

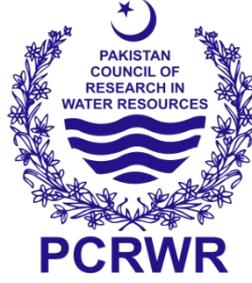
PCRWR

Annual Report

2024-25

**Pakistan Council of Research in Water Resources
(PCRWR)**

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Editors

Anwaar Ahmad Qureshi

Muhammad Umar Munir

Compilation & Coordination

Ms. Sumaira Farrukh

Content Development & Designing

**Library Documentation &
Information Centre
PCRWR**

Foreword

Water resources management remains a critical national priority for Pakistan, directly influencing food security, public health, economic growth, and climate resilience. In an environment marked by increasing water stress, climate variability, and competing sectoral demands, the Pakistan Council of Research in Water Resources (PCRWR) continued to discharge its mandate with diligence, professionalism, and strategic foresight during the year under review.

PCRWR undertook focused efforts to generate credible scientific evidence, strengthen national water monitoring systems, and promote efficient and sustainable water management practices. The Council advanced applied research, expanded water quality surveillance, developed and demonstrated conservation and treatment technologies, and enhanced institutional data systems to support informed policy formulation and planning. These efforts reflect PCRWR's sustained commitment to addressing emerging water challenges through science based solutions.

The Council also deepened collaboration with federal and provincial departments, academic institutions, development partners, and international organizations to ensure coordinated and effective responses to national water issues.

This Annual Report presents an account of PCRWR's performance, achievements, and initiatives undertaken in furtherance of its statutory responsibilities. It demonstrates the Council's resolve to continue serving as the national apex body for water resources research and to contribute meaningfully to Pakistan's long term water security through evidence driven research, technical leadership, and institutional excellence.

Nadeem Anjum
Director (Admin)
PCRWR

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About PCRWR

Introduction

Pakistan Council of Research in Water Resources (PCRWR) is the national apex organization mandated to conduct, organize, coordinate, and promote research on all aspects of water resources in Pakistan. Established in 1964, PCRWR operates as a statutory body corporate under the Pakistan Council of Research in Water Resources Act, 2007. The Council functioned under the Ministry of Science and Technology until May 2022, after which it was placed under the administrative control of the Ministry of Water Resources.

PCRWR undertakes applied and strategic research in water resources development, conservation, water quality, groundwater management, and climate-resilient water solutions. It provides scientific and technical support to federal and provincial governments, contributes to evidence based policy formulation, and promotes sustainable water management through innovation, capacity building, and demonstration of appropriate technologies. Through its nationwide network of laboratories, research stations, and regional offices, PCRWR plays a vital role in addressing Pakistan's water security challenges. The functions assigned to PCRWR are outlined below:

Research & Development

- Conducts, organizes, coordinates, and promotes research on all aspects of water resources
- Focus areas include irrigation, drainage, land reclamation, drinking water, and industrial effluents

National Water Quality Monitoring

- Implements the National Water Quality Monitoring Programme
- Covers both urban and rural areas across Pakistan

Technology Development & Demonstration

- Develops and demonstrates water conservation and treatment technologies
- Technologies for irrigation, drinking water, and industrial effluent management

National Water Resources Database

- Manages the National Water Resources Information Centre
- Supports data-driven planning, research, and policy formulation

Capacity Building, Consultancy & Contractual Services

- Provides technical advisory, consultancy, and contractual services
- Supports public and private sector organizations through training and expert guidance

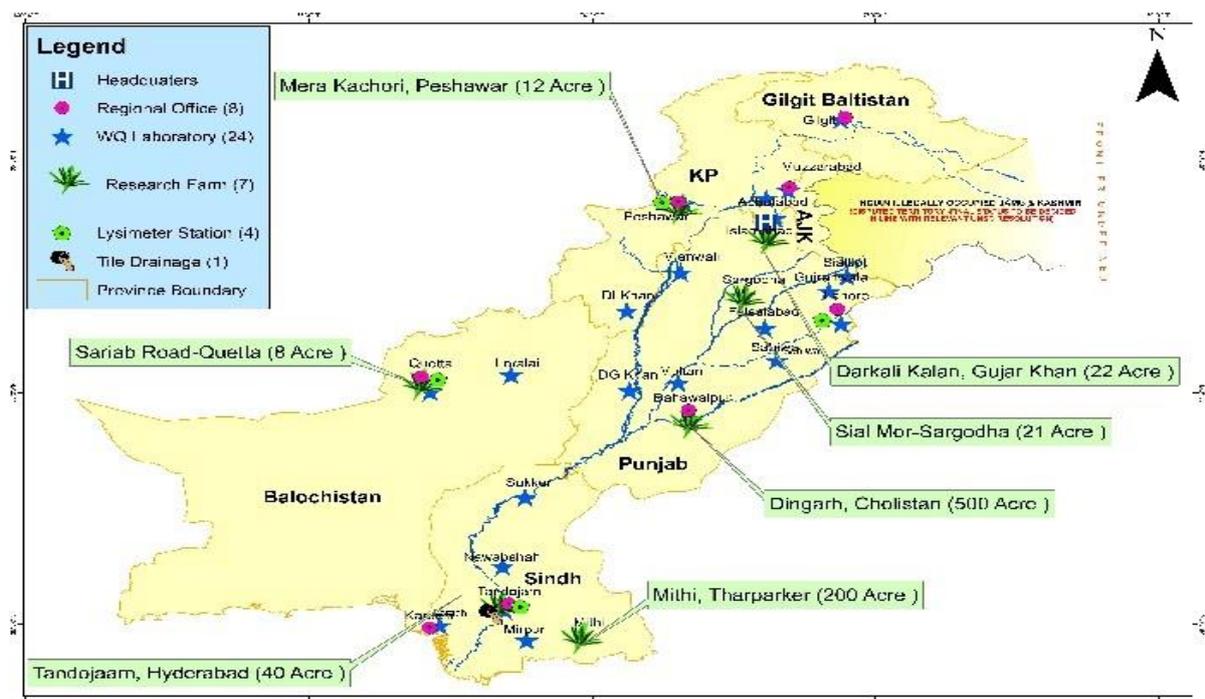
Policy Support & Recommendations

- Develops evidence-based recommendations on:
 - Water quality
 - Water conservation and utilization
 - Water management strategies
 - Technology development

Research Establishments

PCRWR has played its role, as a leading water sector research and development (R&D) organization through a well established state of the art research and dissemination infrastructure:

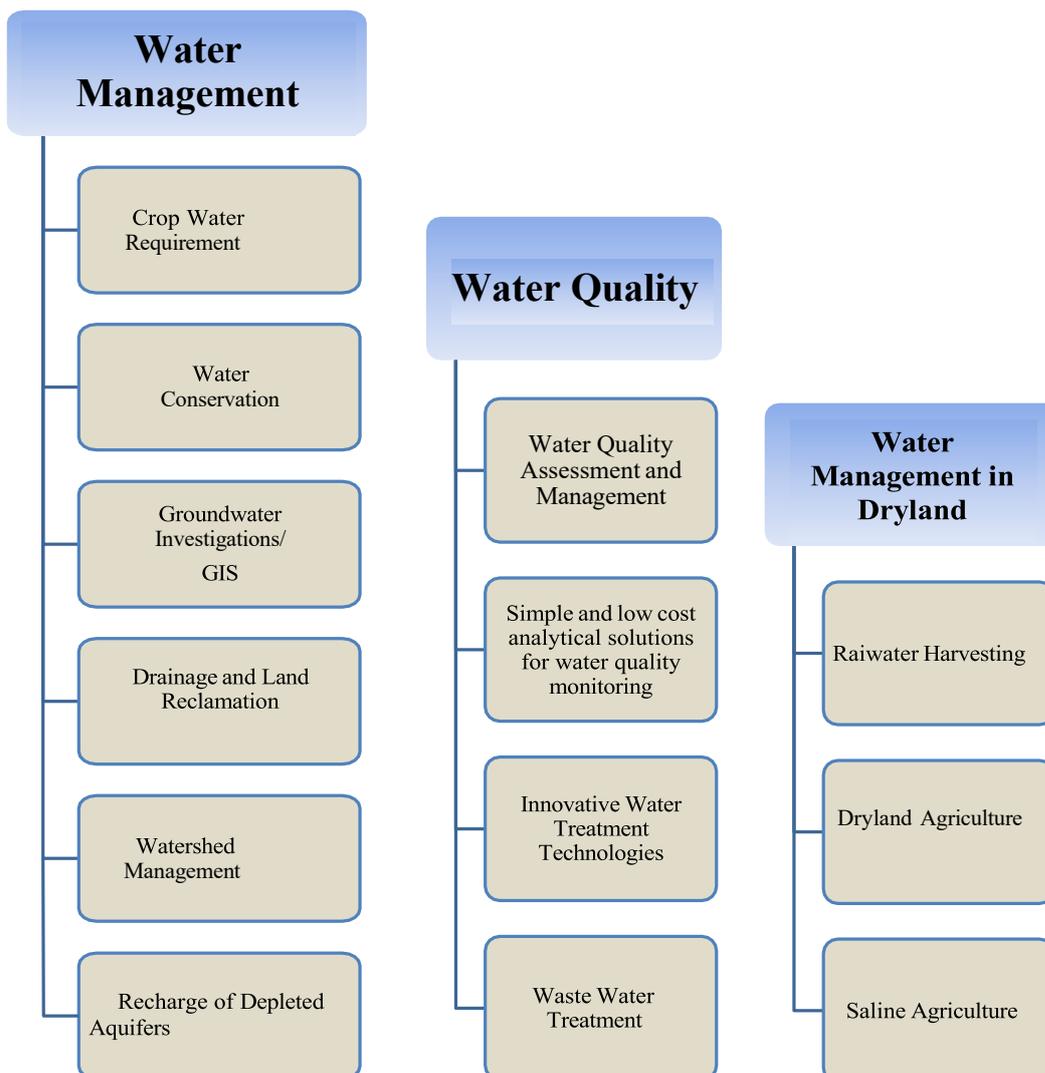
- Headquarters in Islamabad with eight regional offices at Tandojam, Quetta, Bahawalpur, Lahore, Peshawar, Karachi, Muzafarabad and Gilgit
- Water testing laboratories in 24 cities including; Islamabad, Lahore, Bahawalpur, Tandojam, Quetta, Peshawar, Faisalabad, Gujranwala, Mianwali, Sahiwal, Sargodha, Sialkot, DG Khan, Multan, Badin, Hyderabad, Karachi, Nawabshah, Sukkur, Loralai, Abbottabad, DI Khan, Muzaffarabad and Gilgit
- National Capacity Building Institute (NCBI) Islamabad
- A network of seven research and demonstration stations in different agro-climatic zones of the country.
- GIS and Geo-hydrological laboratory, Islamabad
- Library Information and Documentation Centre, Islamabad
- Drainage type lysimeters located at Tandojam, Lahore, Quetta, and Peshawar to determine crop water requirements
- Soil Physics Laboratory, Islamabad



Major Research Areas

PCRWR’s mandate covers a wide range of research in all aspects of water resources across the country, including irrigation, drainage, water quality, wastewater management, and conservation technologies. However, within this broad mandate, research priorities are carefully selected and focused based on the country’s current resources, emerging challenges, and strategic water needs to ensure maximum impact and relevance.

PCRWR conducts its research keeping in view the needs of the country and in line with the Pakistan vision 2025, National Water Policy 2018, SDGs, PCRWR's research agenda and other related policies, such as Food Security Policy, Climate Change Policy, Drinking Water Policy etc.



Key Achievements/ Activities

Celebration of World Water Day 2024

Pakistan Council of Research in Water Resources (PCRWR), in collaboration with UNESCO, UN-Habitat, UNICEF, ECO Science Foundation (ECO-SF), National University of Sciences and Technology (NUST), and Islamic Relief Pakistan, organized an event on 09 July 2024 to commemorate World Water Day 2024. Held under the global theme “Water for Prosperity and Peace,” the event brought together leading stakeholders and experts to deliberate on emerging water-related challenges and opportunities for sustainable management.

Dr. Hifza Rasheed, Director-General PCRWR, highlighted the critical role of water in driving social, economic, and environmental prosperity. She underscored the value of shared water resources in fostering regional cooperation and reaffirmed PCRWR’s commitment to curbing water losses and promoting efficient water use.

A technical roundtable discussion featured distinguished water professionals, including Mr. Nasir Ghafoor, Dr. Muhammad Riaz, Ms. Saiqa Imran, Dr. Muhammad Waseem, Mr. Zamir Ahmad Soomro, Mr. Khalil Raza, and Mr. Raza Narejo. The panel stressed the need for greater public awareness on water scarcity, improved conservation practices, and strengthened Water, Sanitation, and Hygiene (WASH) services. Participants also emphasized trust building through transparent data sharing and the adoption of Integrated Water Resources Management (IWRM) for equitable and sustainable water allocation.

Mr. Jawed Ali Khan, Head of Programmes Management, UN-Habitat, highlighted the role of water in enhancing community resilience to climate change, noting UN-Habitat’s ongoing initiatives in this domain.

Prof. Seyed Komail Tayebi, President ECO-SF, underscored the importance of nature-based solutions for water conservation and community participation. He reaffirmed ECO-SF’s commitment to bridging policy and practice through regional cooperation and dialogue. Mr. Kar Hung Antony Tam, Officer-In-Charge, UNESCO Islamabad, reiterated the significance of World Water Day in fostering awareness and collective action on water-related challenges. He also highlighted UNESCO’s collaborative efforts with PCRWR, including the inscription of the Karez System Cultural Landscape (KSCL) on the World Heritage List, an initiative aimed

at strengthening trust and addressing water-related conflicts. The event also featured the launch of the United Nations World Water Development Report 2024, titled “Water for Prosperity and Peace,” reinforcing the global call for sustainable water management to achieve long-term development goals.



Inception and Stakeholder Workshop on “Transformation through Adoption of Trees and Shrubs for Salinity Management in the Southern Indus Basin, Pakistan”

PCRWR Regional Office Tando Jam organized an Inception and Stakeholder Workshop on “Transformation through Adoption of Trees and Shrubs for Salinity Management in the Southern Indus Basin, Pakistan” on 29 July 2024 at the U.S.-Pakistan Center for Advanced Studies in Water (US-PCAS-W), Mehran University of Engineering and Technology (MUET), Jamshoro. The workshop brought together researchers, policymakers, development partners, academia, and field practitioners to deliberate on sustainable, nature-based solutions for addressing the growing salinity challenges in the Southern Indus Basin.

The session aimed to introduce the project framework, outline key research objectives, and engage stakeholders in identifying gaps, opportunities, and collaborative pathways for effective salinity management. Participants discussed the increasing severity of land degradation, declining agricultural productivity, and environmental impacts associated with widespread salinity, particularly in lower Sindh.

Hafiz Abdul Salam, Regional Director, PCRWR Tandojam, delivered a detailed technical presentation on the salinity phenomenon in the Southern Indus Basin. He highlighted the historical evolution of salinity management practices, the ecological role of salt tolerant trees and shrubs in rehabilitating saline landscapes, and the potential of afforestation as a cost-effective and climate resilient solution. His presentation also reviewed relevant national policies, past initiatives, and ongoing efforts to control salinity through biological and hydrological interventions.

Stakeholders emphasized the need for integrated land and water management approaches, rigorous field testing of suitable species, community participation, and alignment of project activities with provincial and federal environmental strategies. The workshop concluded with a consensus on enhancing inter-agency collaboration and strengthening research-based interventions to promote sustainable salinity mitigation across the Southern Indus Basin.



Workshop with ICAS Project Progressive Farmers of Tando Allahyar and Mirpur Khas

PCRWR Regional Office, Tando Jam organized a two day workshop with progressive farmers associated with the ICAS Project from Tando Allahyar and Mirpur Khas on 22–23 August 2024 at the DRIP-PCRWR, Tando Jam. The workshop aimed to enhance farmers’ technical capacity, promote climate smart agricultural practices, and strengthen collaboration between PCRWR and local farming communities for improved water and land management.

