

ACIAR SDIP

Improved food, energy and water security for sustainable food systems in the Eastern Gangetic Plains

Thursday 17th September 2020



Australian Government

Australian Centre for
International Agricultural Research

**Australian
Aid** 

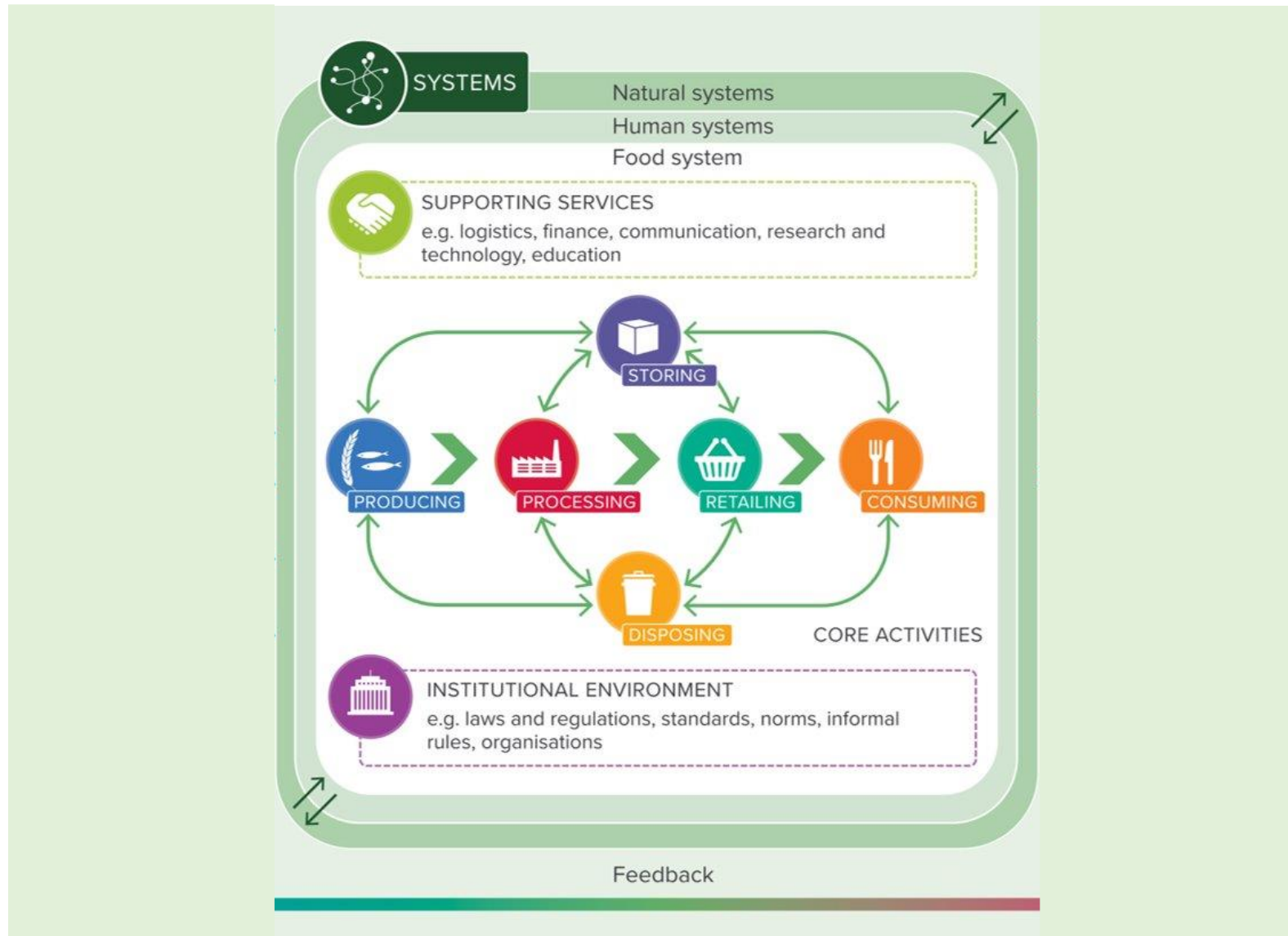
Agenda

1. Background Eric Huttner
2. Achievements Tamara Jackson
3. Sustainability Kuhu Chatterjee
4. Lessons & next steps Robyn Johnston
5. Questions

Where we work: the Eastern Gangetic Plains



Widening the focus: SDIP Phase 1 - 2



Key achievements





Synthesis & dialogue

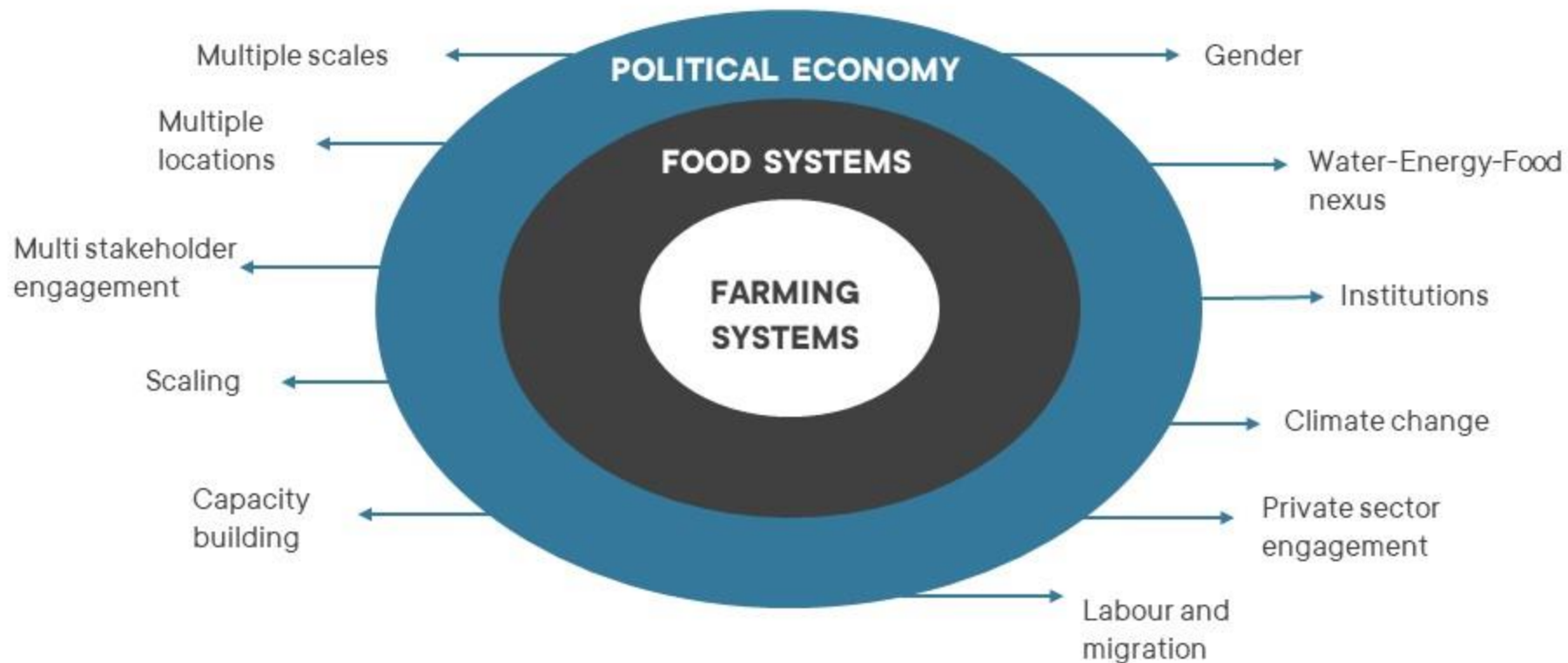


Cross cutting research approaches



Field research & intervention

Foresight



Cross cutting themes

Sustainable Farming Systems



Conservation agriculture



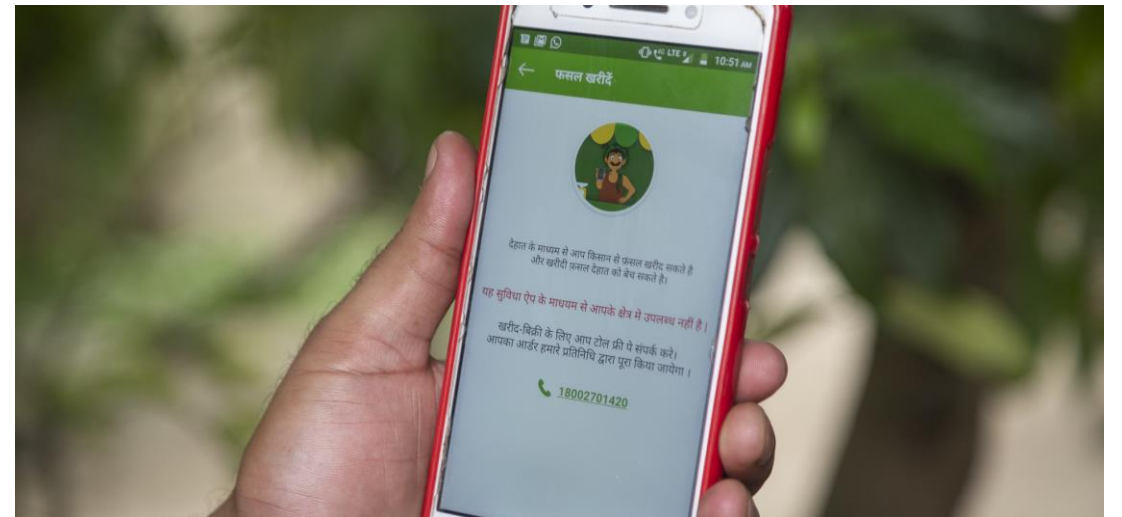
Mechanisation



Groundwater

Sustainable farming systems

Supporting more sustainable and resilient farming systems through technical and institutional change



