



# Supporting sustainable food systems: Filling research gaps

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Australian Government  
Australian Centre for  
International Agricultural Research

**Australian  
Aid** 



Synthesis & dialogue

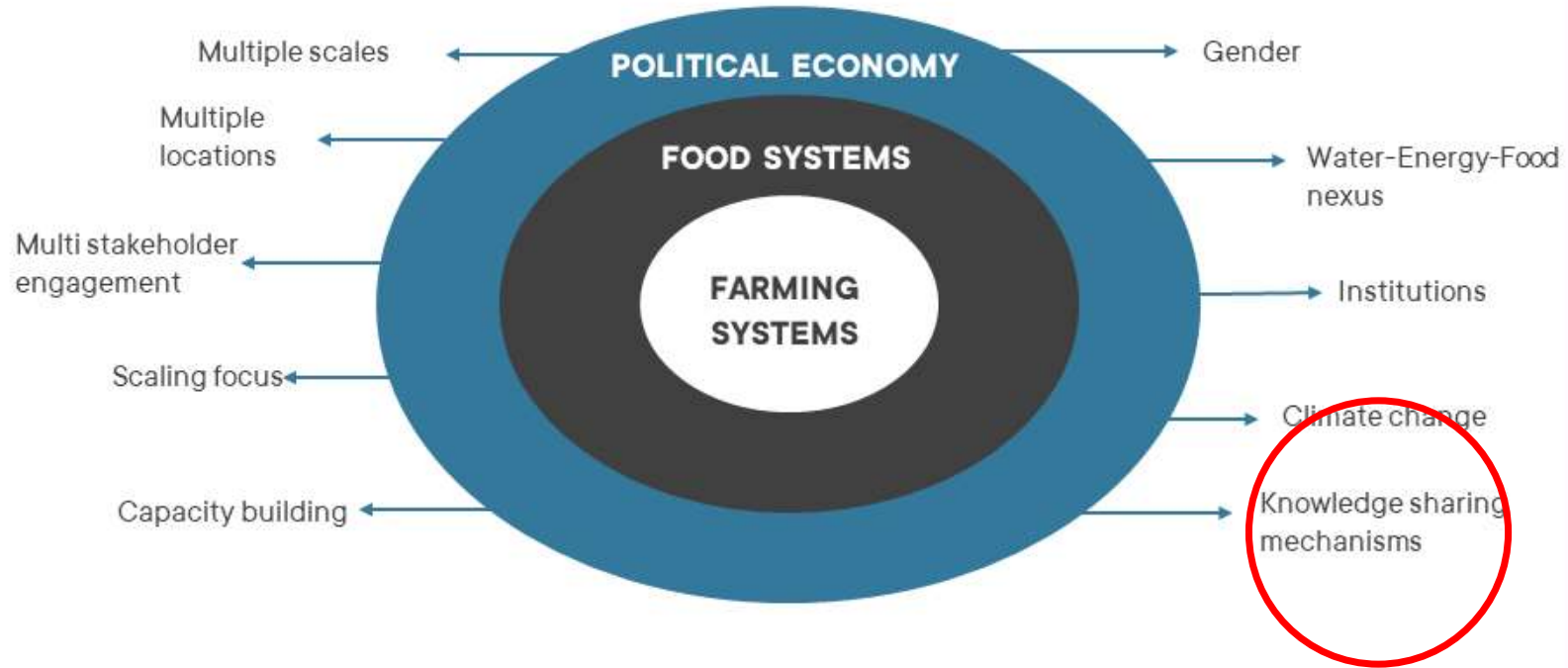


Cross cutting research approaches



Field research & intervention

# Foresight



Cross cutting themes

## Sustainable Farming Systems



Conservation agriculture



Mechanisation



Groundwater

# Projects

Theme	Project	Commissioned
Context for Development	Understanding women's role in agriculture in the EGP: The macro and micro connections	SACIWATERS
	Political economy analysis of cross border agricultural trade in Bangladesh, India and Nepal	The Asia Foundation
Potential constraints	Quantifying crop yield gaps across the IGP from new perspectives – production, farmer profit and sustainability of water use	CSIRO, CIMMYT
	Understanding the gendered implications of changing weed dynamics in farming systems intensification in the EGP	CIMMYT
	Identifying EGP Soil Constraints	University of Queensland
Sustainable Groundwater Development	Regional scale water impacts	CSIRO
	Unravelling the WEF nexus in West Bengal, India	IWMI
	Role of groundwater in agrarian change in West Bengal and Bangladesh: A comparative analysis	IWMI
	Aquifer characterisation, artificial recharge and reuse of suddenly available water in south Bihar	Nalanda University
Scaling Mechanisation	Value chain and policy interventions to accelerate adoption of zero tillage in rice-wheat farming systems across IGP	University of Adelaide
	Pilot project on commercialisation of the Virtual Multi-Crop Planter in Bangladesh	Murdoch University, Hoque Corporation
Knowledge Sharing Mechanisms	Farmers' Hubs as a vehicle to deliver solutions and services to farming communities	CSIRO, BAU
	Pilot study on knowledge transfer mechanism for effective agriculture extension services in Nepal	Centre for Green Economic Development Nepal