The event brought together a diverse group of farmers, field practitioners, and technical experts to discuss key challenges related to irrigation efficiency, soil health, crop productivity, and the impacts of climate variability on agriculture in the region. Sessions were designed to provide hands-on learning and practical demonstrations tailored to the local agro-ecological context. During the workshop, PCRWR experts delivered training on improved irrigation scheduling, water-saving techniques, soil salinity assessment, and the use of modern tools for field monitoring under the ICAS initiative. Participants were also introduced to innovative low-cost technologies and best management practices that support sustainable crop production and resource conservation.

Farmers actively engaged in discussions, shared field experiences, and highlighted local constraints such as groundwater depletion, rising input costs, and deteriorating soil quality. The workshop provided an opportunity to collect valuable feedback for refining on ground interventions and adopting farmer centric approaches within the ICAS Project. The two-day event concluded with a collective commitment to strengthen cooperation, adopt efficient irrigation and agronomic practices, and support PCRWR’s ongoing efforts to promote climate-resilient agriculture in Tando Allahyar, Mirpur Khas, and surrounding areas.



Stakeholders' Consultations on the Science-Policy-Practice Interface (SPPI) for Water Security in Pakistan

Pakistan Council of Research in Water Resources (PCRWR), under the UNESCO-funded project “Capacity Building on the Science Policy Practice Interface for Achieving Water Security for Pakistan,” organized a series of comprehensive national and regional consultation workshops across Islamabad, Karachi, Peshawar, and Lahore during 2024–2025. The initiative aims to develop practical guidelines that strengthen the integration of scientific research with policy formulation and on-ground implementation to improve water governance and advance national water security.

As part of this effort, a National Consultation Workshop was held at PCRWR Headquarters, Islamabad on 29 January 2025, bringing together senior representatives from government bodies, academia, research institutions, and the private sector. Dr. Hifza Rasheed, Director General PCRWR, inaugurated the workshop by emphasizing the urgent need for a structured SPPI framework to bridge the longstanding disconnect between research, policymaking, and implementation. She highlighted that although Pakistan holds significant scientific expertise, weak coordination among stakeholders often limits effective decision-making and impacts sustainable water management.

Mr. Kar Hung Antony Tam, UNESCO’s Officer-In-Charge, reiterated the importance of inclusive, evidence based approaches in tackling Pakistan’s growing water challenges, particularly under increasing climate pressures. He noted that the Islamabad workshop marked the final consultation following earlier engagements in all four provinces, and that collective insights would guide the development of national SPPI guidelines.

Mr. Muhammad Kashif Manzoor, Deputy Director PCRWR, provided detailed presentations on project objectives, methodology, and the role of stakeholder feedback in shaping practical and responsive SPPI recommendations throughout the workshops. Participants in Islamabad contributed valuable insights on policy practice gaps, the need for coherent national and provincial water policies, and the importance of platforms enabling regular interaction among researchers, policymakers, and practitioners. The session concluded with closing remarks from Ms. Bareerah Fatima, Deputy Director PCRWR, who encouraged continued collaboration and sustained engagement on water governance reforms.

Earlier, regional consultations were held across the country. At the Karachi consultation on 9 October 2024, hosted at PCRWR’s Regional Office, Dr. Ghulam Murtaza, Regional Director, underscored the critical importance of SPPI for sustainable water management in Sindh. Stakeholders including government officials, academia, NGOs, and INGOs engaged in in-depth discussions on integrating scientific evidence into water-related decision-making.

Two additional regional consultations were conducted on 12 September 2024 in Peshawar and 25 September 2024 in Lahore, gathering broad representation from provincial departments, technical agencies, universities, and civil society. Across all consultations, stakeholders demonstrated strong support for the SPPI initiative, consistently identifying the need for enhanced coordination, greater investment in science-based policy development, and the establishment of inclusive platforms that connect researchers, policymakers, and practitioners. PCRWR reaffirmed its commitment to advancing these recommendations into a robust national SPPI guideline, strengthening institutional capacities, and supporting sustainable and equitable water resource management across Pakistan.



One-Day Workshop on “Upscaling WASH System Strengthening in Pakistan to Achieve SDG 6”

A one-day workshop on “Upscaling WASH System Strengthening in Pakistan to Achieve SDG 6” was organized by the Pakistan Council of Research in Water Resources (PCRWR) in collaboration with Welthungerhilfe (WHH), AGAHE (Association for Gender Awareness & Human Empowerment), and key WASH sector partners on 20 September 2024 at Islamabad. The workshop aimed to promote systems thinking and system-based programming as essential approaches for improving Water, Sanitation, and Hygiene (WASH) services in Pakistan.

The primary objective of the workshop was to advance the adoption and scaling of WASH system strengthening approaches and enhance stakeholders’ understanding of their application within Pakistan’s WASH sector. It brought together representatives from government institutions, development organizations, civil society, and technical experts committed to accelerating progress toward Sustainable Development Goal 6 (SDG 6).

Dr. Hifza Rasheed, Director General PCRWR, delivered the opening remarks, emphasizing the importance of shifting from the traditional “build–neglect–rebuild” cycle toward sustainable, system oriented solutions. She emphasized the need for stronger coordination, long term planning, and synergy among stakeholders to achieve meaningful WASH reforms and ensure sustainability of services.

Representing the Ministry of Climate Change, Ms. Saima Nazir highlighted the Ministry’s role in strengthening WASH systems through the establishment of a National Coordination Committee to address gaps in coordination and streamline sectoral efforts.

Engr. Muhammad Dilshaad, Director PCRWR, discussed the significance of rainwater harvesting as a practical measure to address water scarcity in both urban and rural settings. He introduced stakeholders to the design, cost, and potential benefits of pilot rainwater harvesting systems, highlighting Islamabad’s considerable rainwater resource.

The workshop concluded with a shared recognition of the need for strengthened systems, increased investments, and collaborative action to ensure sustainable, equitable, and resilient WASH services across Pakistan.

National Youth Contest on Water Challenges of Pakistan

PCRWR in collaboration with UNICEF, UNESCO, IWMI Pakistan, Islamic Relief, WaterAid, Muslim Hands, and Riphah International University, organized a National Youth Contest on “Water Challenges of Pakistan” on 29 October 2024. The event brought together students from schools and universities across the country to creatively explore key water issues through debates, posters, documentaries, essay writing, and UNESCO’s educational water-themed board games.

The contest was designed to inspire young minds to think critically about Pakistan’s evolving water challenges and to contribute innovative ideas for sustainable water management. Activities included debate, poster, and water board game competitions, each judged by panels comprising experts from leading national and international water-sector organizations.

The debate competition featured 16 students from 8 schools who presented compelling arguments on topics such as water conservation, wastewater reuse, climate change impacts, and sustainable management approaches. Their thought-provoking discussions reflected a strong commitment to environmental stewardship and highlighted the growing awareness among youth regarding water security.

In the poster competition, 62 students from 15 universities showcased visually impactful artwork on diverse water-related themes. The posters demonstrated both creativity and conceptual clarity, emphasizing the urgency of protecting Pakistan’s water resources and adopting responsible water-use practices.

A water board games competition, conducted in collaboration with the UNESCO Pakistan Office, engaged 16 students from 6 schools. The interactive sessions introduced students to real-world water-management scenarios, requiring strategic thinking, teamwork, and informed decision-making. Participants expressed keen interest in the learning-through-play approach, recognizing its relevance to understanding water governance challenges.

Three panels of judges evaluated the entries and finalized the winners of the competitions. Alongside the on-site contests, national-level essay writing and documentary competitions were also held; their winners will be announced during the closing ceremony of Pakistan Water Week on 7 November 2024 at Serena Hotel, Islamabad. Winners of all five competitions will

receive cash prizes, souvenirs, and certificates.

The closing session of the contest was graced by distinguished guests including Mr. Itsuro Takahashi, WASH Manager (UNICEF); Mr. Raza Shah, Scientific Officer (UNESCO Pakistan); Mr. Ihsanullah, Program Officer (Muslim Hands Pakistan); and Mr. Shah Zaib (Islamic Relief Pakistan). The event commenced with the recitation of the Holy Quran followed by the national anthem. Dr. Hifza Rasheed, Director General Water Quality, welcomed the participants and highlighted the importance of youth engagement in addressing Pakistan's water and climate challenges. Subsequently, Ms. Saiqa Imran, Director Water Quality, announced the competition results as follows:

Debate Competition

- 1st Position: Ms. Sanabil Almas, IMCG I-9
- 2nd Position: Syed Ibrahim Ali, Silver Oaks School & College
- 3rd Position: Ms. Tayyaba Tahir, International Maarif School

Poster Competition

- 1st Position: Ms. Zoha Iqbal, COMSATS University Wah Campus
- 2nd Position: Ms. Muneeba Arooj, Islamic International University Islamabad
- 3rd Position: Ms. Hajira Noor Khalid, Islamic International University Islamabad

Water Board Games Competition

- 1st Position: Ms. Iqra Jamshaid, IMCG I-8/4
- 2nd Position: Ms. Alishba Bibi, IMCG Shah Allah Ditta
- 3rd Position: Ms. Waleeja Noor, IMCG F-7/4
- 4th Position: Mr. Muhammad Ayan, IMCB Shah Allah Ditta

In his remarks, Mr. Itsuro Takahashi commended the participants for their creativity, dedication, and strong understanding of national water issues, underscoring the significance of youth-led initiatives in addressing water sector challenges. Certificates and souvenirs were distributed among contestants by the focal persons of the competition.

In closing, Mr. Ihsan Ullah, Program Officer at Muslim Hands, appreciated the enthusiasm and awareness demonstrated by the youth, reaffirming the importance of nurturing young leaders capable of contributing to Pakistan's water-secure future.



Workshop on Sustainable Groundwater Management in Pakistan

PCRWR Regional Office DRIP Tando Jam organized a comprehensive workshop on “Sustainable Groundwater in Pakistan” on December 10, 2024, at Tando Jam. The workshop served as an important multi-stakeholder platform, bringing together representatives from key federal, provincial, academic, and private-sector organizations, including USPCAS-W Jamshoro, Sindh Agriculture University (SAU), PARC, NIA, Agriculture Engineering Hyderabad, Agriculture Extension Hyderabad, SIDA Hyderabad, FAO, and progressive farmers from the region.

The event aimed to address the growing threat of groundwater depletion and deterioration across Pakistan, particularly in irrigated agricultural zones where groundwater serves as a critical buffer against surface water shortages. Participants engaged in technical discussions on declining water tables, uncontrolled tube well installation, inefficient irrigation practices, and the absence of coordinated groundwater governance issues that continue to strain the country’s water security.

Experts highlighted the urgent need for sustainable groundwater abstraction, community centered monitoring systems, and the adoption of modern, high efficiency irrigation technologies such as drip and sprinkler systems. Policy interventions were also discussed, focusing on establishing provincial groundwater regulatory frameworks, strengthening institutions, and enhancing data collection mechanisms to support evidence-based decision-making. Representatives from the farming community shared practical insights on water productivity, crop-water requirements, and field-level challenges in adopting advanced irrigation methods. The workshop concluded with a collective commitment to promoting sustainable groundwater management across Pakistan.



Technology Transfer and Capacity Building Training Program on “Hand-Operated Portable Water Filtration Unit”

Pakistan Council of Research in Water Resources (PCRWR), under its mandate for capacity building and technology dissemination, organized a week-long training program from 15–21 December 2024 on the development and deployment of the Hand-Operated Portable Water Filtration Unit. The program was conducted for the International Centre for Integrated Mountain Development (ICIMOD), an international organization working for sustainable development across the Himalayan region.

The training aimed to transfer PCRWR’s locally developed, hand operated filtration technology, an innovative, portable, and cost effective solution designed to provide safe drinking water during disasters in remote and, underserved communities. The filtration unit, recognized for its ease of operation and low maintenance, has proven highly effective in flood prone and emergency response contexts.

This collaborative initiative between PCRWR and ICIMOD has strengthened technical capacity, enhanced disaster preparedness, and contributed to improved water security for vulnerable mountain communities. The training program covered the following key areas:

- **Knowledge and Technology Transfer:** Detailed briefings on the design, installation, operation, and routine maintenance of the filtration unit to ensure effective utilization in field conditions.
- **Field Demonstrations:** Practical demonstrations enabling participants to operate the unit independently and understand its functionality during real emergency scenarios.
- **Technical Support and Hands-On Training:** Guidance on troubleshooting, repair procedures, and component replacement to ensure the sustainability of the filtration units.
- **Capacity Building of ICIMOD’s Local Vendors:** Training provided to local vendors to support long-term sustainability, supply chain strengthening, and community self reliance.

The program concluded with an emphasis on continued collaboration for scaling up these low cost technologies and empowering local communities to access safe drinking water during climate induced disasters.

Consultative Meeting on Environmental AMR Surveillance Strategy (2025–2027)

PCRWR in collaboration with the Fleming Fund Country Grant Program and DAI's One Health Surveillance initiative, convened a consultative meeting on 28 January 2025 in Islamabad to review and refine the draft Antimicrobial Resistance (AMR) Surveillance Strategy in the Environment (2025–2027). The meeting brought together experts, policymakers, and stakeholders committed to strengthening environmental AMR surveillance and promoting a One Health approach in Pakistan.

Dr. Hifza Rasheed, Director General (Water Quality) PCRWR, welcomed participants and outlined the objectives of the meeting. The keynote address was delivered by Dr. Qadeer Ahsan, Team Lead for the Fleming Fund Country Grant Program, who emphasized the critical role of environmental AMR surveillance in addressing public health and ecological challenges through evidence-based interventions.

The meeting included a comprehensive presentation on the draft strategy, highlighting its objectives, scope, implementation plan, methodologies, sampling protocols, and data management frameworks. Participants actively contributed feedback, and suggested actionable solutions to enhance the strategy's effectiveness.

A pilot study plan for environmental AMR surveillance (2025–26) was also introduced to test and validate the proposed methodologies before nationwide rollout. The session concluded with closing remarks and a vote of thanks from Dr. Ali Khalid, One Health Surveillance Manager, DAI, who underscored the importance of multistakeholder collaboration, sustained engagement, and commitment to effectively address AMR challenges in Pakistan.



Focus Group Discussions on Salinity Management in the Southern Indus Basin, Sindh

PCRWR Regional Office DRIP Tando Jam, in collaboration with the Pakistan Agricultural Research Council (PARC), conducted a series of Focus Group Discussions (FGDs) across Sindh from October 2024 to January 2025 under the project “Transformation through Adaptation of Trees and Shrubs for Salinity Management in the Southern Indus Basin, Pakistan.” The FGDs were organized across multiple locations, including Tando Allahyar, Saeedabad, Khairpur, Sukkur, Mirpurkhas, Thatta, Larkana, Sanghar, Khipro, Sakrand, and Nawabshah, covering the Upper, Middle, and Lower Indus Basin regions.

The primary objective of these FGDs was to gather indigenous knowledge and practical experiences from local farmers regarding the use of trees and shrubs in saline affected areas, including their adaptation practices, challenges, and economic as well as environmental benefits. The discussions also provided an opportunity to engage government officials, agricultural extension officers, and technical professionals to share insights on salinity mitigation strategies and policy interventions. Key discussions included:

- **Tando Allahyar & Saeedabad:** Sessions at Nawazabad and Shaikh Suleman Farm highlighted farmers’ experiences in selecting salt tolerant tree species and shrubs, irrigation challenges, and soil management techniques.
- **Khairpur & Sukkur:** Farmers at Village Lahano Khan Khokhar and Muhammad Ibrahim Chandio shared adaptive practices to sustain crop productivity in saline soils.
- **Mirpurkhas & Thatta:** Participants at Kot Ghulam Mohd and Satyon Road discussed integration of trees and shrubs in farming systems to improve soil health and reduce salinity impact.
- **Larkana:** FGDs at Dokri focused on traditional water management practices and community led efforts to combat salinity.
- **Sanghar & Khipro:** Morhadi Khipro discussions emphasized the use of local vegetation for soil stabilization and economic benefits from tree products.
- **Sakrand & Nawabshah:** Sessions at Pai Belo included soil sampling and technical evaluation of salinity levels to support future interventions.
- **Tando Jam:** A concluding discussion with professionals from various organizations at DRIP Tando Jam synthesized lessons learned, identified gaps in current practices, and

proposed recommendations for scaling up salinity management initiatives using trees and shrubs.

