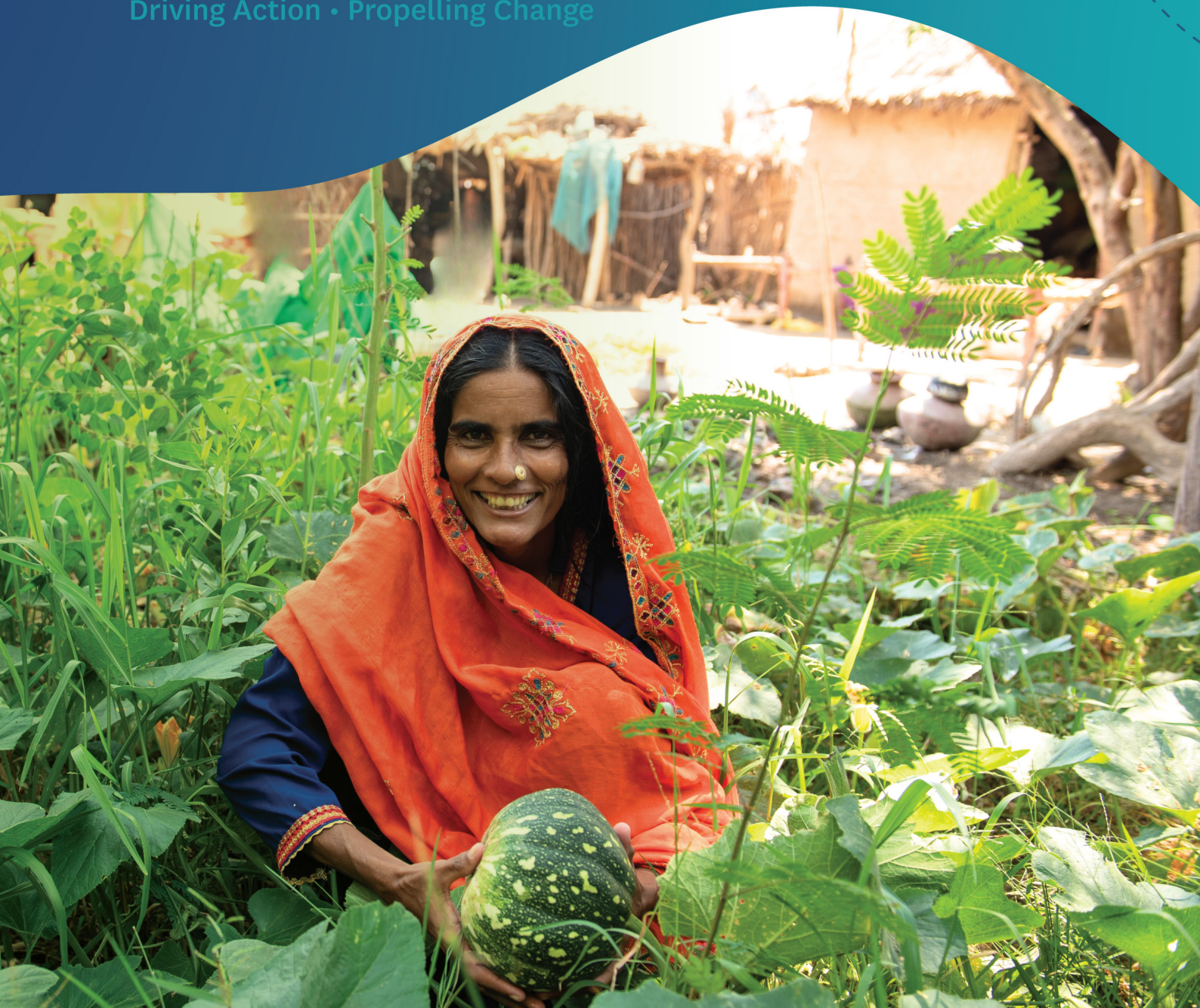
IWMI
International Water Management Institute

Country Strategic Roadmap Pakistan

2024–2030

Driving Action • Propelling Change



Credits:

Photography
Front cover: A smiling woman in Sindh, Pakistan growing vegetables in her kitchen garden. (IWMI/Pak)
Page iii-iv: Farmers planting rice seedlings in a paddy field, supporting rural livelihoods and food security in Pakistan. (Amjad Jamal/IWMI)
Page vii: Ensuring precision in every reading, IWMI researchers calibrate and troubleshoot a flux tower to maintain high-quality data on water and climate dynamics. (Amjad Jamal/IWMI)
Page 15: A farmer manages intercropping of tomato with orchard in Swat Valley for better water use and net income. (Amjad Jamal/IWMI)

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Contents

Acronyms and Abbreviations

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
CGE-W	Computable General Equilibrium model for Water
CSR	Country Strategic Roadmap
DFAT	Department of Foreign Affairs and Trade, Australian Government
FAO	Food and Agriculture Organization of the United Nations
FCDO	Foreign, Commonwealth & Development Office
GDP	Gross Domestic Product
GESI	Gender Equality and Social Inclusion
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GMIS	Groundwater Management Information System
IFAD	International Fund for Agricultural Development
IOM	International Organization for Migration
IRBM	Integrated River Basin Management
IRSA	Indus River System Authority
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
MELIA	Monitoring, Evaluation, Learning, and Impact Assessment
MoCC&EC	Ministry of Climate Change and Environmental Coordination
MoE	Ministry of Energy
MoNFS&R	Ministry of National Food Security & Research
MoWR	Ministry of Water Resources
NDMA	National Disaster Management Authority
NDRMF	National Disaster Risk Management Fund
PakDMS	Pakistan Drought Monitoring System
PCRWR	Pakistan Council of Research in Water Resources
PIDE	Pakistan Institute of Development Economics
PMD	Pakistan Meteorological Department
R4D	Research-for-Development
SACAN	South Asian Conservation Agriculture Network
SDPI	Sustainable Development Policy Institute
TFWS	Transformative Futures for Water Security
ToC	Theory of Change
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commission for Refugees
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WAPDA	Water and Power Development Authority
WEFE	Water-Energy-Food-Environment
WWF	World Wildlife Fund

