

Weather and climate information services in Pakistan

Assessing benefits and impacts on key farm outcomes from a user perspective

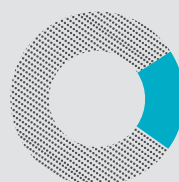
Agriculture in Pakistan

Pakistan is an agro-based economy. Wheat and cotton, the major crops, are often grown together: wheat in the winter, and cotton in the summer. Across Pakistan, this combined production system covers 11.6 million hectares of land, the majority (approximately 76%) of which is in the Punjab Province. Wheat and cotton production are highly dependent on weather conditions and face serious challenges from climate change and variability, including changes to precipitation, floods, droughts, and rising temperatures.

Agriculture and weather and climate information services

The Intergovernmental Panel on Climate Change (IPCC) has highlighted the potential of improved weather and climate information services (WCISs) in helping farmers overcome climate-related risks. WCISs are also needed to make better-informed policies about the production and management of food supplies. National meteorological and hydrological services play an important role in the provision of these services to farmers.

Pakistan – agricultural facts



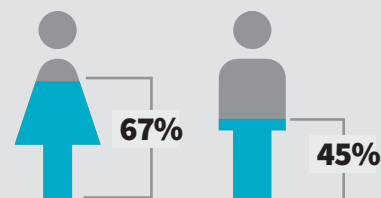
Contribution to GDP
18.9%

Workforce employed

42.3%



Workforce distribution



National calorific intake





Foreign earnings from agriculture



Agromet advisory service in Pakistan

The Pakistan Meteorological Department (PMD) provides WCISs to farmers through different means such as the internet, TV, radio, newspaper, and SMS (see table below) to reduce uncertainties and help farmers in planning their agricultural operations and maximising the socioeconomic benefits that can be derived from weather and climatic variations.

Information type		Frequency	Dissemination mode
Weather 	<ul style="list-style-type: none"> • Three-day agromet forecast • Weekly agromet forecast at sub-district level • Agromet bulletins with analysis of observed weather parameters 	<ul style="list-style-type: none"> • Daily • Every Monday • Weekly, every 10 days, and monthly 	<ul style="list-style-type: none"> • www.namc.pmd.gov.pk • Newsletter • Social media
Climate 	<ul style="list-style-type: none"> • Three-monthly seasonal agro-climatic outlook • Crop reports • Long-term technical reports (5–10-year period) 	<ul style="list-style-type: none"> • Monthly • End of winter and summer seasons 	<ul style="list-style-type: none"> • Agricultural departments and research institutions • National/local languages

The study: Evaluation of weather and climate information services in Pakistan

Climate programmes attempt to minimise the adverse impacts while maximising the benefits, if any, of weather and climatic variations, and WCIS evaluations have helped many countries in designing such services to deliver better agricultural outcomes. Pakistan would also benefit from such a study.

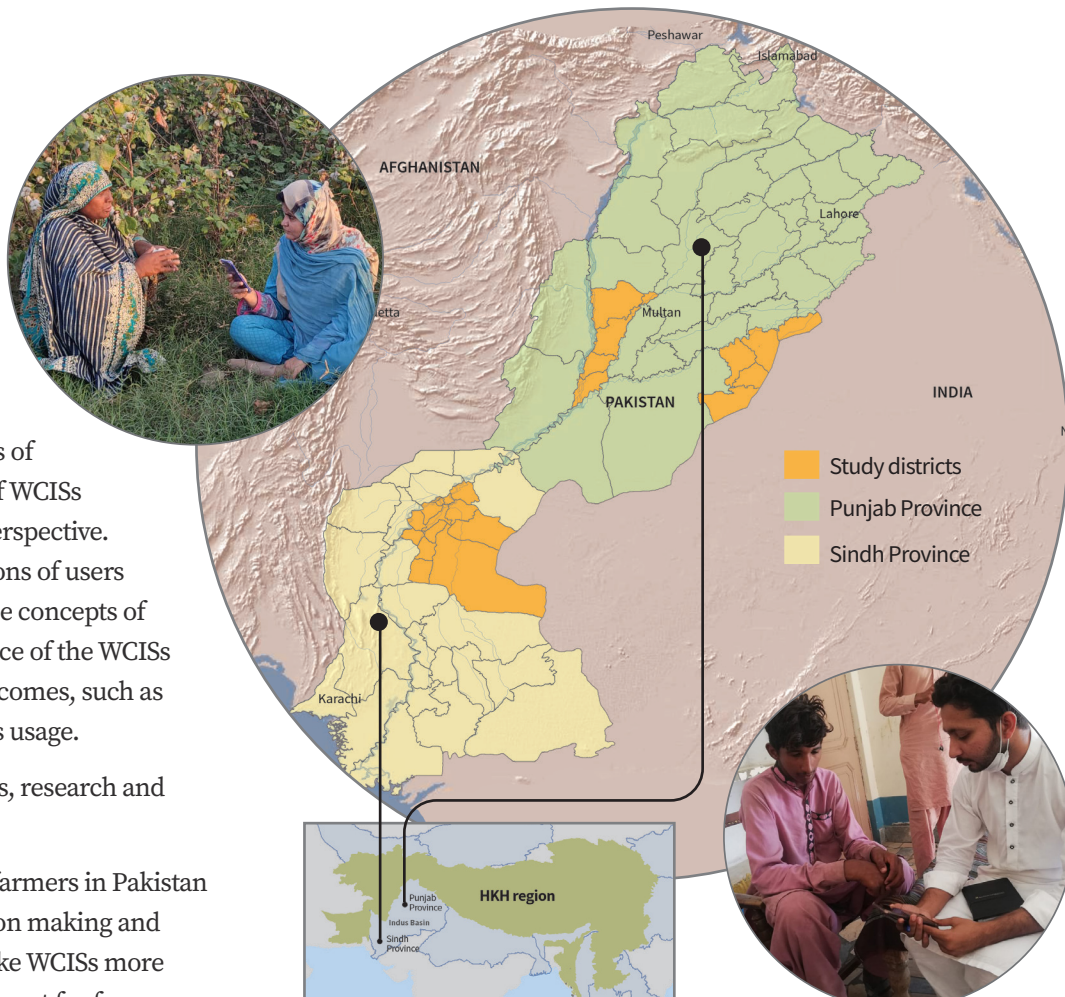
Accordingly, under the UK Aid-funded Asia Regional Resilience to a Changing Climate (ARRCC) programme, the University of Leeds (UoL) and ICIMOD together with the PMD and the Muhammad Nawaz Shareef University of Agriculture, Multan (MNSUAM), conducted a study of 612 farm households from Punjab and Sindh provinces of Pakistan to evaluate the impact of WCISs on farm outcomes from a user perspective. The study evaluated the perceptions of users and non-users of WCIS around the concepts of timeliness, accuracy, and relevance of the WCISs and their impact on key farm outcomes, such as profits, costs, revenue, and inputs usage.