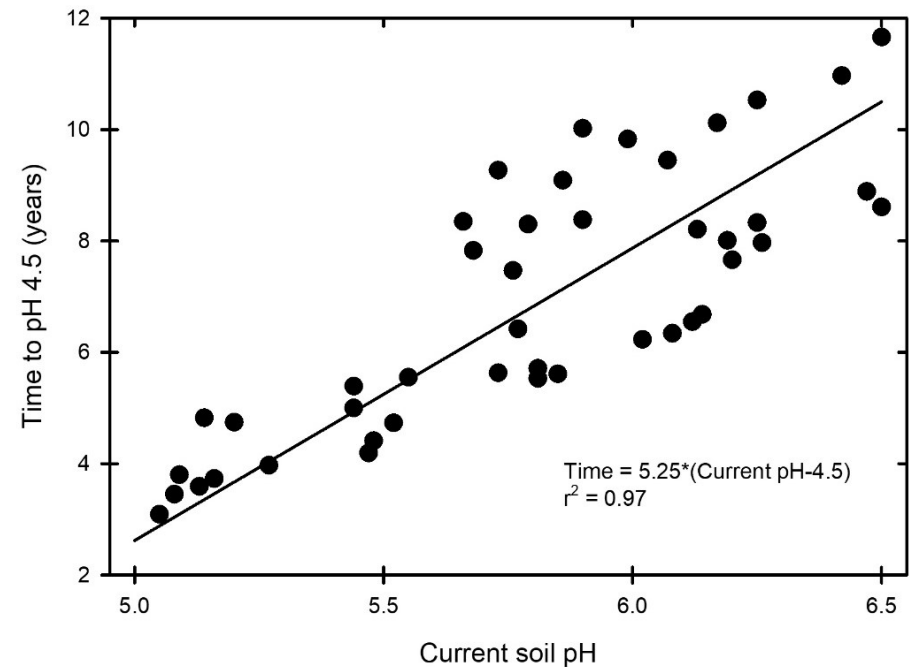


# Potential constraints



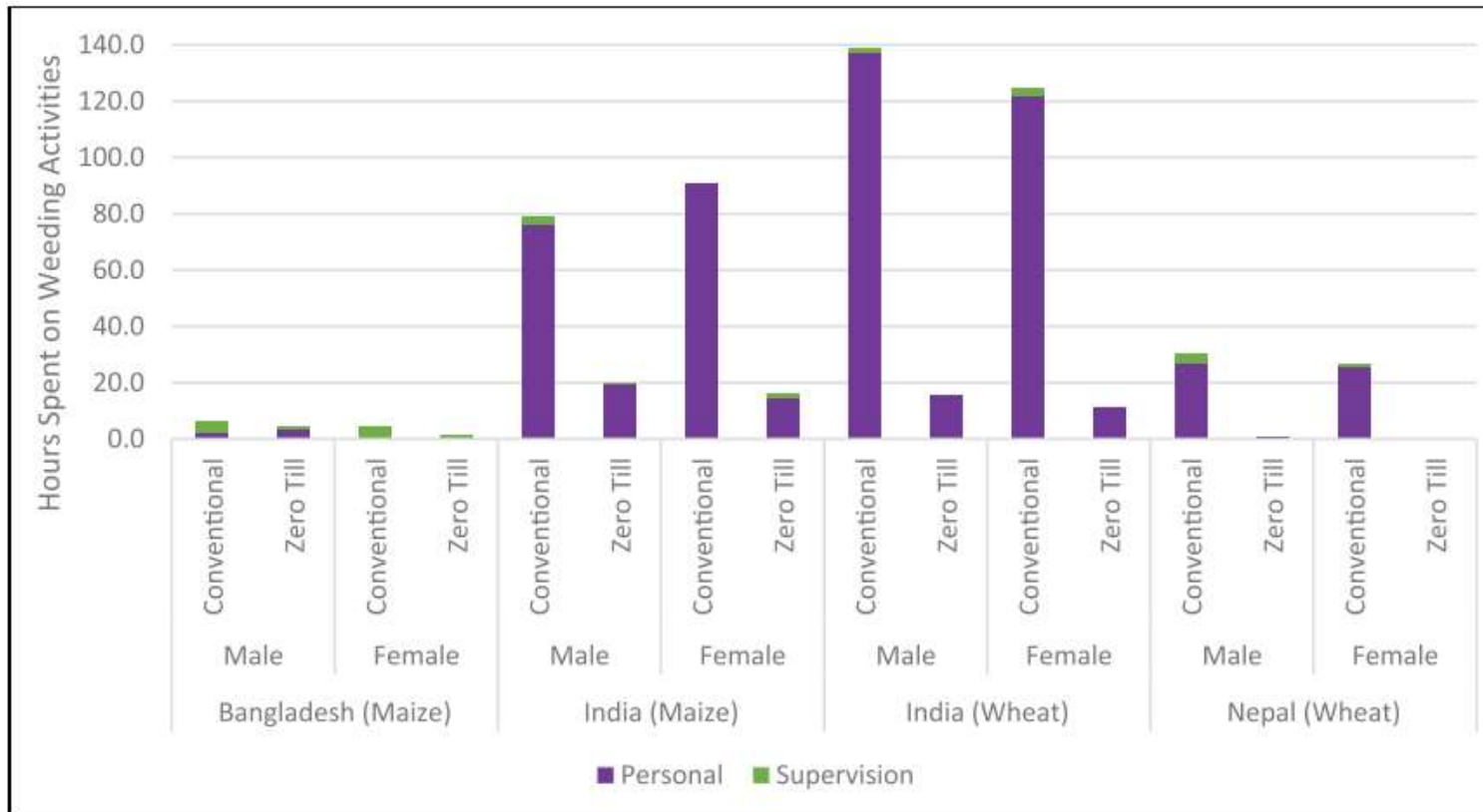
## Soil constraints

- Soil degradation through acidification is a considerable risk to agricultural productivity
- Zinc deficiency is widespread and needs a targeted extension approach