Foreword by the Country Representative

Pakistan stands at a defining moment as water scarcity, climate change, rapid population growth, and development pressures converge with increasing intensity. As one of the world's most climate-vulnerable countries, food security, economic growth, ecosystem health, and social stability are closely linked to how sustainably and equitably its water resources are managed. The Pakistan Country Strategic Roadmap (CSR) 2024–2030 presents IWMI's strategic response to these challenges, grounded in science, strengthened through partnerships, and focused on delivering impact.

> **IWMI will continue to support Pakistan through high-quality data, analytical tools, and research-for-development approaches**

For more than four decades, IWMI has worked closely with federal and provincial governments, development partners, research institutions, and communities across Pakistan. This strategy builds on that engagement and aligns with national priorities, including water and climate change policies and Pakistan's commitments to the Sustainable Development Goals. It reflects IWMI's strong understanding of the Indus Basin and the complex water–food–energy–climate linkages shaping the country's development.

The CSR 2024–2030 is structured around four strategic priorities: irrigation modernization and food security; integrated river basin management; climate resilience and livelihoods; and wastewater reuse and safe disposal.

These are underpinned by cross-cutting commitments to capacity building, gender equality, youth engagement, and social inclusion, recognizing that sustainable water solutions must be both technically robust and socially inclusive.

A central pillar of this strategy is evidence-based decision-making. IWMI will continue to support Pakistan through high-quality data, analytical tools, and research-for-development approaches that strengthen water governance, improve agricultural productivity, enhance climate resilience, and support low-emission transitions, while promoting inclusive processes that elevate women, youth, and marginalized communities' role in water management.

Developed through extensive consultation with national and provincial stakeholders, this strategy aligns with global initiatives such as Transformative Futures for Water Security and CGIAR's impact agenda, reinforcing Pakistan's role in regional and global water dialogues.

I extend my sincere appreciation to our government and development partners, collaborators, and the IWMI team in Pakistan for their continued trust, cooperation, and scientific excellence, with the hope that this strategy will guide collective action toward a water-secure, climate-resilient, and prosperous Pakistan.

Dr. Muhammad Ashraf
Country Representative – Pakistan

> The Pakistan Country Strategic Roadmap (CSR) 2024–2030 builds on nearly four decades of engagement, positioning IWMI's research-for-development (R4D) mandate to respond to evolving geopolitical, socioeconomic, and systemic pressures shaping Pakistan's water future.

1. Context

Pakistan stands at a critical juncture where water scarcity, climate change, rapid population growth, urbanization, and development pressures are converging with increasing intensity. As one of the world's most climate-vulnerable countries, its food security, economic growth, ecosystem health, and social stability are deeply intertwined with how sustainably and equitably its water resources are managed. These challenges are further amplified by transboundary river systems, a complex multi-level water governance structure across federal and provincial institutions, and persistent data and capacity gaps.

Since its establishment in Pakistan in 1986, the International Water Management Institute (IWMI) has supported federal and provincial governments, development partners, and communities in addressing these interconnected water challenges. The Pakistan Country Strategic Roadmap (CSR) 2024–2030 builds on nearly four decades of engagement, positioning IWMI's research-for-development (R4D) mandate to respond to evolving geopolitical, socioeconomic, and systemic pressures shaping Pakistan's water future.

1.1 Water management in Pakistan

Pakistan relies almost entirely on the Indus River Basin, a transboundary system shared with Afghanistan, China, and India, sustaining the country's agriculture, energy production, and domestic water supply. Nearly half of the basin lies within Pakistan, where river flows are strongly influenced by Himalayan snow and glacier melt, as well as increasingly erratic monsoon rainfall. Climate change is altering these hydrological regimes, increasing uncertainty in water availability and intensifying floods, droughts, and heat extremes.

Water management is further complicated by the strong interlink between surface water and groundwater. Unsustainable groundwater abstraction has become a defining feature of the water economy, driven by unreliable surface supplies, energy subsidies, and weak regulations. At the same time, limited water storage capacity and aging irrigation infrastructure constrain the country's ability to buffer climate variability.

Institutionally, water governance spans multiple federal and provincial agencies, with fragmented mandates across water, agriculture, energy, environment, and climate portfolios. While national policies on water and climate change have been adopted in recent years, implementation remains uneven, coordination is weak, and decision-making is often constrained by limited, inconsistent, or inaccessible data.

1.2 Development challenges

Agriculture remains the backbone of the country's economy, employing over one-third of the workforce and accounting for nearly a quarter of GDP. However, agricultural water productivity is low, with substantial conveyance and on-farm losses, widespread reliance on conventional irrigation practices, and increasing land degradation due to salinity and waterlogging. Climate change has exacerbated these challenges, placing additional pressure on already scarce surface and groundwater resources and threatening rural livelihoods and food security.

The country is experiencing one of the fastest rates of urbanization in South Asia. Growing urban populations are placing increasing stress on already dwindling water supply, sanitation, and wastewater management systems. Drinking water contamination from untreated sewage, industrial effluents, and agricultural runoff is widespread, contributing to high burdens of waterborne diseases. Extremely low wastewater treatment rates (<1%), poor solid-waste management, and lack of capacity further undermine urban water security and resilience.

