

Improving Agricultural Productivity through Irrigation Capacity Building



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Pakistan: Country Profile

- Located in South Asia,
- Shares an eastern border with India
- North-eastern border with China
- Iran makes up the country's south-west border
- Afghanistan is along its western and northern edge



Agriculture in Pakistan: An overview

 Major crops (wheat, rice, cotton and sugarcane) accounts for 32 percent of the value added in the agriculture

 The minor crops (oilseeds, pulses, potato, Chillies etc) account for 10.1 percent of the value added in overall agriculture

• Livestock contributes 55.1 percent to agricultural value added

Distribution Of Cropped Area

Crops	Area (mha)	Percent Area (%)
Food grains (wheat, rice, maize, etc)	11.999	54
Cash crops (sugarcane, cotton, tobacco)	4.339	20
Pulses	1.380	6
Oil seeds	0.579	3
Vegetables	0.329	1
Condiments	0.169	1
Fruits	0.664	3
Others	2.662	12
Total	22.120	100

Source: Agricultural Statistics of Pakistan, 2010-11

Agriculture: Contribution to GDP



- Contributes 21 percent to GDP
- 60 percent of the rural population depends upon this sector for its livelihood.

Employment Share



Generates productive employment opportunities for more than 40 percent of the country's labour force

Mean Annual Rainfall



Natural Resource Base

- Out of 79.6 m ha, only 22 m ha area available for farming
- Around 16 m ha irrigated and 4 m ha under rainfed farming
- Pakistan is predominantly arid and semi-arid with 68 m ha (85%) area where rainfall is less than 300 mm.
- Pakistan has diverse landscapes including:
 - High mountain ranges of the Himalayas, Karakorams and Hindu Kush
 - Snow-covered peaks, eternal glaciers, and the inter-mountain valleys in the north
 - Rich irrigated plains in the Indus basin
 - Snow and glacier melt keeps the Indus Basin rivers perennial
 - Undulating highly vulnerable agri. areas of rainfed Pothowar

Irrigation System

- Irrigated agriculture is the major user of both, surface and groundwater resources of Pakistan.
- The average annual river diversions for irrigation in the Indus Basin are of 104.7 MAF.
- Of this, 67.11 MAF diverted during the kharif (summer) period, while 37.63 MAF during the rabi (winter) period.
- A further 41.6 MAF is pumped annually from the groundwater reservoirs, of which more than 90% is used for irrigation.



Schematic Diagram of IBIS



Land and Water Resources of Pakistan

- Major storage reservoirs: 3
- Live storage capacity (designed): 15 MAF
- Barrages, headworks and siphons: 23
- Main irrigation canals:
- Command area:

- 45
- 16.6 Mha

Three Prong Approach

- Conservation
- Recycling
- Augmentation

- Watercourse lining
- Precision land leveling
- Zero tillage
- Bed and furrow irrigation

- Spate irrigation technology for Rod-Kohi and Sailaba areas
- Indigenization of sprinkler and drip irrigation systems with private sector companies
 - Rain Gun Sprinklers
 - Drip Irrigation
 - High Pressure Pumps
- Rain water conservation and management for Barani
 lands
- Watershed management and livelihood generation Rawal Watershed

On-Farm Water Management

- In 1976, the first On-Farm Water Management (OFWM) Project was launched.
- To increase overall irrigation efficiency through improvement of community watercourses, precision land levelling of farmers fields, and adoption of advanced irrigation agronomic techniques.
- Its ultimate goal was to foster "increased agricultural production and improved income for the low income farmers in Pakistan."
- Followed by various OFWM projects with the financial assistance of World Bank, IDA, IFAD, OECF, Japan, ADB, FAO



- Barani areas
- Spate irrigation
- Drip irrigation







Recycling Of Waste Waters

- Utilization of shallow layer of fresh groundwater using skimming wells
- Use of drainage effluents through chemical, biological and microorganisms based amendments
- Treatment of sewage water using microorganisms based technologies

Augmentation Of Water In Indus Basin

- Establishment of hydral projects
- Raising of Mangla dam
- Desilting of Tarbela dam
- Pumping of fresh groundwater in areas of high recharge causing water logging
- Amending brackish groundwater using chemical, biological and microorganisms

Augmentation Of Water Outside Indus Basin

- Construction of small and mini dams for storage of water
- Construction of earthen ponds for domestic use and stock water
- Harnessing of hill-torrents
- Exploitation of shallow groundwater using dug wells

Some Major Water Sector Issues

Water Resources Development

- Shortage of water
- Inadequate storage facility
- Sedimentation in storage reservoirs
- Unutilized potentials hill torrents, sailaba 18 MAF

Water Resources Management

- Low system efficiency (less than 40%)
- Low Productivity per unit of water
- E quity in water distribution
- Mining of groundwater

Improve Water Productivity

- Improving conveyance and application efficiencies
 - Canal and watercourse improvement/maintenance
 - Improving farm layout
 - Leveling of fields
- Using high efficiency irrigation systems:
 - Bed and furrow methods of irrigation
 - Sprinkler/drip irrigation system
- Changing the existing cropping patterns i.e. by adopting low delta crops
- Adopting proper irrigation scheduling
 - When to apply and how much to apply water?
- Using saline groundwater, in conjunction with canal water, or independently with salt tolerant crops.
- Use of improved agronomic practices

An integrated approach is required to optimally use the available water resources

Some Demonstration Sites





Wheat on beds