The relationship between initial soil pH, and the estimated time for the best case / current cropping system to acidify the soil to pH 4.5 (Menzies et al., 2020).

# Weed management

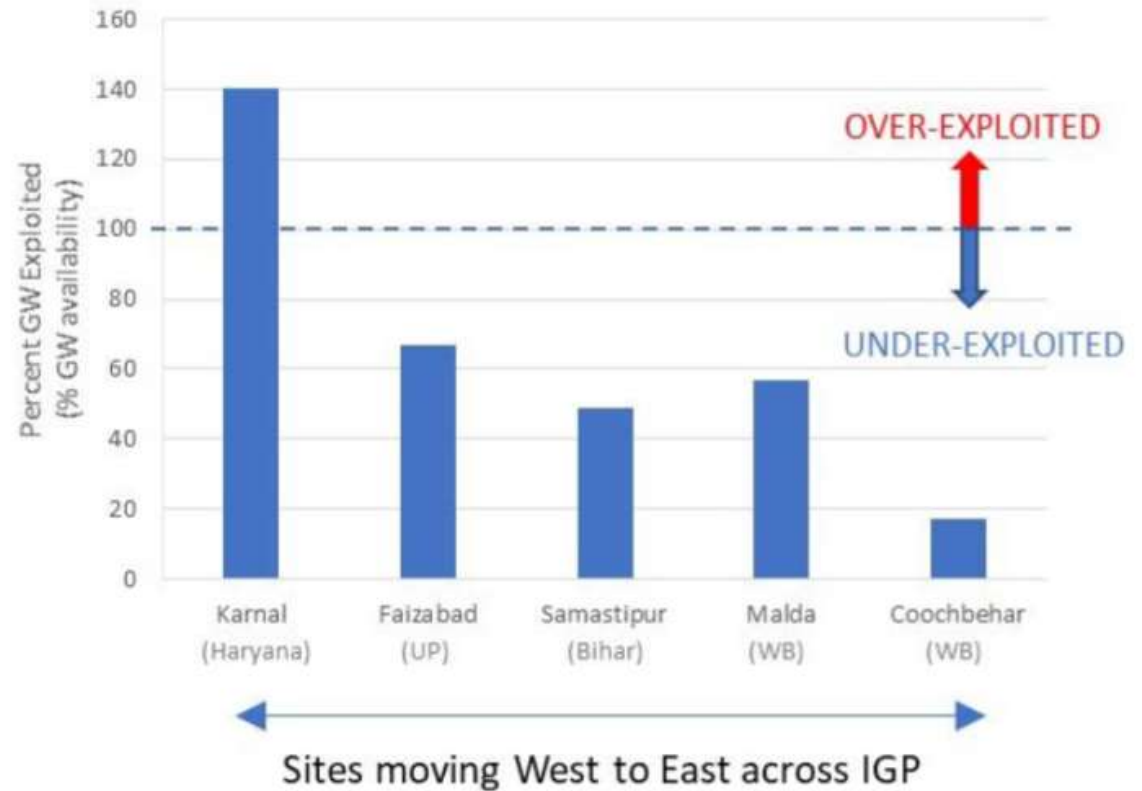
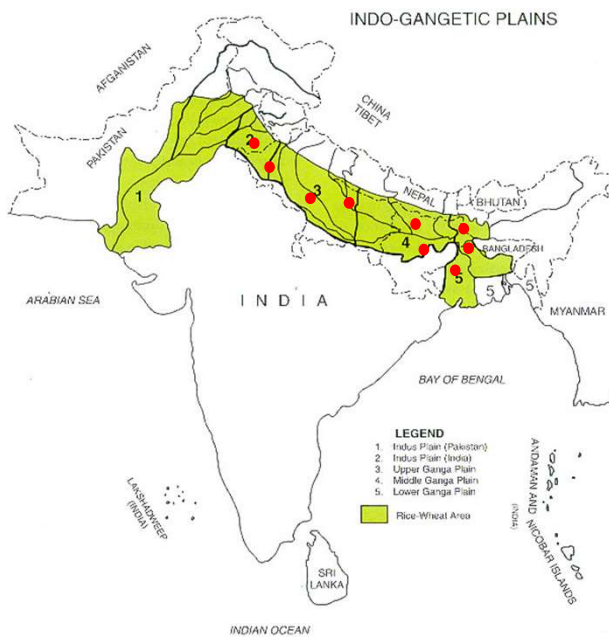