Pakistan's energy sector is closely linked to water availability. Hydropower generation depends on seasonal river flows, while groundwater-based irrigation relies heavily on electricity. Climate-induced hydrological variability, combined with fossil-fuel dependence, exposes the energy sector to increasing risks. Despite growing recognition of the water–energy–food nexus, integrated planning across these sectors is limited.

Persistent governance challenges, including fragmented institutions, weak enforcement, limited transparency, and inadequate monitoring, constrain effective responses to water and climate risks. These challenges disproportionately affect women, youth, and marginalized groups, who play critical roles as water users. In a country with a large youth population and deep gender disparities, inclusive water governance is essential for social stability, conflict prevention, and sustainable development.

1.3 Trends and emerging opportunities

Despite these challenges, important opportunities are emerging. Policy momentum around climate action, water security, and renewable energy is increasing, with growing recognition of integrated, evidence-based decision-making processes. Advances in remote sensing, digital monitoring systems, hydrological modelling, and data platforms are creating new possibilities for water accounting, early warning, and adaptive management at scale.

Pakistan's engagement in global and regional initiatives, including mission-driven partnerships under the Transformative Futures for Water Security (TFWS) initiative, reflects appetite for collaborative and cross-sector solutions. The TFWS dialogues have highlighted strong national demand for science-based interventions to build climate-resilient agriculture, improve freshwater availability, overcome data gaps, strengthen governance, and manage transboundary water risks.

There is also growing recognition of the role of nature-based solutions, circular water economy approaches, wastewater reuse, and climate-smart agriculture in enhancing resilience while reducing environmental footprints. Harnessing the country's demographic dividend through targeted investments in youth skills, innovation, and leadership in the water sector presents further opportunities for long-term transformation.

2. Achievements: Our Story of Impact

With over four decades of engagement in Pakistan, IWMI has evolved from piloting field-level interventions to delivering systemic, policy-relevant, and scalable solutions that strengthen water governance, climate resilience, and improve agricultural productivity. Working as a trusted R4D partner with federal and provincial governments, IWMI has consistently bridged gaps between science, policy, and practice, thus supporting institutions to move from fragmented decision-making toward evidence-based, integrated water management across the water–energy–food–environment (WEFE) nexus.

In recent years, IWMI's work has increasingly focused on improving water governance: embedding tools, data systems, and analytical frameworks within government agencies; strengthening national and provincial capacities; and enabling long-term ownership of digital and policy innovations. These achievements reflect a deliberate shift from short-term project outputs to enduring public-sector impact.

2.1 Transforming water governance and allocation

A central achievement of IWMI's work in Pakistan has been strengthening the foundations for transparent, evidence-based water governance. Its water allocation and planning systems have long been constrained by outdated data, fragmented institutions, and limited analytical capacity. IWMI addressed these gaps by developing and operationalizing decision-support systems that are now being used by government agencies.

A landmark achievement is the Groundwater Management Information System (GMIS), which integrates geospatial datasets, automated monitoring, and historical records into a unified platform. Piloted and formally handed over to the Punjab Irrigation Department in 2024, GMIS is now part of operations supporting groundwater regulation under the Punjab Water Act 2019. Similar groundwater information systems and digital atlases have been developed and deployed in Sindh and Balochistan, strengthening provincial capacity to identify depletion/hotspots, manage abstraction, and plan climate-resilient interventions.

IWMI has also played a key role in advancing water allocation planning at basin scale. The development of Pakistan's first open-source Indus water allocation planning model (Indus Pywr), in collaboration with IRSA, WAPDA, provincial irrigation departments, and international partners, has enabled transparent analysis of trade-offs across water, food, and energy systems. Complemented by a hydro-economic CGE-W model hosted by the Pakistan Institute of Development Economics (PIDE), these tools allow policymakers to assess the economic and distributional impacts of water and climate policies, marking a significant step toward integrated and long-term planning.

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2.2 Advancing climate resilience and disaster preparedness

IWMI has made sustained contributions to strengthening Pakistan's capacity to anticipate, monitor, and respond to climate risks, particularly floods and droughts. Through the development and operationalization of digital drought and climate analytics, IWMI has supported national and provincial institutions to shift from reactive crisis response toward anticipatory action.

A flagship achievement is the development of the Pakistan Drought Monitoring System (PakDMS) through the integration of satellite-based indicators, including FAO's WaPOR data. Implemented in partnership with PMD, NDRMF, and provincial departments, this work has enhanced real-time drought assessment, reporting, and early warning across arid and semi-arid regions. The tool is now being used to inform agricultural planning, rangeland management, and disaster risk reduction efforts.

IWMI has further strengthened Pakistan's climate monitoring and mitigation readiness by establishing the country's first network of eddy covariance flux towers, generating high-quality data on evapotranspiration, crop water use, and carbon fluxes. This infrastructure supports validation of satellite products, improves water accounting accuracy, and contributes to emerging Measurement, Reporting, and Verification (MRV) systems for climate action.

