

A New Trans-Disciplinary Approach to Regional Integrated Assessment of Climate Impact and Adaptation in Agricultural Systems



Ibrahima Hathie
Initiative Prospective Agricole et Rurale (IPAR)
&
AgMIP CIWARA CO-PI
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Provide effective science-based agricultural
decision-making models and assessments of climate
variability and change and sustainable farming systems to
achieve local-to-global food security



3 Focus areas

Modeling for
Sustainable
Farming Systems

Coordinated Global and
Regional Agricultural
Assessments

AgMIP

NextGen
Knowledge Products,
Improved Models, Data

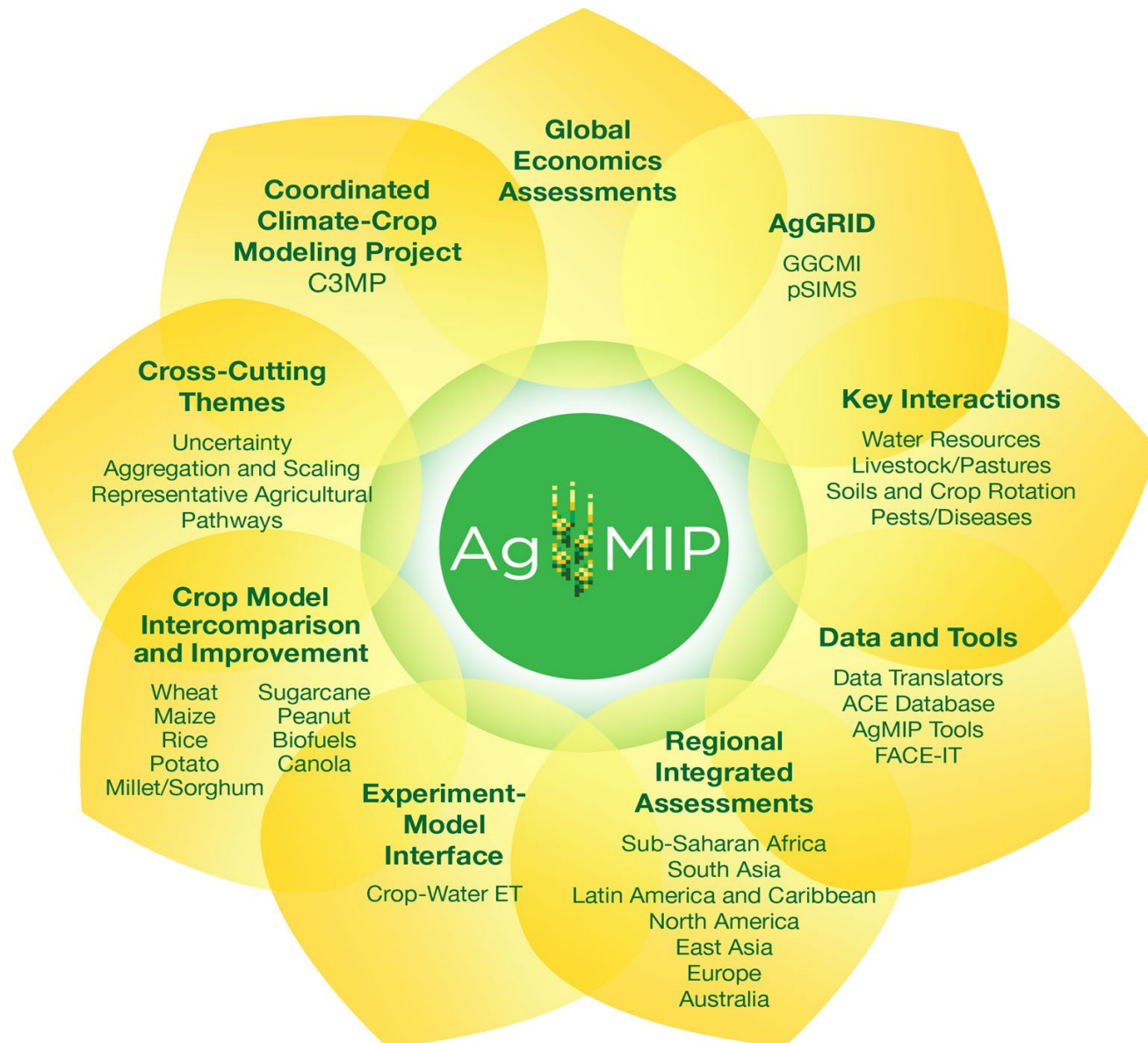
Incorporate state-of-the-art climate products as well as crop and agricultural trade model improvements in coordinated regional and global assessments of future climate impacts

