

PROJECT
LWR - 036

IMPROVING GROUNDWATER MANAGEMENT TO ENHANCE AGRICULTURE AND FARMING LIVELIHOODS IN PAKISTAN

QUARTERLY NEWSLETTER

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Charles Sturt
University



ICARDA
Center for Sustainable Use of Water



This ACIAR funded project is about the contribution of groundwater management to farming family livelihoods. It aims to build capacity of researchers, farming communities and relevant agencies to improve groundwater management in ways that enhance farming family livelihoods in Pakistan. As core partners, the three irrigation departments in the provinces where we have case studies (Balochistan, Punjab and Sindh) contributed to the project's design and implementation. The Pakistan Council of Research in Water Resources provides national leadership and central coordination. The team's focus over the first two years has been on building partnerships among academic and other researchers, partner government agencies and community-level stakeholders, and on building capacity. Building capacity means enhancing skills, knowledge and confidence, and the provision of tools and processes. Our partners (researchers and research users) are working together at provincial and national levels to collect, collate and analyse data for modelling the groundwater systems in the six case studies areas (two per province). Training in GIS has facilitated improved understanding of how data can be used to develop groundwater models, and workshops have enabled partners to take the lead in planning and developing these models. All three provincial irrigation departments have reported significant technical capacity building as a result, and the models will soon be able to be used for planning in each province.

TRAINING IN MOBILE ACQUIRED DATA

Socio-economic team leaders from all three provinces attended a workshop in Australia to receive training in how to acquire data using mobile devices, including data management strategies of storage, retrieval and analysis. The training, from 28 May to June 1, 2017, enabled the team to collect survey data on mobile devices from householders in all six case study areas. The training is part of a broader project strategy to build the research capacities of our partners and improve the quality of technical reports and academic publications. It builds on prior training in participatory research strategies, leading to the establishment of stakeholder forums for all our project case study areas. The project team is now partnering with these forums to ensure farming family and other case study stakeholders can contribute to the purpose, design and outcomes of the project research activities in their areas. This is enabling us to identify what management approaches we can test in the field with our case study collaborators to make a sustained difference for rural communities.

CONSULTATIVE SESSION TO DEVELOP REPRESENTATIVE AGRICULTURAL PATHWAYS

Building on the use of participatory research and mobile acquired data, the contributions from the socio-economic team have been further refined through another training workshop led by University of Agriculture, Faisalabad (UAF) in how to develop scenarios from an approach known as Representative Agricultural Pathways (RAPs). UAF wanted to bring all provincial socio economic teams on one page as UAF team

members have developed expertise with this RAP methodology and they were keen for everyone else involved to start using the same. Participants came from UAF, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi (UAAR), Pakistan Council of Research in Water Resources (PCRWR), Sindh Agriculture University (SAU) and Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS), as well as from our case study communities (two farmers: Mr Sheraz & Mr Ikram). As a result of the training, participants learned how to use the RAP method for scenario development drawing on the socio-economic data that had been collected on mobile devices, which will be combined with input from a wide range of case study stakeholder perspectives to eventually enable better decision making.



STAKEHOLDER WORKSHOPS IN PUNJAB, SINDH AND BALOCHISTAN

Effective strategies for improved groundwater management require holistic planning. To facilitate this, the groundwater project is supporting ongoing stakeholder forums in all six case study areas. These forums include a range of people with a 'stake' in groundwater – including farmer organisation representatives, other progressive farmers, provincial agency staff, extension staff, water management teams, technical representatives, NGO staff and other project team members all brought together on one platform. The forums provide a space for these stakeholders to share their perspectives on issues affecting them, particularly in relation to water management. Stakeholder forum workshops were undertaken in Punjab, Sindh and Balochistan during April and August 2019 to identify potential solutions that could be investigated related to the groundwater issues of concern to them. These workshops have provided the project team with some clear directions on where to focus collaborative research efforts with case study communities in the final year of the project. The workshops included presentations on four potential research opportunities developed by experts from the project team as a starting point for the discussions: the use of loggers and EC meters for groundwater monitoring, the use of the Apna Pani App, use of socio-economic data, and accessing information provided by groundwater modelling. Workshop participants then divided into small groups that included a range of expertise: technical, government, water management, local hierarchy and farmer so everyone can learn from each other's perspectives and come up with solutions together. Based on all the discussions, a set of problems were prioritised and unanimous action plans were developed. These are now in the process of being implemented across all three provinces. Use of a participatory approach helped those engaged to develop comprehensive viewpoints on prevalent problems in groundwater management.