The FGDs provided valuable field level insights into challenges faced by farmers, highlighted effective adaptation strategies, and fostered knowledge exchange between local communities, researchers, and government representatives. The outcomes of these discussions will inform the development of targeted interventions, policy recommendations, and practical guidelines for sustainable salinity management in the Southern Indus Basin.



Workshop on Evaluating the Potential of Membrane Technologies for Desalination and Wastewater Recycling in OIC Countries

PCRWR in collaboration with COMSTECH, successfully organized a one day workshop on “Evaluating the Potential of Membrane Technologies for Desalination and Wastewater Recycling in OIC Countries” at the COMSTECH Secretariat, Islamabad on 26 February, 2025. The workshop brought together leading water experts, researchers, policymakers, and stakeholders from OIC countries to explore the application of membrane technologies in addressing water challenges.

In her opening remarks, Dr. Hifza Rasheed, Director General PCRWR, highlighted the major water scarcity issues and technological constraints faced by OIC countries. She emphasized the importance of membrane technologies as one of the most promising solutions for water treatment, desalination, and wastewater recycling.

Prof. Dr. M. Iqbal Choudhary, Coordinator General, COMSTECH, attended as Chief Guest and commended PCRWR’s national and regional efforts in water research and technology adoption. He stressed that unplanned industrialization, anthropogenic pressures, and climate change have intensified water challenges, highlighting the urgent need to adopt cost effective and sustainable technological interventions.

The participants focused on the potential of desalination, wastewater recycling, and innovative membrane applications to meet growing water demands while promoting environmental sustainability. Overall, the event strengthened regional cooperation, encouraged cross sectoral dialogue, and emphasized the critical role of advanced technologies in achieving long term water security in the OIC region.



Launching and Dissemination of the National Strategy for AMR Surveillance in the Environment

PCRWR in collaboration with The Fleming Fund Country Grant Program (FFCGP) and DAI Pakistan, successfully organized the launching and dissemination event of the National Strategy for AMR Surveillance in the Environment on 28 February 2025 in Islamabad. The event provided a platform to formally introduce the strategy, engage key stakeholders, and solicit feedback for its effective implementation.

The session commenced with welcome remarks from Dr. Qadeer Ahsan, Team Lead, DAI-FFCGP, followed by an introduction and background of the AMR Surveillance Strategy presented by Dr. Hifza Rasheed, Director General, PCRWR. The event was graced by Mirza Nasir Ud Din Mashood Ahmed, Special Secretary, Ministry of National Health Services, Regulations & Coordination, who emphasized the critical importance of integrating environmental monitoring into the National Action Plan (NAP) on AMR within the One Health framework.

The event brought together a diverse group of policymakers, public health professionals, environmental scientists, researchers, and educators, who provided valuable feedback to enhance inter agency collaboration and strengthen AMR mitigation efforts.

The workshop successfully disseminated the AMR Surveillance Strategy, reinforced stakeholder engagement, and laid the foundation for coordinated efforts to monitor, prevent, and manage antimicrobial resistance in the environmental sector across Pakistan.



Seminar on Glacier Preservation “World Water Day 2025”

PCRWR Regional Office Karachi, successfully organized a seminar on “Glacier Preservation” to commemorate World Water Day 2025. The event convened water experts, environmentalists, students, and stakeholders from various sectors to raise awareness about the urgent need to protect Pakistan’s rapidly melting glaciers, which serve as a vital source of freshwater for the country.

Dr. Ghulam Murtaza, Regional Director, PCRWR Karachi, delivered the opening remarks, emphasizing the critical role of glaciers in sustaining Pakistan’s water supply and highlighting the alarming rate of glacier retreat due to climate change. He underscored the need for immediate action through sustainable policies, scientific research, public awareness, and community participation to ensure the preservation of these natural water reservoirs for future generations.

The seminar featured a distinguished panel of speakers from leading institutions. Mr. Adnan Shafiq, Deputy Director, PMD, presented an overview of glacier distribution and inventory in Pakistan, discussing the contributions of organizations such as SUPARCO and ICIMOD, and highlighting the potential hazards of Glacial Lake Outburst Floods (GLOFs) in the northern regions. Dr. Sardar Sarfaraz, Chief Meteorologist (Retd.), PMD, addressed rainfall variability and temporal climatic trends influencing glacier dynamics. Prof. Dr. Viqar Hussain, Convener of SEGMITE, discussed local environmental challenges, including pollution and water wastage, and advocated for comprehensive water conservation strategies. Prof. Dr. Erum Bashir from Karachi University emphasized fostering collective responsibility and national commitment to ensure the sustainable management of water resources.



Workshop on Climate Resilient Water Allocation Planning in Pakistan

PCRWR hosted a project workshop for the ACIAR funded initiative “Climate Resilient Water Allocation Planning in Pakistan” on 10 April 2025 in Islamabad. The workshop brought together national and international partners to discuss strategies for enhancing irrigation efficiency, optimizing water distribution, and supporting climate-resilient water management practices across Pakistan.

Dr. Hifza Rasheed, Director General, PCRWR, welcomed all project partners and emphasized the critical challenges facing Pakistan’s irrigation system, including groundwater depletion, population growth, rapid urbanization, and climate change impacts. She highlighted the project’s potential to improve farm level irrigation efficiency and provide actionable insights for policymakers, particularly in supporting smallholder farmers.

The workshop featured presentations from key project partners. Ms. Susan Cuddy from CSIRO, Australia, outlined the objectives of the workshop, emphasizing integrated water management approaches that link system level and local scale interventions. Dr. Mubin-ud-Din Ahmad, CSIRO, provided an overview of the project’s core aim: developing science based solutions to optimize water distribution under changing climatic conditions. He highlighted the integration of surface and groundwater data and stressed the importance of supporting smallholder farmers through improved irrigation practices.

Mr. Geoff, Hydrologist from Australia, shared lessons from the management of the Murray Darling Basin, underscoring the importance of stakeholder engagement, adaptive planning, and transparent data management in achieving sustainable water use. He highlighted how integrated water accounting and policy frameworks balance agricultural needs with environmental sustainability, offering practical insights for Pakistan.

Representatives from the Indus River System Authority (IRSA), the lead implementation agency, stressed the urgency of adopting data-driven, integrated approaches to manage Pakistan’s water resources. Mr. Amjad Saeed, Member IRSA Punjab, highlighted IRSA’s central role in system scale water allocation and the importance of inter institutional collaboration for equitable and efficient water distribution.

Technical sessions provided an opportunity for project partners to share their specific roles and upcoming activities. PCRWR outlined its role in linking system level insights with local scale implementation, while the University of Agriculture Faisalabad (UAF) emphasized incorporating socioeconomic and gender considerations for inclusive planning. The South Asian Conservation Agriculture Network (SACAN) presented its work on community engagement and promoting efficient on farm water management practices.

In the closing session, Mr. Ehsan Laghari, Member IRSA Sindh, expressed appreciation for the collaborative efforts under the ACIAR project. He emphasized the significance of evidence based planning, institutional coordination, and the importance of the knowledge shared during the workshop in shaping future water policies. The session reaffirmed the collective commitment of all partners to advancing climate-resilient and sustainable water management across Pakistan.



Multistakeholder Workshop on Evidence-Based Interventions to Reduce Antimicrobial Resistance in Poultry

PCRWR in collaboration with its partners, organized a multistakeholder workshop on Identifying Evidence Based Interventions to Reduce Antimicrobial Resistance (AMR) in Poultry on 15 April 2025 at University of Agriculture, Faisalabad. The workshop convened experts, researchers, policymakers, and industry stakeholders to discuss practical strategies to mitigate the rising threat of AMR in the poultry sector.

The workshop highlighted key findings from field assessments, revealing a high prevalence of *E. coli*, *Salmonella*, and *Mycoplasma* in commercial broiler farms. The studies indicated widespread use of oral antimicrobials and inadequate biosecurity measures as significant contributors to the problem. Other factors identified included limited awareness of AMR among farmers, the use of Highest Priority Critically Important Antimicrobials (HPCIA), weak regulatory enforcement, and insufficient diagnostic capacities.

Participants identified the misuse of antibiotics and substandard farm management practices as major challenges exacerbating AMR. The workshop emphasized evidence based interventions, including capacity building for farmers and veterinarians, promotion of antimicrobial alternatives, strict adherence to treatment guidelines, cross sectoral research, and strengthening surveillance systems. Stakeholder engagement through consultations and the establishment of model farms to demonstrate best practices were also recommended as key strategies for sustainable AMR management in the poultry industry. The workshop concluded with a consensus on the importance of integrating scientific research, regulatory frameworks, and practical interventions to reduce AMR.



Technical Workshop on Local Scale Component of Climate Resilient Water Allocation Planning Project

A one day technical workshop on the local scale component of the ACIAR funded Climate Resilient Water Allocation Planning Project was successfully held on 14 April 2025 at PCRWR Lahore. The workshop was chaired by Project Coordinator Ms. Bareerah Fatima and commenced with a recitation from the Holy Quran, followed by welcome remarks from Regional Director, Engr. Faakhar Raza. Dr. Munawar Raza Kazmi, ACIAR Country Manager, reaffirmed ACIAR's continued partnership with PCRWR, while Dr. Mobin-ud-Din Ahmad from CSIRO outlined the objectives and agenda of the workshop.

During the session, project partners including PCRWR, University of Agriculture Faisalabad (UAF), South Asian Conservation Agriculture Network (SACAN), On Farm Water Management (OFWM), Lahore University of Management Sciences (LUMS), and CSIRO presented updates on key project activities. These included progress on data collection, socio-economic surveys, deployment of IoT-enabled flumes, soil moisture sensors, Water Wise VIA tools, and community engagement initiatives. Participants engaged in detailed discussions to refine work plans, align reporting timelines, and address implementation challenges.

The workshop concluded with a consensus on adopting data driven, climate resilient water management pathways. The event reaffirmed the commitment of all stakeholders to collaboratively advance the project's objectives, ensuring sustainable and efficient water allocation at the local scale.



Hands On Training Workshop on Groundwater Modeling with MODFLOW

Pakistan Council of Research in Water Resources (PCRWR) in collaboration with The Centre of Excellence in Water Resources Engineering (CEWRE), UET Lahore, conducted a hands on training workshop on Groundwater Modeling with MODFLOW on 15 April 2025 in Lahore. The workshop brought together students, researchers, and water professionals to enhance practical skills in groundwater modeling, a critical tool for sustainable water resource management in Pakistan.

Dr. Amjad Masood, Assistant Professor and Head of Research and Outreach at CEWRE, delivered the keynote session, providing in-depth insights into groundwater flow dynamics, hydrological systems, and the strategic application of modeling tools to address real-world water challenges. Engr. Faakhar Raza, Regional Director, PCRWR Lahore, conducted a practical session using the PMWIN interface for MODFLOW, guiding participants through conceptual model development, boundary condition setup, and aquifer simulation techniques.

Prof. Dr. Muhammad Atiq Ur Rehman Tariq, Director CEWRE, highlighted the critical role of modeling in sustainable groundwater management and underscored CEWRE's commitment to advancing research and equipping participants with practical skills. He also gathered valuable feedback from attendees, appreciating their enthusiasm and active engagement throughout the workshop. The event provided a collaborative and interactive platform for participants to strengthen their technical expertise, contributing to improved groundwater management and addressing Pakistan's pressing water challenges.



Final Workshop on Transformation through Adaptation of Trees and Shrubs for Salinity Management in the Southern Indus Basin, Pakistan

PCRWR Regional Office DRIP Tando Jam, successfully organized the final workshop of the project “Transformation through Adaptation of Trees and Shrubs for Salinity Management in the Southern Indus Basin, Pakistan” on 16 June 2025 at Karachi. The workshop brought together project stakeholders, including government officials, researchers, farmers, and representatives from partner organizations, to review project achievements, share lessons learned, and discuss strategies for sustainable salinity management in the region.

The workshop featured presentations on the project’s outcomes, including the adoption of saline-tolerant tree and shrub species, community engagement initiatives, and the socioeconomic and environmental benefits observed across various sites in the Southern Indus Basin. PCRWR highlighted the role of indigenous knowledge and participatory approaches in identifying suitable species and management practices, while partner organizations shared insights on policy support, extension mechanisms, and scaling up successful interventions.

Participants engaged in interactive discussions focusing on sustainable land and water management, strategies to mitigate soil salinity, and recommendations for wider adoption of climate resilient practices. The workshop concluded with a consensus on the importance of continued collaboration among stakeholders, emphasizing the need for knowledge dissemination, capacity building, and the integration of project lessons into regional and national salinity management policies. The event reaffirmed PCRWR’s commitment to promoting sustainable agricultural practices and enhancing resilience to salinity challenges in Pakistan’s southern river basin areas.



Farmers Field Day at PCRWR R&D Centre, Sialmore

PCRWR, Regional Office Lahore, organized a Farmers Field Day at the PCRWR R&D Centre in Sialmore on 30 November 2024. The event was hosted by Engr. Khuram Ejaz, Deputy Director, Ms. Bareerah Fatima, Deputy Director, Mr. Luqman Ahmed, Project Coordinator, and a representative from INARA Technology, Islamabad.

The program focused on enhancing farmers' understanding of modern agricultural tools and technologies, particularly weather monitoring gadgets and their significance in improving crop management. Participants were introduced to the Irrigation and Climate Advisory Service (ICAS) mobile application, which provides timely guidance for irrigation scheduling and crop input decisions, helping farmers make data driven and efficient management choices. Informative brochures and pamphlets were also distributed to provide additional technical guidance and practical recommendations.

Farmers actively engaged in the session, expressing appreciation for PCRWR's initiative and recognizing the ICAS app as a valuable tool to support informed decision making, improve water use efficiency, and optimize crop production practices. The event underscored PCRWR's commitment to knowledge dissemination, capacity building, and fostering technology adoption for sustainable agriculture.



Participation in Early Recovery and Decent Employment Initiatives Event

Dr. Ghulam Murtaza, Regional Director, PCRWR Karachi, actively participated in the event on “Early Recovery and Decent Employment Initiatives” held on 20 February 2025 in Islamabad, organized by Helvetas Swiss Intercooperation. The event showcased the progress, findings, and lessons learned from two major initiatives: the Early Recovery Support (ERS) project for flood affected areas in Sindh and Khyber Pakhtunkhwa, and the Skills for Decent Employment (SDE) project in Khyber Pakhtunkhwa.

The workshop provided a platform for key stakeholders to discuss strategies for transitioning from emergency relief to long-term recovery, promoting decent work conditions, and enhancing climate-resilient infrastructure and disaster risk reduction. The participation of PCRWR strengthened knowledge exchange on sustainable development practices, resilience building, and community centered approaches for vulnerable populations. The engagement underscored PCRWR’s commitment to contributing expertise in water resource management and disaster preparedness to support inclusive and sustainable recovery initiatives.



Certification and Accreditation

ISO/IEC 17025:2017 Accreditation

The National Water Quality Laboratory (NWQL) of the Pakistan Council of Research in Water Resources (PCRWR) is accredited under ISO/IEC 17025:2017, the international standard for testing and calibration of laboratories. PCRWR has consistently maintained this accreditation since 2007, demonstrating its long standing commitment to quality, technical competence, and reliability in water quality testing and analysis.

The laboratory is currently accredited by the Pakistan National Accreditation Council (PNAC), with the accreditation valid up to January 2026. This accreditation ensures that NWQL's testing procedures, quality management systems, and analytical results meet internationally recognized standards. It also enhances the credibility and acceptance of PCRWR's water quality data at national and international levels.