Comparison of total hours spent on weeding related activities in first 5 weeks post planting (Brown et al., 2021).

A group of people, including men and women, are gathered in a cornfield. They are working with a large, yellow, flexible pipe that is being laid out on the ground. The scene suggests a community effort in agricultural or water management. The background shows rows of corn plants. The entire image is overlaid with a semi-transparent blue filter.

# **Sustainable groundwater development**

# The importance of understanding the links between local and regional hydrology

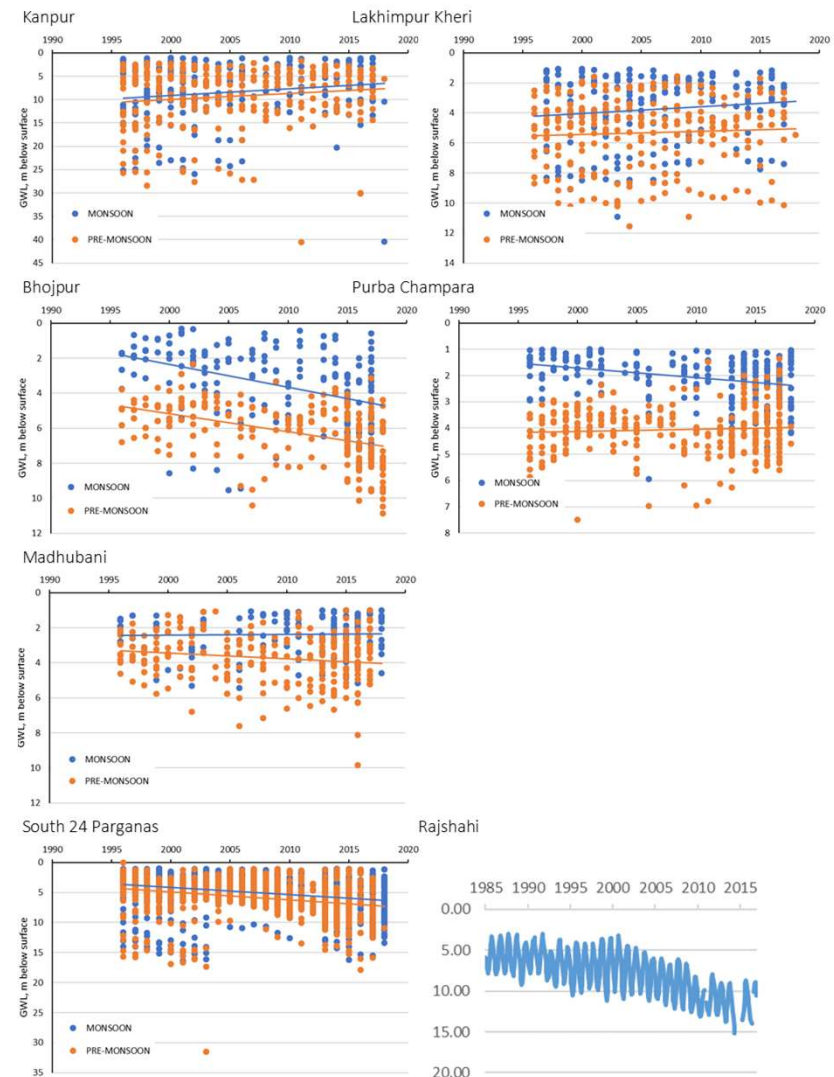


(Gaydon et al., 2021).

