



# Improving groundwater management to enhance agriculture and farming livelihoods in Pakistan

## Overview

Pakistan's population of over 180 million relies heavily on agriculture, which contributes 21 percent of the country's Gross Domestic Product and more than 40 percent of its employment. Around 95 percent of the country's water consumption is used for agriculture, and the pressure on available resources is increasing.

Surface water supply is variable, particularly for farmers at the tail end of canals and distributaries in Sindh and Punjab provinces. Dependence on groundwater has increased with over one million tubewells in use. Groundwater decline and spread of salinisation is rendering fertile lands unusable. Electricity subsidisation, inefficient irrigation practices and lack of regulation exacerbates groundwater over-extraction. Lack of monitoring, awareness, and other socio-political constraints compound the challenge of pursuing productive and sustainable groundwater use.

This project is a collaboration through partnerships to address the complexity of achieving effective and fair groundwater management. This project aims to build capacity of researchers, farmers, farming communities and relevant government and non-government agencies to improve groundwater management in ways that enhance farming family livelihoods in Pakistan. Building capacity means building skills, knowledge and confidence, and providing relevant tools and processes.

<b>ACIAR project number</b>	LWR-2015-036
<b>Start date and duration (years)</b>	July 2016 4 years
<b>Location</b>	Pakistan
<b>Budget</b>	AUD \$2,050,000

### Project leader(s) and Commissioned Organisation

Prof Max Finlayson (Project Director)  
 Dr Jay Punthakey (Project Leader)  
 Drs Michael Mitchell, Catherine Allan and Richard Culas,  
 Charles Sturt University

### Partner country project leaders and their institutions

Mr Faizan ul Hasan, Pakistan Council of Research in Water Resources  
 Prof Dr Md Ashfaq, University of Agriculture, Faisalabad  
 Dr Syed Khair, Balochistan University of Information Technology, Engineering & Management Sciences  
 Prof Dr Bakhshal Lashari, Mehran University of Engineering & Technology  
 Prof Dr Md Shafqat Ejaz, NED University of Engineering & Technology  
 Dr Mobushir Riaz Khan, PMAS University of Arid Agriculture  
 Dr Tehmina Mangan, Sindh Agriculture University  
 Mr Abdul Razzaq Khilji, Balochistan Irrigation & Power Department  
 Mr Ghulam Zakir Hassan Sial, Punjab Irrigation Department  
 Mr Zarif Khero, Sindh Irrigation Department  
 Mr Ijaz Javed, International Waterlogging & Salinity Research Institute, Water & Power Development Authority  
 Dr Ing Usman Khalid Awan, International Center for Agricultural Research in the Dry Areas

### ACIAR Research Program Manager

Dr Robyn Johnston



## Research

The project is designed to provide an enabling environment for communities to participate in the research process and to develop socially acceptable solutions.

The objectives are to:

- » Develop and articulate a shared understanding of sustainable groundwater use for agriculture and the need for improved management in Balochistan, Punjab and Sindh provinces.
- » Develop, with collaborating stakeholders in each case study, groundwater management tools and options that have the potential to enhance livelihoods of farming families.
- » Enhance capacity and institutional arrangements for post project adoption of tools and options developed in objective two by collaborating with stakeholder organisations.

The project's three case study areas comprise different agro-ecological settings across three provinces:

- » Pishin Lora Basin in Balochistan, with two villages selected as case studies.
- » The Lower Bari Doab Command area in Punjab, with two distributaries selected as case studies.
- » the Shaheed Benazirabad (formerly Nawabshah) and Naushahro Feroze Districts of Sindh, with a distributary selected for each of the two districts.

Key outcomes by the end of the four-year project include:

- » Farmers, farming organisations and partner non-government organisations have started introducing improved groundwater management practices.
- » Government agencies in Pakistan have started developing/ demonstrating improved groundwater-related planning, monitoring, management strategies, options and policies.
- » Relevant provincial-level government agencies, non-government organisations and farming organisations have developed effective partnerships for ongoing discussion on groundwater management issues and solutions.

The research is part of the Australia Water Program in Pakistan that includes two other ACIAR projects:

- » Developing approaches to enhance farmer water management skills in Balochistan, Punjab and Sindh, led by Dr Sandra Heaney Mustafa (University of Canberra).
- » Efficient participatory irrigation institutions to support productive and sustainable agriculture in south Asia, led by Prof. Lin Crase (University of South Australia).

## Achievements

### 1. Foundations have been laid to nurture a partnership approach for improved groundwater management.

For example:

- » Partner team members have collaborated on project design and delivery, training delivery and exchanges, and PRAs/ field trips with case study communities.
- » Provincial agencies are collaborating with other partners to spearhead the project's case study investigations.
- » All six case study communities (two per province) have had stakeholder forums established with representation from relevant government and non-government organisations, farmers' organisations and progressive farmers.

### 2. Partners' capacities are being developed.

For example:

- » Partners are collating and analysing data to be used to model case study groundwater systems. Training in GIS has facilitated improved understanding of how data can be used to develop models.
- » Three hands-on workshops have been provided for partners to plan and develop groundwater models. All three provincial irrigation departments have reported significant technical capacity building as a result.
- » Six team members attended a training workshop with AgImpact in May 2018 in the development and use of Mobile Acquired Data.
- » Training has also been provided to partners to build their research capacities in literature reviews and software, and to improve quality of academic publications.



Groundwater pump in operation in the Chiho case study area, Sindh  
Description: Picture taken on 8 Feb 2018 during field visit by LWR-036 team to Chiho. Photographer: Michael Mitchell