Farm level impacts



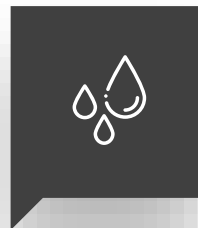
+ 3 - 6%
Yield



+ 17 - 41%
Profits



- 28%
Labour



- 11%
Water



- 6 - 11 %
Energy

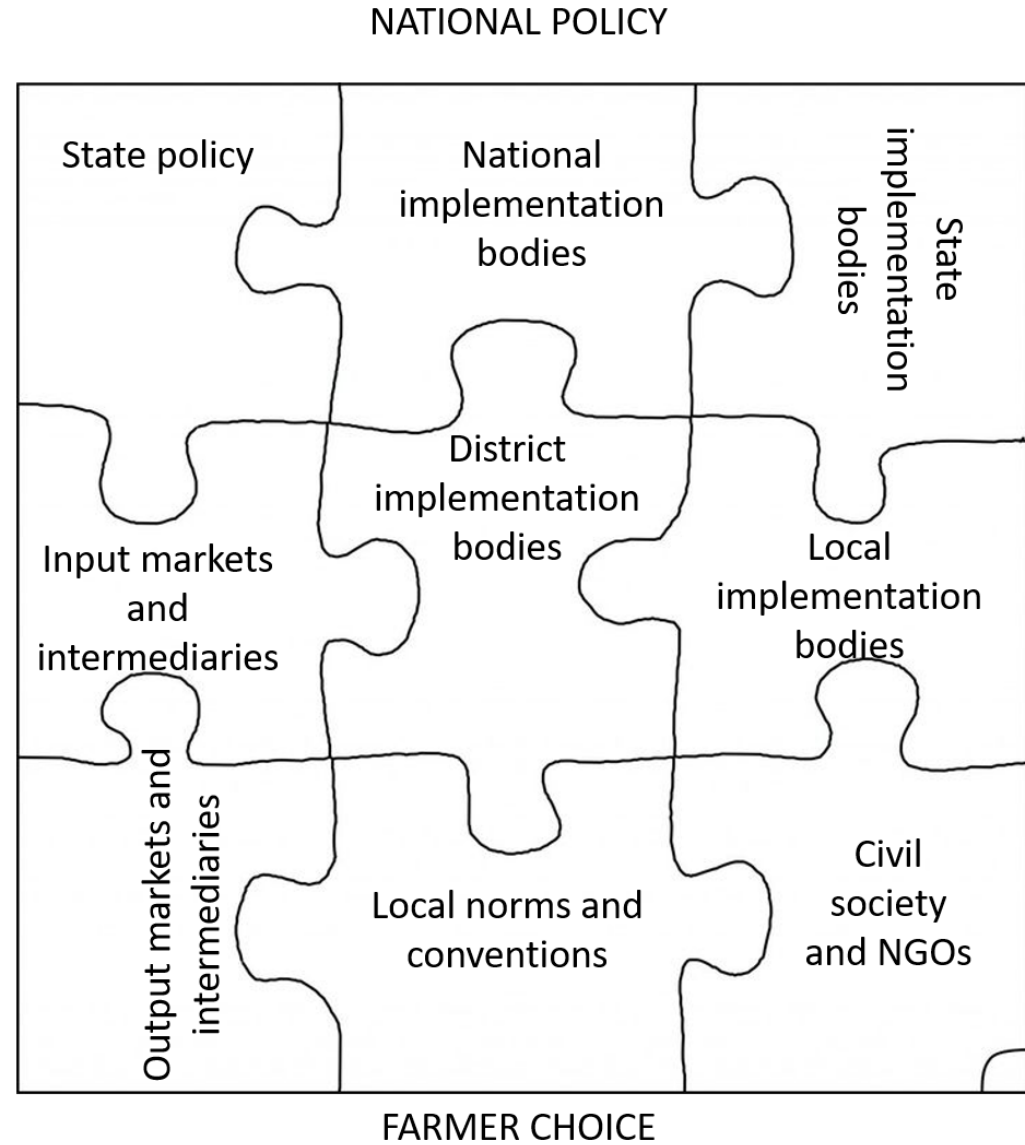


- 6 - 12%
Emissions



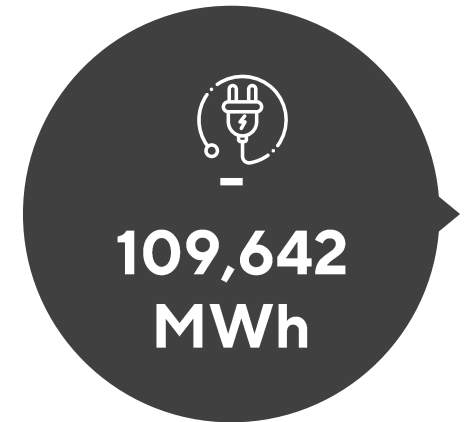
*These figures are the average across crop systems and locations in changing from conventional production systems to CASI based.

Understanding scaling: Institutional changes

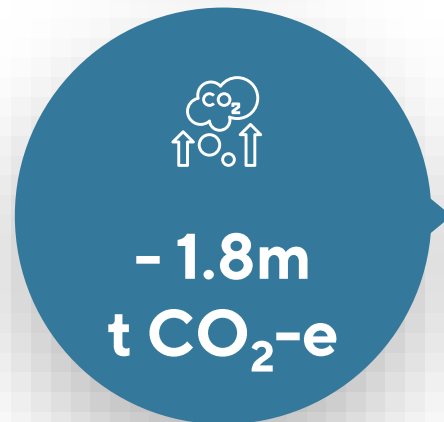


Impact of scaling farming systems change

ACIAR SDIP



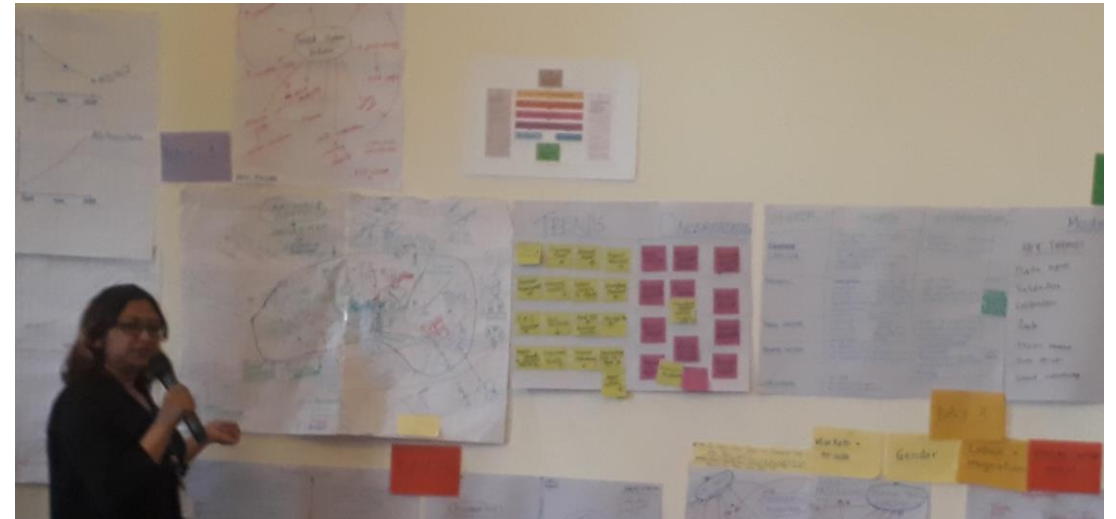
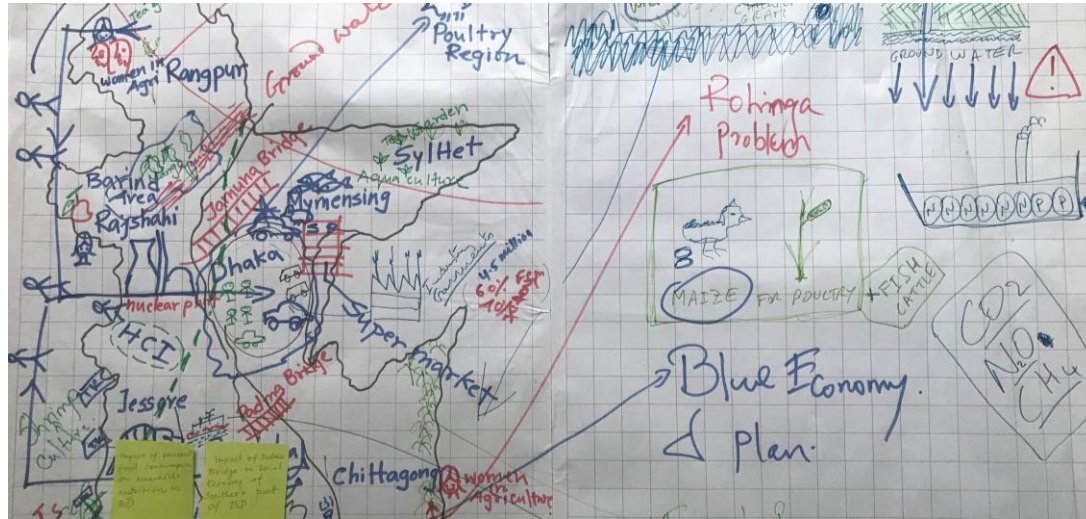
If 50% farmers use CASI