2.3 Driving climate-smart and low-emission agricultural transitions

Agriculture remains the country's largest water user and a major source of greenhouse gas emissions. IWMI's achievements in this domain demonstrate how climate adaptation and mitigation can be pursued simultaneously through data-driven interventions. IWMI has led national efforts to advance water productivity analysis, producing district-level physical, economic, and nutritional water productivity estimates and developing interactive dashboards and atlases to guide investment and planning. These tools are now used by provincial departments to target interventions, prioritize crops, and improve irrigation efficiency. A major contribution to Pakistan's low-emission transition is IWMI's leadership in solar irrigation planning. Through solar suitability mapping and the development of a national Solar Irrigation Pump Sizing Tool, IWMI has provided the government, farmers, and investors with evidence to scale solar irrigation while avoiding groundwater overexploitation. These tools have been formally acknowledged by the Government of Pakistan and are being upscaled through provincial and national programs, supporting both climate mitigation and farmer resilience.

2.4 Strengthening institutions, inclusion, and capacity

Across all areas of work, IWMI has prioritized institutional strengthening and human capacity development as prerequisites for sustainable impact. Over the past several years, thousands of government officials, researchers, and practitioners across irrigation, agriculture, planning, and climate institutions have been trained in water accounting, groundwater management, modeling, and digital decision-support tools. IWMI has also embedded gender equality, youth engagement, and social inclusion into its technical work. Through gender-transformative approaches under the WEFE nexus, IWMI has facilitated community dialogues, developed institutional scorecards, and supported provincial agencies to better integrate women and marginalized groups into water governance processes. Evidence generated through these initiatives has helped shift perceptions of inclusion from a social add-on to a core determinant of water security and resilience.

2.5 Positioning Pakistan in regional and global water agendas

Beyond national impact, IWMI has helped position Pakistan as an active contributor to regional and global water dialogues. As a co-convener of the TFWS initiative, IWMI has amplified Pakistani perspectives in Global South–led discussions on water futures, science priorities, and mission-driven partnerships. The stakeholders have actively contributed to shaping eight transformative missions, many of which align directly with national priorities and IWMI's ongoing work. These achievements demonstrate IWMI's role in Pakistan as a trusted technical partner, a convener of multi-stakeholder dialogue, and a catalyst for evidence-based reform. By institutionalizing digital systems, strengthening analytical capacity, and embedding inclusive approaches within water governance, IWMI has laid a strong foundation for scaling impact under the CSR 2024–2030, supporting Pakistan's transition toward a water-secure, climate-resilient, and sustainable future (Figure 1).

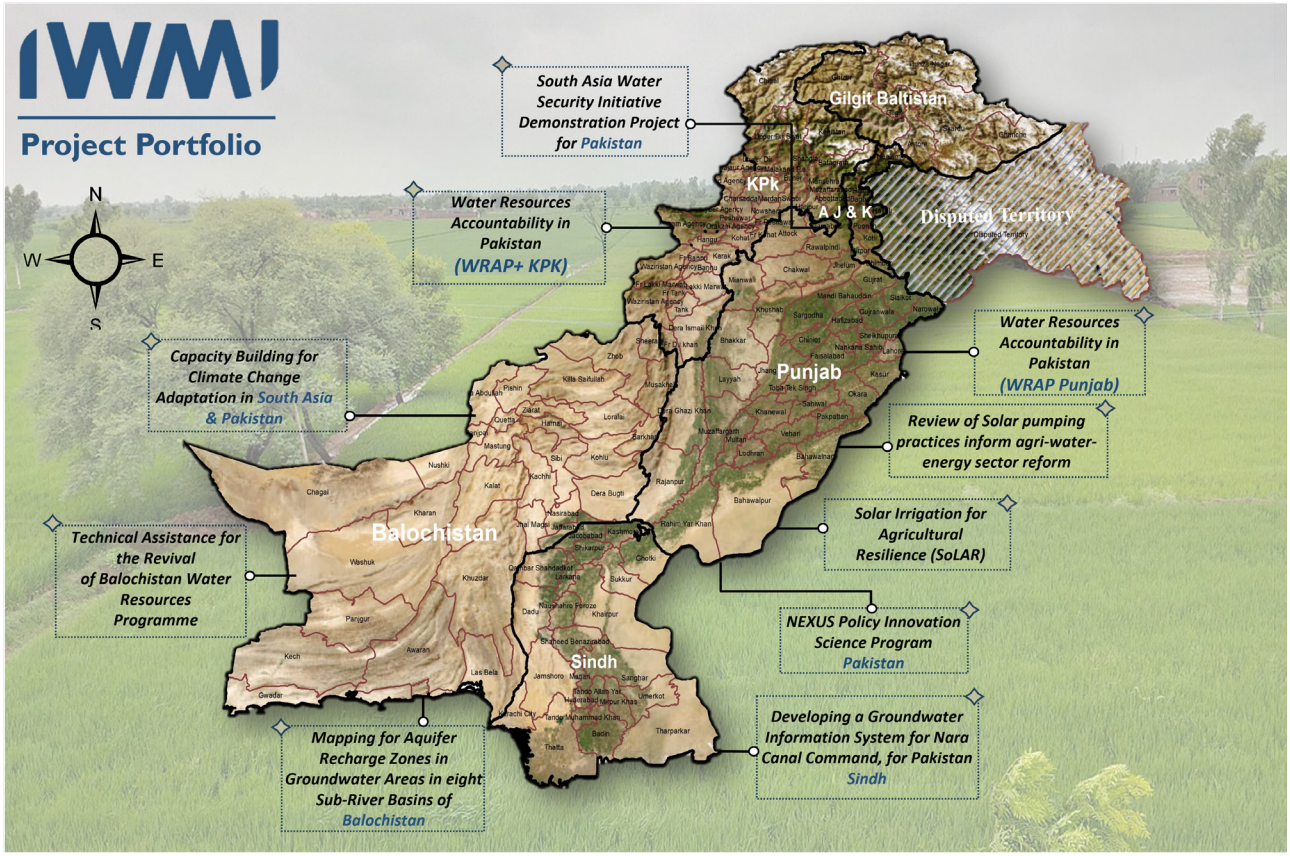

Figure 1. Spatial distribution and thematic focus of IWMI's projects in Pakistan over the last five years (source: IWMI)

3. Strategic Priorities

IWMI has developed and adopted its Strategy for 2024–2030, with three strategic focus areas and four strategic levers (Figure 2). This strategy should facilitate achieving IWMI's vision of a water-secure world. The primary focus of the strategic planning meeting for Pakistan was to identify IWMI's current activities and categorize potential interventions in Pakistan, ensuring alignment with the IWMI Strategy 2024–2030.

