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ON AGRICULTURAL GREENHOUSE GASES

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

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



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

Flagship Project Goal(s)

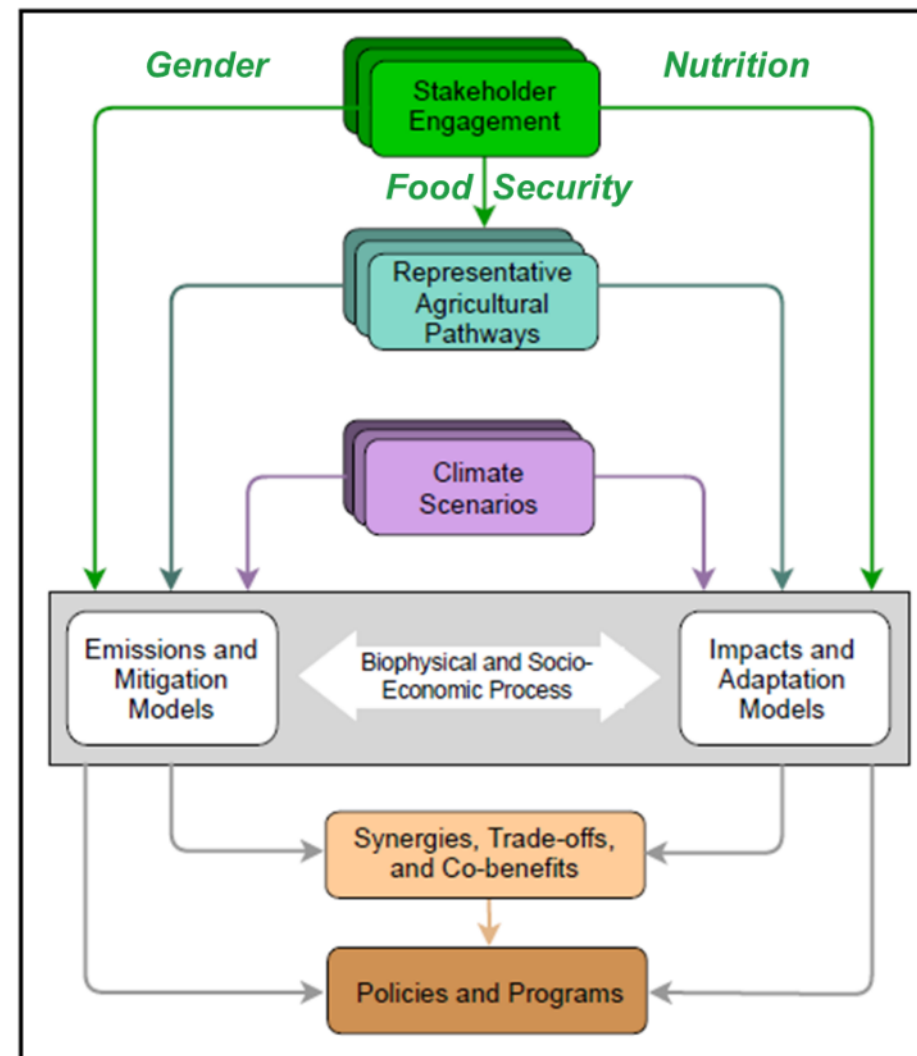
- Trial a modeling approach for quickly and efficiently determining the likely best options for changing agricultural practices in ways that deliver both mitigation and adaptation benefits.
- Accelerate the process of identifying the most promising options, and thus progress to trialing and scaling more quickly than has generally been done to date.
- Apply this methodology in many regions worldwide.

Pilot project funding
from



Anticipated Flagship Outcomes/Impacts

- The MAC-B Flagship Project will develop tools by which national stakeholders can learn how mitigation strategies in agriculture will interact with climate change, as well as adaptation.
- The MAC-B Flagship Project will build on the GRA expert community to develop and apply new protocol-based methods for providing country-level decision-makers the evidence base needed to ensure that mitigation strategies have lasting impact.
- The project will generate new knowledge with high scientific impact contributing to the development of NDCs.