Include multiple models, scenarios, locations, crops and participants to explore uncertainty and impact of data and methodological choices

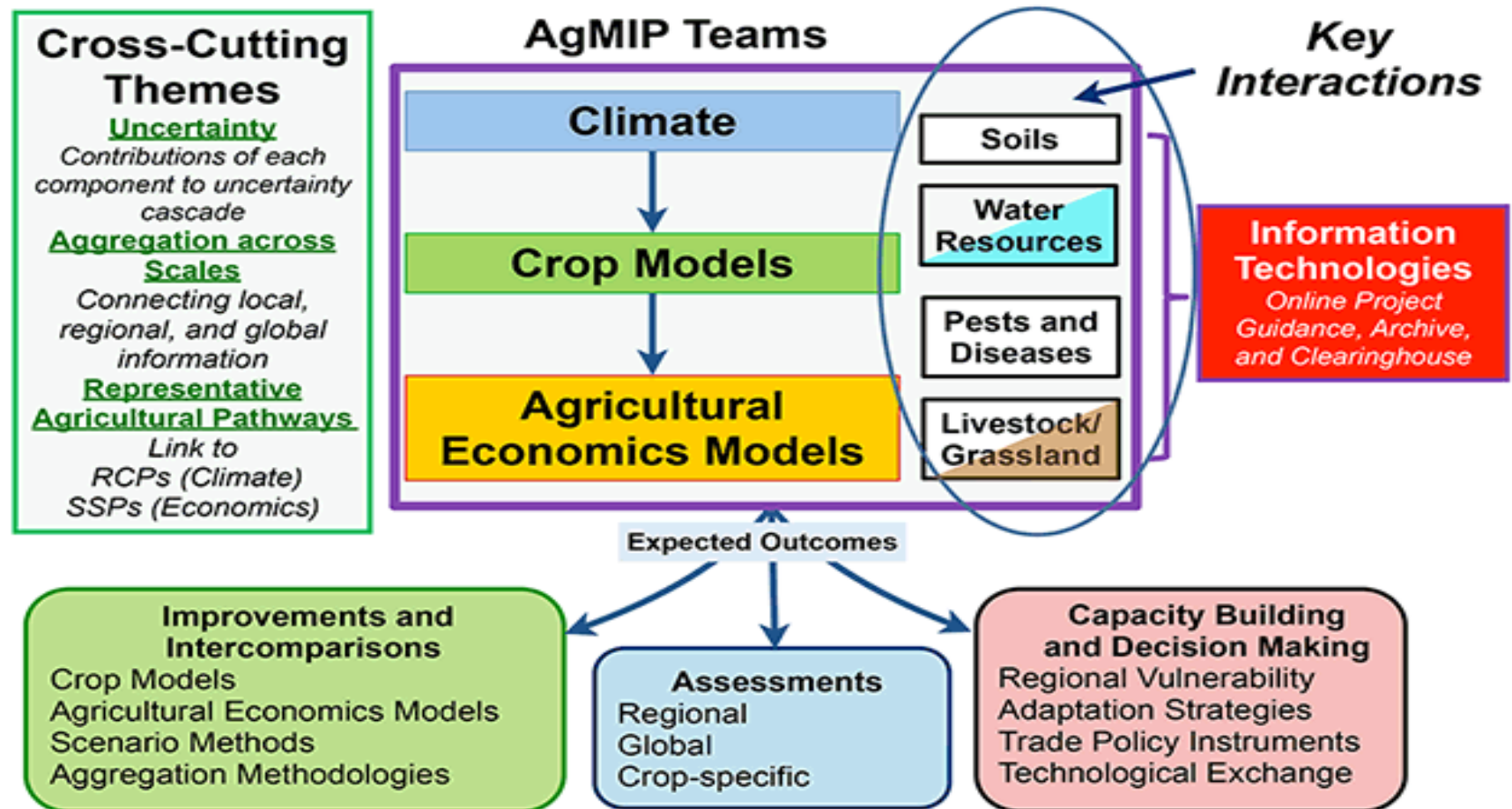
Collaborate with regional experts in agronomy, economics, and climate to build strong basis for applied simulations addressing key climate-related questions