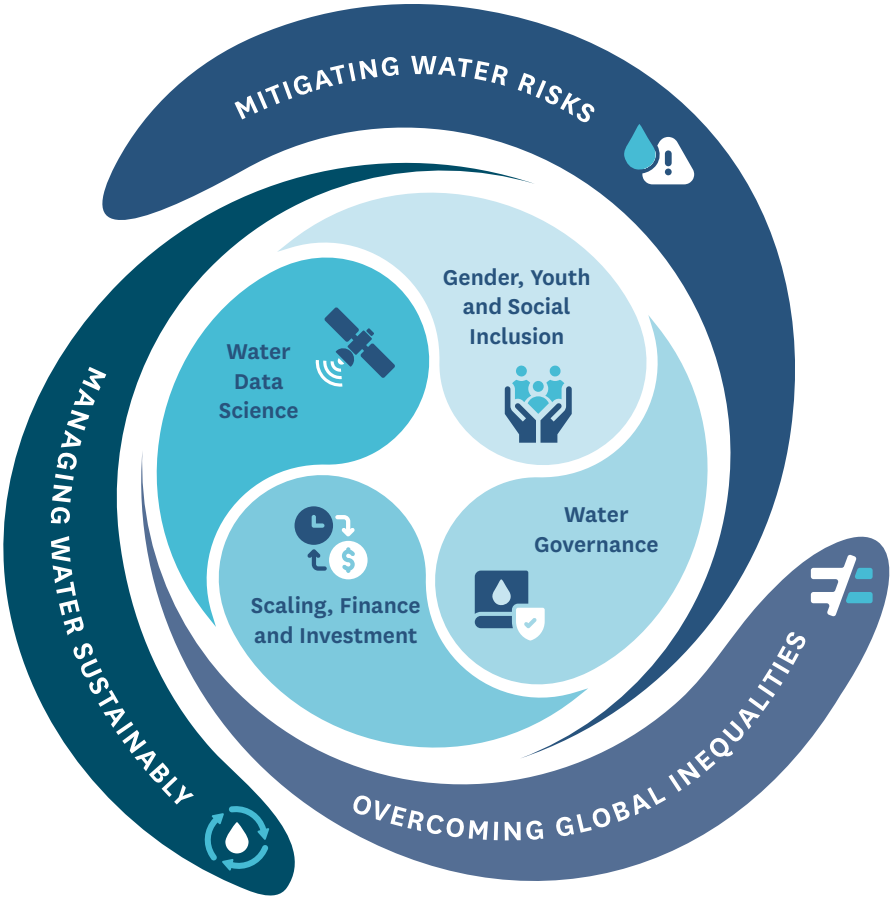

Figure 2. IWMI's 2024-2030 Strategy: Strategic focus areas and levers (IWMI 2024)[1]

3.1 Co-design process

IWMI's strategic priorities for Pakistan 2024–2030 were developed through an inclusive, multi-stage co-design process that combined technical consultation with political-economy analysis to ensure relevance, feasibility, and ownership. The process engaged IWMI staff, federal and provincial government institutions, development partners, academia, civil society organizations, private sector, and youth representatives, and was aligned with IWMI's Global Strategy 2024–2030 and Pakistan's national and provincial policies and development priorities. In the first stage, the process began with an internal strategic reflection led by IWMI's senior scientific and management team in Pakistan, drawing on nearly four decades of engagement in the country. This exercise reviewed ongoing and completed initiatives, assessed emerging climate and water risks, and identified priority areas where IWMI's comparative advantage could deliver system-level impact, with particular attention to institutional mandates, inter-provincial dynamics, incentive structures, and implementation bottlenecks shaping water governance and reform. In the second stage, IWMI engaged

1 International Water Management Institute (IWMI). 2024. *IWMI Strategy 2024-2030: Research and innovation for water security*. International Water Management Institute (IWMI). https://doi.org/10.5337/2024.217.

federal and provincial counterparts through bilateral consultations, technical working groups, and project steering committees. These engagements were informed by political-economy considerations, including power relations across institutions, policy-implementation gaps, fiscal and capacity constraints, and the distributional impacts of water and climate decisions on different social groups, ensuring that strategic priorities were grounded in operational realities. In the third stage, the strategy was further updated through multi-stakeholder dialogues organized under IWMI's co-convening role in the TFWS initiative. Through regional dialogues and a global conference, Pakistani stakeholders from government, civil society, the private sector, academia, and youth contributed to shaping eight transformative missions for water systems science, highlighting strong national demand for cross-sectoral, mission-driven partnerships.

At the fourth and final stage, input from internal and external stakeholders was consolidated and systematically reviewed to ensure coherence across thematic areas, alignment with donor and government priorities, and integration of cross-cutting commitments to capacity building, gender equality, youth engagement, and social inclusion. Together, this co-design process has resulted in a focused set of strategic priorities that reflect shared ownership, political feasibility, and scientific rigor, providing the foundation for IWMI's strategic orientation and programmatic focus in Pakistan through 2030.

