AgMIP The Agricultural Model Intercomparison and Improvement Project

Latin America – Effects of Climate on Food Security
Examples from AgMIP

Cynthia Rosenzweig, Roberto Valdivia, John Antle, and AgMIP LAC

Advancing Success Towards SDG2 Through Science and Technology
NASEM Roundtable on Global Science Diplomacy
July 13, 2023

NASA

Columbia University

SDGs and Climate Change

To promote SDG2 and climate change action, there is growing attention by policy-makers, stakeholders, and researchers on interventions* that contribute to both mitigation, adaptation, and food security co-benefits, trade-offs, and synergies

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

Observed and Projected Climate Change Impacts

- Central and South America are **highly exposed, vulnerable and strongly impacted by climate change, a situation amplified by inequality, poverty, population growth, and high population density.**

- **Changes in the timing and magnitude of precipitation and extreme temperatures** in Central and South America are impacting agricultural production.

- **In the Caribbean**, additional warming of 0.2◦C - 1.0◦C, could lead to a predominantly drier region (5–15% less rain than present day), **a greater occurrence of droughts along with associated impacts on agricultural production and yield in the region.**

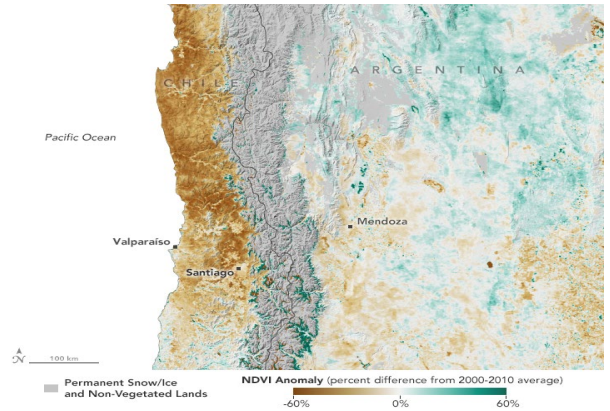
IPCC AR6-WG2 Report

AgMIP The Agricultural Model Intercomparison and Improvement Project

Extreme Events in Latin America and the Caribbean

- 9 of top 20 countries suffering climate-related losses as % of GDP are located in LAC.
- LAC is the most unequal region in the world. Hurricane Mitch (1998) hit Honduras, destroying 18% of assets in the poorest 20% of the population, only 3% for the richest.
- 2020 severe drought in N. Argentina, Paraguay, and Brazil caused US$3B in agricultural losses.
- In 2019, Central Chile had 80-90% rainfall deficit, gov't declared agricultural emergencies.

