GLOBAL RESEARCH ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

Cynthia Rosenzweig, Sonali McDermid, Roberto Valdivia, Tao Li, Erik Mencos; AgMIP

Evaluation of Mitigation and Adaptation Co-benefits (MAC-B) of Agricultural GHG Emission Reduction Strategies Over Time

Situation/Issue

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To promote climate change action and the SDGs, there is growing attention by policy-makers, stakeholders, and researchers on interventions* that contribute to both mitigation and adaptation co-benefits, trade-offs, and synergies

COP21·CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

*e.g., sustainable intensification, soil carbon sequestration, crop-livestock systems

Flagship Project Goal(s)

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- Implement a modeling approach to rigorously and comprehensively evaluate agricultural practices that deliver both mitigation and adaptation benefits.

- Work with key stakeholders to accelerate the process of identifying the most promising options, and thus progress to trialing and scaling more quickly than has generally been done to date.

- Apply this methodology for major agricultural systems in many regions worldwide.

Pilot project funding from ACIAR

Anticipated Flagship Outcomes/Impacts

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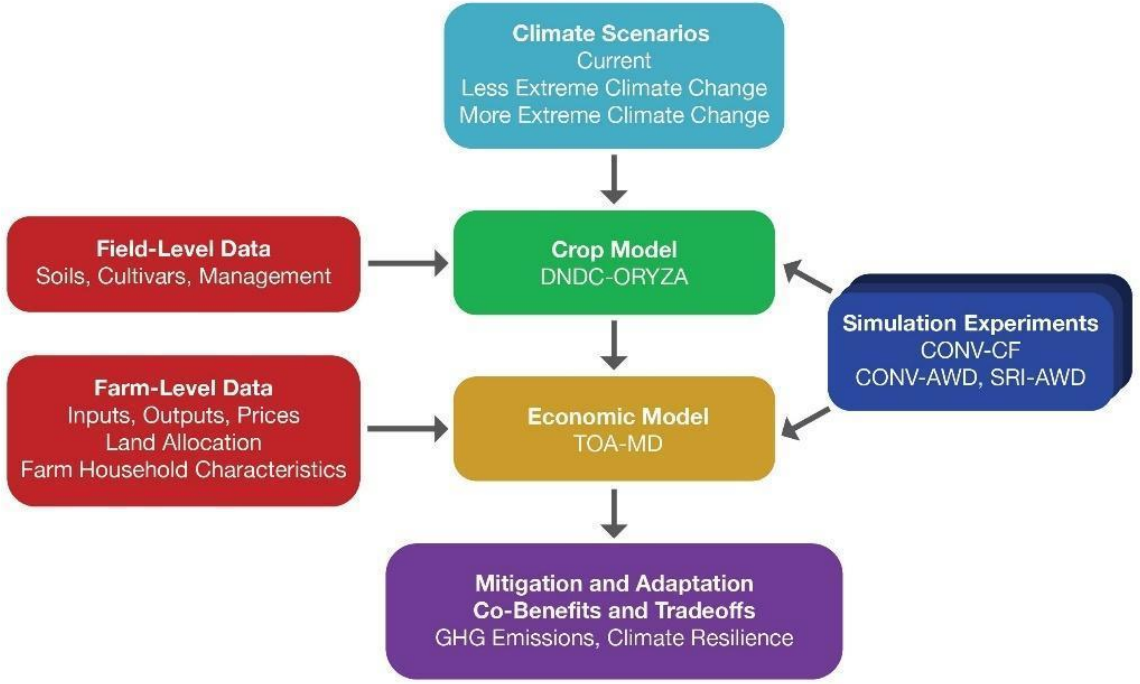
- The MAC-B Flagship Project has developed tools by which national stakeholders can learn how mitigation strategies in agriculture interact with climate change, as well as adaptation.

- The MAC-B Flagship pilot project funded by ACIAR developed and applied new protocol-based methods for providing country-level decision-makers the evidence base needed to ensure that mitigation strategies have lasting impact.

- The project has generated new knowledge with high scientific impact and a journal article is currently under review