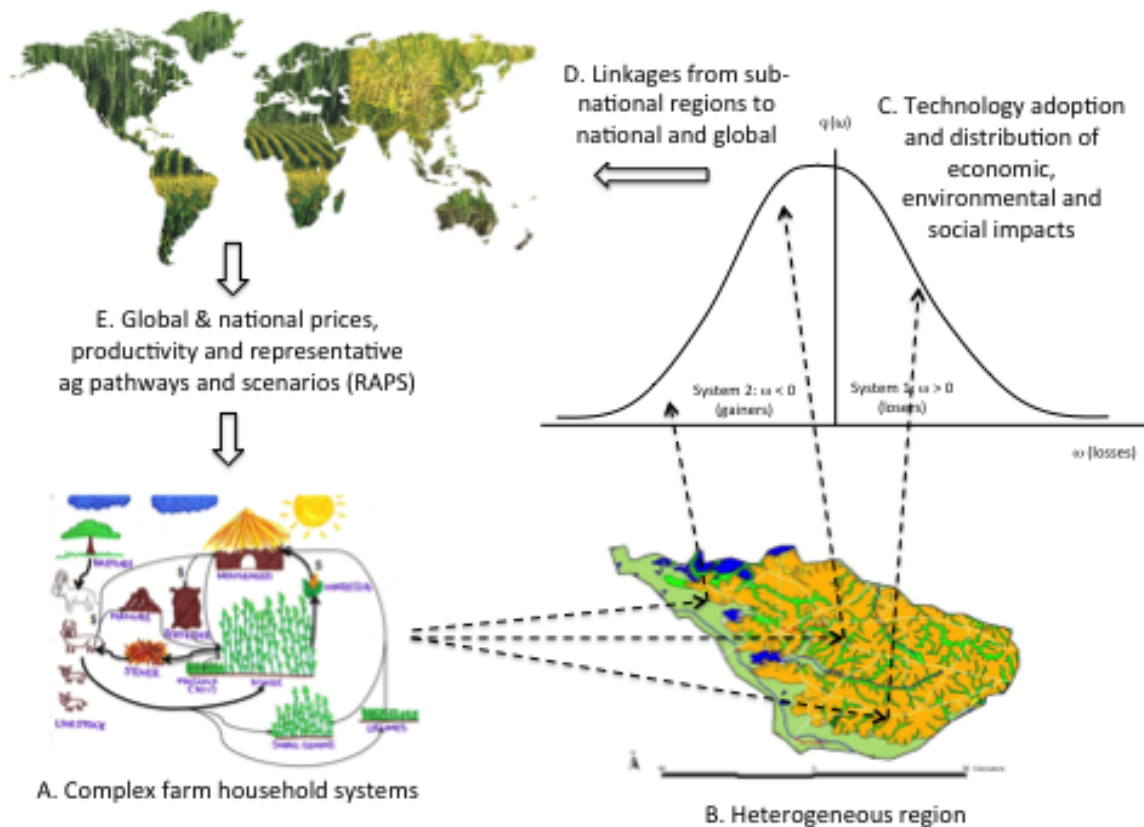
Improve scientific and adaptive capacity for major agricultural regions in the developing and developed world