Foresight for food systems



Taking a long-term, systems approach to changing food systems

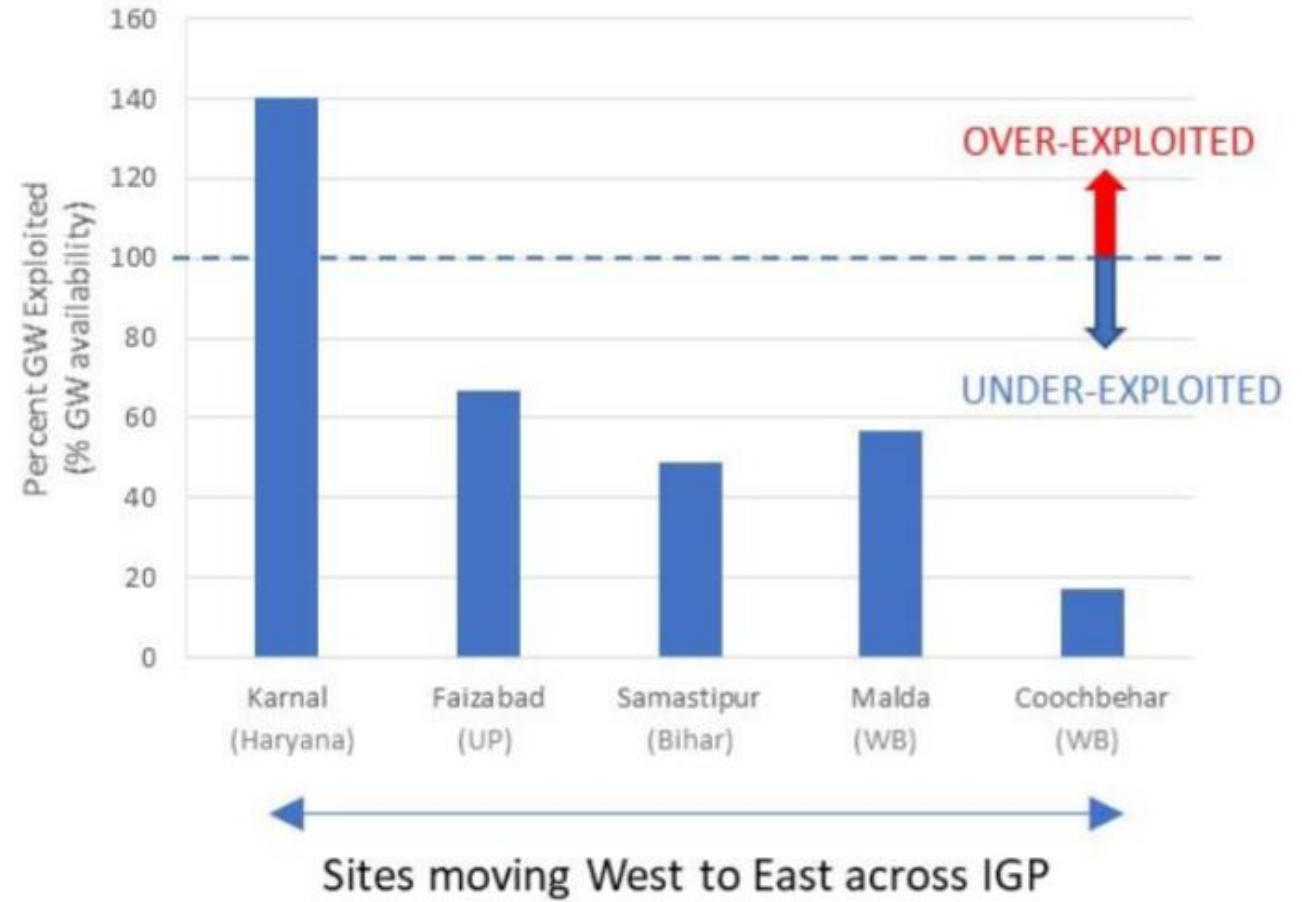
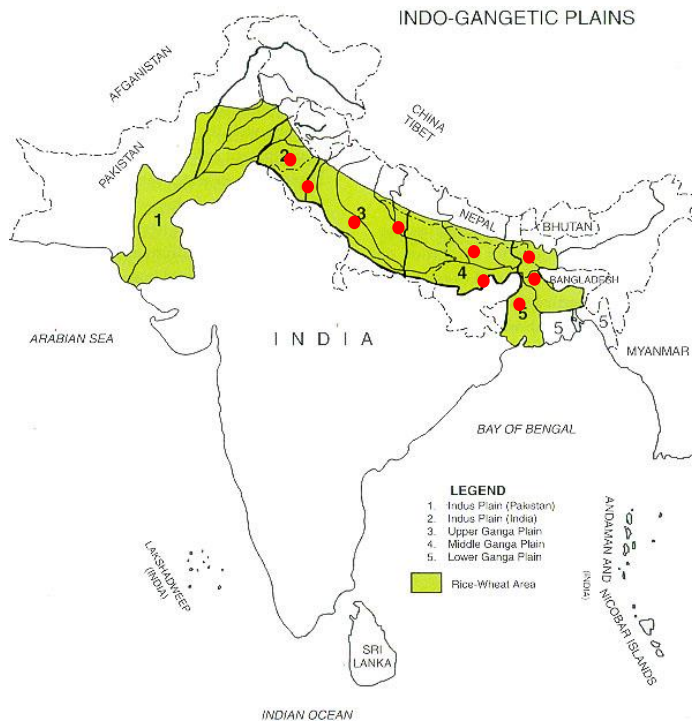