Maintaining ISO/IEC 17025 accreditation enables PCRWR to provide accurate, reliable, and defensible water quality assessments in support of public health, environmental protection, regulatory compliance, and evidence-based policymaking. The continued accreditation reflects PCRWR's dedication to continual improvement, staff competency development, and adherence to best laboratory practices.



Establishment of PCRWR E-Library and Digital Knowledge Access

Library Documentation and Information Center of PCRWR achieved a major institutional milestone by initiating the establishment of its E-Library, marking a significant step toward digital transformation and enhanced research support. The PCRWR Library at Islamabad serves as a national level knowledge repository, housing a comprehensive collection of over 36,000 books, scholarly articles, scientific journals, technical reports, and research publications covering water resources, environmental sciences, and allied disciplines.

For the first time in the history of PCRWR, the Council's valuable library assets have been digitized and made accessible online with the technical facilitation of the Pakistan Scientific and Technological Information Centre (PASTIC). The PCRWR E-Library can now be accessed through the online portal at <http://koha.pastic.gov.pk:6049/>, enabling researchers, policymakers, students, and professionals across Pakistan to conveniently access scientific information without physical limitations. This initiative not only improves information accessibility but also ensures long term preservation and systematic management of PCRWR's intellectual resources.

Building on this achievement, PCRWR plans to further modernize its library services by expanding digital collections, integrating national and international research databases, improving search and retrieval tools, enabling remote access for regional offices and partners, and strengthening collaboration with knowledge networks to enhance research visibility and information exchange.

Through continuous enhancement of its E-Library and knowledge services, PCRWR aims to promote research excellence, support evidence-based policymaking, and reinforce its role as a leading national institution in the water sector.

R&D Activities

Research Activity 1

Monitoring Sea Water Intrusion, Sea Level Rise, Coastal Erosion, and Land Subsidence along Sindh and Balochistan Coast (Five-Year Project)

The Pakistan Council of Research in Water Resources (PCRWR), in collaboration with the National Institute of Oceanography (NIO) and funded by the Government of Pakistan (GoP), has been conducting a five year study to monitor sea water intrusion, sea level rise, coastal erosion, and land subsidence along the Sindh and Balochistan coasts. The project has successfully achieved its initial objectives, including the planning, design, and installation of 100 Multi Level Observation Wells (MLOWs) in the Indus Delta and surrounding coastal areas. Data collected from these wells focuses on Depth to Water Table (DTW) fluctuations and groundwater quality, providing vital insights into the dynamics of coastal aquifers.

i. Monitoring of Piezometers (MLOWs)

PCRWR Karachi conducts quarterly monitoring of DTW across all observation wells. A total of 141 MLOWs were actively monitored during the reporting period, providing critical information on groundwater table fluctuations and the progression of seawater intrusion along the Sindh coast.

Table: Quarterly DTW Monitoring Summary (2024–2025)

Quarter	Number of MLOWs Monitored	Remarks
July – Sept 2024	467	DTW measurement & sample collection
Oct – Dec 2024	455	DTW measurement & sample collection
Jan – Mar 2025	442	DTW measurement & sample collection
Apr – Jun 2025	425	DTW measurement & sample collection
Total	1,789	Cumulative monitoring

ii. Water Quality Analysis

PCRWR Karachi performed a detailed physicochemical analysis of groundwater samples collected from MLOWs. Parameters analyzed include pH, electrical conductivity, total dissolved solids, color, odor, nitrate-N, sulfate (SO₄), alkalinity, total hardness (CaCO₃),

magnesium, calcium, potassium, sodium, carbonate (CO_3^{2-}), bicarbonate (HCO_3^-), and chloride ions. During the reporting period, 1,322 water samples were collected and analyzed. This analysis provides a comprehensive understanding of salinity, groundwater quality, and the extent of seawater intrusion along the coastal regions.

Table: Water Samples Collected and Analyzed (2024–2025)

Time Period	Samples Collected	Analysis Conducted
July – Sept 2024	467	Cations & Anions
Oct – Dec 2024	455	Cations & Anions
Jan – Mar 2025	442	Cations & Anions
Apr – Jun 2025	425	Cations & Anions
Total	1,322	Comprehensive Water Quality Analysis

iii. Isotopic Analysis of Groundwater

To trace the sources of salinization and understand aquifer recharge mechanisms, water samples for isotopic analysis were collected from MLOWs in Tando Mohammad Khan, Hyderabad, Badin, Sujawal, Thatta, and Karachi during September–October 2024. Samples were analyzed at PINSTECH Islamabad for $\delta^{18}\text{O}$, $\delta^2\text{H}$, $\delta^{13}\text{C}$, $\delta^3\text{H}$, $\delta^{34}\text{S-SO}_4$, and $\delta^{18}\text{O-SO}_4$. Each sample had a standard volume of 2,000 ml, with analysis periods ranging from 4–20 weeks depending on the isotope.

This isotopic data provided a scientific basis for understanding the origin, movement, and mixing of saline and freshwater along the coastal aquifers, which is critical for modeling seawater intrusion and groundwater management.

iv. Electrical Resistivity Survey (ERS)

An Electrical Resistivity Survey was conducted over a 10 km × 10 km grid covering Karachi, Thatta, Hyderabad, Sujawal, Badin, and Tando Mohammad Khan. A total of 229 survey points were evaluated at depths ranging from 25 m to 300 m.

The ERS delineated saline and fresh zones using Dar Zarroukh parameters, revealing that seawater intrusion is most pronounced at depths greater than 100 meters. Seawater intrusion extended inland up to 140 km from Sujawal, while the least intrusion, less than 45 km, was observed from Thatta.

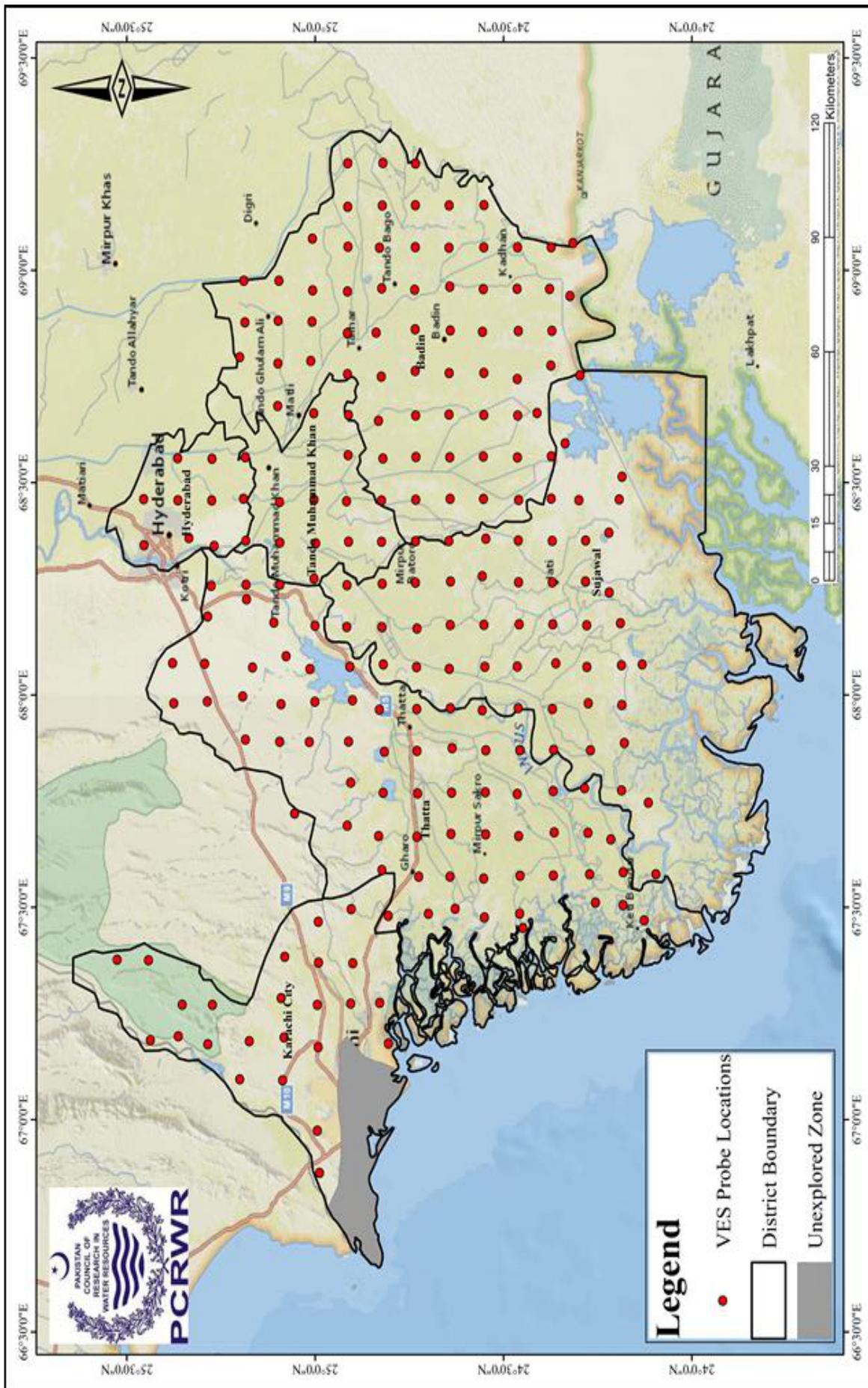


Figure 1. ERS Survey Location & Grid Map under Sea Water Intrusion Project

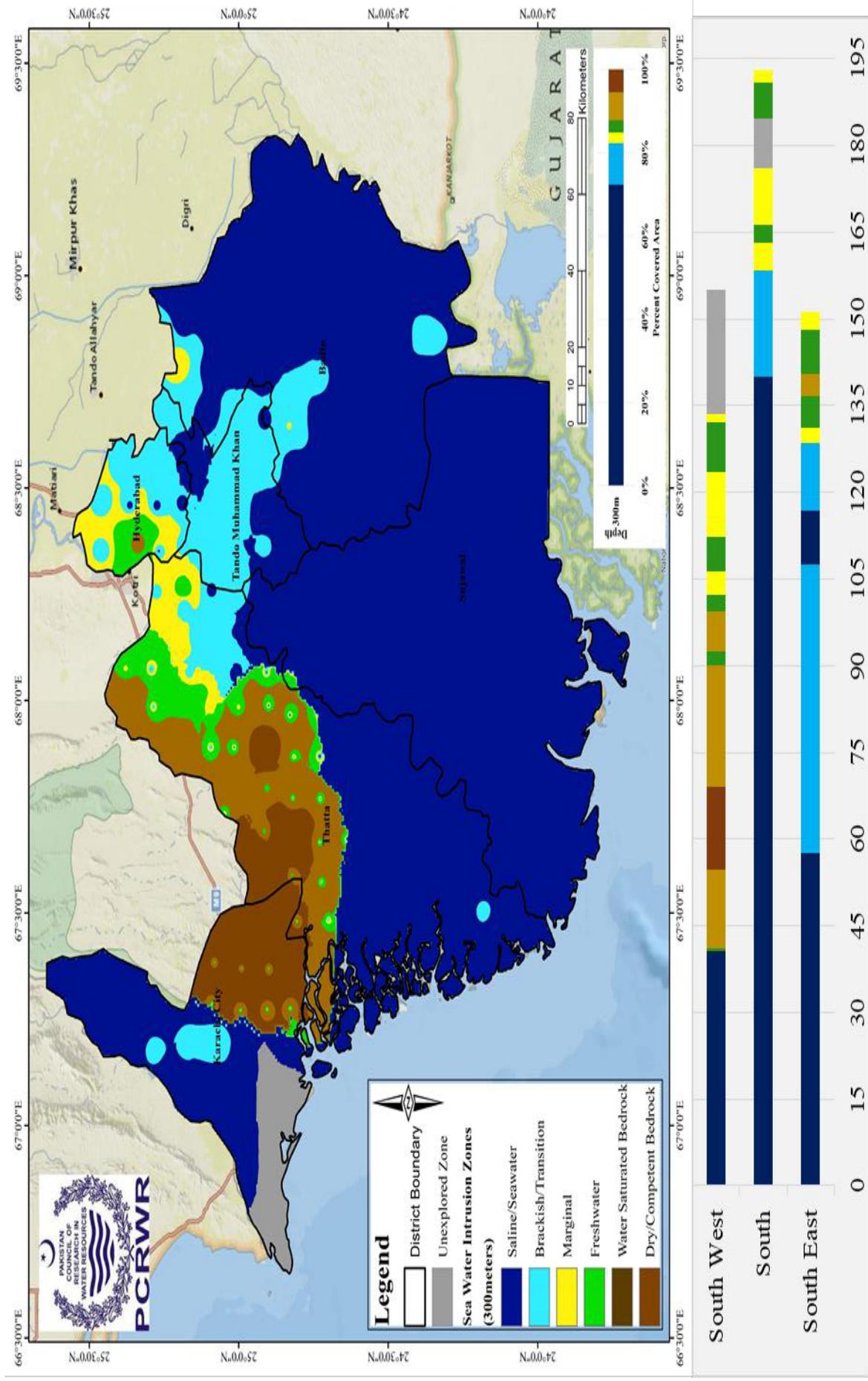


Figure 2. Map showing extent of Seawater Intrusion in study area

v. Repair and Maintenance of MLOWs

During the reporting period, 13 MLOWs in Thatta, Badin, Sujawal, and Karachi were damaged due to environmental and operational factors, impacting DTW and water quality monitoring. The wells were successfully rehabilitated between October and December 2024, restoring full functionality for continuous monitoring.

Table: Repair and Maintenance of MLOWs (Oct–Dec 2024)

District	Number of MLOWs Repaired
Badin	4
Sujawal	4
Thatta	4
Karachi	1
Total	13

vi. Focus Group Discussions (FGDs)

To assess the socioeconomic and health impacts of sea water intrusion, PCRWR Karachi conducted FGDs in Sujawal, Thatta, and Badin on October 18–19, 2024. Participants included farmers, students, educators, journalists, healthcare professionals, and civil society representatives. The discussions highlighted challenges including crop loss, salinity-induced soil degradation, loss of freshwater availability, and health impacts. A dedicated session with a medical officer in Kadhan, District Badin addressed emerging health issues linked to seawater intrusion and coastal erosion.

FGDs provided qualitative data that complements quantitative monitoring, emphasizing the need for community focused mitigation strategies to protect livelihoods and public health.



vii. Project Impact and Future Plans

The ongoing monitoring and data collection from MLOWs, coupled with physicochemical and isotopic analysis, FGDs, and ERS, provide a robust dataset to model seawater intrusion, coastal erosion, and land subsidence. This dataset is essential for:

- Identifying safe and vulnerable aquifers
- Designing evidence-based groundwater management strategies
- Informing policy for coastal water security and climate resilience
- Guiding long-term mitigation plans to protect livelihoods, ecosystems, and public health

Future work will focus on data synthesis, hydrogeochemical modeling, GIS mapping, and dissemination of findings to policymakers and stakeholders. The project provides a foundation for sustainable water resource management along the Sindh and Balochistan coasts.

Research Activity 2

Survey of Groundwater Quality, Quantity, and Mapping Across Sindh

PCRWR has been awarded the project titled “Survey of Groundwater Quality, Quantity, and Mapping Across Sindh”. The project is scheduled for completion over a 24 month period. The project aims to provide a comprehensive understanding of groundwater resources in Sindh to support sustainable water management and planning.

The key objectives of the project are to conduct district wise groundwater aquifer mapping and investigation using geophysical methods, primarily through Electrical Resistivity Survey (ERS) up to a depth of 300 meters. Surveys are being carried out on a 5 x 5 km grid size across Sindh, excluding Tharparkar district and arid Talukas, prioritizing villages with populations of 500 or more in each union council. Sindh covers an area of 87,420 sq. km, representing 62% of the total provincial area of 141,000 sq. km.