Develop framework to identify and prioritize adaptation strategies



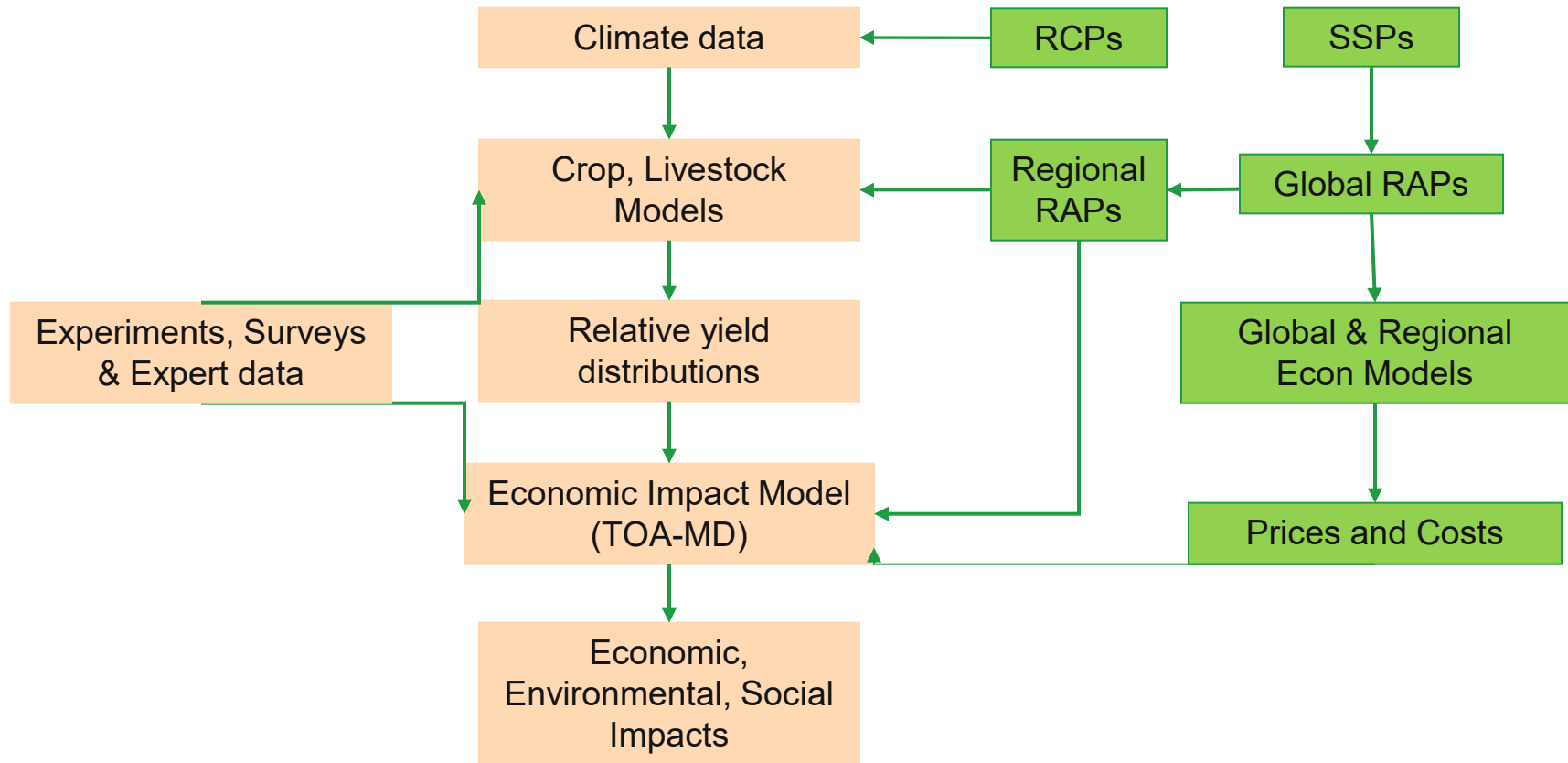
AgMIP Teams, Linkages, and Outcomes





- Farming systems
- Transdisciplinary: climate/biophysical/ socio-economic
- Multi-scale: field, farm, region, global data and models
- Multiple climate and crop models
- Distributional results: impacts on poverty

- **A protocol-based approach:** rigorously documented so results can be replicated and inter-compared, and methods improved
- **Participatory:** identification of impact indicators, choice of key systems, adaptations, design of future pathways and scenarios used
- **A trans-disciplinary, systems-based approach:** must include key features of current and possible future systems, including multiple crops, inter-crops, livestock, and non-agricultural sources of income.
- **Heterogeneity:** must account for the diversity of systems, and the widely varying bio-physical and socio-economic conditions
- **Vulnerability:** must be possible to characterize the impacts on those farm households that are adversely impacted by climate change, as well as those that benefit from climate change.
- **Key uncertainties** in climate, production system and economic dimensions of the analysis must be assessed and reported so that decision makers can understand them and use them to interpret the results of the analysis.