Sustainable groundwater development

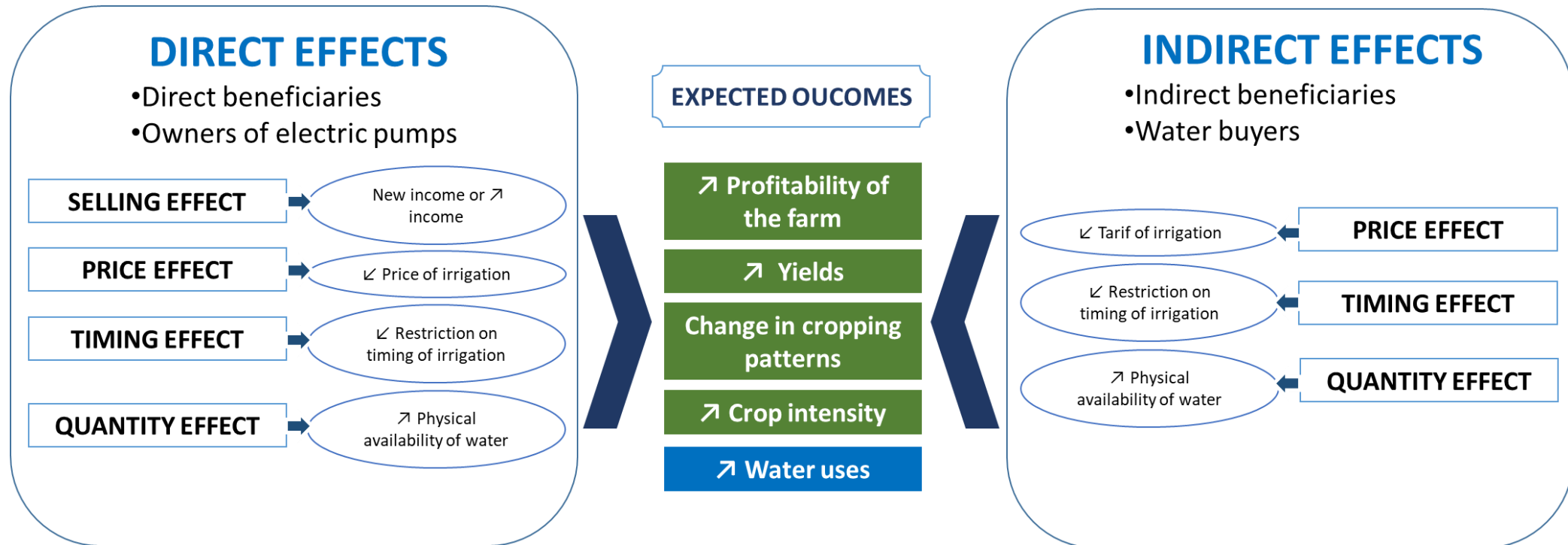
Understanding access and availability



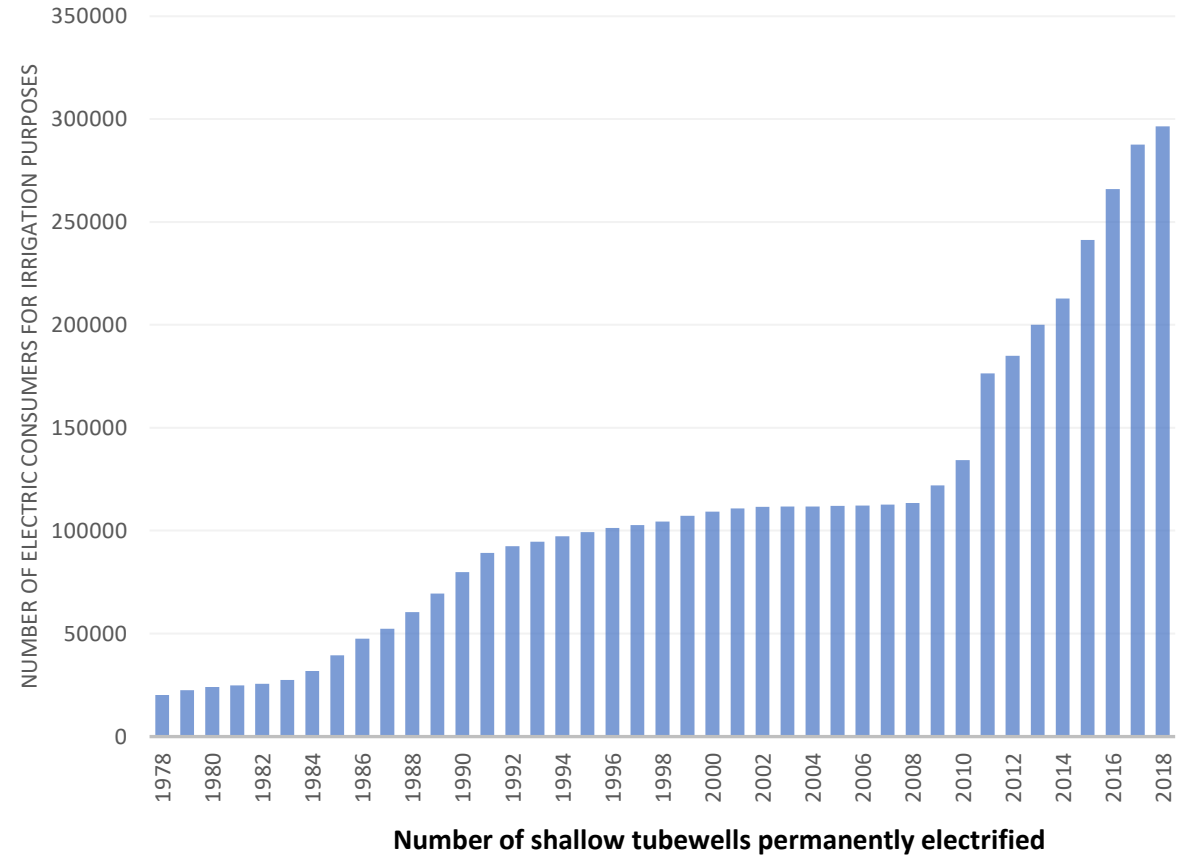
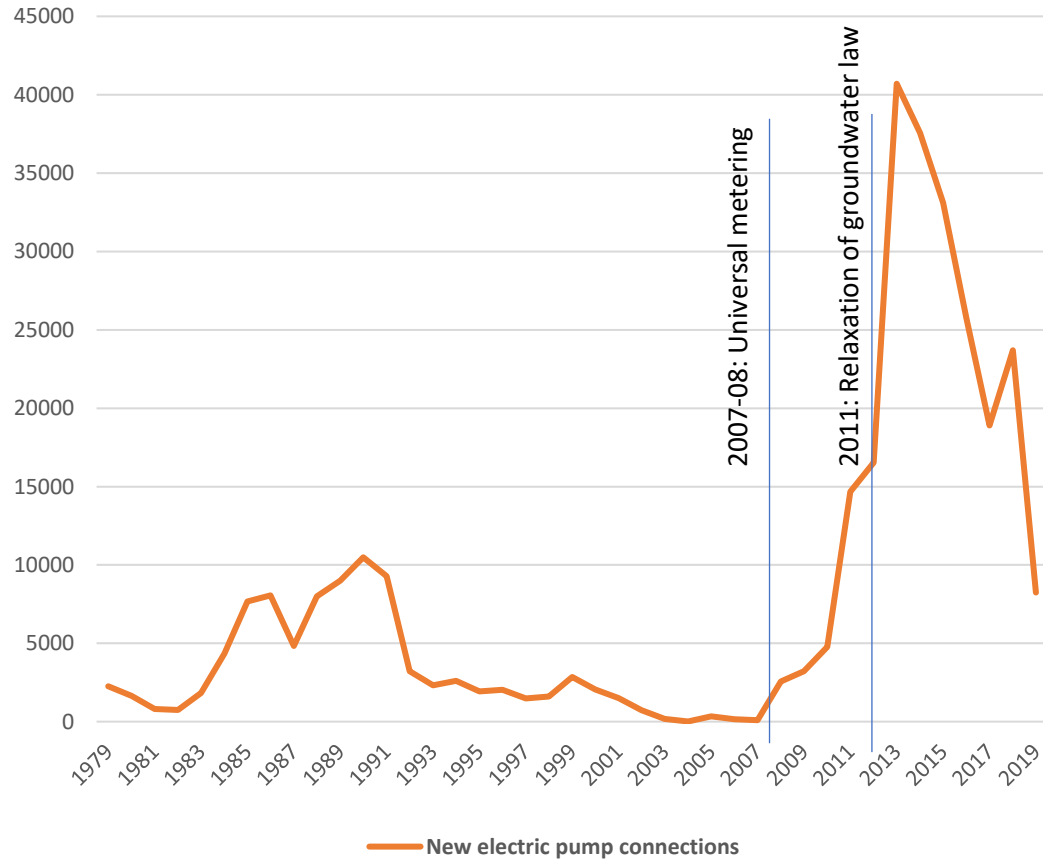
Groundwater availability