In addition to aquifer mapping, the project focuses on the verification of groundwater quality from existing sources such as tube wells, hand pumps, and other wells to determine suitability for human consumption in accordance with national drinking water standards. The assessment also includes verification of groundwater quality and quantity for existing water supply schemes, whether functional or non-functional, to identify areas requiring interventions.

A major component of the project is the development of district wise spatial maps illustrating variations in drinking water quality parameters. These maps will aid in identifying potential groundwater recharge zones suitable for artificial aquifer recharge during the monsoon season. Furthermore, the project includes the design and installation of approximately 150 Multi-Level Observation Wells (MLOWs) up to 80 feet deep to monitor water quality and depth-to-water table (DTW) variations over time. Soil and water samples collected from these wells will be analyzed for physicochemical parameters and soil texture to inform sustainable groundwater management strategies.

As part of the project’s implementation, the Electrical Resistivity Survey and water quality sampling were conducted in District Jamshoro and Shaheed Benazirabad in June 2025. The detailed progress of the ERS survey is summarized below:

Table: Details of ERS Survey under PHED Project

S. No	District	Proposed Points	Completed Points
1	Shaheed Benazirabad	181	64
2	Jamshoro	196	76
	Total	450	140

The survey and subsequent analysis of groundwater quality and aquifer characteristics will provide critical data for the planning and management of water resources in Sindh. This initiative represents a significant step toward ensuring safe and sustainable groundwater use, supporting both rural and urban populations across the province.

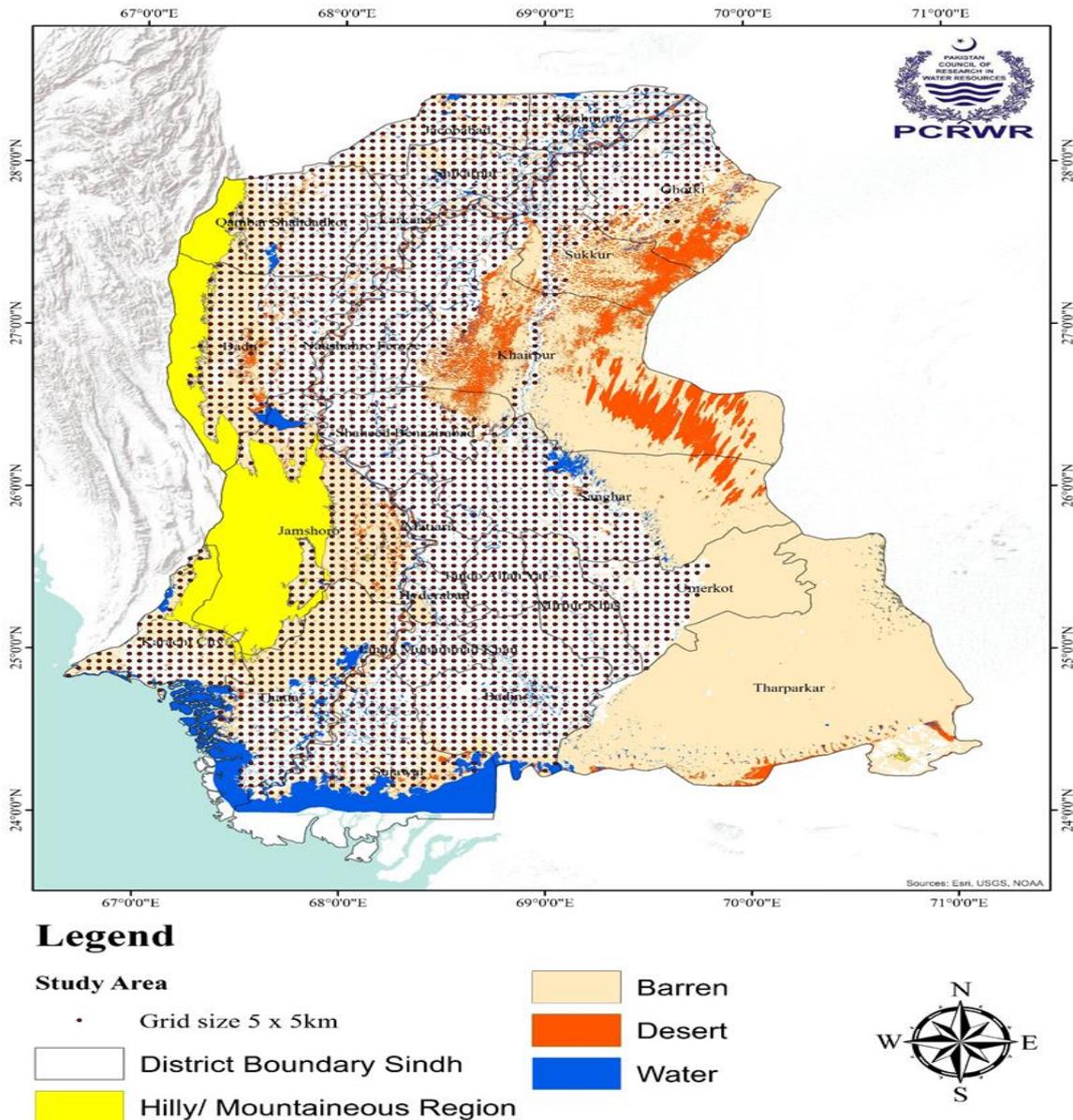


Figure 3. Study Area of PHED Supported Project

Research Activity. 3

Mapping Water Quality Challenges in Tehsil Khairpur Nathan Shah, District Dadu, Sindh

PCRWR conducted a detailed study titled “Mapping Water Quality Challenges in Tehsil Khairpur Nathan Shah, District Dadu, Sindh”, supported by Islamic Relief Pakistan (IRP). The project aimed to leverage scientifically based findings and comprehensive water quality data to develop sustainable water solutions for both public and private stakeholders in the region.

i. Objectives and Scope of Work

The primary objective of the study was to generate actionable insights on the status and challenges of water quality to support vulnerable communities in the study area. The scope of work included:

- a) Conducting a comprehensive water quality assessment of both groundwater and surface water in Union Councils (UC) Paryo and Mitho Babar of Tehsil Khairpur Nathan Shah, District Dadu.
- b) Evaluating drinking water quality for local communities, with a focus on public health and safety.
- c) Implementing a grid-based sampling strategy to systematically collect water samples for physical, chemical, and microbiological analysis.
- d) Analyzing the collected data to understand spatial variations in water quality, its suitability for human consumption and irrigation, and its impacts on community livelihoods.

ii. Water Sampling Approach

A structured and systematic sampling approach was adopted to ensure comprehensive coverage of key water sources, including hand pumps, motor pumps, tube wells, wells, canals, and ponds, which serve as primary water sources for the local population.

- A grid based mapping system was designed at a scale of 1.5 km × 1.5 km for both union councils.
- Based on this framework, 36 grids were delineated in UC Paryo and 39 grids in UC Mitho Babar, resulting in a total of 75 grids across the study area.

- To ensure representative sampling, two water samples were collected per grid, yielding a total of 150 water samples encompassing both groundwater and surface water sources.

This approach provided a comprehensive spatial understanding of water quality challenges and enabled precise identification of areas with contamination risks, serving as a foundation for future interventions and sustainable water management solutions

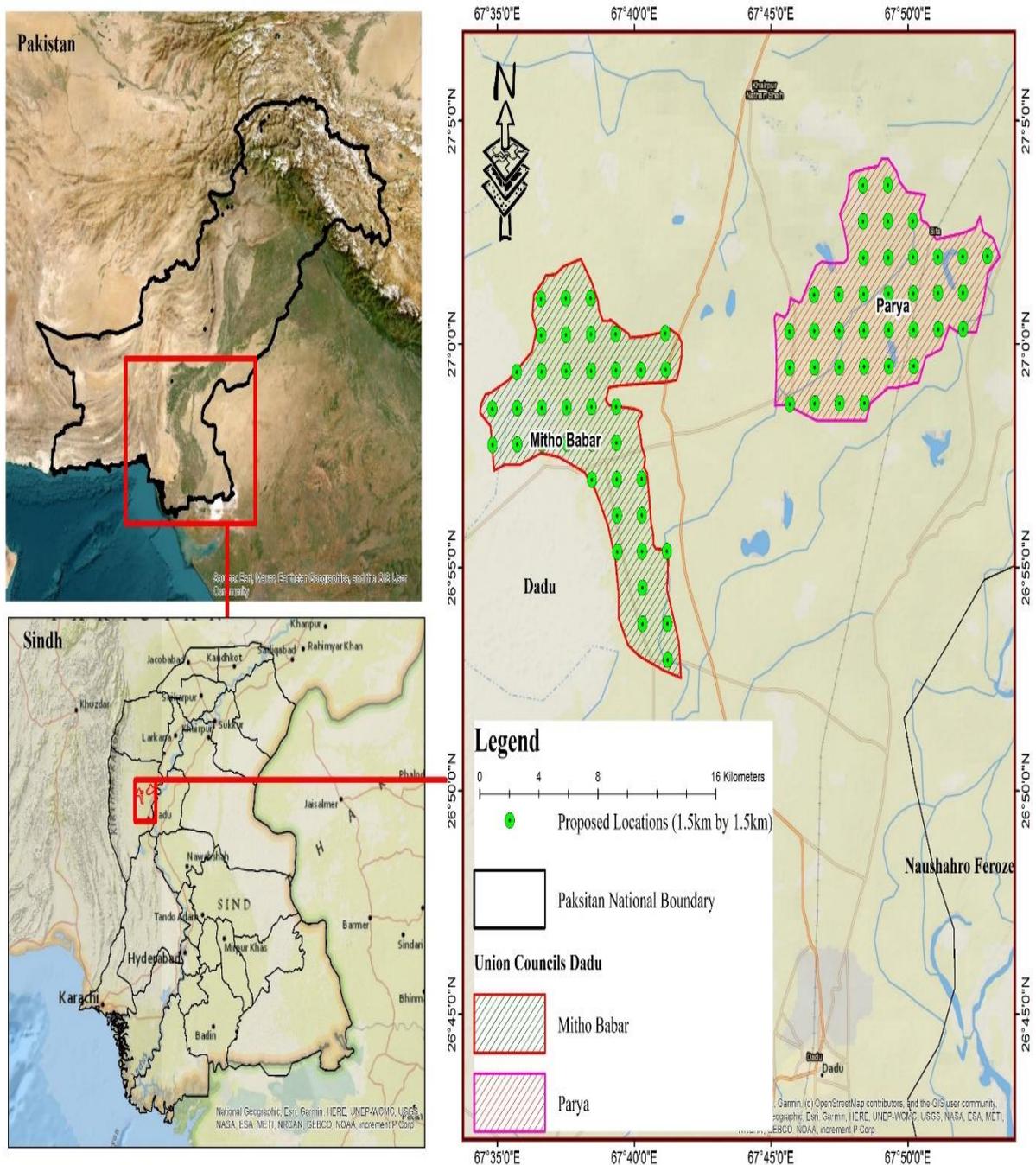


Figure 4. Location Map of Study Area in District Dadu, Sindh

Research Activity 4

Hydrogeological Study of Pakistan Security Printing Corporation (PSPC), Karachi

PCRWR conducted a comprehensive hydrogeological study at the Pakistan Security Printing Corporation (PSPC) premises in Karachi to address the critical issue of groundwater depletion. Over the past decades, the water table at PSPC has drastically declined from approximately 3 meters in 1997 to 30 meters in 2024, underscoring the urgent need for aquifer evaluation and sustainable management strategies.

The study commenced with extensive field investigations, including the collection of soil and water samples, measurement of depth to water levels, and detailed assessment of existing wells. Soil analyses revealed that the overburden consists primarily of sandy clay loam to silty clay loam, exhibiting low permeability and significantly limiting natural groundwater recharge. Given the average annual rainfall of 218.67 mm and confined aquifer conditions, natural recharge in the area is negligible.

An Electrical Resistivity Survey (ERS) was conducted to evaluate groundwater potential, delineate aquifer depth and thickness, and identify suitable zones for sustainable abstraction. The Analytical Hierarchy Process (AHP) was employed to map potential groundwater recharge areas based on critical factors including soil type, drainage density, slope, and land use. The study identified moderate recharge potential zones covering approximately 13,555 m², highlighting areas with potential for targeted interventions.

Groundwater quality assessments indicated elevated salinity levels, with Electrical Conductivity (EC) values averaging 3.1 dS/m during the post monsoon 2024 period, suggesting the impacts of over abstraction and possible saltwater intrusion. The feasibility of artificial recharge through dry wells was deemed limited due to contamination risks.

A groundwater model was developed using Groundwater Vistas MODFLOW, calibrated, and validated to simulate various abstraction scenarios. Results indicated that increasing the abstraction rate from 548 m³/day to 1,135 m³/day would lead to unsustainable water table declines of up to 30 meters. Conversely, a controlled abstraction rate of 842 m³/day, combined

with rainwater harvesting and supplemental surface water use, was identified as a sustainable approach to preserve the aquifer.