Group photo of Punjab stakeholder forum workshop participants at IIL site
Small group discussion at IIL workshop with representation from government departments, NGOs and local farmers (including an observer from Balochistan).
Two stakeholder forum workshops held at Zarghoon (Balochistan) with males and females
Small group discussion at stakeholder forum workshop held in Sindh
Group photo of stakeholder forum workshop held in Sindh



Group Photo of Punjab Stakeholders at IR site



Micro group discussion on project opportunities with representation from gov. Deptt, NGOs and Local farmers



Two Stakeholder workshops held at Zarghoon (Balochistan Site) included men and women





Two Stakeholder workshops held at Benazirabad (Sindh)



Group photo of Stakeholder workshop held at Benazirabad (Sindh)

PIEZOMETER DRILLING AND GROUNDWATER ANALYSIS IN BALOCHISTAN

This year, the Balochistan Irrigation Department (BID), Balochistan University of Information Technology, Engineering and Management Sciences (BUIITEMS), Pakistan Council of Research in Water Resources (PCRWR) and Charles Sturt University (CSU) jointly funded the installation of four piezometers in the province (two for each case study area). The purpose of installing these piezometers was primarily to measure groundwater levels and salinity to better understand groundwater responses to recharge and abstraction. Groundwater levels in Balochistan's Pishin Lora Basin have been declining for several decades as this groundwater supports irrigated agriculture and domestic uses. The increased tubewell numbers in Balochistan have caused a manyfold increase in agricultural production, while also causing sharp decline in groundwater levels at the rate of 2 to 5 metres annually. The result is that many areas are running out of water, Tubewells are failing resulting in a loss of farming livelihood. Groundwater levels have also been declining due to drier conditions that have persisted in Balochistan for the past two decades. It is important to better understand how much recharge is expected under this low-rainfall-high-use environment to be able to move to a sustainable management of the aquifers. The data provided by the piezometers and the models we are developing will allow an improved understanding of the water balance in the two sub-catchments in Pishin Lora and will allow options and strategies to be developed that can lead to a more sustainable groundwater regime.



SOCIO-ECONOMIC ANALYSIS OF CROPPING IN THE PISHIN LORA BASIN

Agriculture is the main source of livelihood for some 60–70% of the people in our two case study sites Kuchlagh and Malikiyar. During the Kharif season crops are sown in summer and harvested in late summer or early winter, while during the Rabi season crops are sown in winter and harvested in late winter or early summer. The cropping pattern is dominated by horticultural crops (fruits and vegetables). Apple being the most profitable crop dominates the cropping pattern. Grapes and tomato are crops replacing apple in water scarce areas, and wheat, onion, and garlic are also grown. Farmers are growing high water demanding horticultural and vegetable crops with traditional irrigation

techniques. However, research shows that high value, low water demanding fruits such as grapes, pistachios and almonds are also suitable for the area, are economically viable, and have promising futures for sustainable farming. The economic modelling will allow us to better inform farming communities in the Pishin Lora Basin of the options available for suitable crops and benefits of adopting climate smart agricultural practices. Improving water productivity of irrigated agriculture will allow a sustainable future for agricultural communities in the Pishin Lora Basin. Water conservation and using water for high value use will help transform how groundwater is used in Balochistan.

MOBILE AND WEB APPLICATIONS FOR DECISION SUPPORT – BALOCHISTAN

The ACIAR groundwater project is developing a mobile App for use by stakeholder communities. One part of the App (Apna Pani) is for recording well information, the other (Apna Farm) displays many types of land information on a map. With this mobile application farmers can:

- Access current weather data for their farm.
- Easily calculate crop water requirements with three clicks.
- Compare various options of crops and their water needs.
- Get regional rainfall and surface water supply information.

The Apna Pani App has been installed by all members of project partners (BID, BUIEMS, and PCRWR) in Balochistan. The team members are also making use of this App individually. On 31st March, 2019 during a field visit to the Piezometer site in Huramazai village (Pishin sub-basin) the Apna Pani App was successfully used to upload data on the depth to water table measured at 85 m at a farmer owned tubewell. Regular monitoring using Apna Pani will allow farmers to understand how the groundwater is responding to pumping.



Piezometer at Huramazai village



Farmer tubewell at Huramazai



Measuring salinity of water using total dissolved solids (TDS)



Measuring salinity of water using electrical conductivity (EC)

REFLECTIONS FROM COMMUNICATION MANAGER



**Ms.
KANZA
JAVED**

Being a people person I always wanted to pursue my career in such a job which would involve a lot of interaction. With a Bachelor's degree in environmental engineering and a Master in GIS, I was lucky that the first opportunity I got was for a project where I could use both my technical and people skills as its communications manager. I already understood the importance of communication in making a project

successful as much as that of the technical aspect and I learned all this from first-hand experience. One leverage that I had was technical understanding of the projects given my educational background and coupling that with clear and crisp communication helped us streamline our project. I could clearly communicate with all the team members – since I very well understood all aspects on a deeper level. The biggest obstacle in this project and the main reason for the need of an efficient communication strategy was that there were 12 organisations and 32 dedicated individuals involved in the execution of this project. So I had to ensure that only relevant information was communicated to each party but at the same time everyone had to be on the same page as well. All the various teams had different working schedules as well. So I had to ensure not to disturb someone in their off time. Although there was some friction in this process but through persistence we have now developed an efficient strategy through which our activities and all the teams involved work at a faster pace and synonymously.