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 in Bangladesh funded by the Australian Centre for International Agricultural Research; work in Vietnam (data from AgResults) and India funded by Carnegie Corp.; currently in discussion with the Global Methane Hub for additional funding to continue the research.

# Anticipated Flagship Outcomes/Impacts

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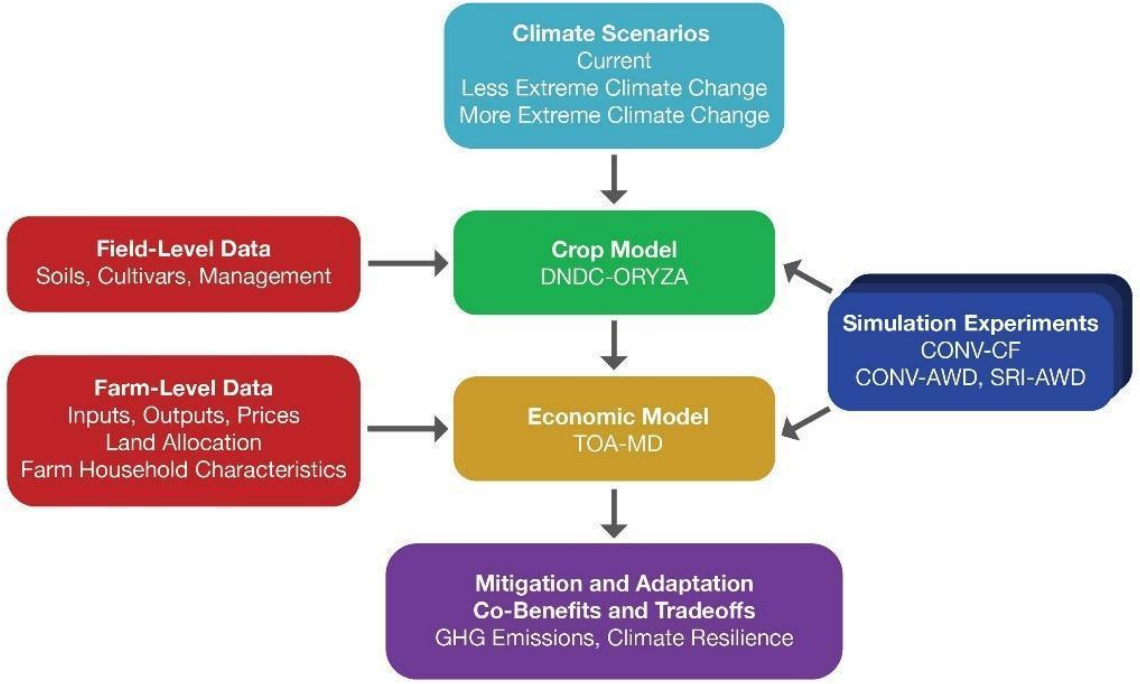
- The MAC-B Flagship Project has developed tools by which national stakeholders can learn how mitigation strategies in agriculture interact with climate change, as well as adaptation.
- The MAC-B Flagship pilot project funded by ACIAR developed and applied new protocol-based methods for providing country-level 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
- We are having discussions with the Global Methane Hub to continue MAC-B efforts, with a workshop at IRRI in The Philippines currently being planned for late Summer 2025.




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
Tamil Nadu Agricultural University, India

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

MAC-B Stakeholder Workshop
Sep 2022

# Activities/Results To Date

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1. We are nearing completion of a journal paper based on the results on the MAC-B Flagship activity in Bangladesh, funded by ACIAR (https://www.aciar.gov.au/publication/clim-2021-109-final-report). Our plan is to submit the paper to Nature Food in the coming weeks.

2. Our team has also published the following paper, which describes AgMIP's MAC-B work in Vietnam. This research was funded by Carnegie Corp. Li, T., McDermid, S. S., Valdivia, R. O., Sundaram, P. (2024). Climate change mitigation and adaptation for rice-based farming systems in the Red River Delta, Vietnam. CABI Publishing. https://doi.org/10.1186/s43170-024-00308-0

This is part of a MAC-B special collection at CABI Agriculture and Bioscience, which also includes:

Hellin, J., Fisher, E., Taylor, M., Bhasme, S. and Loboguerrero, A.M., 2023. Transformative adaptation: from climate-smart to climate-resilient agriculture. CABI Agriculture and Bioscience, 4(1), p.30.