3.2 Strategic priority areas

Building on the co-design process, IWMI's strategic priorities for Pakistan focus on four mutually reinforcing areas where science, policy engagement, and partnerships can deliver transformational impact. These priorities respond directly to Pakistan's water-security challenges, align with national and provincial policy frameworks, and leverage IWMI's comparative advantage in generating actionable evidence at scale. Together, they provide a coherent framework for addressing water scarcity, climate risk, food security, and environmental sustainability under complex political and institutional conditions.

3.2.1 Irrigation modernization and food security

Ensuring food security under increasing water scarcity and climate variability is central to Pakistan's development agenda. Being a primary source of livelihoods, agriculture accounts for the largest share of national water use. However, irrigation systems are characterized by low efficiency, high system losses, and growing dependence on unsustainable groundwater. IWMI will support the transition toward water-efficient, climate-smart agricultural systems that enhance productivity while reducing pressure on surface and groundwater resources.

This priority emphasizes irrigation modernization through improved water delivery, precision land and water management, sustainable groundwater governance, and diversification toward high-value and climate-resilient crops. IWMI will generate policy-relevant evidence to inform irrigation reforms, water pricing and subsidy debates, and public investment decisions, while supporting institutional and extension capacities needed for adoption and scaling. By linking farm-level interventions with system-level reforms, this priority aims to improve food security while strengthening long-term water sustainability.

3.2.2 Integrated river basin management

Pakistan's river basins, particularly the Indus Basin, face increasing pressure from climate change, ecosystem degradation, competing sectoral demands, and fragmented institutional mandates. Despite policy recognition of Integrated River Basin Management (IRBM), implementation remains limited due to data gaps, coordination challenges, and weak basin-scale planning mechanisms. IWMI will advance IRBM as a foundation for equitable, climate-resilient, and sustainable water management.

Key areas of focus include basin-scale water accounting and auditing, hydrological and nexus modeling, assessment of surface and groundwater interactions, and evaluation of storage and watershed-management options. IWMI will deploy advanced decision-support tools to inform allocation choices and trade-offs across water, food, energy, and ecosystems. Strengthening inter-provincial coordination, stakeholder participation, and evidence-based basin planning will be central to improving governance and long-term basin health.

3.2.3 Climate resilience and livelihoods improvement

Pakistan is among the countries most vulnerable to climate-induced hazards, including floods, droughts, heatwaves, and ecosystem degradation. These risks disproportionately affect poor and marginalized communities whose livelihoods depend on climate-sensitive sectors such as agriculture, livestock, and fisheries. IWMI will strengthen climate resilience by supporting informed decision making, anticipatory action, and adaptive livelihood strategies.

This priority focuses on strengthening flood and drought monitoring systems, multi-hazard early warning, and climate-informed planning tools, including hydrological modeling and floodplain analysis. We will also support nature-based solutions for ecosystem restoration, carbon sequestration, and risk reduction. Working closely with government institutions and communities, IWMI will help enhance disaster preparedness, adaptation capacity, and implementation of climate policies, contributing to more resilient livelihoods and reduced climate vulnerability.

3.2.4 Wastewater reuse and circular water management

Rapid urbanization, industrial growth, and population pressure have made wastewater management a critical but underdeveloped component of Pakistan's water-security strategy. Untreated wastewater poses serious risks to public health, ecosystems, and groundwater, while treated wastewater is a big resource and can help reduce the gap between water demand and supply, besides protecting the vital ecosystem. IWMI will promote a shift toward a circular water economy by advancing safe wastewater reuse alongside improved disposal and regulation.

This priority focuses on generating evidence on the safe reuse of wastewater in agriculture and other productive uses, assessing health and environmental risks, and strengthening implementation of wastewater regulations. IWMI will engage with wastewater producers (industry, commercial, and domestic users), municipalities, regulators, users, and the private sector to support investment planning, treatment performance, and integration of wastewater management into broader urban water, environmental protection, and climate strategies. Advancing circular water approaches will help reduce freshwater demand while improving environmental outcomes.

3.2.5 Capacity building, gender, youth, and inclusiveness (cross-cutting)

Across all strategic priorities, IWMI will integrate capacity building, gender equality, youth engagement, and social inclusion as core cross-cutting elements. Strengthening institutional and human capacity at federal, provincial, and local levels will underpin all interventions, enabling sustained uptake of evidence-based tools, policies, and practices. Gender-transformative and inclusive approaches will ensure meaningful participation of women, youth, and marginalized groups in water governance, decision-making, and innovation, while systematically addressing structural barriers that limit equitable access to water resources and services.

3.3 Target population and geographic focus

IWMI's strategic priorities for Pakistan are designed to deliver impact across multiple scales, with particular attention to vulnerable populations, water-stressed regions, and institutions responsible for water and climate governance.

Target populations are:

- Smallholder and commercial farmers dependent on irrigated and rainfed agriculture
- Climate-vulnerable rural and urban communities exposed to floods, droughts, and heat stress
- Women, youth, and marginalized groups with limited voice in water governance
- Federal, provincial, and local government institutions responsible for water, agriculture, climate, energy, and urban services
- Private sector actors and service providers engaged in irrigation, energy, agribusiness, and wastewater management

Geographic focus areas are:

- Indus Basin, including major sub-basins and irrigated command areas
- Water-stressed provinces: Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan
- Climate hot spots, including floodplains, arid and semi-arid zones, and rapidly urbanizing corridors
- Selected urban and peri-urban areas facing acute water-quality and wastewater challenges

4. Implementation Roadmap

The implementation roadmap is structured around IWMI's Strategic Priority Areas for Pakistan 2024–2030. It aligns all expected outcomes, interventions, partnerships, and delivery pathways with the country strategy. It also integrates cross-cutting commitments to capacity building, gender equality, youth engagement, and social inclusion (Table 1).