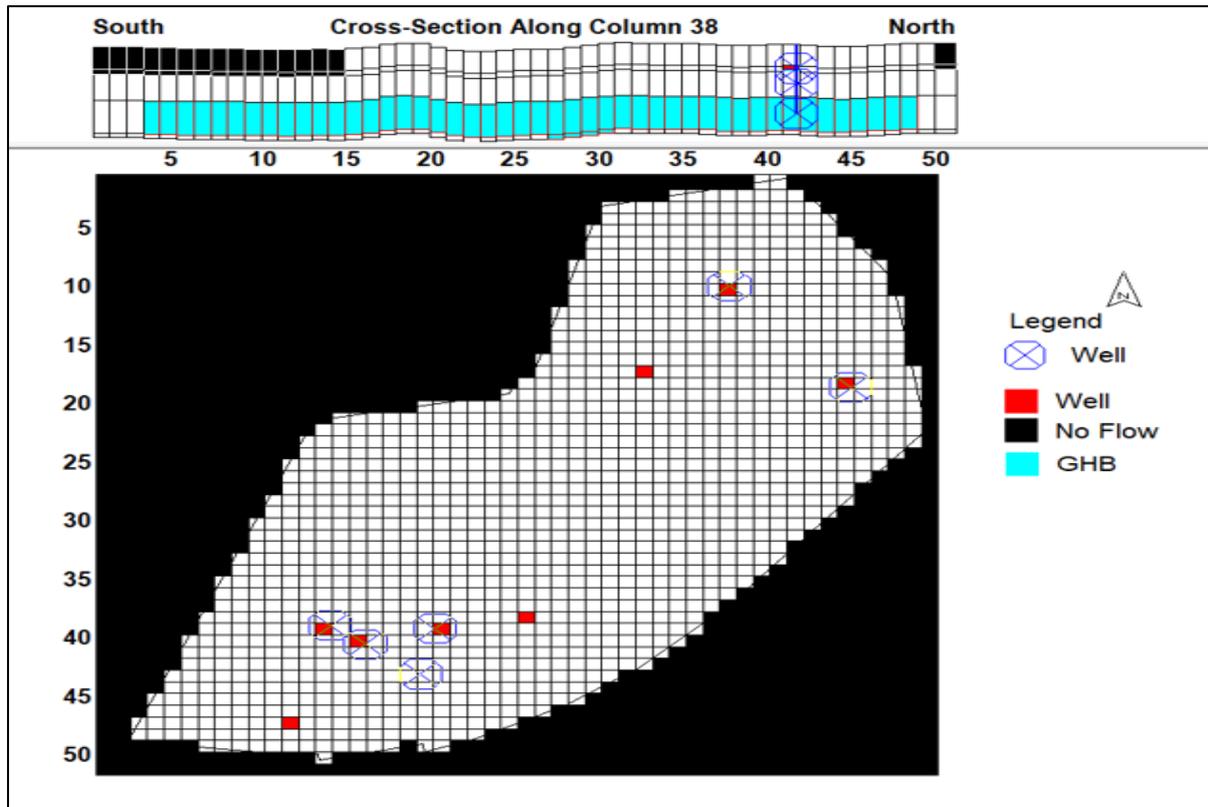


Figure 6. Model domain and Boundary conditions for PSPC groundwater model

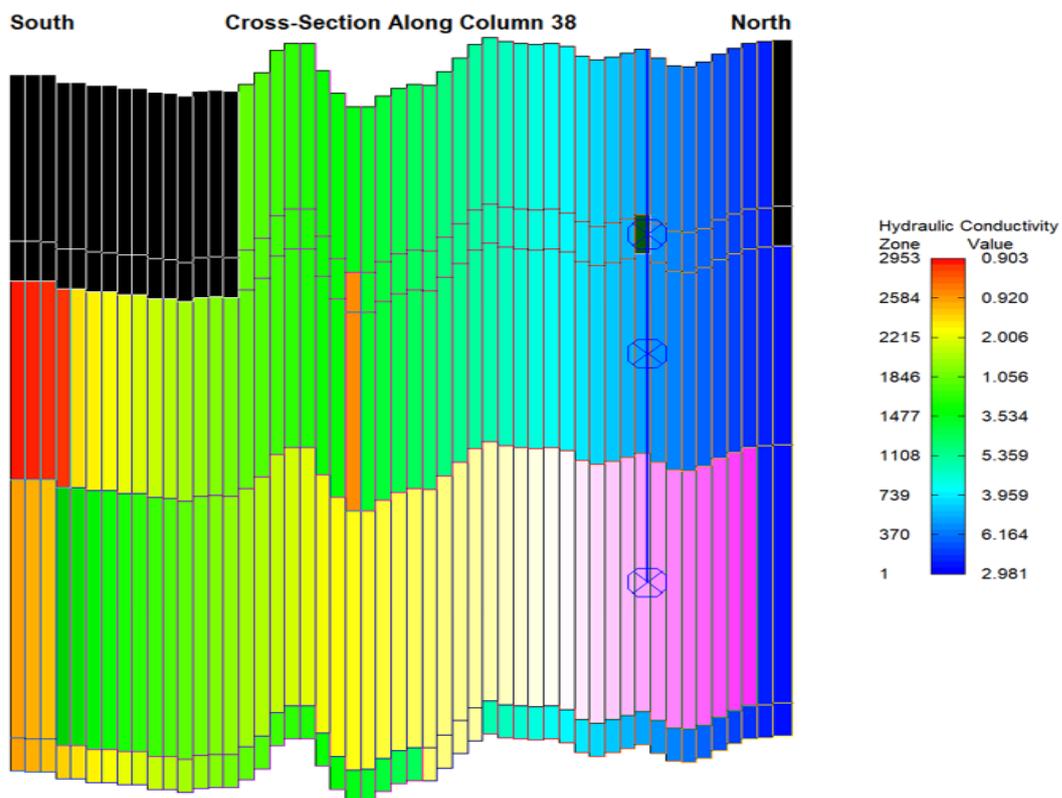


Figure 5. Vertical Discretization and Hydraulic Conductivities of a cross section

Key recommendations from the study include implementing regular water audits, conducting risk assessments prior to constructing recharge wells, and integrating rainwater harvesting systems. Strategic placement of recharge wells, maintaining sustainable abstraction rates, and continuous monitoring are essential to ensure the long-term viability of the PSPC aquifer and secure water supply for operational and industrial needs.

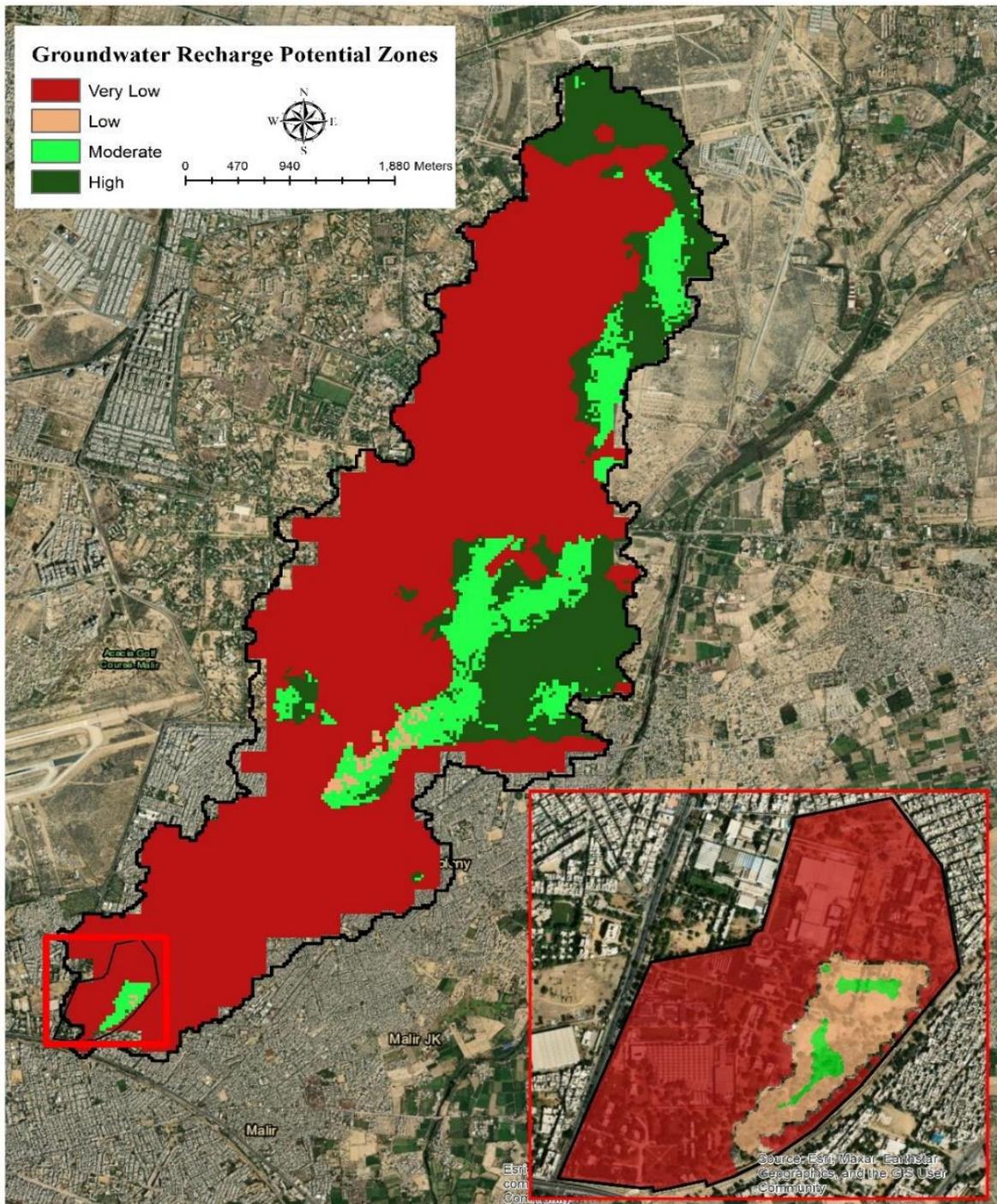


Figure 7. Potential Zones Identified for Groundwater Recharge

Research Activity 5

Punjab Rural Sustainable Water Supply and Sanitation Project (PRSWSSP) – Research and Water Quality Monitoring

PCRWR has been actively engaged in the Punjab Rural Sustainable Water Supply and Sanitation Project (PRSWSSP) through a three year contract signed with the Punjab Rural Municipal Service Company (PRMSC) on 13 June 2023. PCRWR's role focuses on ensuring the quality of drinking water and wastewater across 16 underserved districts and tehsils of rural Punjab, covering about 2,000 villages and serving over 6 million residents.

This project addresses critical water, sanitation, and hygiene challenges in areas with high rates of child stunting and prevalent geogenic contamination, including arsenic and fluoride. PCRWR's contribution includes systematic sample collection, laboratory analysis, and reporting from drinking water supply schemes, comparing results against WHO and environmental standards. The organization's head office in Islamabad and six regional water quality laboratories in Bahawalpur, Multan, Sahiwal, Sargodha, Faisalabad, and Dera Ghazi Khan are providing technical support to ensure accurate and timely water quality assessments.

Since the inception of the project, PCRWR has analyzed approximately 800 drinking and wastewater samples under 18 work orders and developed Action Based Reports (ABRs) in collaboration with PRMSC. These activities have not only strengthened water quality monitoring systems but also contributed to improved service delivery for safe drinking water, sanitation, and environmental management, aligning with the broader goals of public health protection and sustainable rural development in Punjab.

This engagement highlights PCRWR's research excellence and technical capacity in large scale water quality monitoring and positions the organization as a key partner in advancing water security and public health initiatives in Pakistan.

Research Activity 6

Evaluation of Arsenic Free Groundwater Zones in Punjab and Sindh

PCRWR has been implementing a comprehensive study to evaluate arsenic free groundwater zones in areas affected by arsenic contamination in Punjab and Sindh. Arsenic in groundwater poses a severe environmental and public health challenge in Pakistan, with contamination levels exceeding national and international drinking water standards in several regions. Understanding the geological, hydrogeological, and biogeochemical processes influencing arsenic mobility is crucial for designing effective mitigation strategies and safe groundwater extraction practices.

The project focused on identifying high and low arsenic contamination zones, selecting sites for the installation of Multi Level Observation Wells (MLOWs), determining spatial and temporal variations of arsenic concentrations at different depths, and developing a comprehensive groundwater arsenic profile to guide mitigation interventions. Implemented through PCRWR's National Water Quality Laboratory (NWQL), the study tested 653 groundwater samples from three districts: Kasur in Punjab, and Tando Allahyar and Matiari in Sindh. Of these, 78 samples exceeded the national permissible limit of 50 µg/l, while 575 samples were below the threshold, indicating that approximately 88% of the samples were safe, with Kasur exhibiting higher contamination levels.

Based on these findings, three MLOW sites were selected for monitoring: two in Kasur—Shaikhum Kasur Poultry Farm (medium arsenic) and Kot Jalal Din Yasra Petrol Pump (high arsenic), and one in Tando Allahyar (village Allah Bakhsh Arbab/Musas Seenhrao) classified as low arsenic. Wells were installed at appropriate depths for sustainable monitoring, and soil samples were collected during drilling for laboratory testing. Quarterly groundwater sampling from these MLOWs was initiated to capture arsenic concentrations at multiple depths ranging from 30 to 400 feet, providing validated data for hydrogeochemical analysis and GIS based arsenic mapping.

The second year of the project (April 2024–March 2025) successfully completed all planned activities, including arsenic monitoring, water sampling, and preliminary data analysis. This

foundation enables precise groundwater modeling to recommend safe well depths and supports evidence-based mitigation strategies. The final year will focus on data synthesis, advanced geochemical modeling, and dissemination of findings to stakeholders.

The project's outcomes will provide scientifically validated guidance for safe groundwater extraction, identification of low-risk aquifer zones, and mitigation strategies to reduce arsenic exposure. It represents a significant step toward ensuring sustainable access to clean, arsenic-free drinking water for communities in affected regions of Punjab and Sindh, supporting public health and long-term water security in Pakistan.

Research Activity 7

Joint Discharge Measurement and Validation of Flow Sensors in Khyber Pakhtunkhwa Irrigation Canals

PCRWR, in collaboration with the International Water Management Institute (IWMI) and the Provincial Irrigation Department of Khyber Pakhtunkhwa, conducted joint discharge measurement and validation activities under the USAID-funded “Water Management for Enhanced Productivity (WMEP)” project. This initiative focused on the installation and verification of the Indus Telemetry System at major irrigation canals across the province.

The Indus Telemetry System employs automatic flow sensors integrated with GSM technology to collect and transmit real-time flow data to a secure cloud database. This system enables the Irrigation Department to access instantaneous flow measurements and seasonal volumetric reports, which are shared with the Indus River System Authority (IRSA) for effective water allocation and management.

To ensure the accuracy and reliability of the installed telemetry sensors, PCRWR conducted joint discharge measurement campaigns in collaboration with IWMI and the provincial irrigation team. The field validation was carried out from July 22 to August 01, 2024, covering 11 major canals, including:

1. Upper Swat Canal
2. Tanda Irrigation Main Canal
3. Pehur High Level Canal
4. Warsak Gravity Canal
5. Lower Siran Canal
6. Kabul River Canal
7. Warsak Left Bank Canal
8. Pehur Main Canal
9. Lower Swat Canal
10. Gomal Zam Main Canal
11. Khanpur Dam Left Bank Canal

The measurements utilized state of the art Acoustic Doppler Current Profiler (ADCP) equipment, providing precise calibration and validation of the telemetry-based flow sensors. Through this collaboration, PCRWR has contributed technical expertise and capacity-building support to the Provincial Irrigation Department, enabling the effective implementation, monitoring, and management of advanced telemetry systems. This initiative strengthens evidence-based water management, improves operational efficiency of canal systems, and supports sustainable irrigation practices in Khyber Pakhtunkhwa.



Research Activity 8

Water Resources Assessment and Management Plan – Naval Anchorage, Islamabad

The Pakistan Council of Research in Water Resources (PCRWR) conducted a comprehensive Water Resources Assessment and Management Plan for Naval Anchorage, Islamabad, in response to the growing scarcity of potable water in the housing society. With limited groundwater sources and a rapidly increasing population, the demand supply gap for safe drinking water has widened, necessitating an evidence based intervention plan.

i. Objectives

The study aimed to develop a sustainable water management framework for Naval Anchorage with the following objectives:

- a) Conduct Electrical Resistivity Surveys (ERS) to assess groundwater potential.
- b) Evaluate the potential for rainwater harvesting and identify suitable sites for groundwater recharge.
- c) Assess the quality of groundwater to ensure suitability for domestic use.
- d) Examine potential surface water storage options, such as lakes or ponds, to supplement water availability.
- e) Explore the reuse of treated wastewater for multiple purposes, including irrigation and landscaping.

ii. Methodology

An integrated approach was employed, combining hydrological, geophysical, and sociotechnical assessments. The methodology included:

- Analysis of water demand and existing supply systems.
- Reconnaissance and topographic surveys to map existing infrastructure and potential water sources.
- Hydrological and geophysical investigations, including ERS, to determine groundwater potential and aquifer characteristics.
- Collection and laboratory analysis of surface and groundwater samples for physico-chemical parameters.
- Discharge measurements of surface drains to evaluate available runoff.

- Review of secondary datasets to inform planning for groundwater, surface water, and wastewater management.

iii. Proposed Interventions

Based on field assessments and data analysis, the following interventions were proposed to ensure a sustainable and resilient water supply system:

- Identification of optimal locations for installation of new tube wells to augment groundwater supply.
- Development of rainwater harvesting ponds and recharge wells to enhance aquifer replenishment.
- Implementation of rooftop rainwater harvesting systems across residential and commercial buildings.
- Design and adoption of wastewater treatment systems to enable reuse for irrigation and landscaping.
- Introduction of water conservation measures, including water metering, leakage control, and automation of the water supply network.

This comprehensive plan provides a roadmap for sustainable water resource management in Naval Anchorage, ensuring reliable access to potable water, promoting efficient water use, and integrating alternative water sources to meet future demands.

