



Australian Government

Australian Centre for
International Agricultural Research

Climate and Water

The regional hydrological impact of farm-scale water saving measures in the eastern Gangetic plains

Overview

The project will explore the links between farm-scale water saving practices and wider hydrological impacts, and develop options for sustainable groundwater management for irrigated crop production in the Eastern Gangetic Plains (EGP), with the aim of improving the livelihood of farming communities including women and marginal farmers.

Irrigation in the EGP is predominantly based on groundwater. In recent years, there is evidence that groundwater levels are falling in some areas of the region, particularly in the northwest of Bangladesh. To improve these conditions, many farm-scale water saving measures are proposed and actively promoted, such as stopping seepage from water delivery canals and fields, alternative wetting and drying and conservation agriculture practices (zero tillage, minimum tillage, etc.).

However, there are no documented examples of substantial water savings at wider scales for field crops in terms of consumptive use and as a result it is likely that these measures will have no impact on the sustainability of groundwater at a regional level. Instead some of the measures such as zero tillage or conservation agriculture are likely to be counterproductive; reducing recharge to the aquifer.



KEY FACTS

ACIAR Project No. WAC/2019/104

Duration: July 2019 to June 2020

Target areas: Bangladesh, India, Nepal

Budget: A\$200,000

Project Leader

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Objective

The aim of this project is to better understand the impact of farm-scale water management on regional hydrology, in order to provide options for sustainable groundwater management for irrigated crop production in the EGP, thus improving the livelihood of the farming communities including women and marginal farmers.

The objectives of the study are to:

- ◆ Develop a field-scale understanding of the different 'water savings' and 'conservation practices' and their likely impacts on the local and regional water balance and groundwater recharge.
- ◆ Develop a detailed understanding of 'effective water savings measures' and ways of enhancing recharge into the aquifer for long-term sustainability of groundwater irrigation in the EGP
- ◆ Suggest policy support options for sustainable groundwater management to improve food security and livelihoods of the farmers including women and marginal farmers.

Research activities

- ◆ Review of conservation agriculture and agricultural water saving measures and their impact on hydraulic properties of soils and landscape, and regional hydrology outcomes, with particular reference to the Eastern Gangetic Plains.
- ◆ Review of groundwater trends and issues in the Eastern Gangetic Plains, possibly with some indicative coarse modelling if the data are readily available. Where data is available, trends in groundwater levels will be used to provide inferences about recharge and discharge processes related to groundwater use for irrigation.

- ◆ APSIM modelling that focuses on the impact of land use change and changes to soil / landscape infiltration properties. APSIM will allow detailed analysis of daily water balance components for a range of cropping system options in the target region. This will provide insight into the relative magnitudes of rainfall, irrigation, drainage below crop roots, runoff, sub-surface lateral flows, soil (and pond) evaporation, and crop transpiration for different crops, cropping rotations, and imposed farmer managements.
- ◆ Water balance studies, particularly focussing on Northwest Bangladesh (where water balance studies are already in progress). Work in West Bengal, Bihar and the Terai will be subject to the availability of data, especially groundwater data. Use a water balance model to partition the flows between runoff and groundwater recharge/discharge, with the observed changes in groundwater level used as a test of the model.

Expected outcomes

- ◆ Improved understanding of the regional hydrology impact of farm-scale water saving measures in the EGP, including water use and recharge to groundwater, and identification of the most effective farm-scale water saving measures that also impact on sustainable groundwater use.
- ◆ Inform policy settings and farm-scale incentives for water saving that reduce the risk of undesirable regional hydrology impacts, and ensure that desired impacts (i.e. combatting groundwater decline) are achieved.