Flagship Project Partners

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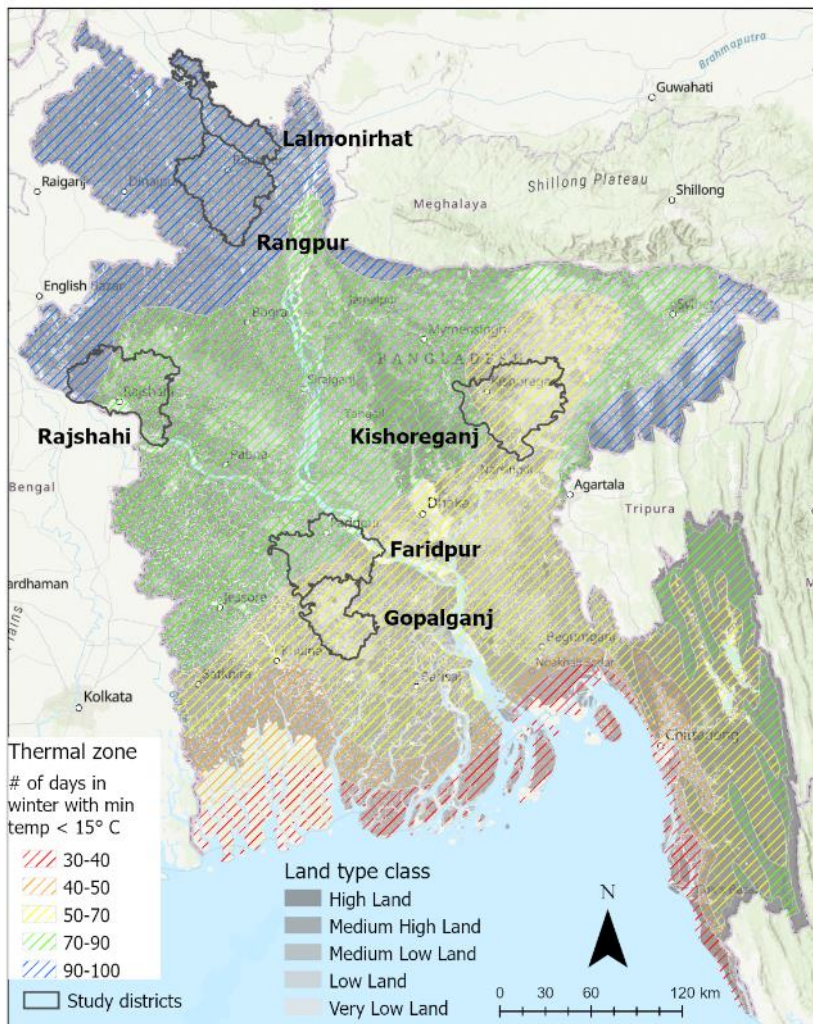
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Bangladesh Rice Research Institute
Bangladesh Agriculture Research Institute
Bangladesh Met Department
Bangladesh Rural Development Academy
CIMMYT Bangladesh

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



Activities/Results To Date



- **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:

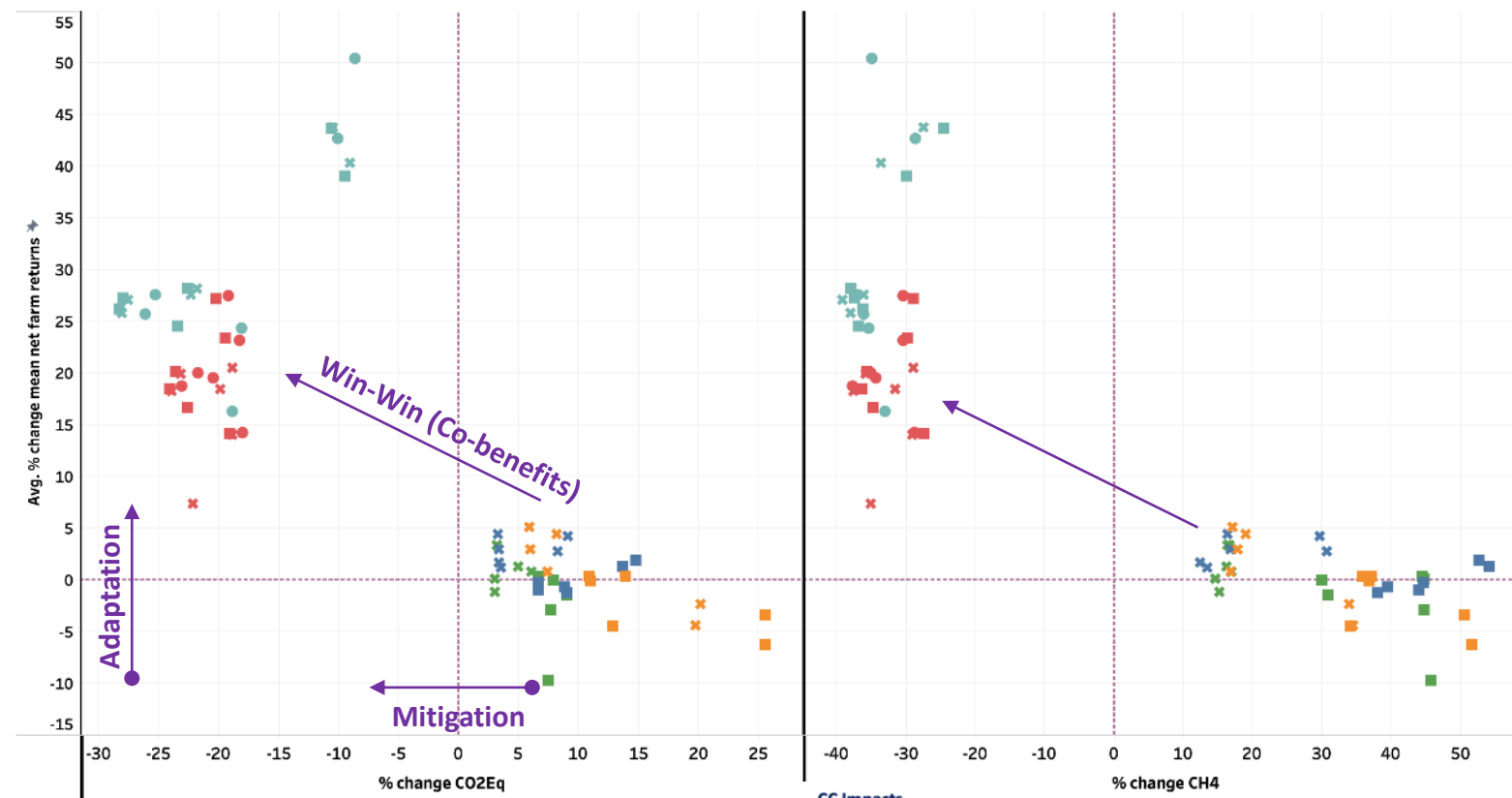
1. Climate change impacts on:

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



Tradeoffs between socio-economic and environmental outcomes

Climate change reduces farm net returns in most sites and increases GHG emissions.

Adoption of Conventional 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.

Both Conventional AWD and SRI 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.

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


Opportunities to get involved

- Contribute data, modeling expertise
- Members of the Integrative, Paddy Rice, Croplands, and Livestock Research Groups will have opportunities to participate in applying their data and tools and developing MAC-B protocols for a range of agricultural systems
- Following the current funding model, we will seek funding from GRA country members interested in MAC-B to fund assessments in their own region or other countries of interest

MAC-B Special Issue in CABI A&B

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Search

Co-Benefits and Tradeoffs to Food Security from Mitigation and Adaptation in Agriculture



This thematic series will publish in
CABI Agriculture and Bioscience.



If interested, contact Dr. Sonali McDermid
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