnership with the Asian Disaster Preparedness Center (ADPC), IWMI helped build the capacity of public and private sector stakeholders, farming communities, and water user associations. Government officials and technical partners acquired skills to enhance institutional coordination, climate finance, planning and evidence-based decision-making, making water and agriculture systems more resilient.

Water, energy, food, and ecosystems

IWMI supports a climate-smart water-energy-food nexus by promoting clean energy transitions in agriculture. We advance solar irrigation, analyze trade-offs between water use, energy pricing, and cropping patterns, and develop context-specific models. This approach enhances groundwater sustainability, reduces carbon emissions, and strengthens farmers' resilience to climate variability while improving energy access.

Under the **Solar Energy for Agricultural Resilience (SoLAR)** project, in collaboration with Infrastructure Development Company Limited (IDCOL), IWMI shows that solar irrigation reduces diesel use, lowers costs, and improves irrigation access for smallholders. Comparative studies in Bangladesh and India informed models balancing energy efficiency, groundwater sustainability, and climate-resilient agricultural water management.



Groundwater management

IWMI strengthens groundwater sustainability by advancing governance, demand management, and recharge solutions. We support Managed Aquifer Recharge (MAR), promote efficient irrigation, and test smart economic instruments for water use. This approach addresses depletion in the Barind and salinity in coastal areas, while encouraging conjunctive water use and nature-based solutions to ensure water security.

In Bangladesh's coastal districts of Satkhira, Khulna and Bagerhat, IWMI assessed MAR as a nature-based solution. MAR stores monsoon freshwater in shallow aquifers to create freshwater lenses, reducing salinity, arsenic exposure, and seasonal shortages. Implemented with partners, this approach improved year-round drinking water access, reduced reliance on unsafe sources, and demonstrated a low-cost, community-managed approach to enhance long-term groundwater resilience.



Disaster risk reduction and early warning

IWMI works to advance flood and drought resilience through climate risk management approaches, including flood insurance, drought monitoring systems, early warning services, and climate-informed forecasting. The work supports localized forecasts, anticipatory action, and risk-informed decision-making to help reduce disaster impacts and strengthen community resilience.

IWMI uses satellite data to enable rapid and transparent payouts to flood-affected households in Gaibandha districts. In collaboration with Oxfam Bangladesh, World Food Programme, and other partners, IWMI expanded index-based food insurance (IBFI) to Pabna, Kurigram and Sirajganj districts in northern Bangladesh. These efforts improved early warning-linked financial protection and enhanced the resilience of vulnerable farming communities to climate-induced floods and shocks.



Gender, equity, and social inclusion

IWMI strengthens gender and social inclusion in the water sector by addressing barriers to women's access and decision-making. We promote inclusive irrigation technologies and business models, support women's leadership in water institutions, and generate sex-disaggregated data to inform policy and budgeting, ensuring equitable access to water resources and climate-resilient livelihoods.

IWMI, CGIAR partners, Northwestern University, and local communities in coastal Bangladesh co-designed the Agricultural Water Insecurity Experiences (AgWISE) module under the CGIAR Scaling for Impact Program. The tool generated evidence on women's lived experiences of agricultural water insecurity, capturing material, relational, and psychosocial dimensions. The findings informed the design of more inclusive climate adaptation and budgeting processes at local and national levels.



IMPACT STORY

IWMI research drives solar investment decisions

In Bangladesh, rising energy costs, groundwater depletion, and dependence on diesel-powered irrigation continue to challenge the sustainability of agriculture. To address these interconnected issues, IWMI worked closely with Infrastructure Development Company Limited (IDCOL) to generate evidence on innovative solar irrigation solutions that could support both farmers and national energy goals.

Through this collaboration, IWMI supported the piloting of grid-integrated solar irrigation pumps (SIPs) — the first systems of this kind in Bangladesh.

Unlike conventional solar irrigation systems that often underutilise excess electricity during non-irrigation periods, these pilot models enabled surplus solar power to be exported directly to the national electricity grid. This created an additional revenue stream for operators while improving the financial sustainability of solar irrigation investments.

Seven pilot SIPs were established and closely monitored to assess technical performance, water-use efficiency, energy generation, and economic viability. The pilots demonstrated that grid integration could significantly reduce operational costs, lower dependence on government subsidies, and encourage more efficient groundwater use by linking irrigation with energy management. The evidence also highlighted how clean energy solutions in agriculture can contribute to reducing carbon emissions while supporting farmers' resilience to climate variability.

The success of the pilots directly influenced investment decisions by IDCOL and development partners, including KfW (Kreditanstalt für Wiederaufbau). Building on IWMI-generated evidence and technical insights, IDCOL approved 56 new SIPs, of which 39 were designed as grid-connected systems.

The initiative has since helped shape Bangladesh's future solar irrigation strategy, with grid-connected models now emerging as the preferred approach for upcoming investments. By linking renewable energy, sustainable water management, and agricultural productivity, the project demonstrates how research-driven innovation can influence national investment priorities and accelerate climate-smart rural development.

*This was realized as part of the **Solar Irrigation for Agricultural Resilience (SoLAR)** project, led by IWMI with IDCOL.*



ABOUT IWMI

The International Water Management Institute (IWMI) is an international, research-for-development organization that works with governments, civil society and the private sector to solve water problems in developing countries and scale up solutions. Through partnership, IWMI combines research on the sustainable use of water and land resources, knowledge services and products with capacity strengthening, dialogue and policy analysis to support implementation of water management solutions for agriculture, ecosystems, climate change and inclusive economic growth. Headquartered in Colombo, Sri Lanka, IWMI is a CGIAR Research Center with offices in 17 countries and a global network of scientists operating in more than 55 countries.

CONTACT US

Dhaka (Bangladesh office)
iwmi.org/contact/bangladesh-office



IWMI
International Water
Management Institute