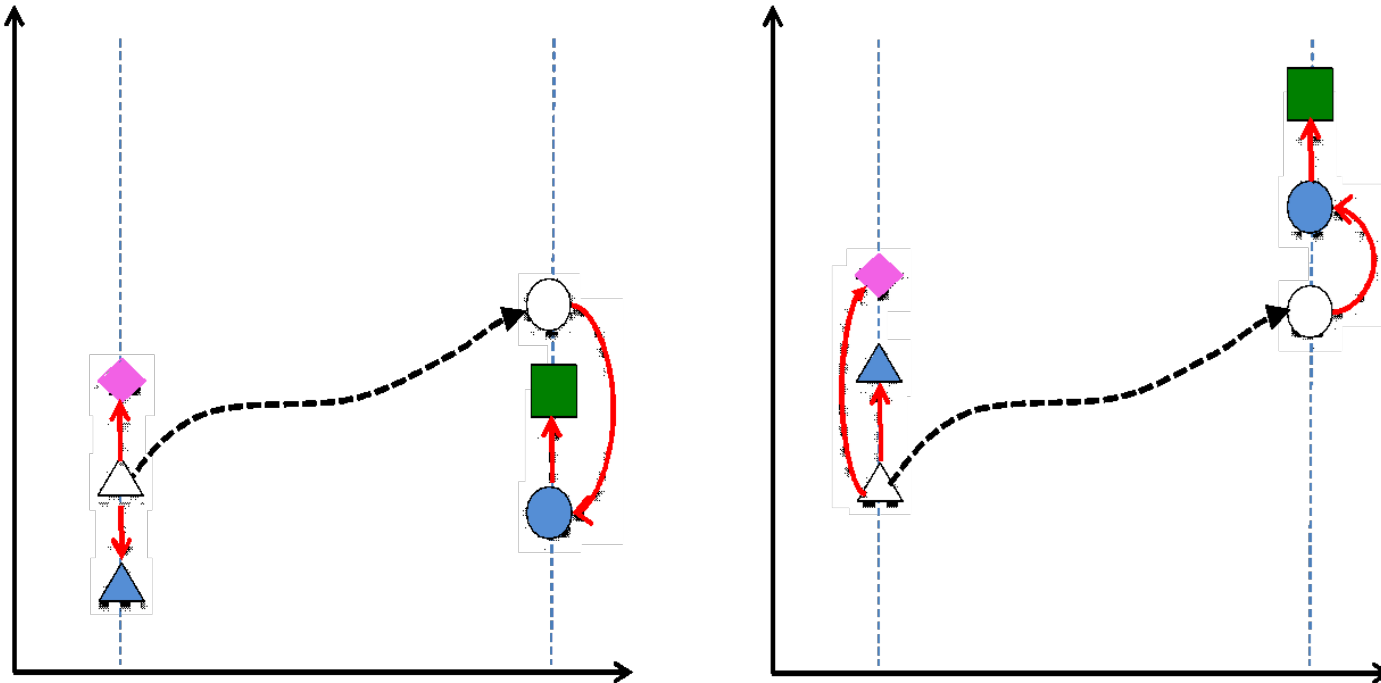


Q1. What is the sensitivity of current agricultural production systems to climate change?

Q2. What are the benefits of adaptation in current agricultural systems?

Q3. What is the impact of climate change on future agricultural production systems?

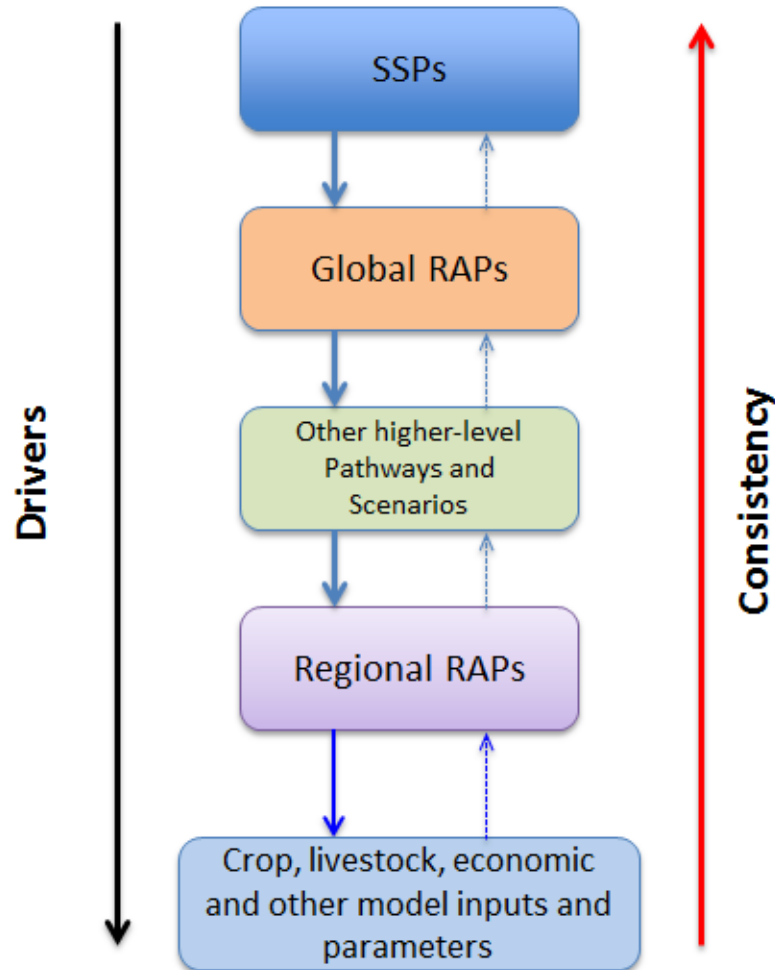
Q4. What are the benefits of climate change adaptations?