# The importance of understanding the links between local and regional hydrology

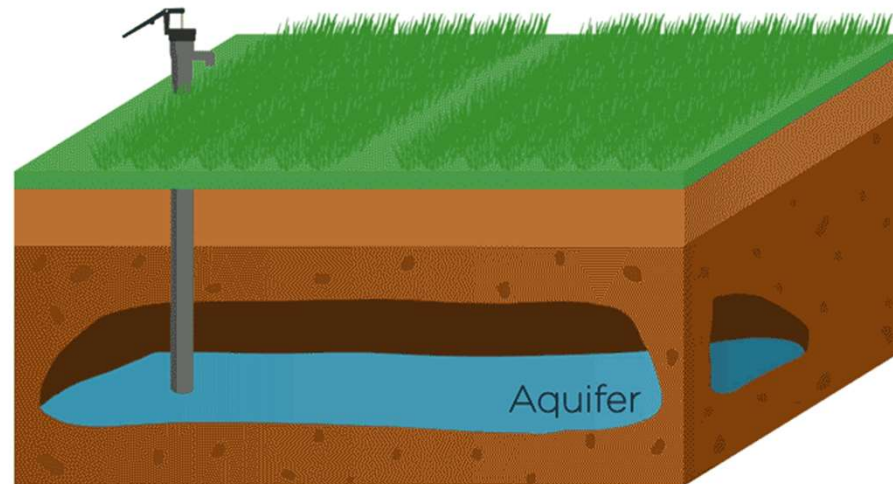
- Groundwater levels in seven districts in m, from 1996 to 2018 (Indian districts) or 1985 to 2016 (Rajshahi in Bangladesh).
- The graphs are in a west to east order from top to bottom.

(Mainuddin et al., 2021).