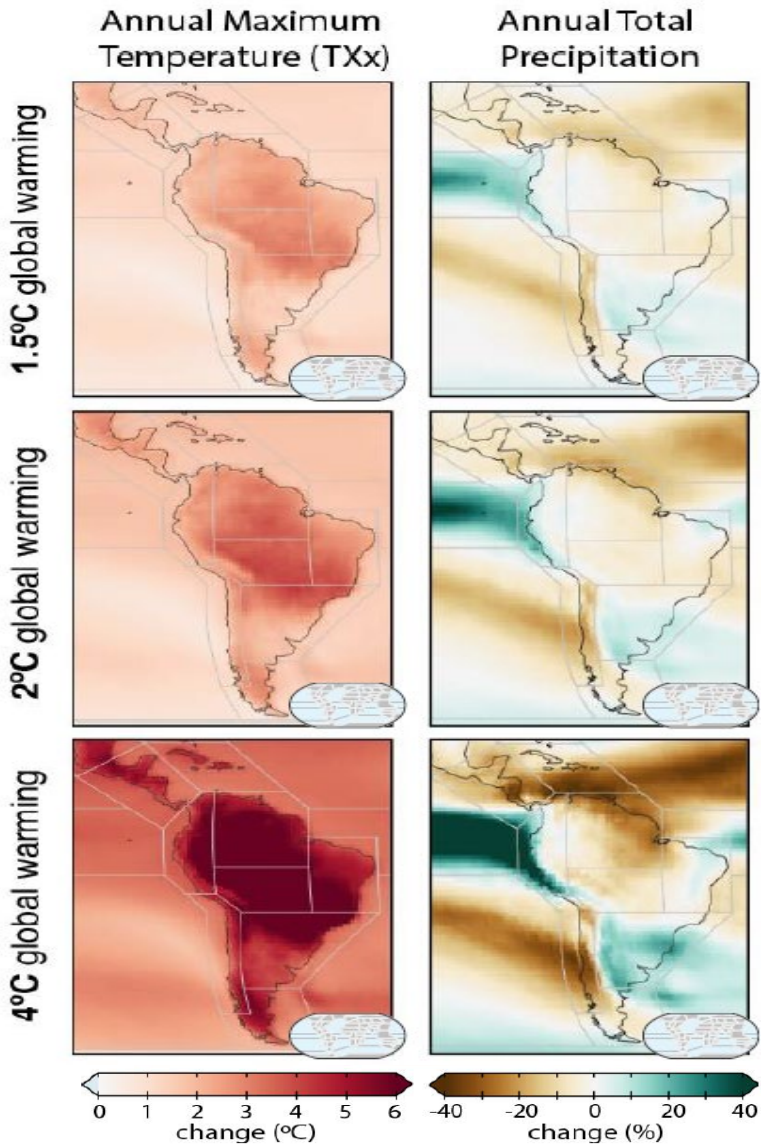
Hurricane Mitch, Oct 27, 1998
Image: NASA



2019 Central Chile Drought (NDVI Anomaly)
NASA, 2020. Image: NASA

Global Center on Adaptation, 2020

IPCC Climate Change Projections



IPCC Interactive Atlas

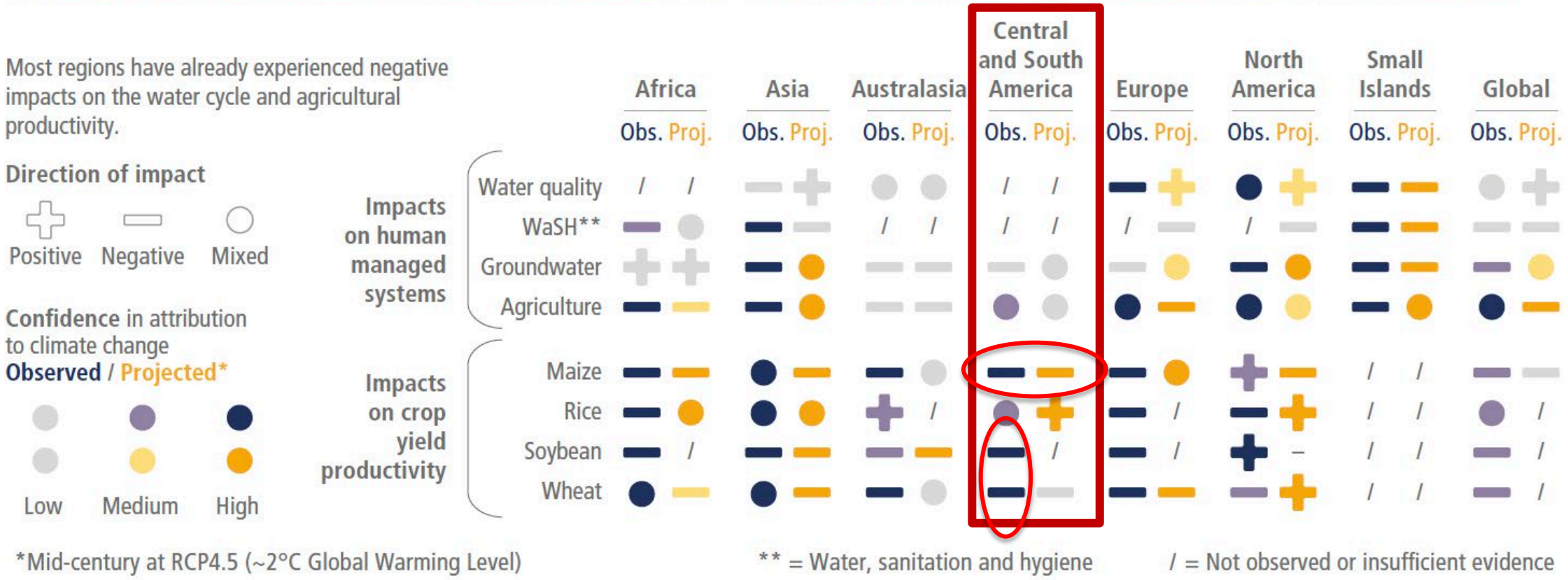
Projected changes in annual mean temperature and annual total precipitation, at 1.5C, 2C, and 4C (in rows) global warming relative to 1850–1900.