Core climate impact questions and the states of the production system that will be simulated with negative impacts of climate change (left) and positive impacts of climate change (right)



Linking Agriculture-Specific Pathways to SSPs: Representative Agricultural Pathways (RAPs)

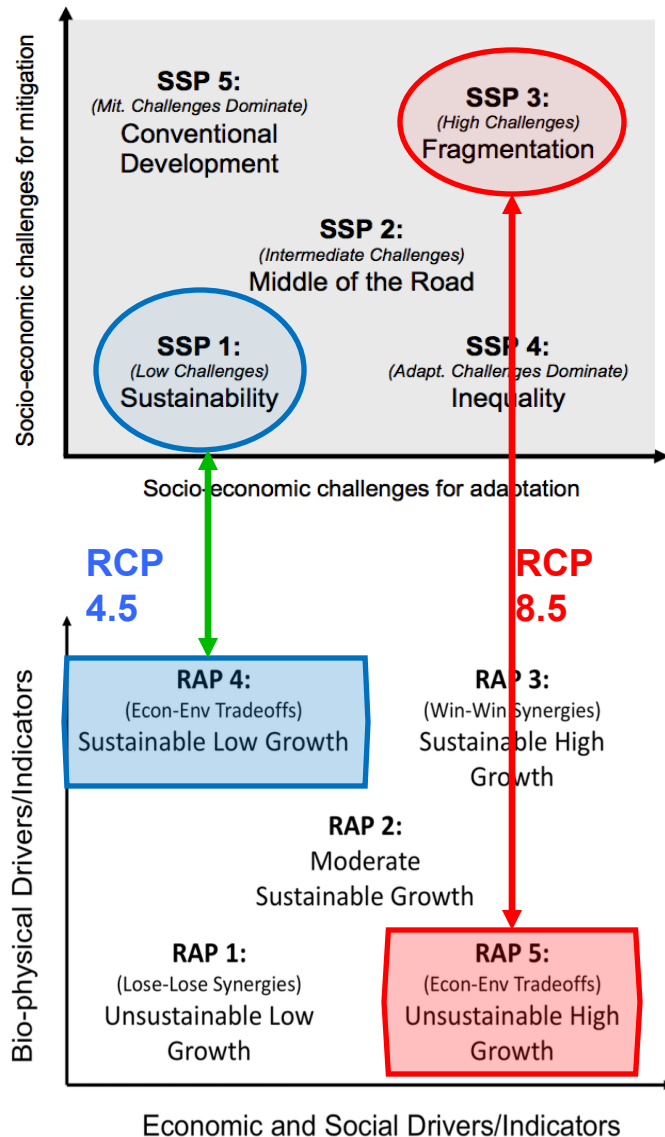


-> Hierarchical structure (nested approach)

. SSPs: Framework for development of sectoral (e.g. agricultural) global and regional scenarios.

- Global RAPs: Global Economic Models and other non-modeled global socio-economic conditions:
 - GDP, population & policy and trade, etc
- Regional RAPs: Allow us to include key drivers likely to affect future bio-physical and socio-economic conditions:
 - ag productivity trends, land use, policy, regional development
 - farm size, system-specific productivity & management, infrastructure, etc

AgMIP:
Developing and implementing Representative Agricultural Pathways and Scenarios (RAPs)