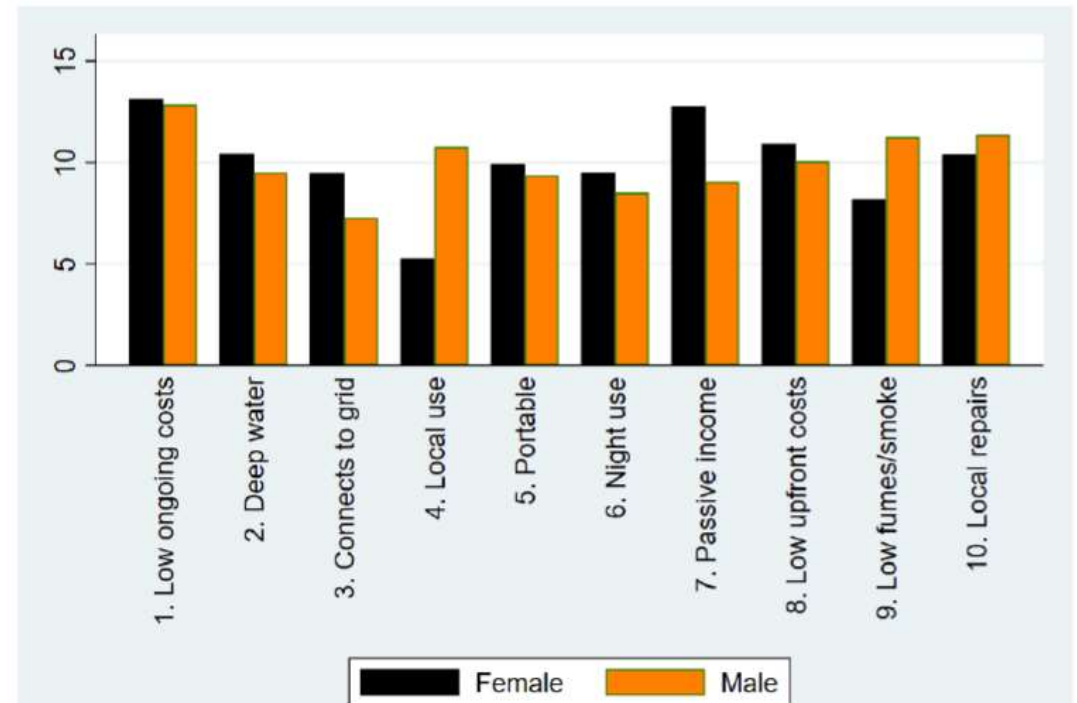


## Misconceptions about what causes groundwater decline



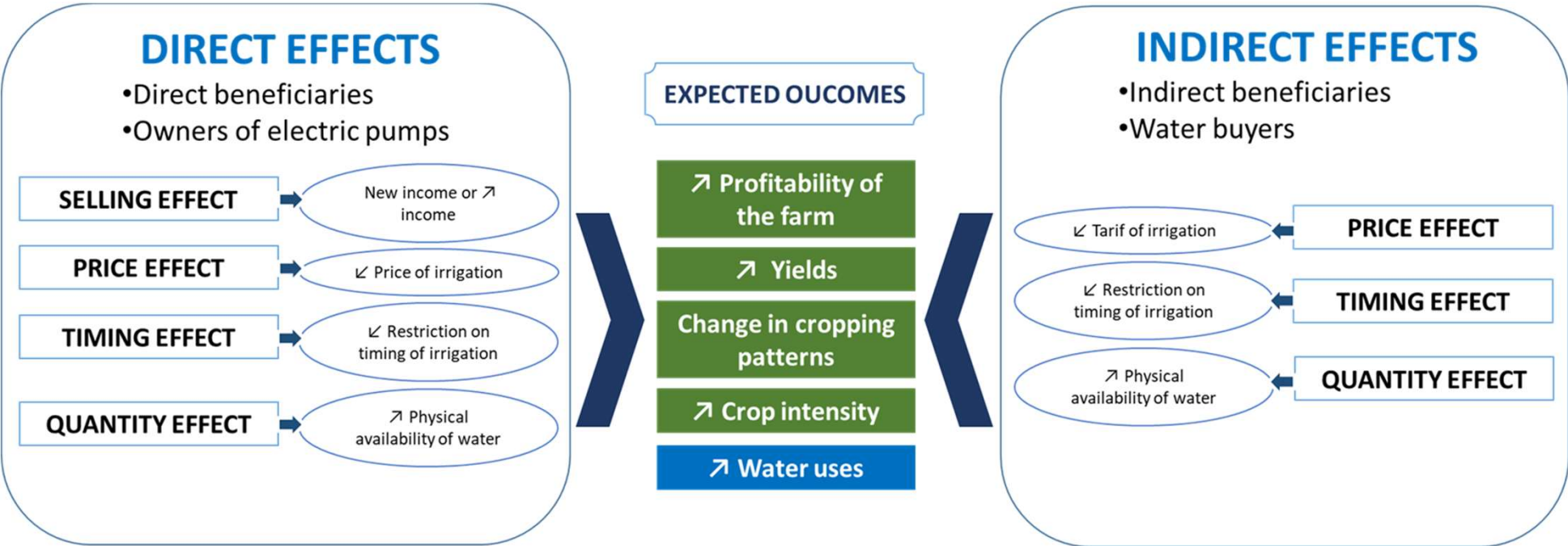
- Percolation is recharging groundwater during the irrigation season –it is not lost from the groundwater based irrigation system
- The irrigation in the EGP is predominantly based on good quality groundwater  
(Mainuddin et al., 2021).

## Improving access to pumps



Preferences for pump set characteristics for women and men farmers in West Bengal (Lountain et al., forthcoming).

# The changing irrigation – energy nexus



(Mukherji et al., 2020).

# Water alone is not enough



# Scaling mechanization



# VMP commercialisation: Lessons learnt

- Based on this pilot project, a Planting Incentive Model was successful and can be used for wider out-scaling of VMP
- Greater interest and business potential found in sowing non-rice crops
- Year-round job assurance is required to retain experienced operators of VMP
- 4 business models emerging for VMP use
- Co-investment support to private sector for promotions, marketing, training, after sales services are critically important for commercialization of VMP



*Commercialization of Versatile Multi-crop Planter (VMP)*

## Lessons for scaling



- Need to engage and work with a range of stakeholders
- The power of the group
- Effective field – policy links can result in convergence



1. ZERO-BURN FROM ZERO-TILL  
Awareness Raising Campaign  
be Introduced



2. Innovation Platforms as an  
Inclusive Extension Vehicle  
for CASI be Expanded



3. Building a More Effective  
ZT/HS Seed Drill Supply  
and Service Sector



4. Re-orientation  
of Government Subsidies  
and Support Mechanisms  
are Required




5. Concerted Effort  
to Support the Establishment  
of Sustainable Business Models  
for Custom Hire Centres (CHC's)



6. Formation of a Regional  
Collaborative Platform (RCP)  
for the IGP Region



The background is a blue-tinted photograph of a field. In the foreground, there are rows of crops, possibly corn. In the middle ground, several people are walking away from the camera. The background shows a line of trees under a clear sky.