Rosenzweig et al., in review

Flagship Project Partners

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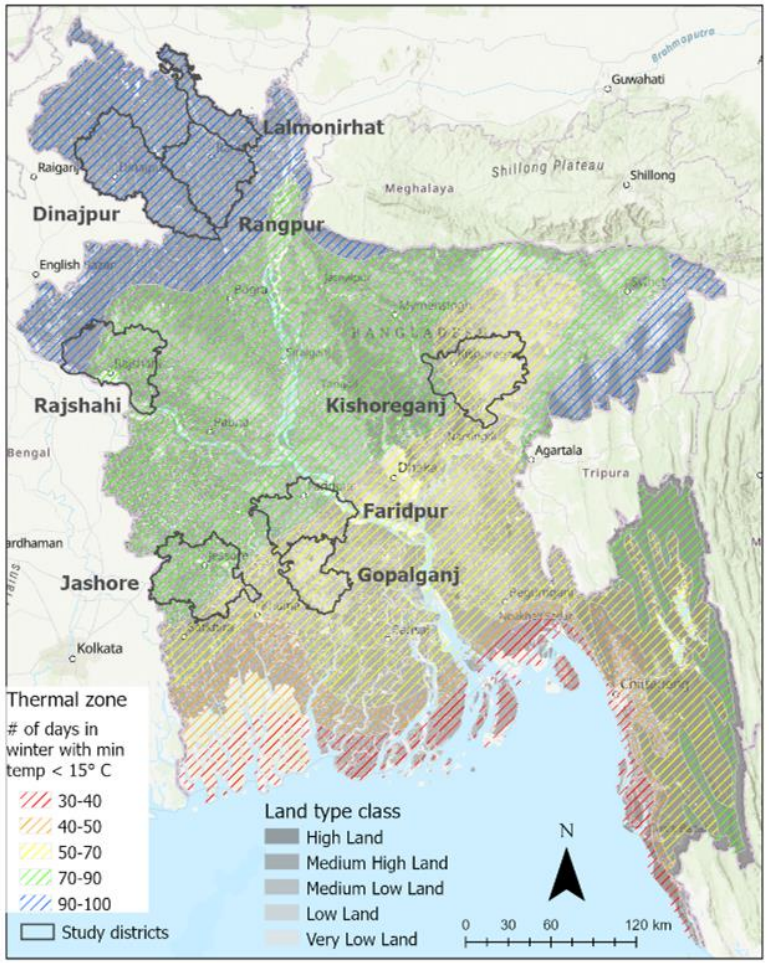
Bangladesh Rice Research Institute
Bangladesh Agriculture Research Institute
Bangladesh Met Department
Bangladesh Ministry of Public Admin.
CIMMYT Bangladesh

AgMIP
Columbia University/NASA
Oregon State University
New York University
DNDC-ART / IRRI

MAC-B Stakeholder Workshop
Sep 2022

Activities/Results To Date



Rosenzweig et al., in review

- **Climate projections:** CMIP6 SSP2-4.5; HadGEM, MIROC6
- **Crop Models:** DNDC-Oryza, APSIM
- **Rice yield and cropping management:** Field survey conducted in Bangladesh from 2019 to 2021
- **Soil data:** Extracted from SoilGrid2.0 of ISRIC and corrected by soil profile data from field experiments
- **Economic model:** TOA-MD

Simulation Experiments for rice systems:

1. Climate change impacts on:

- **Conventional continuous flood (CONV-CF)**
- **Conventional Alternate-Wetting and Drying (CONV-AWD)**
- **System of Rice Intensification with AWD (SRI-AWD)**

2. Technology adoption (current and future climate):

- **Switch from Conventional continuous flood to Conventional AWD**
- **Switch from Conventional continuous flood to SRI-AWD**

Activities/Results To Date

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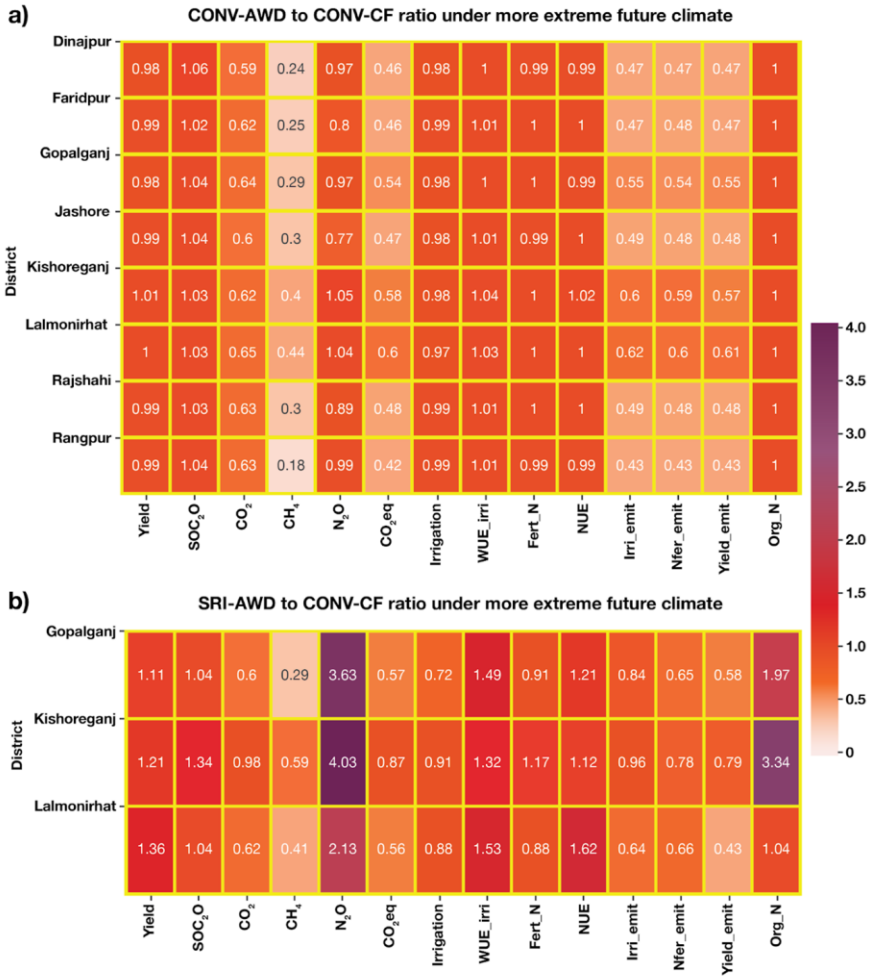