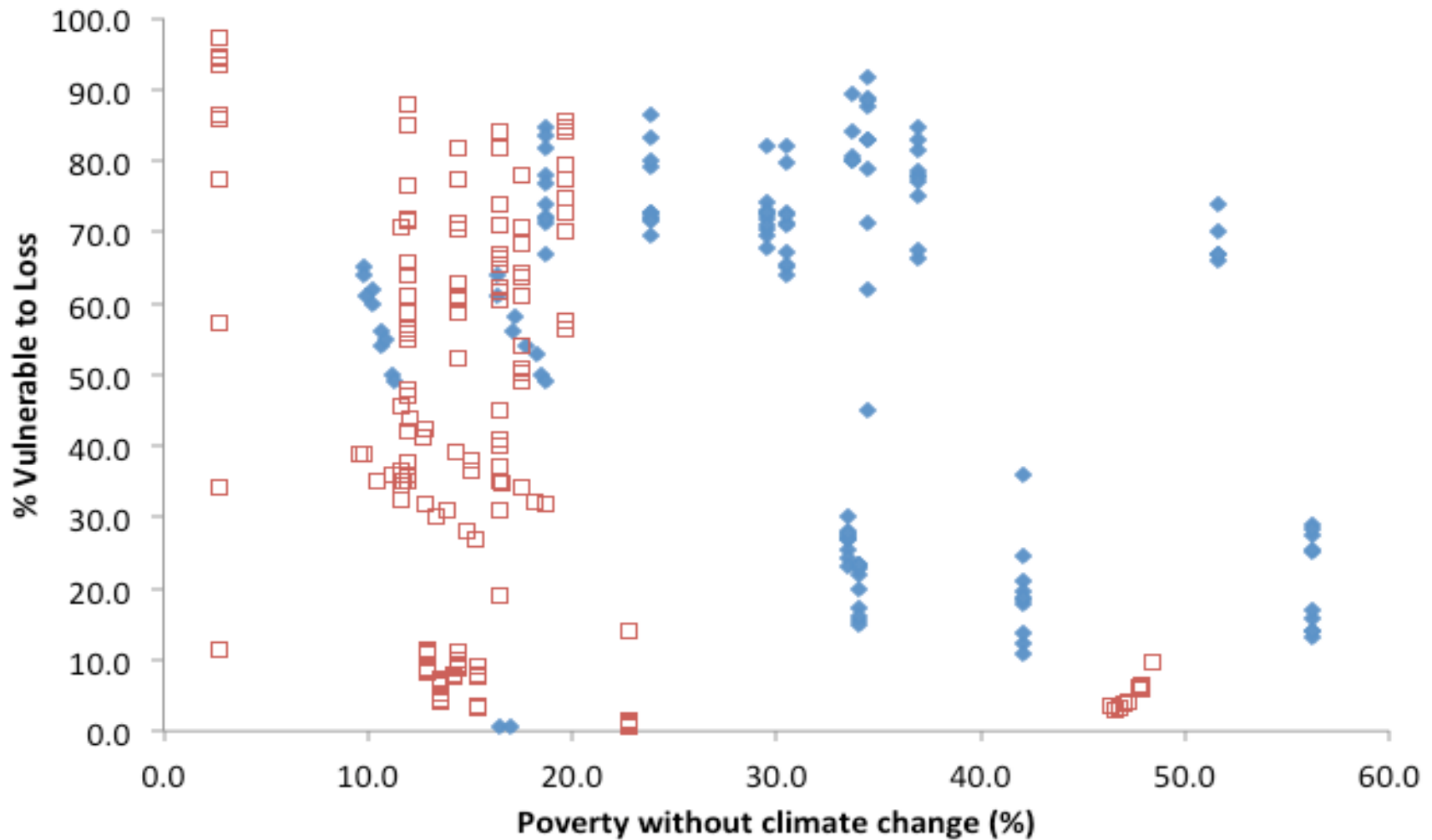


RAP 4: “Sustainable low growth (SLG)”.

This RAP will be combined with RCP 4.5 and with global economic model outputs associated with SSP1.

RAP 5: “Unsustainable high growth (UHG)”. This RAP will be combined with RCP 8.5 and with global economic model outputs associated with SSP3 (or SSP5 if available).

AgMIP Regional RIAs: Importance of Future Scenarios (RAPS)



Each point = RCP 8.5 climate x
crop model x region

◆ Q1 □ Q2

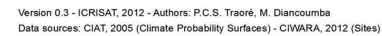


- Adaptation packages in core question 2 are changes in the production system under the current climate (**no climate change**)
- Adaptation packages in core question 4 are changes in the future production system in response to climate change

Adaptation elements:

- Within-System adaptations
 - Crop varieties, fertilizer use, plant density, etc.
 - Breeds, feeding strategy, etc
 - Land allocation among activities
- Between-system adaptations:
 - Change crops or livestock
- Economic Adaptations:
 - Could be both with- and between-system adaptations, motivated by economic considerations (e.g. changes in prices).
 - Land allocation within system
 - Off farm labor