The food-energy-water nexus in action: increasing access to electricity

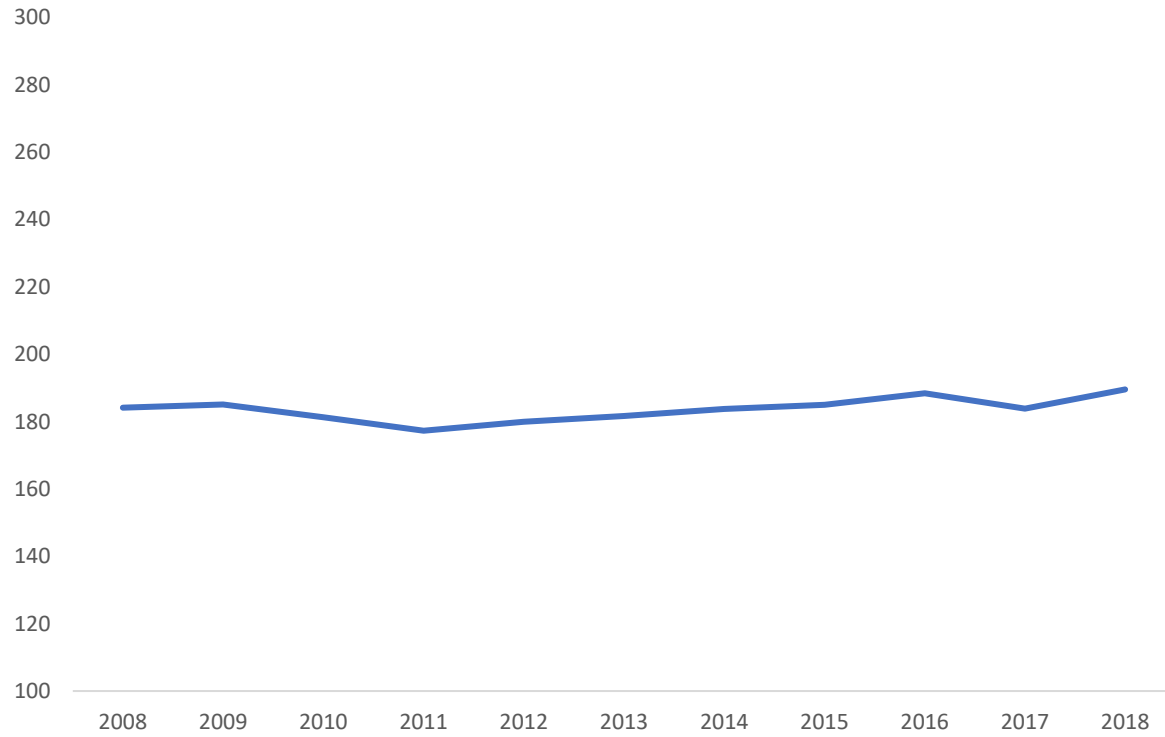


Trends in electrification of agricultural tubewells in West Bengal

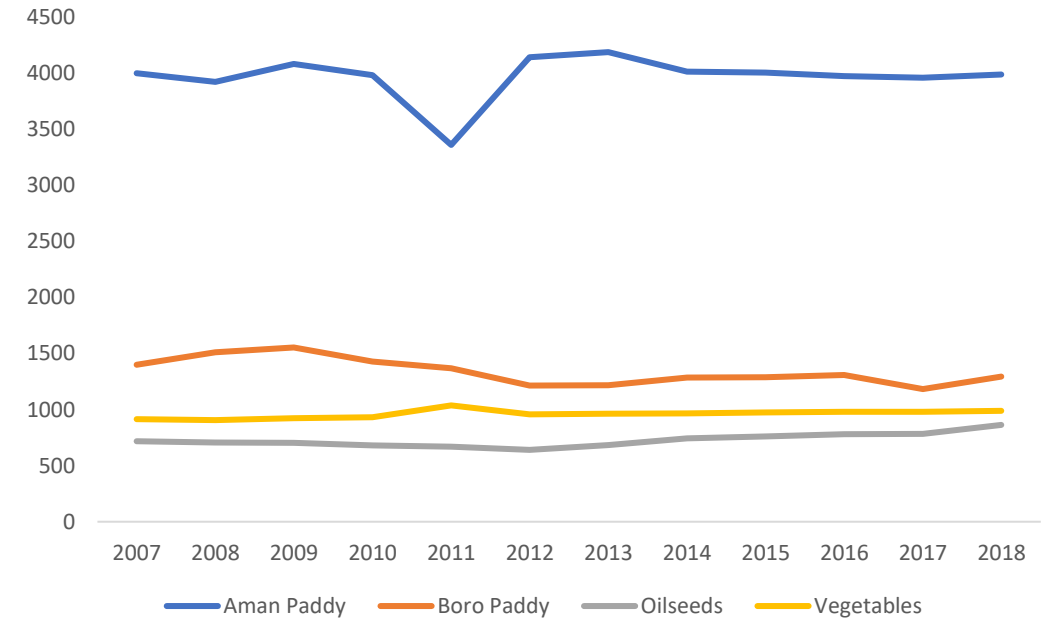


216,000 tubewells permanently electrified from 2011 to 2019

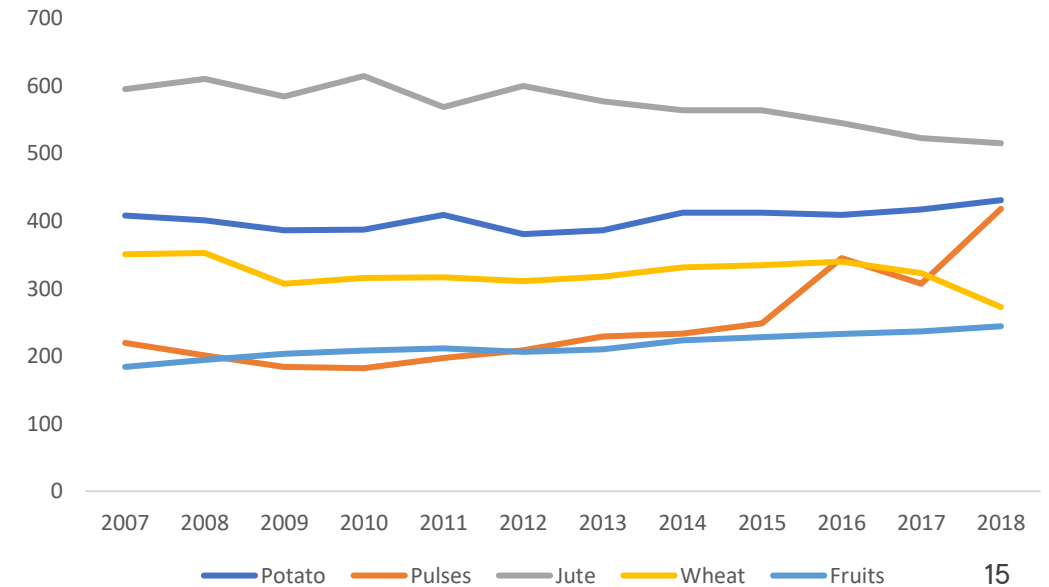
Impacts on agriculture



(a) Cropping intensity



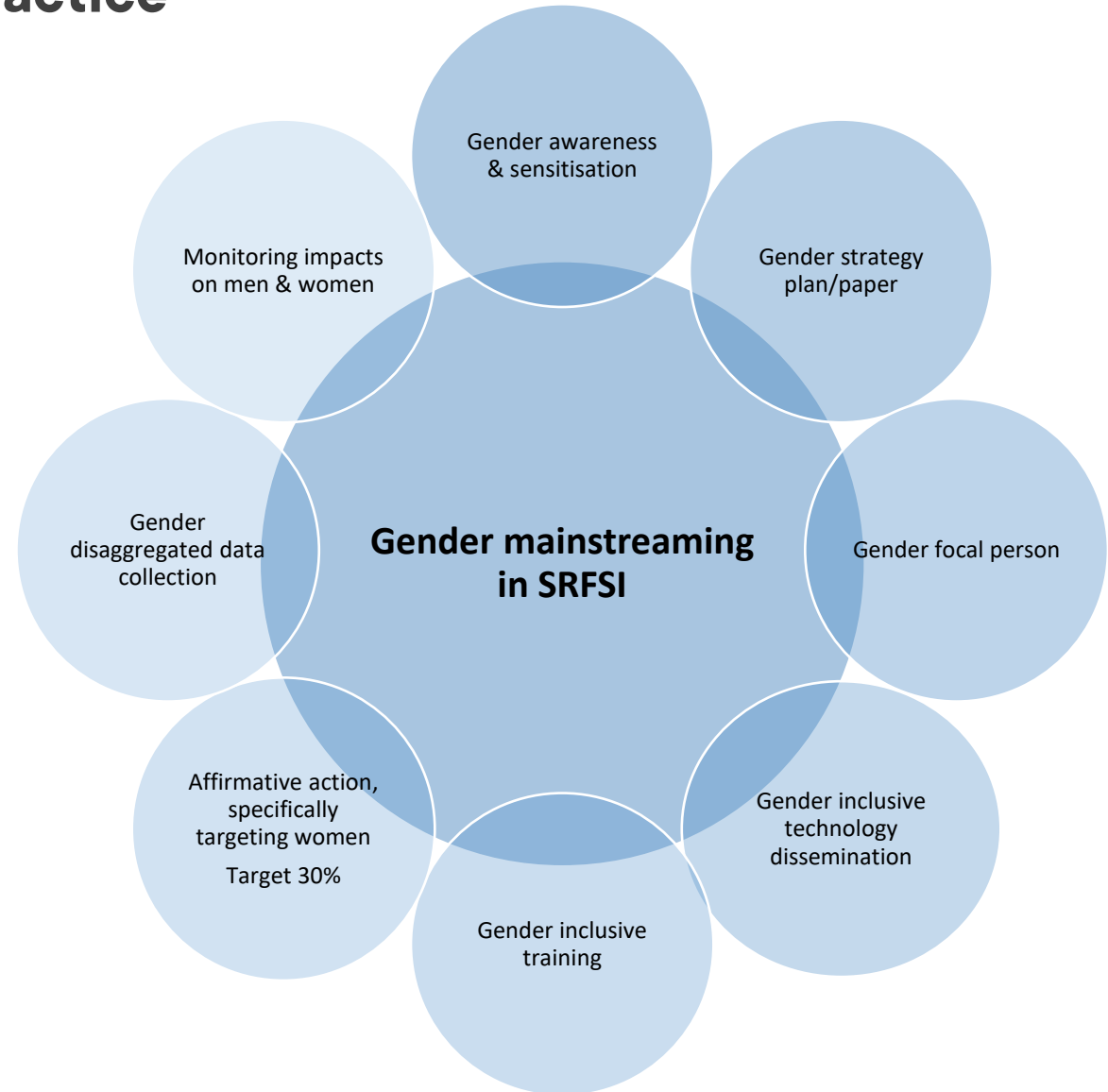
(b) Area (thousand of ha) cultivated with major crops