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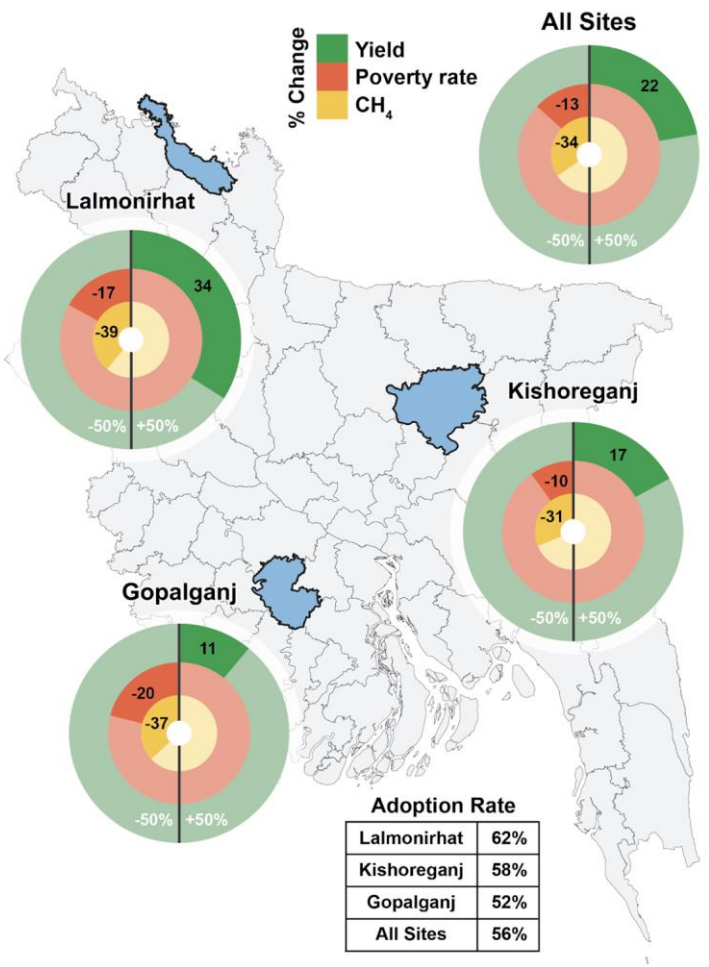
c) Relative changes in socio-economic and environmental outcomes resulting from SRI-AWD adoption by CONV-CF farmers



Adoption Rate

Lalmonirhat	62%
Kishoreganj	58%
Gopalganj	52%
All Sites	56%

Climate change (CC) reduces farm net returns in most sites and increases GHG emissions

Tradeoffs between socio-economic and environmental outcomes:

Adoption of CONV-AWD or SRI-AWD under current or future climate shows strong reductions in GHG emissions of methane and CO2eq.
Changes in N2O emissions vary across sites and farm types (small vs large). Water requirements for irrigation are reduced (a, b)

Both CONV-AWD and SRI-AWD show potential co-benefits in reducing GHG emissions and increasing income and reducing poverty rates in the region (win-win outcomes).
SRI shows the largest benefits (c)

AWD and SRI are likely to be more resilient to CC compared to continuous flood systems

Opportunities to get involved

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- Having completed the pilot study in Bangladesh funded by the Australian Government, AgMIP is seeking funding for continued MAC-B work. Interested GRA country members could fund assessments in their own region or other countries of interest

- Members of the Integrative, Paddy Rice, Croplands, and Livestock Research Groups can provide data and tools and partner with AgMIP to apply the MAC-B protocols for a range of agricultural systems.

- Contacts: crr2@columbia.edu; Roberto.Valdivia@oregonstate.edu; sps246@nyu.edu; t.li@irri.org; erik.mencos@columbia.edu