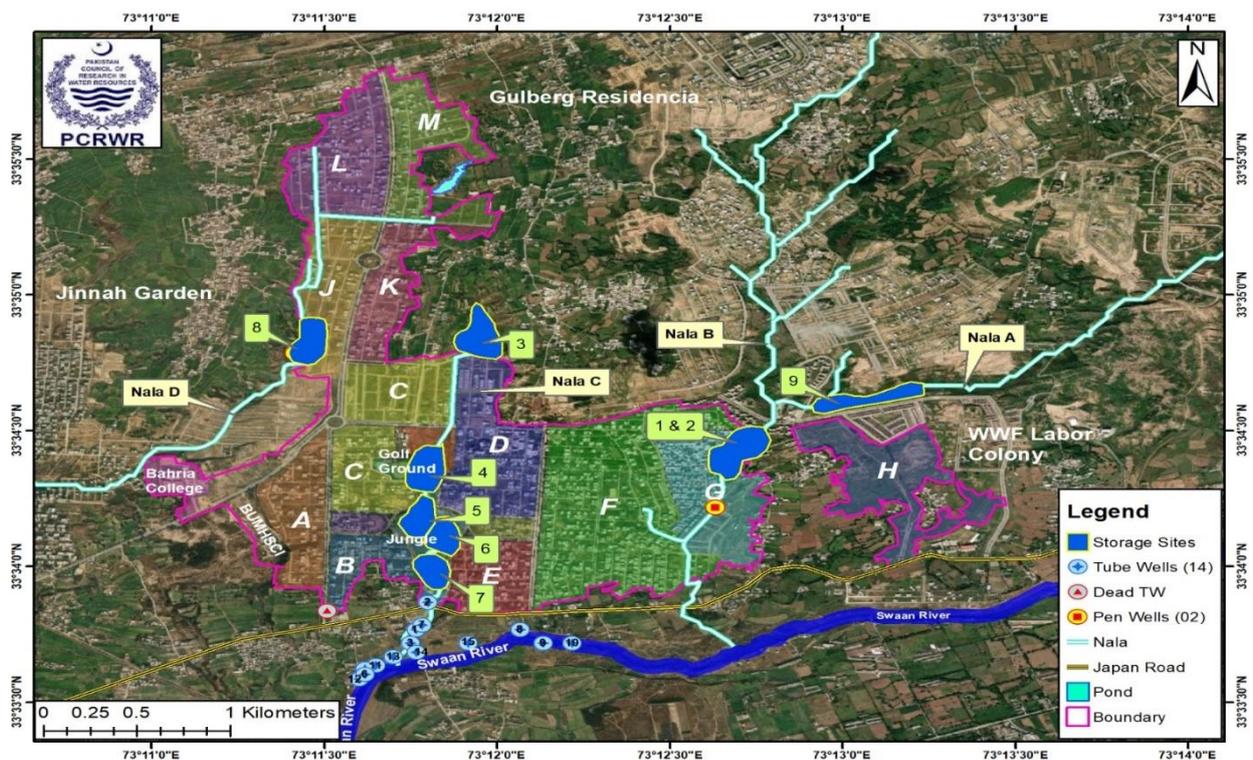


Figure 8. Mapping of Surface and Ground Water Resources of Naval Anchorage, Islamabad

Research Activity 9

Determination of Evapotranspiration of Sugarcane under the Climatic Conditions of the Lower Indus Basin, Pakistan

PCRWR conducted a lysimetric study at DRIP Tandojam to evaluate sugarcane evapotranspiration (ET) and groundwater contribution under a water table depth (WTD) of 2.00 meters and free drainage conditions. The study commenced in November 2021 and was successfully completed by November 2024. The research aimed to quantify sugarcane ET, assess groundwater contributions to meet crop water requirements, determine crop coefficients (Kc), and evaluate the impact of 2.00 m WTD and free drainage conditions on sugarcane yield and water use efficiency (WUE).

Key Findings and Achievements

The study demonstrated that under a 2.00 m WTD, sugarcane ET was 1760 mm, with groundwater contributing 8% of the total crop water requirement. In comparison, free drainage conditions resulted in ET of 1850 mm, approximately 5% higher. The average crop coefficient (Kc) under 2.00 m WTD was 1.09, ranging between 0.50 and 1.56, while free drainage conditions exhibited a Kc of 1.17, ranging from 0.56 to 1.97, indicating that sugarcane ET slightly exceeds reference ET in both scenarios.

Sugarcane yield under 2.00 m WTD ranged from 116.78 to 119.07 t/ha, which is approximately 2% higher than under free drainage. Water use efficiency (WUE) was recorded at 6.77 kg/m³ at 2.00 m WTD, reflecting a 6.8% improvement compared to free drainage, attributable to lower ET and higher yield. Agronomic assessments revealed that biomass (green and dry) and cane length were highest under free drainage conditions; however, single cane weight was maximized at 2.00 m WTD, contributing to the higher overall yield.

Table: Water Balance, Yield, and Yield Parameters of Sugarcane under 2.00 m WTD and Free Drainage Conditions

Parameters	2.00 m WTD	Free Drainage Condition
ET (mm)	1760	1850
Groundwater Contribution (mm)	149	-
Yield (t/ha)	119.07	116.78

Water Use Efficiency (kg/m ³)	6.77	6.31
Green Grass Weight (t/ha)	21.61	22.59
Dry Grass Weight (t/ha)	10.27	11.70
Number of Canes (Nos./ha)	153,500	167,263
Single Cane Weight (kg/cane)	0.776	0.698
Cane Length with Green Grass (m)	3.99	4.01
Cane Length without Grass (m)	2.15	2.16

Conclusion

The study concluded that maintaining a 2.00 m water table depth can significantly reduce surface irrigation demand by approximately 8.5%, particularly during February to May, when water requirements peak. The overall Kc values greater than 1 indicate that sugarcane ET consistently exceeds reference ET, necessitating careful irrigation planning. Performance analysis confirmed that 2.00 m WTD provides the highest yield, reduced ET, and improved water use efficiency, making it a viable and sustainable option for sugarcane cultivation under the climatic conditions of the Lower Indus Basin.

Research Activity 10

Cultivation of Various Sugarcane Varieties under Different Irrigation Methods (2021–2024)

Sugarcane, a high delta crop, exhibits significant variability in yield globally, with an average of 65 t/ha worldwide, 105 t/ha in Egypt, 77 t/ha in China, 70 t/ha in India, and 57 t/ha in Pakistan. This highlights substantial potential for improving both yield and water productivity. Climate change and freshwater scarcity have intensified the need for efficient irrigation strategies. Techniques such as furrow raised beds, ridge planting, and ring pit methods improve root growth, enhance infiltration, reduce deep percolation, and conserve water. While these low cost methods are widely recommended, their performance across different sugarcane varieties had not been thoroughly evaluated. This study aimed to assess the impact of these irrigation methods on water use, crop yield, and water use efficiency (WUE) for multiple sugarcane varieties.

The experiment was conducted over three growing seasons (2021–22, 2022–23, and 2024) at the DRIP research and demonstration farm in Tandojam. Eighteen (18) uniform plots were developed, six for each irrigation method: ring pit, raised bed, and ridge planting. Three sugarcane varieties: NIA-2012, Thatta-10, and CPF-251, were cultivated under each method, with two replicates per variety. All planting structures were prepared manually.

Achievements

Evapotranspiration (ET) under traditional flat flooding varied between 1800–2300 mm, depending on soil, variety, and water table depth. The study demonstrated significant reductions in water use with improved irrigation techniques: 885 mm for ring pit, 1250 mm for raised bed, and 1522 mm for ridge planting (excluding rainfall). Ring pit irrigation saved 42% water compared to ridges and 29% compared to raised beds, while raised beds saved 18% over ridges.

Yield performance varied across irrigation methods and varieties. The NIA-2012 variety produced the highest yield under raised-bed planting, followed by ridges and ring-pit. Water use efficiency was highest under the ring-pit method, followed by raised-bed and ridges.

Table: Three-Year Average Sugarcane Performance under Different Irrigation Methods (2021–2024).

Parameters	Ring-Pit (CPF-251/NIA-2012/Thatta-10)	Raised-Bed (CPF-251/NIA-2012/Thatta-10)	Ridges (CPF-251/NIA-2012/Thatta-10)
Total Water Used (mm)	885 / 1250 / 1522	884 / 1250 / 1522	885 / 1250 / 1522
Yield (t/ha)	83.39 / 90 / 84.57	84.72 / 104.47 / 77.38	97.08 / 95.67 / 65.32
WUE (kg/m ³)	9.42 / 10.17 / 9.56	6.78 / 8.36 / 6.19	6.38 / 6.28 / 4.29
Dry Biomass (t/ha)	13.94 / 15.77 / 14.60	12.48 / 13.63 / 14.16	13.00 / 19.52 / 13.85
Green Biomass (t/ha)	32.09 / 29.89 / 33.06	25.34 / 28.81 / 22.2	23.13 / 19.61 / 25.84

Conclusions

The study concludes that the combination of NIA-2012 variety with raised-bed planting is the most effective and climate-adaptive approach for sugarcane cultivation. This method achieved an 18% water saving compared to ridges, produced 8% higher yield than ridges, and 14% higher yield than ring-pit, making it a practical strategy for improving productivity and resource efficiency in the Lower Indus Basin.

Research Activity 11

Optimization of Irrigation Water Use and Planting Density for Sugarcane Cultivation to Enhance Water Use Efficiency and Climate Resilience

Sugarcane, a high water demanding crop is predominantly cultivated using flood irrigation, often exceeding its actual evapotranspiration (ET) requirements. Climate induced water scarcity has further constrained yield potential, highlighting the need for alternative irrigation strategies. Optimizing furrow-irrigated raised bed design can improve root zone water management, minimize water losses, enhance water use efficiency (WUE), and support climate-resilient sugarcane cultivation. This study aims to evaluate whether raised beds can reduce irrigation water use, improve yields and WUE compared to conventional farmers' practices, and identify the optimal furrow size and planting density to maximize productivity and resilience.

Methodology

The study commenced in March 2025 and will be conducted over three consecutive growing seasons (2025–26, 2026–27, and 2027–28) at the DRIP Research and Demonstration Farm, Tando Jam. Six plots of identical dimensions have been established, with two plots assigned to each furrow size:

- 1.50 ft wide furrow with a single-row plantation (bed width 1.00 ft)
- 1.50 ft wide furrow with a two-row plantation (bed width 1.00 ft)
- 2.00 ft wide furrow with a three-row plantation (bed width 1.00 ft)

The sugarcane variety NIA-2012 has been planted in all plots. Each furrow size treatment is replicated four times, and raised beds are prepared manually.

Research Activity 12

Quarterly Monitoring of Mineral/Bottled Water

PCRWR conducts regular quarterly monitoring of mineral and bottled water to ensure compliance with national water quality standards and safeguard public health. The primary objective of this monitoring program is to identify substandard bottled and mineral water brands and to support improvements in the quality of drinking water available to the general public.

In accordance with the directives of the Federal Cabinet, a standardized, uniform, and transparent methodology is followed for sample collection, laboratory analysis, quality assurance, and data interpretation. During the reporting period from July 2024 to June 2025, a total of 755 bottled and mineral water samples of commercially available brands were collected from major cities across the country, including Islamabad, Rawalpindi, Lahore, Karachi, Quetta, Faisalabad, Multan, Sialkot, Gujranwala, Bahawalpur, D.I. Khan, D.G. Khan, Sargodha, Sahiwal, Mianwali, Tando Jam, Badin, Sukkur, Muzaffarabad, and Gilgit.

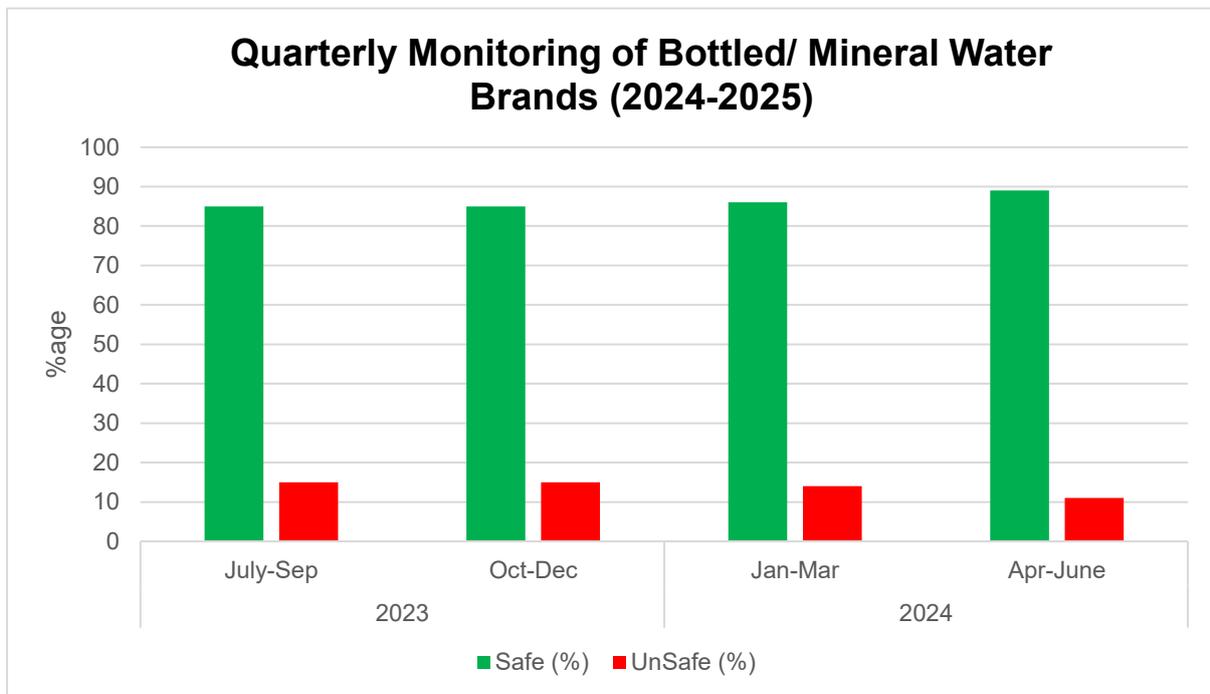
All samples were analyzed at the ISO/IEC 17025-accredited National Water Quality Laboratory (NWQL), PCRWR, Islamabad, for physico-chemical and microbiological parameters. The laboratory results were evaluated against the permissible limits prescribed by the Pakistan Standards and Quality Control Authority (PSQCA). The findings revealed that 651 samples (86%) were found to be safe for consumption, while 104 samples (14%) of various brands were declared unsafe due to chemical contaminants such as arsenic, sodium, potassium, and total dissolved solids (TDS) and/or microbiological contamination, including total coliforms, fecal coliforms, and E. coli. Microbiological contamination poses serious public health risks, potentially causing diseases such as cholera, diarrhea, dysentery, hepatitis, and typhoid, while prolonged exposure to elevated arsenic levels may lead to severe health conditions including skin disorders, cancer, kidney disease, hypertension, cardiovascular complications, and birth defects.

The results of the quarterly monitoring are disseminated through print and electronic media as well as the official website of PCRWR to raise public awareness. In addition, detailed quarterly reports are submitted to the Chief Secretaries of all provinces and to PSQCA for appropriate

regulatory and legal action against substandard brands. As a result of these findings, several enforcement actions were undertaken by PSQCA and Provincial Food Authorities against non-compliant bottled water brands.

Summary of Quarterly Monitoring Results (July 2024 – June 2025)

Year	Quarter	Total Samples	Safe Samples	Safe (%)	Unsafe Samples	Unsafe (%)
2024	Jul-Sep	205	175	85%	30	15%
2024	Oct-Dec	176	149	85%	27	15%
2025	Jan-Mar	171	147	86%	24	14%
2025	Apr-Jun	203	180	89%	23	11%
Total		755	651	86%	104	14%



Meetings and Visits

Visit of UN-Habitat ROAP, Japan Delegation

On 18th September 2024, a delegation from UN-Habitat ROAP visited PCRWR. The delegation was led by Ms. Odicea Angelo Barrios from UN-Habitat ROAP, Japan, accompanied by Mr. Khalil Ahmed and Mr. Basharat Hussain from the UN-Habitat Pakistan office. Ms. Bareerah Fatima, Deputy Director In-Charge (WM) PCRWR, warmly welcomed the delegation and delivered a comprehensive presentation on PCRWR's mandate, functions, and key research areas. She highlighted the organization's significant achievements in addressing the country's water challenges and provided a detailed briefing on the completed AF-project, including the methodology employed in implementing Task 2.3 under the project. Ms. Odicea Angelo Barrios appreciated PCRWR's timely execution and effective management of project activities. The delegation also visited the water conservation models at PCRWR premises, including Rooftop Rainwater Harvesting and Groundwater Recharge systems, and expressed keen interest in the organization's initiatives, commending the efforts and accomplishments of PCRWR.