It reflects a deliberate shift from fragmented, project-based approaches toward a coherent, outcome-oriented programmatic framework aligned with IWMI's Organizational Theory of Change (ToC) and Monitoring, Evaluation, Learning, and Impact Assessment (MELIA) system.

Building on Pakistan's national development priorities and IWMI's comparative scientific advantage, the roadmap identifies priority intervention areas where research-for-development can catalyze systemic change. These include strengthening evidence-based water and climate governance, improving agricultural water productivity, advancing basin-scale planning, enhancing climate resilience and livelihoods, and promoting circular water economy while embedding inclusive institutional capacity. The roadmap emphasizes co-delivery with national and sub-national institutions, political-economy-based implementation, and phased scaling to ensure feasibility, ownership, and sustainability.

Table 1. Implementation roadmap linked to strategic priority areas, IWMI ToC and MELIA

Expected Outcomes (Intermediate Outcomes – IWMI ToC)	Key Activities/ Interventions	Priority Country/ Geographic Area	Key Partners & Intended Beneficiaries	Delivery Model & Timeline
Priority 1: Irrigation Modernization and Food Security				
Outcome 1: Improved water-use efficiency and productivity in agriculture systems	- Irrigation modernization research (precision irrigation, groundwater management) - Water productivity diagnostics and decision-support tools - Piloting and scaling climate-smart irrigation practices	Pakistan (Punjab, Sindh, KP, Balochistan)	**Partners:** Provincial Irrigation and Agriculture Depts, On-Farm Water Management Depts, extension services, private sector **Beneficiaries:** Smallholder and commercial farmers, irrigation managers	**Delivery:** Pilots and scale-up via government programs **Timeline:** 2024–2028 pilots (completed); 2027–2029 provincial scaling; 2029–2030 basin-level scaling
Outcome 2: Evidence-based water and climate policies adopted by national and provincial institutions	- Co-develop policy-relevant analytics (water accounting, climate scenarios, nexus assessments) - Technical support to policy formulation and implementation (water, climate, agriculture) - Policy dialogues, briefs, and advisory support	Pakistan (Federal, Provincial and Local)	**Partners:** MoWR, MoCC&EC, MoNFSR, Planning Commission, Provincial Irrigation and Agriculture Depts, IRSA **Beneficiaries:** Policymakers, regulators, planning agencies, end users	**Delivery:** R4D co-design with government, embedded advisory support **Timeline:** 2024–2030 (continuous, with policy windows)

Table 1 *(Continued)*

Expected Outcomes (Intermediate Outcomes – IWMI ToC)	Key Activities/ Interventions	Priority Country/ Geographic Area	Key Partners & Intended Beneficiaries	Delivery Model & Timeline
Priority 2: Integrated River Basin Management				
Outcome 3: Basin-level water allocation and planning decisions are better informed and coordinated	- Basin-scale water accounting and auditing - Hydrological and WEFE nexus modeling - Decision-support tools for basin planning - Inter-provincial dialogue and coordination support	Indus Basin (national & sub-basins)	**Partners:** IRSA, WAPDA, PCRWR, Provincial Irrigation Depts, Academia **Beneficiaries:** Basin authorities, planners, downstream communities	**Delivery:** Tool development and institutional embedding **Timeline:** 2024–2028 system development; 2027–2030 and beyond, basin-level uptake
Priority 3: Climate Resilience and Livelihoods Improvement				
Outcome 4: Climate risk information and early warning systems inform anticipatory action	- Flood and drought monitoring systems - Multi-hazard early warning tools - Climate scenario modeling and floodplain mapping - Capacity building for operational agencies	National and Provincial (climate hotspots nationwide)	**Partners:** PMD, NDMA, PDMAs, Provincial Irrigation Depts, local governments **Beneficiaries:** Climate-vulnerable communities, disaster managers	**Delivery:** Embedded systems + capacity strengthening **Timeline:** 2024–2027 co-development; 2027–2030 Strengthening & expansion
Outcome 5: Climate-resilient livelihoods and adaptive capacities strengthened	- Community-based adaptation research - Nature-based solutions for resilience - Livelihood diversification options - Local capacity building	Pakistan, Indus basin and sub-basins (flood- & drought-prone regions)	**Partners:** Provincial line departments, NGOs, CSOs, local governments **Beneficiaries:** Rural & peri-urban vulnerable communities	**Delivery:** Action research and community engagement **Timeline:** 2024–2027 pilots; 2028–2030 scaling
Priority 4: Wastewater Reuse and Circular Water Management				
Outcome 6: Wastewater reuse and circular water economy adopted and regulated	- Evidence generation on safe wastewater reuse - Policy and regulatory support - Health and environmental risk assessments - Private sector engagement	Pakistan (major urban and peri-urban areas)	**Partners:** Municipal authorities, EPAs, Industry, commercial areas **Beneficiaries:** Urban populations, farmers using marginal water	**Delivery:** Policy–practice linkage and piloting **Timeline:** 2024–2027 pilots; 2028–2030 institutional uptake