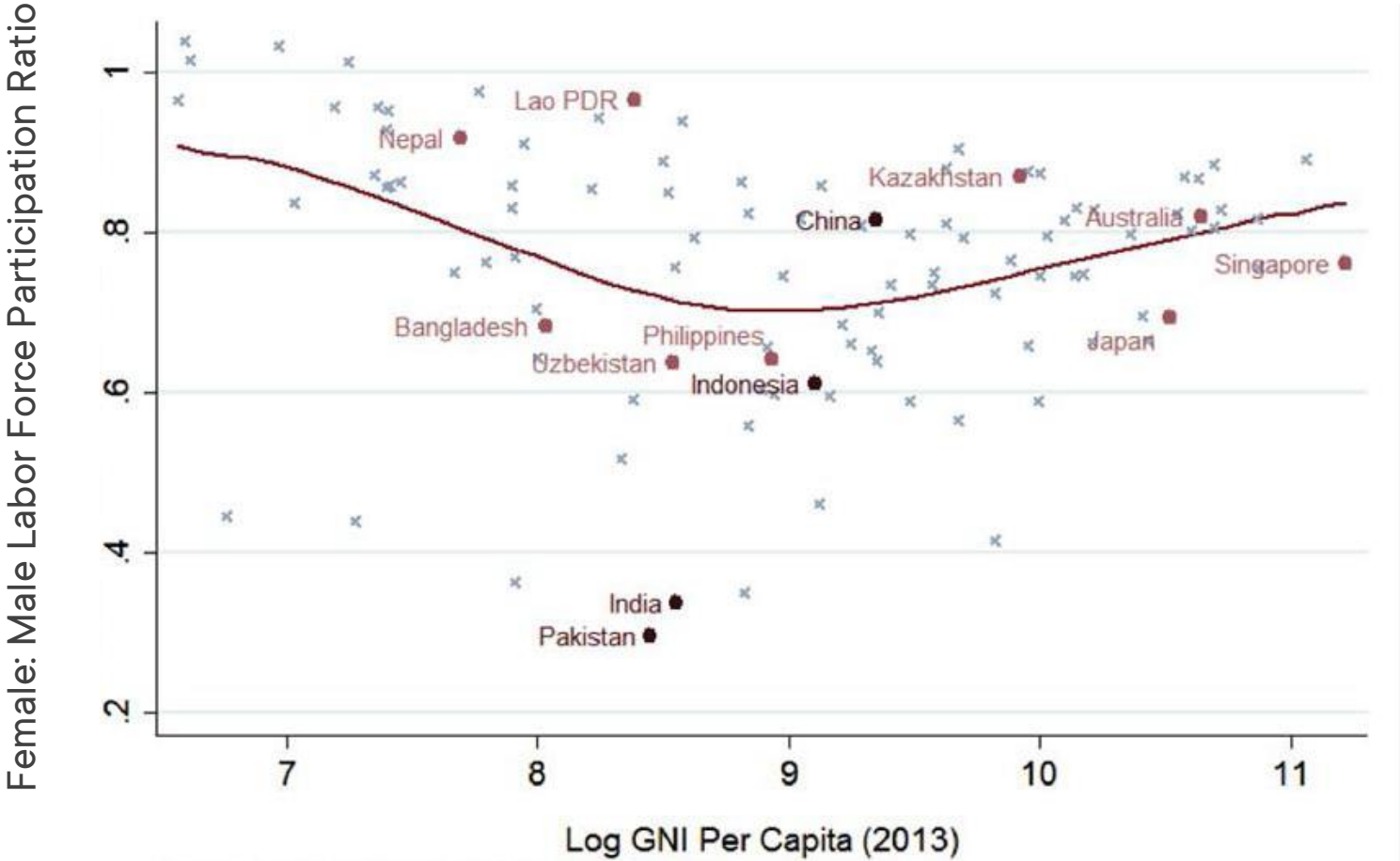
(c) Area (thousand of ha) cultivated with major crops

Gender

Contributing a richer, more nuanced understanding of trends in gender dynamics through research and practice



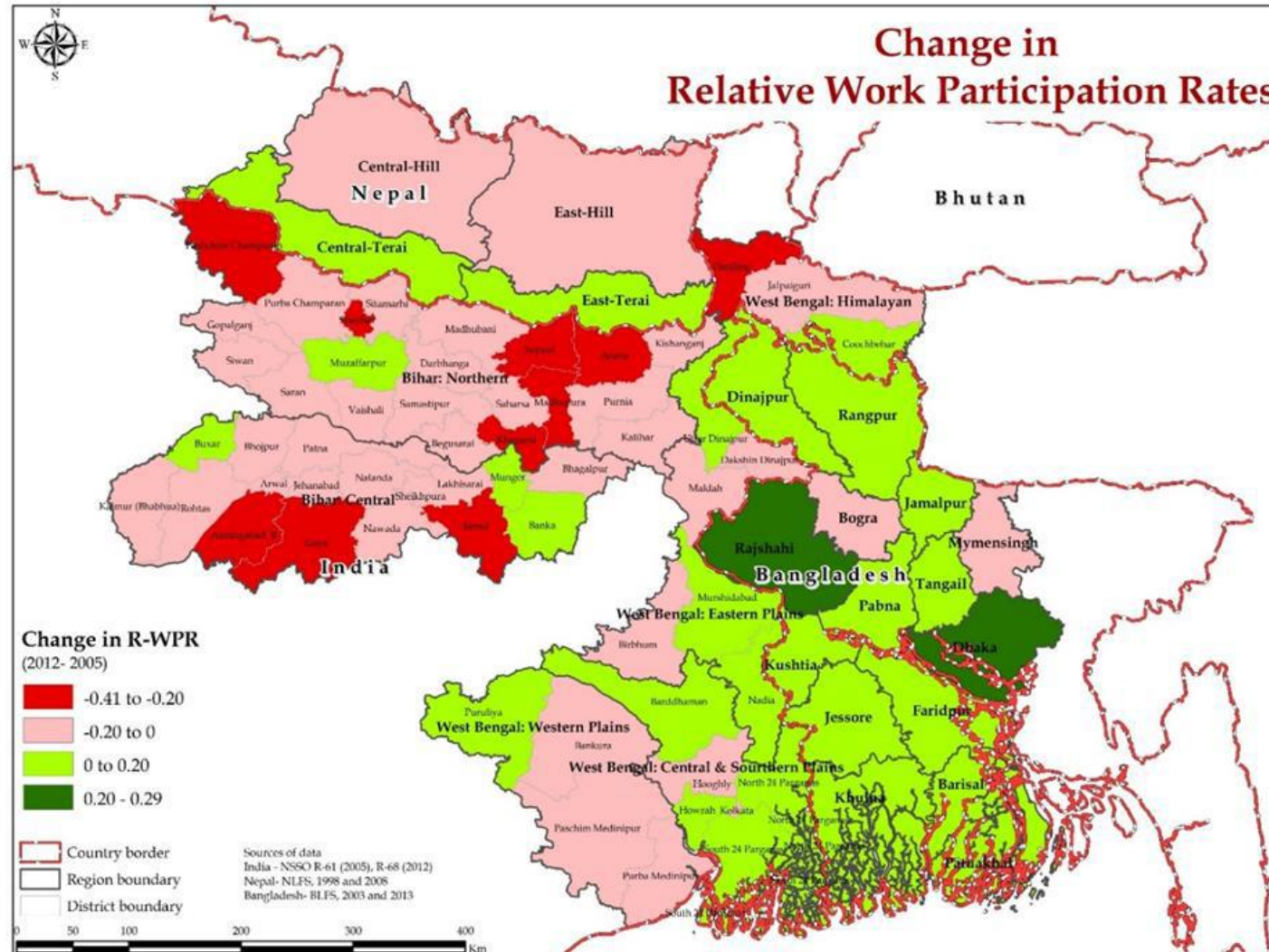
Global trends: women's participation in the workforce



Notes: Labor data for Ages 15+. Excludes the Middle East.
Sources: World Bank (GNI) and International Labor Organization (LFPR), 2013.