Meeting with PINSTECH on Water Sector Research

On 20th November 2024, PCRWR team held a productive meeting with officials from the Pakistan Institute of Nuclear Sciences and Technology (PINSTECH), Isotopic Application Division, at PCRWR Regional Office, Karachi. The meeting provided a platform for knowledge exchange and discussion on ongoing projects in the water sector. PCRWR presented its key initiatives, while PINSTECH shared insights into its advanced research and applications in water management. A significant focus of the discussion was the isotopic analysis of water samples collected from the Monitoring and Low Observation Wells (MLOWs) installed in the coastal areas of Sindh. These wells are part of PCRWR's project titled *"Monitoring Sea Water Intrusion, Sea Level Rise, Coastal Erosion, and Land Subsidence along Sindh and Balochistan Coast."* The collaboration underscores a shared commitment to leveraging scientific advancements, such as isotopic techniques, to improve water resource management, address coastal challenges, and enhance environmental resilience in the region.

Visit of Asian Disaster Preparedness Center (ADPC) Delegation to DRIP

On 20th November 2024, a delegation from the Asian Disaster Preparedness Center (ADPC), participating under the Training of Trainers (ToTs) program, visited PCRWR-DRIP Tando Jam. The visit aimed to exchange knowledge and enhance understanding of effective water management strategies. Engr. Hafiz Abdul Salam, Regional Director, PCRWR delivered a comprehensive presentation highlighting best practices in water management, innovative approaches adopted by the DRIP, and ongoing initiatives focused on sustainable water use. The presentation also provided insights into the DRIP's research, demonstration projects, and capacity building activities, emphasizing strategies to improve irrigation efficiency and resilience against water related challenges. The delegation engaged actively during the session, discussing potential collaboration opportunities and practical applications of DRIP's methodologies in disaster preparedness and water resource management. The visit strengthened ties between ADPC and DRIP, reflecting a shared commitment to advancing knowledge, skills, and sustainable practices in water management across the region.



KOICA Experts Visit PCRWR to Explore Water Management Collaboration

Mr. Jeho Yeon, Country Director of KOICA Pakistan, along with Mr. Jaepil Cho and K-water experts, visited PCRWR to discuss potential collaboration in enhancing water management capacity. The delegation explored initiatives to improve water quality research infrastructure, establish resource management equipment, and develop groundwater evaluation and

information systems. They also visited key sites in Islamabad, including Rawal Lake, Simly Dam, and the Kachnar Park groundwater recharge facility, established jointly by PCRWR, IWMI, WaterAid, and CDA. The visit included discussions on scaling up the groundwater monitoring setup across the Islamabad Capital Territory to create a robust network for sustainable groundwater management.



Visit of Chief WASH UNICEF Pakistan to PCRWR

On 9th December 2024, Ms. Cindy Kushner, the newly appointed Chief WASH UNICEF Pakistan, accompanied by Mr. Itsuro Takahashi, WASH Manager at UNICEF Pakistan, visited PCRWR, Islamabad. The visit provided an opportunity to brief the delegation on PCRWR’s programs and ongoing collaborative initiatives with UNICEF in the water, sanitation, and hygiene (WASH) sector. Dr. Hifza Rasheed, Director General (Water Quality) PCRWR, delivered a comprehensive presentation highlighting the organization’s research and development projects, innovative approaches, capacity building efforts, and joint activities undertaken in partnership with UNICEF.



Visit of Korean Delegation to PCRWR Islamabad

on 24th January 2025, delegation from the Korea International Cooperation Agency (KOICA), led by Ms. Jieun Lee, Water Sector Advisor, and Mr. Harim Go, Assistant Manager, visited the headquarters of the Pakistan Council of Research in Water Resources (PCRWR) in Islamabad. The visit aimed to strengthen bilateral collaboration by providing an overview of PCRWR’s research activities and exploring KOICA’s ongoing and future projects under the PCP initiative. Dr. Hifza Rasheed, Director General (Water Quality) PCRWR, delivered an insightful presentation highlighting the organization’s research and development projects, innovations, capacity building initiatives, and collaborative efforts with KOICA.

Visit of U.S. Consulate General Delegation to PCRWR Regional Office, Lahore

On 28th January 2025, a delegation from the U.S. Consulate General visited the Pakistan Council of Research in Water Resources (PCRWR) Regional Office, Lahore. The delegation was warmly received by Engr. Faakhar Raza, Regional Director, PCRWR Lahore, accompanied by his research team. During the meeting, the delegates emphasized the importance of addressing environmental, scientific, and technological challenges in Pakistan, particularly in the Punjab Province. Engr. Faakhar Raza provided a comprehensive overview of water related issues in the region, highlighting ongoing projects, potential solutions, and PCRWR's significant contributions in addressing these challenges. He also discussed the prospects of a scientist and researcher exchange program with the United States, focusing on water management and water quality. The visit reinforced the commitment to fostering collaboration and dialogue on critical water resource issues, promoting the exchange of expertise, and supporting sustainable solutions in line with broader goals of environmental stewardship and scientific cooperation.



Visit of Chief ABAD to PCRWR

On 12th February 2025, Mr. Arif Niazi, Chief of Barani Areas Development (ABAD), led a delegation to PCRWR Islamabad to explore collaboration in rainwater harvesting and water conservation. PCRWR research team briefed the delegation on groundwater recharge initiatives and rainwater harvesting designs, emphasizing capacity building and cost effective strategies. Mr. Arif Niazi discussed plans for rooftop rainwater harvesting in the Pothwar region and appreciated PCRWR's contributions. The delegation also visited PCRWR's water conservation models, including rooftop rainwater harvesting and groundwater recharge systems, expressing keen interest in the Council's initiatives.



Visit of Co-founder of WHONET

On 13th February 2025, Mr. John Stelling, Co-founder of WHONET and co-director of the WHO Collaborating Centre for Surveillance of Antimicrobial Resistance, along with Dr. Faisal Ahmed, Antibiogram Expert, DAI Fleming Fund, visited PCRWR Islamabad. The visit included an orientation session with Dr. Hifza Rasheed, Director General (WQ) PCRWR, and the Microbiology Section staff of the National Water Quality Laboratory (NWQL) on the use of WHONET and Antibiogram tools in environmental antimicrobial resistance (AMR) data management. Dr. Hifza Rasheed delivered a detailed presentation on PCRWR's mandate, functions, and focused research areas.



Visit of Faculty Members from University of Agriculture, Faisalabad to PCRWR Lysimeter Station

On 12th March 2025, a delegation of professors from the Irrigation Department, Faculty of Agricultural Engineering & Technology, University of Agriculture, Faisalabad, visited the PCRWR Lysimeter Station in Lahore. Engr. Faakhar Raza, Regional Director, highlighted the station's pivotal role in determining Crop Water Requirements (CWR) and Crop Coefficients (Kc) for major crops, including wheat, maize, rice, berseem, sunflower, and sorghum. He also presented ongoing research on sugarcane cultivation using traditional sowing techniques and pit methods, aimed at refining CWR and Kc calculations for the Central Punjab agro-climatic zone. He emphasized the applicability of lysimeter generated data to similar climatic regions and proposed collaborative research between PCRWR's Lahore and the University of Agriculture Faisalabad.



Meeting with Research Team of UET Centre of Excellence at PCRWR Regional Office, Lahore

On 9th April 2025, a meeting was held at the PCRWR Regional Office, Lahore, with the research team from the Centre of Excellence, University of Engineering & Technology (UET), led by Dr. Mudassar. Eng. Faakhar Raza, Regional Director, provided an overview of PCRWR's activities and research focus areas. The primary objective of the meeting was to explore future collaborative opportunities, with the UET research team expressing keen interest in learning about water quality research and in engaging in joint projects. The delegation also visited various facilities at the Regional Office, including groundwater recharge systems, rooftop rainwater harvesting models, and the water quality laboratory. The research team appreciated the initiatives and contributions of PCRWR, Lahore.



Visit of International Delegates from AARDO Member Countries to PCRWR

On 16th April 2025, a delegation of 22 representatives from AARDO member countries, attending the Collaborative International Workshop cum Training Programme on “Irrigation System and Water Management” at NCRD, visited PCRWR, Islamabad. Dr. Hifza Rasheed, Director General (Water Quality) PCRWR, welcomed the delegate and provided an overview of PCRWR's research and development activities, and innovations initiatives. Following the session, the delegation toured the National Water Quality Laboratory (NWQL) and observed demonstrations of PCRWR's water conservation and treatment models.



Field Visit for Drought Validation Survey in Tharparkar

Ms. Nasreen Pathan, Assistant Scientific Officer, DRIP-PCRWR, Tando Jam, facilitated the International Water Management Institute (IWMI) team from Lahore during a field visit for the drought validation survey in Tharparkar, conducted from 11 to 18 July 2025. The visit aimed to assess and validate drought conditions in the region, collect field data, and evaluate the effectiveness of ongoing water management interventions. Ms. Nasreen Pathan guided the team in engaging with local communities, conducting surveys, and inspecting water resources and conservation structures in the area. The field visit also provided an opportunity for knowledge exchange on drought monitoring methodologies, climate-resilient interventions, and sustainable water management practices, reinforcing collaborative efforts between PCRWR and IWMI in addressing water scarcity and climate-related challenges in arid regions.



Visit of RDF Professionals and Farmers to DRIP R&D Farm

On 24th to 25th September 2024, professionals from the Research and Development Foundation (RDF), accompanied by a group of female and male farmers, visited the DRIP R&D Farm. During the visit, DRIP experts provided detailed demonstrations of ongoing research and development activities, showcasing innovative techniques in water management, crop cultivation, and climate-resilient agricultural practices. The delegation was briefed on field-based interventions aimed at improving irrigation efficiency, enhancing crop productivity, and promoting sustainable resource management.



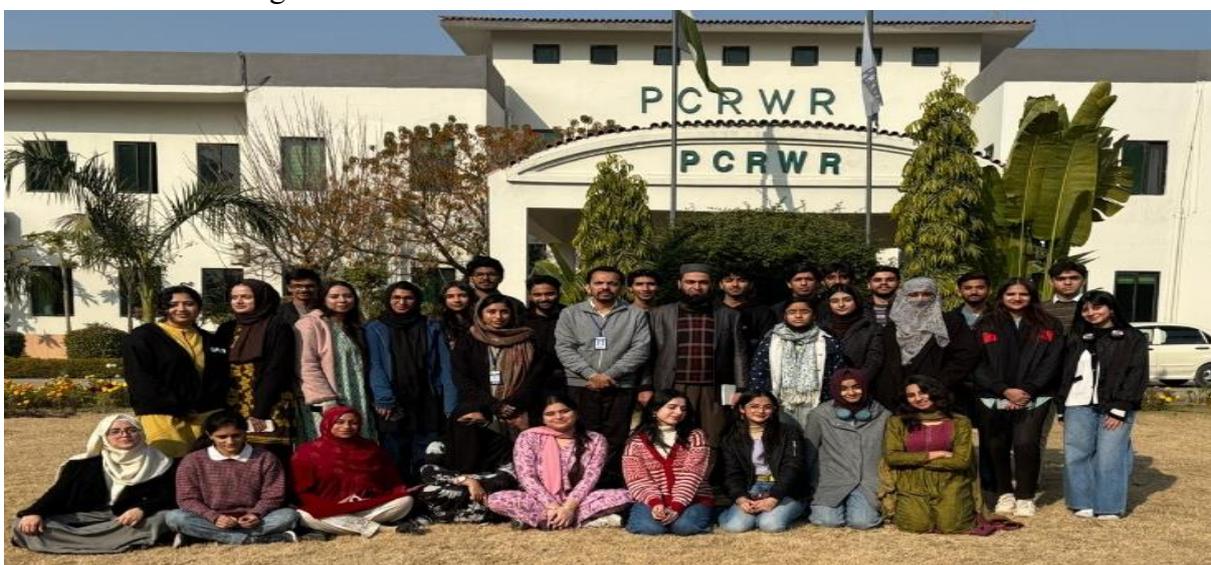
Visit of Foreign Delegates to DRIP Tando Jam

On 30th July 2024, DRIP Tando Jam organized a visit for foreign delegates to Nawazabad Farm, Tando Allahyar, and the DRIP office under the Trees for Salinity-SRA Project. During the visit, DRIP professionals delivered a detailed poster presentation at Nawazabad Farm, highlighting project activities, research interventions, and innovative approaches for salinity management and sustainable agriculture. The visit provided delegates with firsthand insights into field level practices, ongoing research, and DRIP's efforts in promoting climate-resilient and sustainable water and land management strategies.



Exposure Visit of Students of Environmental Sciences & Engineering, NUST, Islamabad

On 26th December 2024, a group of thirty students from the Department of Environmental Sciences & Engineering, NUST University Islamabad, visited PCRWR Islamabad. The visit aimed to provide students with practical insights into applied sciences in the field of water resources. Engr. Salah-ud-Din, Deputy Director PCRWR, briefed the students on multiple research activities and demonstrated various rainwater harvesting and groundwater recharge techniques developed at PCRWR. This exposure visit reflects PCRWR's commitment to supporting academia through research collaborations, internships, and initiatives addressing water related challenges in Pakistan.



Services

Water Quality Testing and Analysis

National Water Quality Laboratory of PCRWR is one of the state of the art Laboratories of Pakistan with high tech water testing equipment and well trained professional. It is ISO-17025:2017 accredited Laboratory. The provision of water and wastewater testing and advisory services to the general public and public and private organizations is a continue activity. NWQL is also executing the ground water, surface water as well as wastewater assessment and monitoring projects of government and or with collaboration of national and international organizations.



Groundwater Investigations

PCRWR has a fully trained team equipped with latest tools and equipment for groundwater investigations. Usually, Electrical resistivity surveying methods have been widely used to determine the thickness and resistivity of layered media for the purpose of assessing groundwater potential and drilling boreholes in fractured unconfined aquifers.



Laser Land Leveling

Laser Land Leveling is a process of smoothing the land surface from its average elevation with a certain degree of desired slope using a guided laser beam through-out the field. Laser leveling of agricultural land is a recent resource-conservation technology. The Research and Demonstration Farms of PCRWR are equipped with the latest Laser Land Levelers and the services are provided to the farmers on their request.



Soil Testing Service

PCRWR has maintained a state of the art soil physics laboratory at its headquarters. Soil testing is an important diagnostic tool for determining the nutrient needs of plants and for environmental assessments. The major laboratory testing includes soil moisture percentage, organic matters in soil, soil moisture retention curves, soil moisture extraction for chemical analysis. PCRWR soil physics laboratory is unique in Pakistan providing all above mentioned tests under one roof.



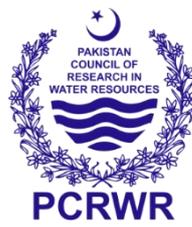
Irrigation Advisory Services

PCRWR launched the service on April, 2016, which is an outcome of international collaboration extended by the University of Washington (UW) and NASA. The SMS based Irrigation Advisory Services of PCRWR are being provided free of cost to about 20,000 farmers on weekly basis in 41 districts of Pakistan. However, PCRWR envisions extending the service to all farmers of irrigated areas, through international and national coordination.



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- Nazar Gul (2025). Basar ji pokhi jo jadeed tariqo mutaarif karayin waqt ji zarurat, Daily Ibrat Newspaper (in Sindhi language), February 06, 2025.



Pakistan Council of Research in Water Resources
Ministry of Water Resources, Government of Pakistan
Khayaban-e-Johar, H-8/1, Islamabad
E-mail: info@pcrwr.gov.pk website: www.pcrwr.gov.pk