Beneficiaries: PMD, line agencies, research and academic institutions, farmers

Outcome: Improved capacity of farmers in Pakistan to integrate WCISs in their decision making and improved capacity of PMD to make WCISs more accurate, reliable, timely and relevant for farmers

Study area

The study covered 24 randomly selected villages (50 wards) in Punjab and Sindh provinces of Pakistan (see figure below), selected because they are the most populous provinces in the country and grow wheat as a staple food crop and cotton as a cash crop.



Objectives of the two surveys

Objective	First survey – wheat (April 2021)	Second survey – cotton (October 2021)
Understand the user landscape	Use of WCISs Demographic data (age, gender, education, land size, material well-being, and experiences of climate stresses, categorised by users and non-users of WCISs) Decisions taken based on WCISs (plantation time, irrigation, harvest, storage, use of fertiliser and pesticide, employ labour, sale time, price, etc.)	Reasons that influence the use and non-use of WCIS
Usefulness and usability of WCISs	Distinguish useful and usable information Information accessibility, accuracy, reliability, and timeliness Perceptions about changing yields (increasing or decreasing) and the role of WCISs in planning an effective response, and how WCISs can be improved	Examine use and usability Examine how to improve WCISs
Explore enabling or constraining conditions for the use of WCISs	Explore personal barriers to using WCISs, including access to information, depending upon gender, age, education, and access to participation in meetings	Stakeholder workshop with local experts in WCISs about policy frameworks
Determine the socioeconomic impacts	Yields, use of inputs, and profit from sales of wheat between users and non-users	Yields, use of inputs and profit from sales of cotton between users and non-users

Objectives and research design

The study aimed to identify areas where the agromet advisories produced and disseminated by PMD could be improved. Underpinning this aim was the concept of equity; that is, the different information needs of men, women, and other marginalised groups must be considered to produce useful and usable WCISs. Accordingly, the research had the following four objectives:

- Understand the user landscape (who uses and who does not use WCISs)
- Examine farmers' perceptions of WCISs in terms of usefulness and usability
- Explore the conditions (policy frameworks or the capacity of individuals) that enable or constrain the use of WCISs
- Determine the impacts of WCISs, including benefits and input costs

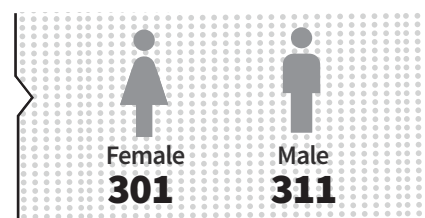
The study comprised two structured questionnaire surveys (see table above) in April and October 2021 among 612 households and 19 focus group discussions (to capture greater details from farmers) in drought- and flood-prone areas of Pakistan's Punjab and Sindh provinces. By comparing the 612 households, the study examined the differences in yields and use of inputs and profit from sales to determine the economic benefits of using WCISs.