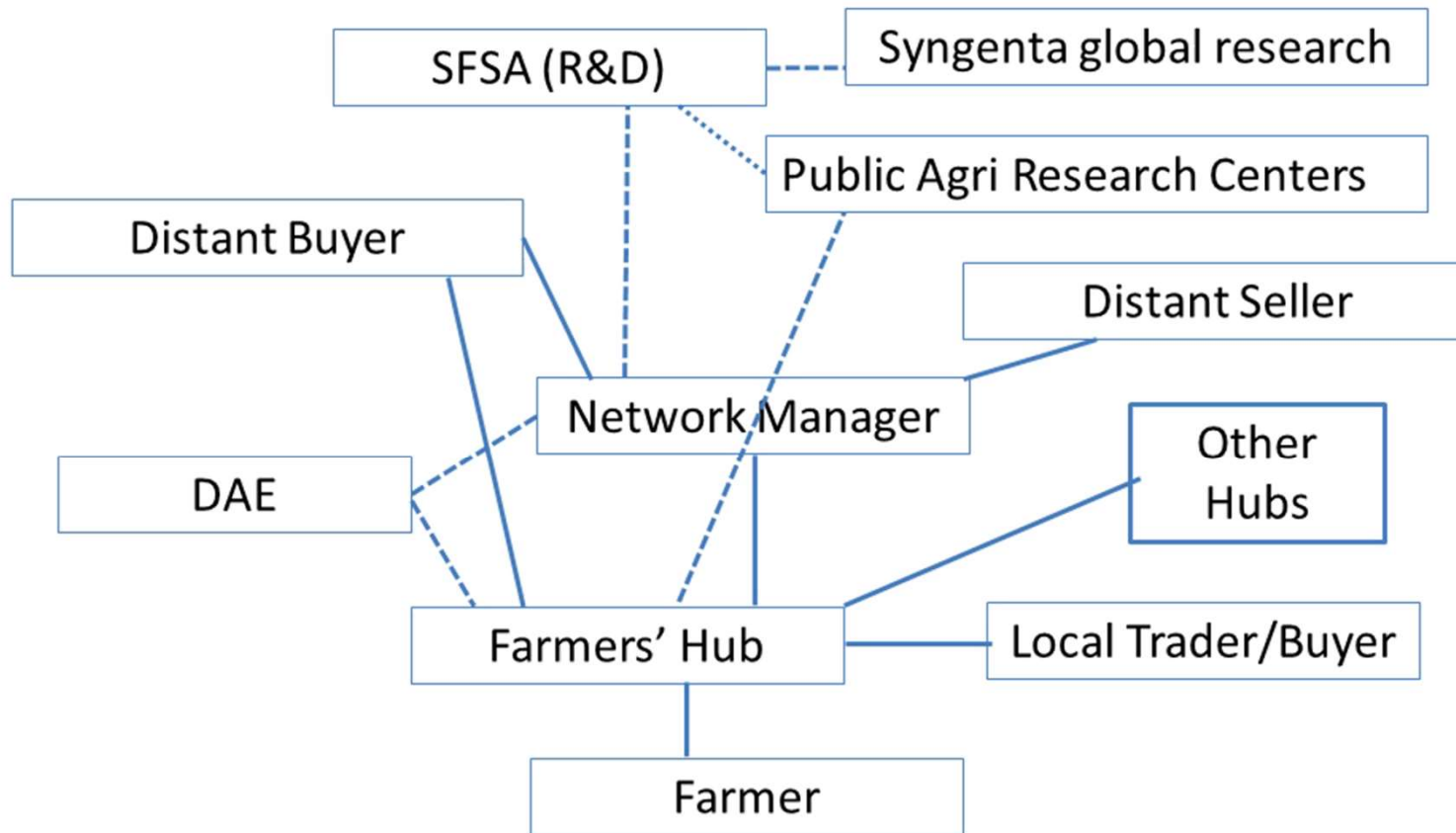
# Knowledge sharing mechanisms





Farmers' Hubs as a vehicle to deliver solutions and services to farming communities CROP/2020/202