Table 1 *(Continued)*

Expected Outcomes (Intermediate Outcomes – IWMI ToC)	Key Activities/ Interventions	Priority Country/ Geographic Area	Key Partners & Intended Beneficiaries	Delivery Model & Timeline
Priority 5: Capacity Building, Gender, Youth, and Inclusiveness (Cross-Cutting)				
Outcome 7: Institutional capacity for water and climate governance strengthened	- Training needs assessment and accompaniment - Training on capacity building - Development of operational guidelines and tools	Pakistan (Federal & Provincial)	**Partners:** Line ministries, training institutes, academia **Beneficiaries:** Government professionals, regulators	**Delivery:** Long-term capacity strengthening **Timeline:** 2024–2030 (cross-cutting)
Outcome 8: Gender-equitable and inclusive water governance practices strengthened	- Gender-transformative research - Gender and youth capacity development - Collection and use of disaggregated data - Policy engagement on inclusion	Pakistan (nationwide)	**Partners:** Government, CSOs, women & youth organizations **Beneficiaries:** Women, youth, marginalized groups	**Delivery:** Embedded GESI across all interventions **Timeline:** 2024–2030 (cross-cutting)
Outcome 9: Knowledge, learning, and partnerships accelerate scaling and impact	- Pakistan Water Week and national dialogues - Knowledge products and learning platforms - Regional and global engagement	Pakistan & Regional	**Partners:** CGIAR, donors, academia, private sector **Beneficiaries:** National & regional stakeholders	**Delivery:** Convening and knowledge exchange **Timeline:** Annual, 2024–2030

Together, the expected outcomes and interventions outlined above provide a clear pathway for translating IWMI's strategy for Pakistan into measurable and scalable impact. Each outcome is explicitly linked to IWMI's intermediate outcomes under the organizational ToC, with defined activities, geographic focus, partnerships, and delivery timelines that support systematic monitoring, learning, and adaptive management under MELIA.

The roadmap adopts a phased delivery model moving from analytical foundations and institutional embedding to scaling and integration across sectors and provinces, and finally to consolidation and sustainability that will be carried out to the next phases. This approach allows IWMI to respond flexibly to evolving climate risks, political and institutional dynamics, and funding opportunities, while maintaining strategic coherence and accountability.

By anchoring implementation within government systems, strengthening institutional and human capacity, and embedding cross-cutting commitments to gender equality, youth engagement, and social inclusion, the roadmap ensures that IWMI's interventions contribute to sustainable policy uptake and long-term resilience. Collectively, this implementation framework positions IWMI as a trusted knowledge partner, convener, and catalyst for evidence-based water and climate action in Pakistan.

5. Partners and Funders

Partnerships are central to IWMI's research-for-development mandate and its ability to deliver policy-relevant, scalable, and sustainable impact. Over nearly four decades of engagement, IWMI in Pakistan has developed a diversified partnership with government institutions, development partners, academia, users, civil society, and the private sector. These partnerships enable co-design, co-delivery, and institutional embedding of science-based solutions across water, agriculture, climate, energy, and urban sectors.

5.1 Government partners

IWMI in Pakistan works closely with key federal ministries and agencies, including the MoWR, MCC&EC, MNFS&R, MoE, and the Planning Commission of Pakistan. Core technical and regulatory partners include the IRSA, WAPDA, PMD, NDMA, and PCRWR.

At the provincial level, IWMI collaborates with Irrigation Departments, Agriculture Departments, On-Farm Water Management Departments, Fisheries Departments, and Environmental Protection Departments in Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan. These partnerships enable the embedding of analytical tools, digital systems, and decision-support frameworks within government institutions and support long-term policy implementation and reform.

5.2 Development partners

IWMI's work in Pakistan has been supported by a wide range of bilateral and multilateral development partners, including FAO, USAID, FCDO, European Union, DFAT (Australia), ACIAR, World Bank, ADB, UNICEF, UNDP, UNEP, IFAD, IOM, GIZ, and UNHCR. These partners provide strategic financing for research, innovation, and capacity development and play a critical role in scaling successful interventions through national programs and investment frameworks.

5.3 CGIAR, international organizations, and research partners

As part of CGIAR, IWMI collaborates closely with other CGIAR centers and science programs to leverage global expertise and interdisciplinary research across the WEFE nexus. Partnerships with international organizations and research institutions, including UNESCO; international universities from Europe, China, and Australia; and regional research networks strengthen scientific rigor, innovation, and knowledge exchange, and ensure alignment with global sustainability and climate agendas.

5.4 Academia, civil society, and the private sector

IWMI works with national and international universities and academic institutions to support applied research, curriculum development, and training of early-career researchers and professionals. Civil society partners such as WWF, IUCN, Hisaar Foundation, SDPI, and SACAN contribute to community engagement, ecosystem conservation, policy advocacy, and inclusive development. Engagement with the private sector, including irrigation technology providers, renewable energy companies, agribusinesses, and wastewater service providers supports innovation, service delivery, and public–private partnership models for scaling sustainable water solutions.

5.5 Strategic convening and partnership platforms

IWMI also plays a convening role through national and international platforms such as Pakistan Water Week and global initiatives including Transformative Futures for Water Security, bringing together government, donors, researchers, civil society, and the private sector to align priorities, mobilize partnerships, and amplify policy impact.

Together, these partnerships and funding relationships enable IWMI to operate as a trusted knowledge partner and convener, bridging science, policy, and practice gaps to support a water-secure, climate-resilient, and inclusive development pathway for Pakistan.

International Water Management Institute

CGIAR RESEARCH CENTER

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.

Vision
A water-secure world

Mission
Research and innovation in partnerships for collective actionthat advance the transformation of water systemsfor sustainable, just and climate resilient development.

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