Results are based on simulations from the CMIP6 multi-model ensemble (32 global climate models) using the SSP5-8.5 scenario to compute the warming levels.

IPCC AR6-WG1 Report

Observed and Projected Impacts

(c) Observed and projected impacts from climate change in the water cycle for human managed systems and crop yield productivity.



Maize, soybean, and wheat negatively affected

IPCC AR6-WG1 Report

AgMIP The Agricultural Model Intercomparison and Improvement Project

Introduction to AgMIP

- A global network of over 1000 agriculture, climate, and food researchers
- AgMIP convenes scientists and stakeholders to conduct multi-model assessments
- Biophysical and economic impacts of practices, technologies, and incentives for current and future climate conditions
- Outcome: Science base for decision-making for SDGs and Paris Agreement

AgMIP The Agricultural Model Intercomparison and Improvement Project

Worldwide Science Community

Since 2010

1st Global Oct 2010

2nd Global Oct 2011

3rd Global Oct 2012

Sub-Saharan Africa #3

South Asia #3

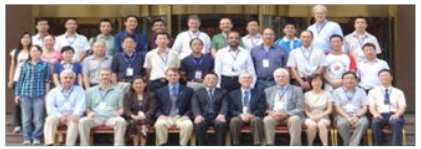
4th Global Oct 2013

8th Global
Oct 2020 (Virtual)

Wheat #2

Maize[2]

Rice



Latin America & Caribbean #2

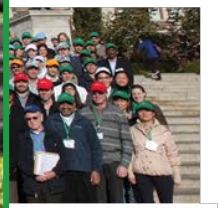
Worldwide Science Community

Since 2010

Oct 2011

3rd Globa

South Asi



l Oct 2013

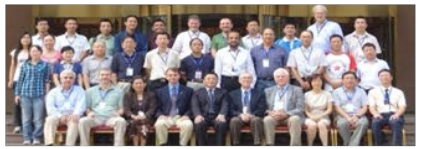
9th Global
June 2023

8th Global
Oct 2020 (Virtual)