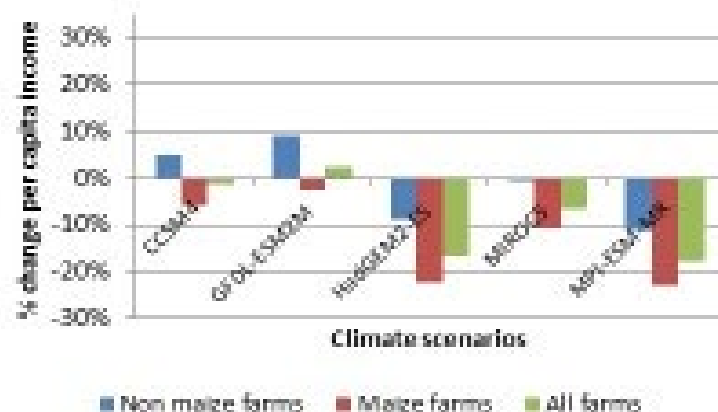
- CIWARA Sites
- CIWARA Countries
- CIWARA Progress
- Climate + Analysis
- Crop + Simulations
- TOA + Int. Assessment



Percent change in per capita income (no adaptation; trend. RAPs; adaptation).

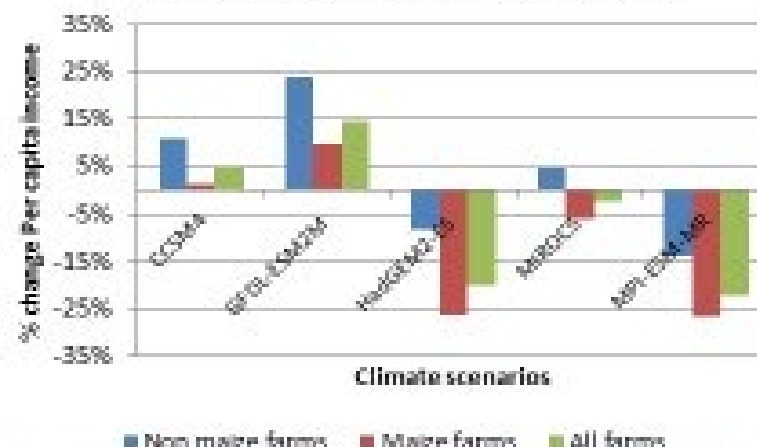
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% change in per capita income (CC w/o adaptation, current prod. Syst.) Nioro, Senegal



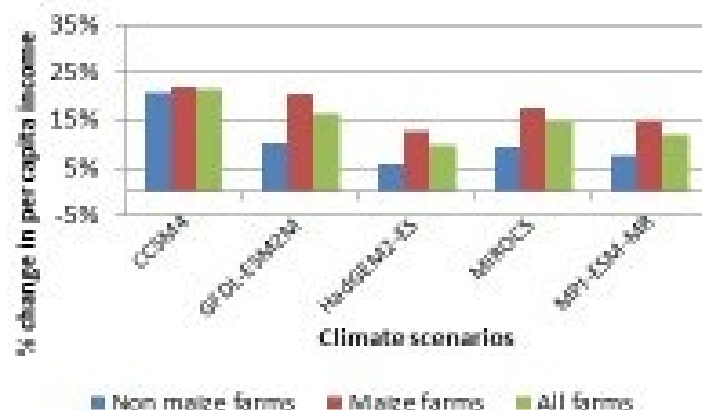
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% change in per capita income (CC w/o adaptation, trend/RAPs, future prod. Syst.) Nioro, Senegal



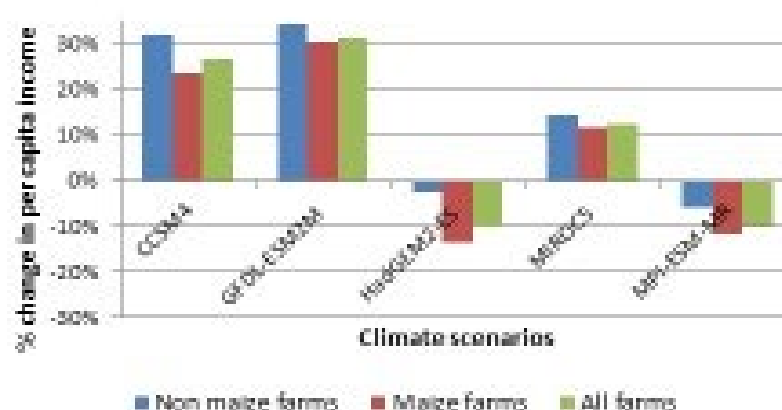
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% change in per capita income, adoption of adaptation package, Nioro, Senegal



4

Net impact of CC on per capita income with adoption of an adaptation package, Nioro, Senegal



Ag MIP6

GLOBAL WORKSHOP

JUNE 28-30, 2016 • MONTPELLIER, FRANCE



THANK YOU