Findings

The study found that 56% of the survey respondents used WCISs while 38% of respondents were non-users and the rest chose not to answer. There are more WCIS users in Punjab (71%) than in Sindh (23%). Around 58% of men and 53% of women use WCISs, and nearly 50% of the WCIS users depend on two PMD information sources (weather news on national TV and PMD's SMS) to make farming decisions such as planting times, harvesting times, threshing times, irrigation, choice of planting varieties, use of pesticides and chemicals, and drying.

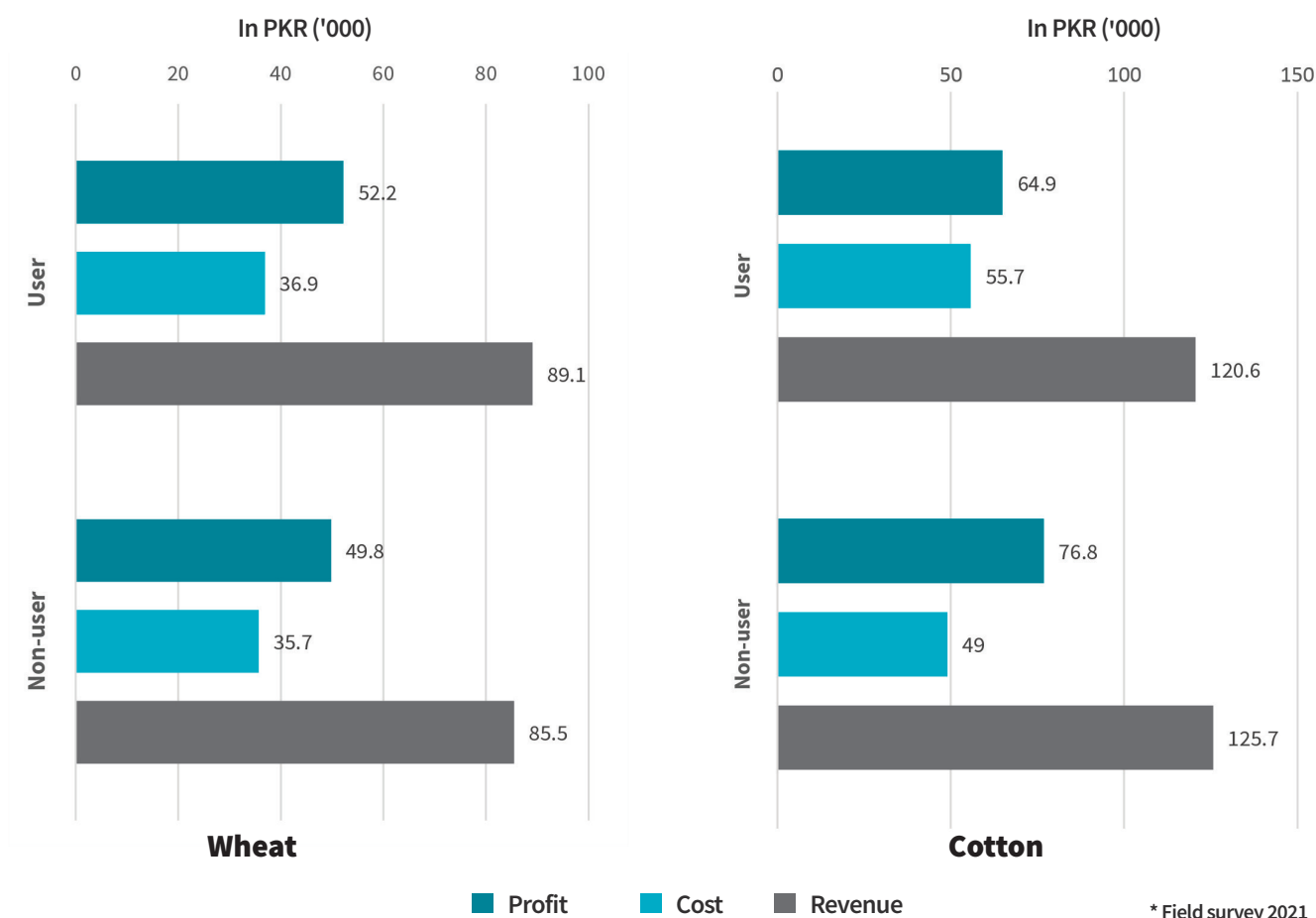
Study respondents by gender, province, and user/non-user status for WCIS

Total
612
farmer households
from Punjab and
Sindh provinces



Users
340
Non-users
233
No answer
39

Economic benefits of using agromet advisories for wheat and cotton farmers in Punjab and Sindh



Although the study did not find a significant direct relationship between use of WCISs and profits, revenue, and cost of cultivating wheat and cotton crops (see figure above), it highlighted that WCIS users agreed that WCISs guided them in making important farming decisions such as improving crop quality and yield, planning for better crop management through irrigation planning, and identifying the timing for harvesting and planting for pest control.

Through the study, farmers also identified that the use of WCISs and their impact on profitability could be improved significantly through improvements in the accuracy and accessibility of the WCISs, as well as provision of information in an understandable format and sufficiently early to allow farmers to take timely actions and provide expert support and trainings on using WCISs effectively.

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