GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

GRA FLAGSHIP PROJECT PROPOSAL

Title: MAC-B: Mitigation and Adaptation Co-Benefits

Leader: AgMIP/GRA Partnership, Cynthia Rosenzweig and Erik Mencos (NASA GISS/Columbia University)

GRA Council Champions: *list the names of at least 5 GRA Members and Partners (including at least 3 Member countries)*

1. *USA*
2. *France (TBC)*
3. *Canada (TBC)*
4. *Australia (TBC)*
5. *Bangladesh (TBC)*

The activity is led by the Agricultural Model Intercomparison and Improvement Project (AgMIP), a partner of the GRA. AgMIP conducts globally integrated transdisciplinary study of climate change and the food system at regional, national and global scales, including the participation of over 1000 leading researchers from developed and developing nations.

Countries involved:

Currently: Bangladesh, USA, Australia

Intended: Additional GRA country members. We already have expressed interest from colleagues in Vietnam, Zimbabwe, and Peru.

Start date and project length:

Ongoing pilot study in Bangladesh started September 2021 and will end December 2022. Building on the Bangladesh pilot study, we anticipate expanding MAC-B to other GRA countries with full 3-year projects beginning in 2022 and extending to 2025.

Brief description of project:

Based on activities undertaken with the GRA Integrative Research Group, the MAC-B Flagship Project will build a community of experts within the GRA Membership to develop and apply new protocol-based methods for providing national decision-makers evidence-based knowledge about how ensure that mitigation strategies have lasting impact. Evaluation of those strategies under changing climate conditions will help GRA efforts to be adaptive over time.

The efficacy of greenhouse gas emissions reduction strategies may diminish over time under changing climate conditions. The MAC-B Flagship Project will develop tools by which national stakeholders can learn how these strategies will interact with climate change as well as the

interventions undertaken for adaptation. By considering mitigation as well as the impacts of climate change and adaptation interventions over time, national decision-makers can assess the long-term benefits of mitigation. The AgMIP/GRA Partnership will develop a globally-applicable 'Mitigation and Adaptation Co-Benefits' (MAC-B) assessment methodology, adapted from the Agricultural Model Intercomparison and Improvement Project (AgMIP) Regional Integrated Assessment (RIA) approach that has been implemented across Sub-Saharan Africa and South Asia (published protocols available at www.agmip.org). The protocols link agricultural models used to simulate greenhouse gas (GHG) emissions and mitigation interventions and models used to simulate climate change impacts and adaptation. The methods utilize climate, crop/livestock, and socioeconomic data, models and tools in order to assess the efficacy of agricultural mitigation over time, in relation to adaptation interventions, climate change, and food security.

Dedicated stakeholder engagement is embedded throughout the project to ensure that the data, models, and tools developed contribute to climate change decision-making at national levels.

We will hold an annual MAC-B forum for all GRA countries to share lessons learned from the project.

Key partners and existing resources:

We have received 250,000 AUD from the Australian Centre for International Agricultural Research to conduct an initial pilot study in Bangladesh.

Key partners include

> In-country: Bangladesh Rice Research Institute, Bangladesh Agriculture Research Institute, Bangladesh Met Department, and Rural Development Academy, CIMMYT Bangladesh
>
> Support team: Columbia University, Oregon State University, New York University, DNDC-ART

The intended goal is to develop long-lasting partnerships with local researchers, stakeholders, and institutions in each country where we apply the MAC-B methodology.

Benefits and outcome from Flagship project:

This project will apply a modeling approach for quickly and efficiently determining how mitigation options for changing agricultural practices to ensure continuing benefits under a changing climate. The intended long-term outcome is to be able to accelerate the process of identifying the most promising and effective mitigation options, and thus progress to trialing and scaling more quickly than has been done to date. The project will generate new knowledge with high scientific impact.

All countries will benefit from GRA-wide collaboration on MAC-B through learning about the effectiveness of mitigation interventions in a wide range of agricultural and development contexts.

Further Resourcing needs:

We are creating a three-tiered approach to activities and funding, so as to ensure the widest possible engagement among GRA countries.

Tier 1 ($250K/country): Pilot Study with data and model calibration and validation; MAC-B results from one intervention package; Stakeholder engagement (1 year)

Tier 2 ($500K/country): Data and model calibration and validation; MAC-B results from 2 intervention packages; Extended stakeholder engagement, including Researcher/Stakeholder Training (2 years)

Tier 3 ($750K/country): Data and model calibration and validation; national/within country region data platform; Full MAC-B Assessment for multiple interventions (3 years)

We are currently performing a fast-track pilot study in Bangladesh. Our ultimate goal is to complete a full MAC-B regional integrated assessment in Bangladesh, as well as conduct studies in other countries. We anticipate a need of 750K USD per country for a full 3-year MAC-B assessment. As an initial phase, we will complete the full project in Bangladesh and conduct MAC-B assessments in an additional 3 countries from 2022-2025 for a total of $3 million. At the same time, we will be developing MAC-B projects in as many GRA member countries as interest is manifested.

Resourcing mechanisms:

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.

Linkages:

The MAC-B Flagship Project will leverage the GRA GRAMP platform to enhance standardization of data and comparability.

It will also interact directly with the GRA Research Groups and Networks:

Paddy Rice – MAC-B will join with the Paddy Rice Research Group to create data and tools for evaluating interventions for reduction of emissions intensity of paddy rice cultivation systems under changing climate conditions, including how adaptation strategies may affect mitigation.

Livestock – MAC-B will work with the Livestock Research Group to share data and tools to evaluate the potential for reducing the emissions intensity of livestock production systems and increasing the quantity of carbon stored in soils supporting these systems under changing climate conditions and a range of adaptive strategies.

Croplands – MAC-B will work with the Croplands Research Group to share data and tools to evaluate the potential for reducing greenhouse gas intensity and improving overall production efficiency of cropland systems under changing climate conditions and a range of adaptive strategies.

Integrative Research Group – Within the IRG, the MAC-B will interact with the Frontiers of Soil Carbon and the Soil Carbon Stocks and MRV activities.

We will link to other key climate change programs including at the CGIAR and bilateral programs.