Wheat #2

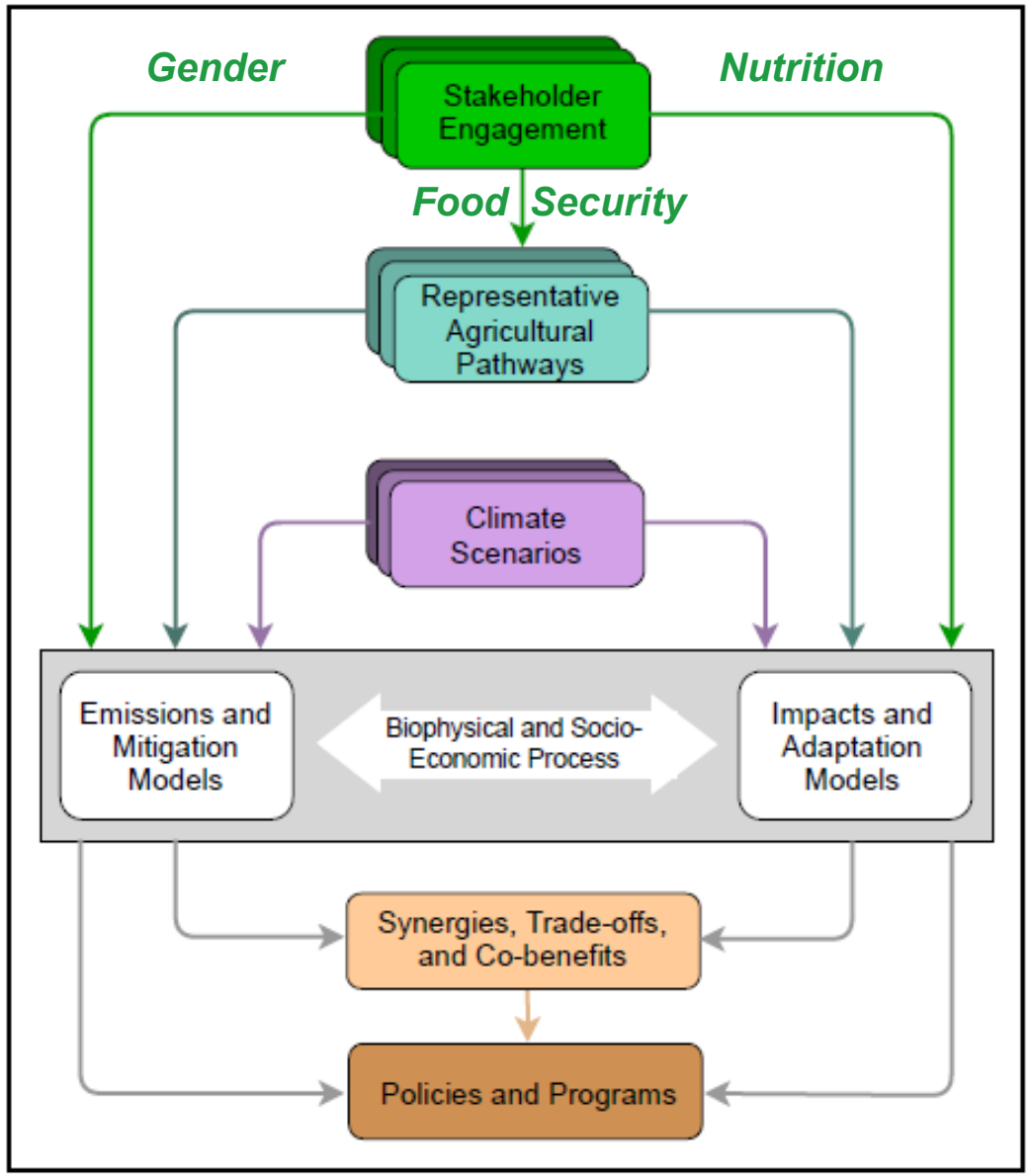
Maize 2

Rice



Latin America & Caribbean #2

MAC-B Assessment Framework



Global Research Alliance Flagship Project

https://globalresearchalliance.org/flagship-projects/mac-b/

10

Climate Adaptation Assessment

Farming system	Adaptation package
 *Tomato*	Drought resistant varieties and improved irirgation systems
 *Pepper*	Drought resistant varieties and improved irirgation systems
Sugarcane 	Soil conservation practices, improving soil nutrients, organic matter and bio-fertilizer (CSA, CA) Improved crop varieties and diversification Microdosing and irrigation and drainage management Support on initial investments
 *Cassava*	Integrated Pest management and improved crop varieties (CSA)

Conclusions

- Climate change threatens the achievement of the SDGs in the LAC region.
- AgMIP protocol-based approach to SDG and climate assessment facilitates collaborative analysis, research synergies, and learning across regions and countries in LAC.
- Improving capacity of both scientists (on the use and implementation of the RIA methods and tools) and policymakers (on the understanding and use of the results) is critical.
- Investments in bio-physical and socio-economic data are needed to leapfrog into science-based technologies for advancing SDGs, climate change adaptation, and mitigation.

AgMIP The Agricultural Model Intercomparison and Improvement Project

Thank You

For protocols, up-to-date events and news, and to join AgMIP, visit www.agmip.org