Homann-Kee Tui, S., Valdivia, R.O., Descheemaeker, K., Sisito, G., Moyo, E.N. and Mapanda, F., 2023. Balancing co-benefits and trade-offs between climate change mitigation and adaptation innovations under mixed crop-livestock systems in semi-arid Zimbabwe. CABI Agriculture and Bioscience, 4(1), p.24.

Iizumi, T., Hosokawa, N. and Wagai, R., 2021. Soil carbon-food synergy: sizable contributions of small-scale farmers. CABI Agriculture and Bioscience, 2, pp.1-15.

# Activities/Results To Date

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3. AgMIP hosted its 10th Global Workshop at CIMMYT in El Batan, Mexico (https://agmip.org/agmip10/). One of the key themes of the Workshop was 'Mitigation and Adaptation Co-Benefits and Life Cycle Analysis'. Additionally, a side-session on 'Rice Modeling for Mitigation and Adaptation' was held. We are now in discussion with the Global Methane Hub to develop a project on rice suitability mapping to help guide the investment in innovation in low methane technologies and practices in rice cultivation, starting with a workshop in The Philippines.

4. We have done a series of MAC-B presentations at different venues, conferences, and as invited presenters, including presenting a webinar to the GRA Cropland Research Group (CRG).

5. We are also working on a proposal for potential MAC-B work in Peru and Paraguay, which will be submitted to FONTAGRO. If the proposal is selected for funding, we will have more to report next year.

# Activities/Results To Date

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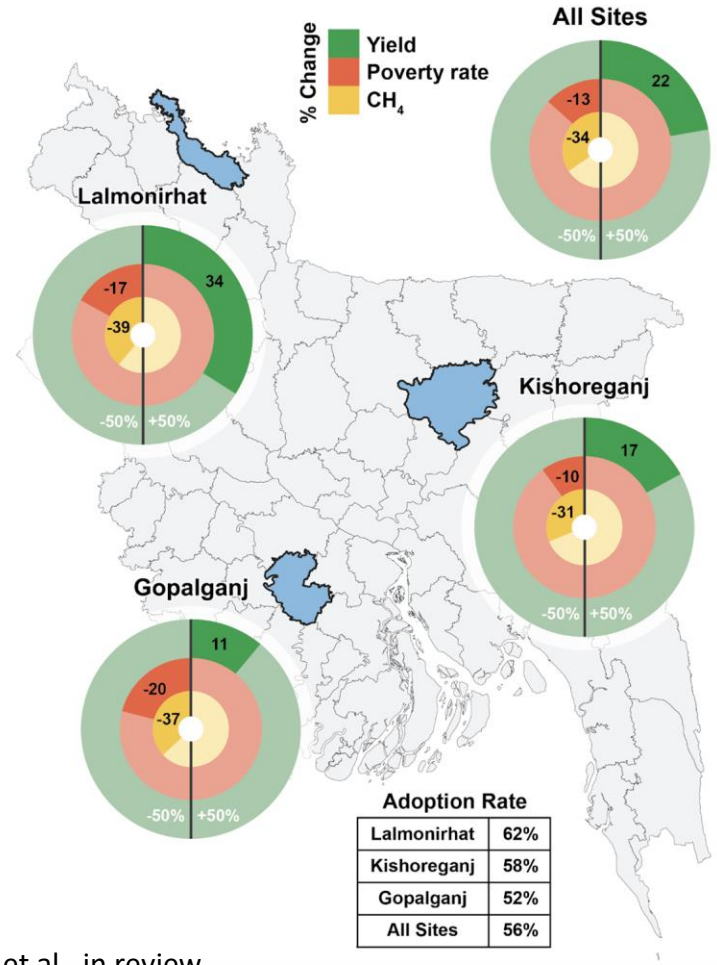
**Relative changes in socio-economic and environmental outcomes resulting from SRI-AWD adoption by CONV-CF farmers**




Rosenzweig et al., in review

**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**

**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**

**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