## Mapping of SFSA Farmers' Hubs



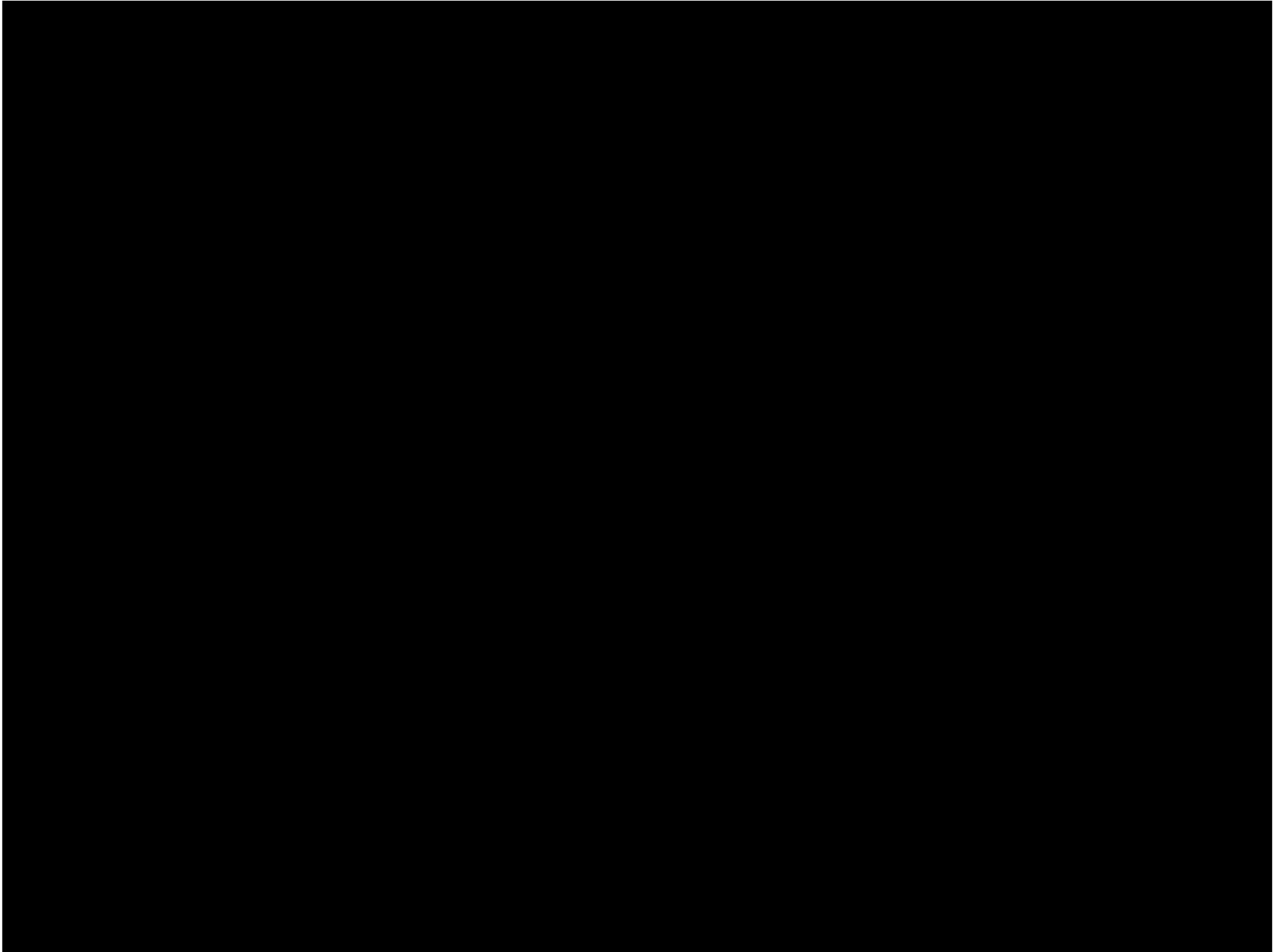
## Nepal: Understanding wider drivers of the food system and testing mechanisms for knowledge sharing



1. Understanding the context of a changing federal system
2. Understanding food systems
3. Testing farm level interventions
4. Pilot approach to improving planning and coordination for mechanisation and knowledge development and access, with good buy in from local stakeholders







A photograph of five women in traditional Indian attire (sarees and headscarves) standing in a line at a public handwashing station. They are leaning over basins, likely using water and soap to clean their hands. The scene is outdoors, with trees and a building visible in the background. The image is overlaid with a semi-transparent blue filter.

# Conclusions

## Conclusions

- Some resource constraints can be anticipated – we need to monitor and manage for them
- Groundwater development is in a state of flux and there are multiple pressures that need to be understood for sustainability
- Mechanization is essential for CASI – how can we learn from scaling experiences?
- Knowledge transfer mechanisms can be enhanced by stronger connections and locally relevant approaches

# Questions



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