Source: Fletcher et al. (2018)

Change in relative work participation rates between 2005 - 2012



Source: Sen et al. (2019)

Matching macro trends with micro actions



Climate change projections

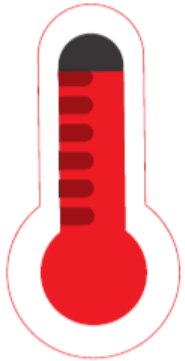
HOW WILL THE CLIMATE CHANGE?



RAINFALL

INCREASED VARIABILITY, DRIER WINTERS

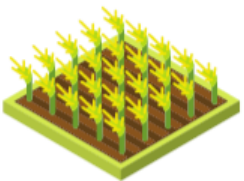
- Total rainfall will increase by 10%, mostly during the monsoon period
- Winters will be drier
- Floods and droughts will occur more often and be more intense



TEMPERATURE

MORE HOT DAYS, AND HIGHER WINTER TEMPERATURES

- Temperatures will increase by 1.5 degrees
- Extreme heat days will increase 2 - 3 x
- Warmer winters and night time minimums



EVAPOTRANSPIRATION

INCREASED BY 5 - 7%

IMPACTS ON AGRICULTURE



GRAIN YIELDS

- Grain yields will fall 10 - 15%
- Higher CO₂ concentrations will boost crop growth rates and yields for C₃ plants (e.g. rice, wheat, soybean)
- High temperatures will reduce growing season length (particularly rabi) and push many regions beyond optimal growing conditions



NUTRITION

- Higher CO₂ concentrations may cause lower nutritional content, e.g. zinc (9%), iron (5%) and protein (6%)
- Regimes of pests and pollinators will change



PEST AND DISEASE

- Regimes of pests and pollinators will change, but not enough is known about how

