



Australian Government

Australian Centre for
International Agricultural Research

Water

Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India



Overview

The Bangladesh and West Bengal Governments have targeted their contiguous coastal zones as the region most in need of poverty alleviation and improved food security. About 65% of the zones' population live below the poverty line. They are disadvantaged by poverty, food insecurity, environmental vulnerability and limited livelihood opportunities.

The population of the region is about 40 million in Bangladesh and 23 million in West Bengal, most of whom live on islands that are prone to seawater inundation. These islands have embankments to protect them from the sea and are often known as 'polders'. The zones depend mainly on agriculture, but productivity is low due to prolonged waterlogging that increases soil salinity, and scarcity of low salinity irrigation water during the dry season.

There are opportunities for cropping intensification through efficient use and optimal management of fresh surface water and groundwater resources during the dry season, improved polder water management, crop calendar planning and improved agronomic practices that maximise water productivity. However, sustainable intensification of crop production requires better understanding of the water and salinity processes and dynamics at sub-regional (polder) and farmer field scales, and evaluation of crop responses by variety and agronomic management practices.

KEY FACTS

ACIAR Project No. LWR-2014-073

Duration: November 2015 to June 2022 (6.5 years)

Target areas: Bangladesh and India (West Bengal)

Budget: A\$2,430,000

Project Leader

Dr Mohammed Mainuddin, CSIRO Land and Water

Key partners

- Krishi Gobeshona Foundation, Bangladesh
- Murdoch University
- Bangladesh Agricultural Research Institute
- Bangladesh Rice Research Institute
- Institute of Water Modelling, Bangladesh
- Khulna University, Bangladesh
- Regional Research Station, West Bengal
- Bidhan Chandra Krishi Viswavidyalaya, West Bengal
- Tagore Society for Rural Development, India

ACIAR Research Program Manager

Dr Robyn Johnston

Objective

The project aims to sustainably increase cropping intensity and productivity in the coastal zones of Bangladesh and West Bengal through integrated soil, water and crop management, particularly in the dry season.

The objectives are to:

- Use three polder case studies that represent the range of salinity conditions across the coastal zone to develop a sub-regional understanding of the surface water and groundwater resources, groundwater recharge and discharge mechanisms, and their trends.
- Develop a detailed understanding of the salt and water dynamics of the case study polders and model pre-monsoon and post-monsoon groundwater abstraction regimes that improve groundwater quality and availability during the dry season.
- Develop a detailed understanding of crop production responses to various improved crop water management strategies, including early sowing.
- Identify superior cropping options and polder water and salt management strategies through field evaluation and co-learning with farmers.

Expected scientific results

- Integrate modelling of surface water, groundwater and salinity, and their interactions, at the polder and farm scale.
- Simulate salinity dynamics and crop response in rice crops.
- Understand the region's irrigation water availability at a biophysical-base and a practical understanding of how it can be used sustainably. This will include:
 - » Perform a range of agronomic options for crop production under the existing constraints of salinity and water availability, and a quantification of their profitability and sustainability.
 - » Understand the potential role of drainage management in increased crop production outcomes, with existing polder infrastructure and with improved infrastructure.
 - » Understand the socio-cultural barriers and constraints and how to manage them to maximise impact on crop production and water productivity.

Expected impact/outcomes

- Increase household income for the region's farmers through improving cropping, water and salinity management techniques.
- Adopt improved varieties and technologies.
- Increase diversity of crops to include wheat, pulses and oilseeds.
- Reduce impacts of salinity and inundation in the coastal zones.
- Increase confidence in growing of both monsoon and dry season crops.
- Generate employment by increasing diversity and productivity of crops.
- Evaluate of groundwater management strategies to ensure the recommended system is sustainable and does not exacerbate the existing salinity problem through over-extraction of the freshwater aquifer.