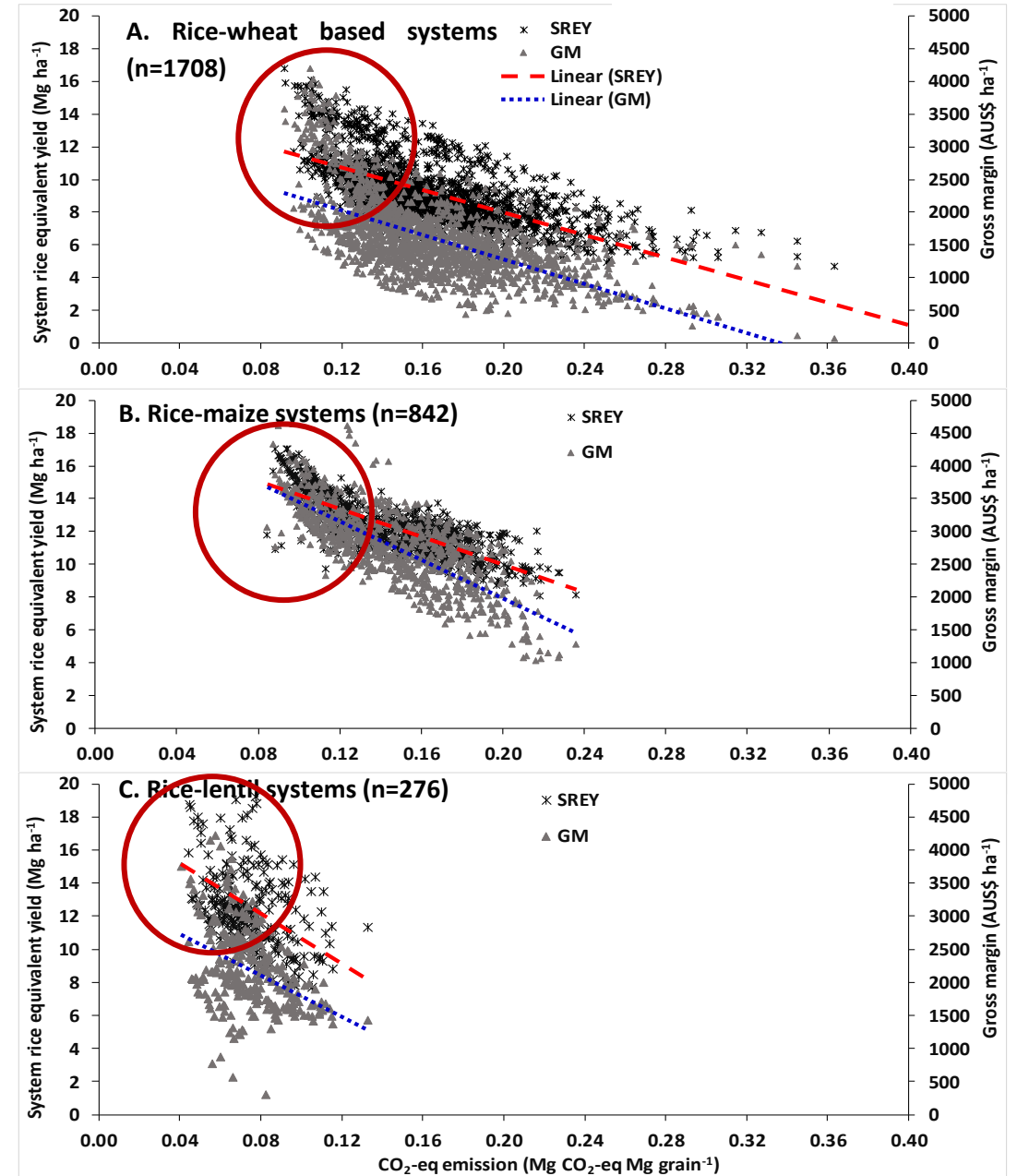
BY 2100, MANY PARTS OF THE EGP WILL BE UNSUITABLE FOR GRAIN PRODUCTION

Climate change impacts: Mitigation opportunities



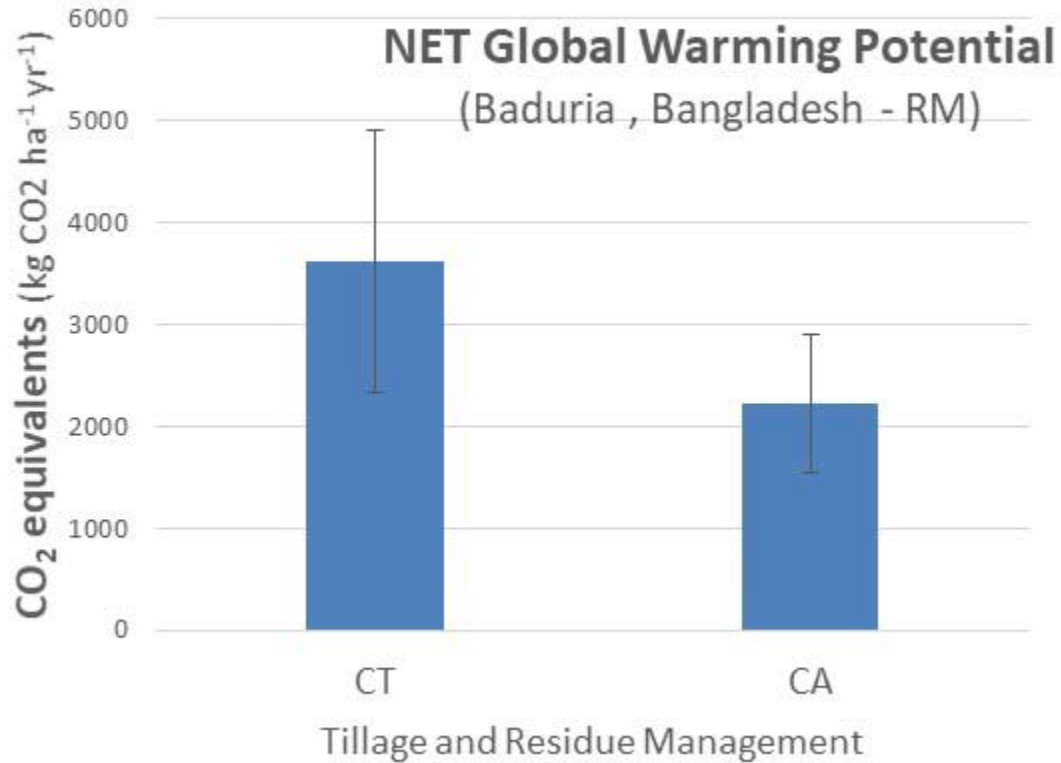
Lower
emissions

Higher yield
& profits

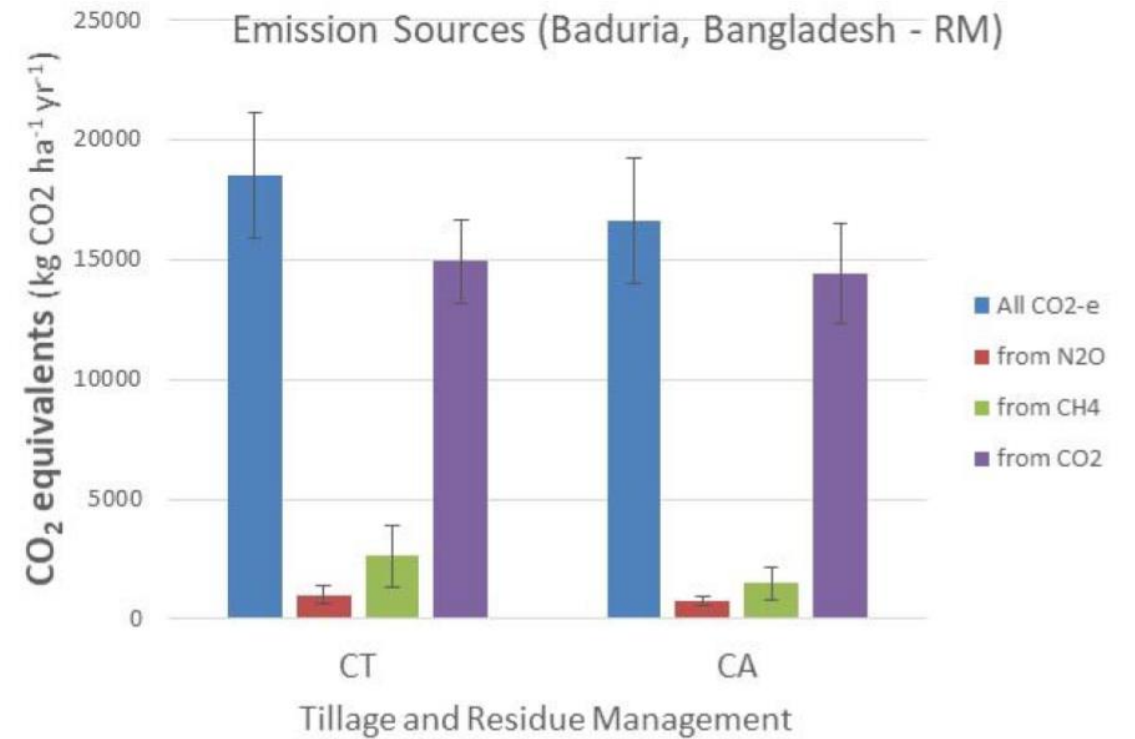


System rice equivalent yield (SREY) and gross margin (GM) against system CO₂-equivalent emissions for different cropping systems in the EGP

Climate change impacts: Modelled results, projections to 2050



Simulated NET Global Warming Potential (GWP) (in CO₂-equivalents) in the rice-maize cropping system at Rajshahi, Bangladesh, for 2050, RCP6.0

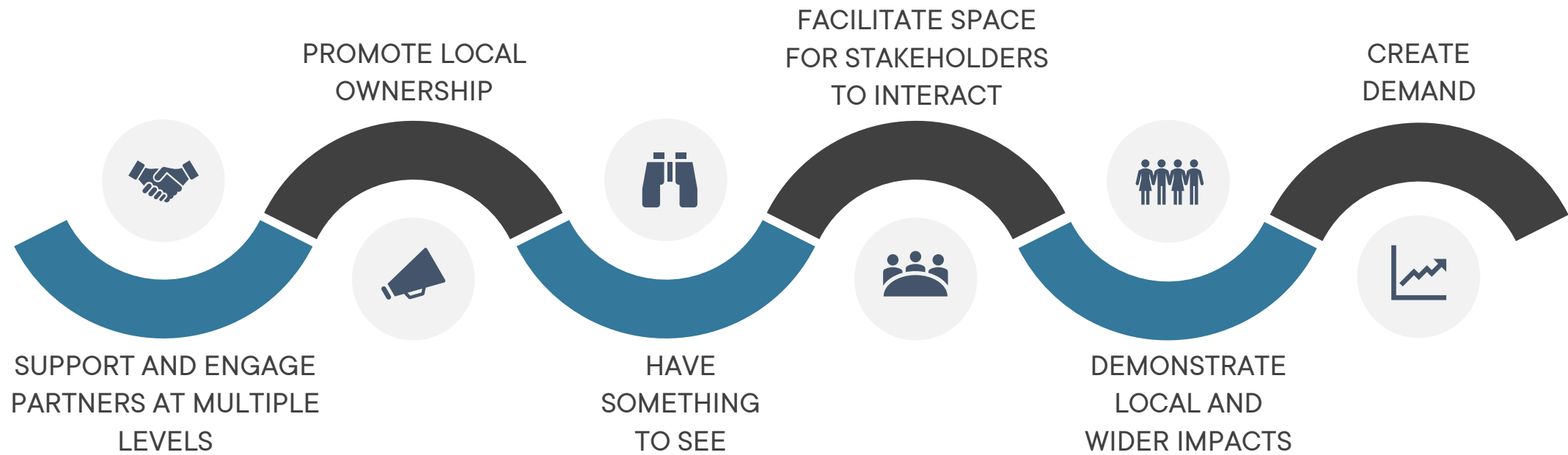


Simulated annual greenhouse gas (GHG) emissions (in CO₂-equivalents) in the rice-maize cropping system at Rajshahi, Bangladesh, for 2050, RCP6.0, illustrating the relative contributions from CO₂, CH₄ and N₂O

A photograph of a man in a white shirt standing in a field, possibly a cornfield, with agricultural machinery and a blue semi-transparent overlay. The text "Sustainability of project outcomes" is centered in white.

Sustainability of project outcomes

Pathways to impact



Value adding through work at multiple scales



Match scaling out with scaling up



Multiple scales = multiple partners



Understand high level trends AND the factors that drive them at the local scale



Increase opportunities for regional cross-learning

Nepal: Understanding wider drivers of the food system



“The COVID-19 crisis and on-going federalisation related challenges offer an opportunity for Nepal to rebuild its stagnant and fragmented agriculture and food systems, and make it resilient to future shocks and disturbances ensuring environmental sustainability and healthy diets”

- Dr Madhav Karki, CGED Nepal



West Bengal: Scaling sustainable farming practices to address challenges in the wider food system



“Today what we are and where we are is mostly due to the SRFSl project and the guidance of experts like you”

- Koushik Barman, Satmile Farmers Club





Lessons and next steps

Future work: Transforming smallholder food systems in the EGP

ACIAR Project 2021-2025, \$4.6m

Enabling transformation of the food system in the EGP to improve farm livelihoods through diversification, while reducing inequity, production risk and unsustainable resource use.

- Understanding and promoting effective mechanisms that make reaching smallholder farming households at scale more effective
- Understanding how food policies in Bangladesh, India and Nepal support diversified food systems, and how they can be better implemented
- Sustainable development of groundwater to support food systems transformation

Partners



Lessons and challenges



Australian Government
**Australian Centre for
International Agricultural Research**



Australian Government
Department of Foreign Affairs and Trade



**Australian Centre
for International
Agricultural Research**



<https://nation.com.pk/04-Apr-2020/sindh-punjab-water-share-up-as-irsa-starts-using-digital-tool>

COVID

Opportunities for sustainable food systems in Nepal in a post-COVID world

The COVID-19 crisis offers an opportunity for Nepal to rebuild its stagnant and fragmented agriculture and food systems and make it resilient to future shocks. [Read More](#) →

MADHAV KARKI · SEPTEMBER 1

Exploring the Private Sector Investment Context in the Eastern Gangetic Plains

Author: Vikas Goswami
Organisation: Boundless Environment Resource Solutions



CASI AgMOOC: Learning during lockdown

More than 7,000 people joined a 6 week online course on CASI systems. [Read More](#) →

MANISHA SHRESTHA · APRIL 12, 2020

Ensuring food security in Bangladesh during COVID-19

An uninterrupted supply line up to the cor

WAIS KABIR · APRIL 24, 2020

India's food system in the time of COVID-19

The COVID-19 response has impacted India's food system due to disrupted supply chains, scarce labour, a credit freeze, changing demand and a pessimistic market outlook. [Read More](#) →

TAMARA JACKSON · APRIL 13, 2020



Mitigating the impacts of COVID-19 on farmers and markets in West Bengal

Satmile Satish Club are helping farmers by procuring wheat and vegetables. [Read More](#) →

MANISHA SHRESTHA · APRIL 20, 2020



Questions



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