

Representative Agricultural Pathways and Scenarios: A Trans-Disciplinary Approach to Agricultural Model Inter-comparison, Improvement and Climate Impact Assessment

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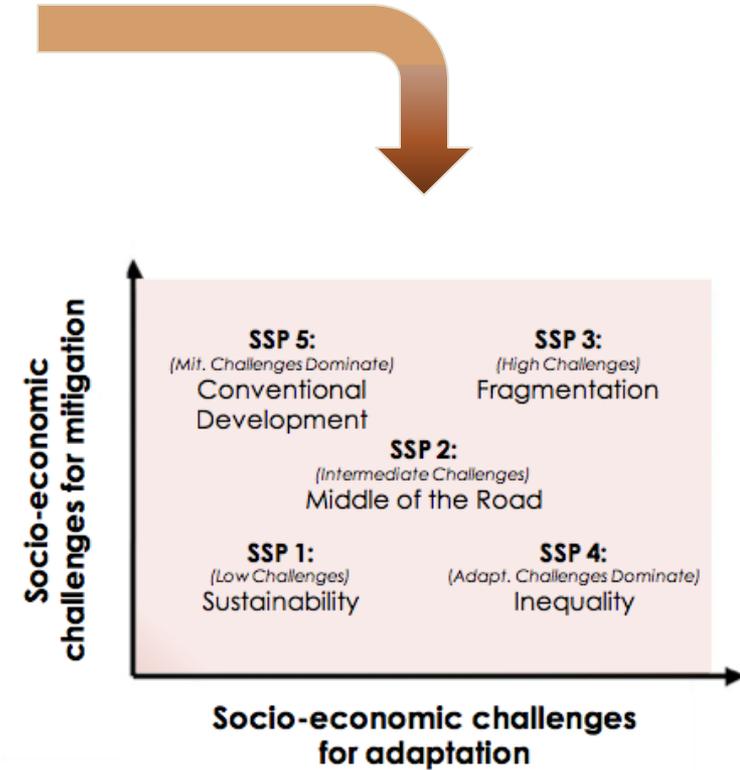
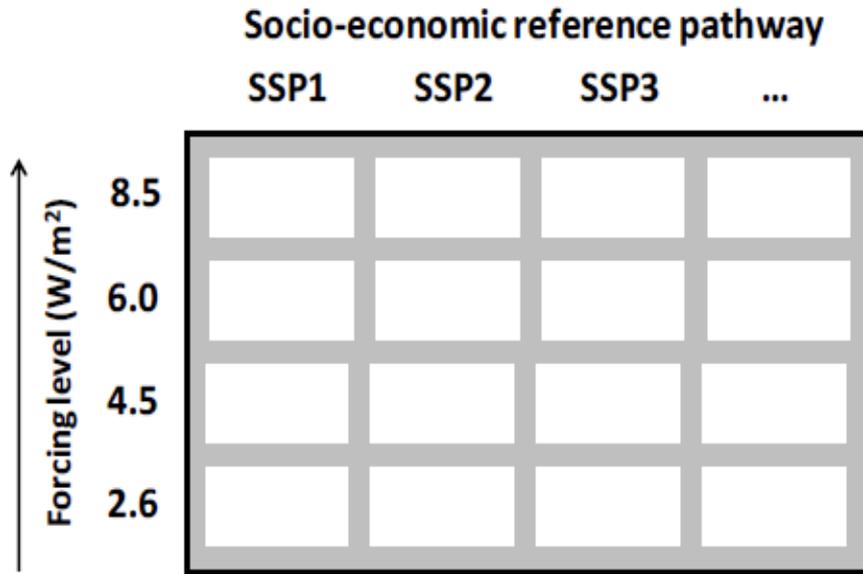
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Pathways and Scenarios

- The global IAM and IAV communities need a ‘small’ set of possible future worlds for integrated assessment modeling and analysis (“reference scenarios”)
 - Earlier version: “Special Report on Emissions Scenarios” linked emissions to socio-economic development narratives and assumptions
 - But in fact there are many socio-economic development pathways consistent with each emission trajectory
- IPCC process for new “pathway” concepts
 - RCPs: Representative Concentration Pathways
 - SSPs: Shared Socio-Economic Pathways

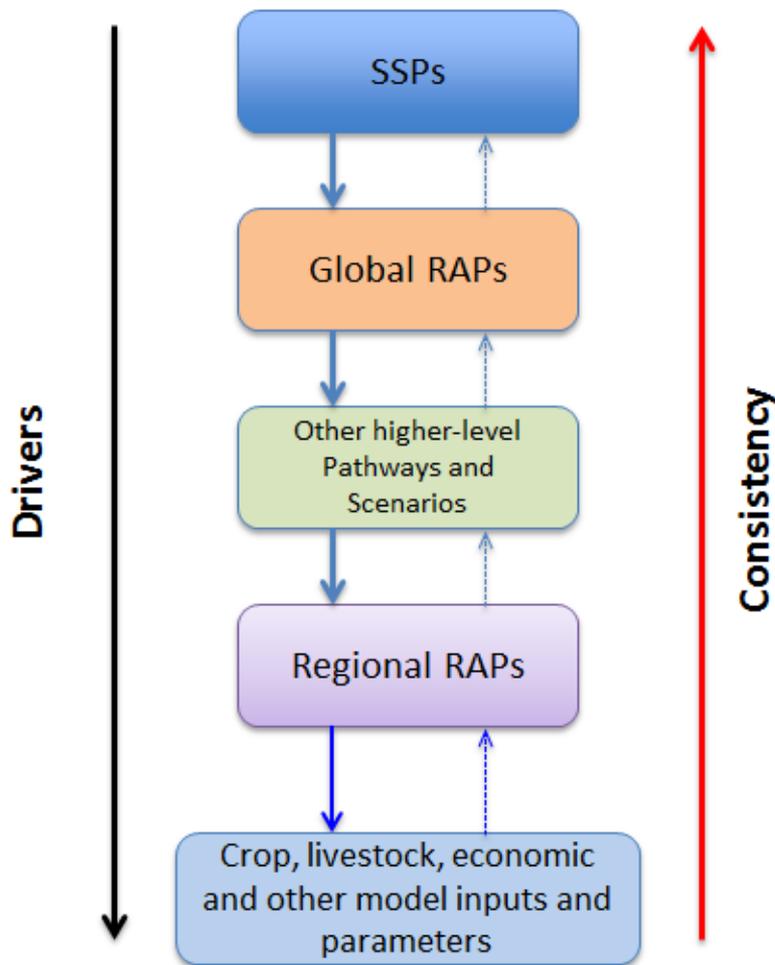
RCPs, SSPs and RAPs



Representative Ag Pathways

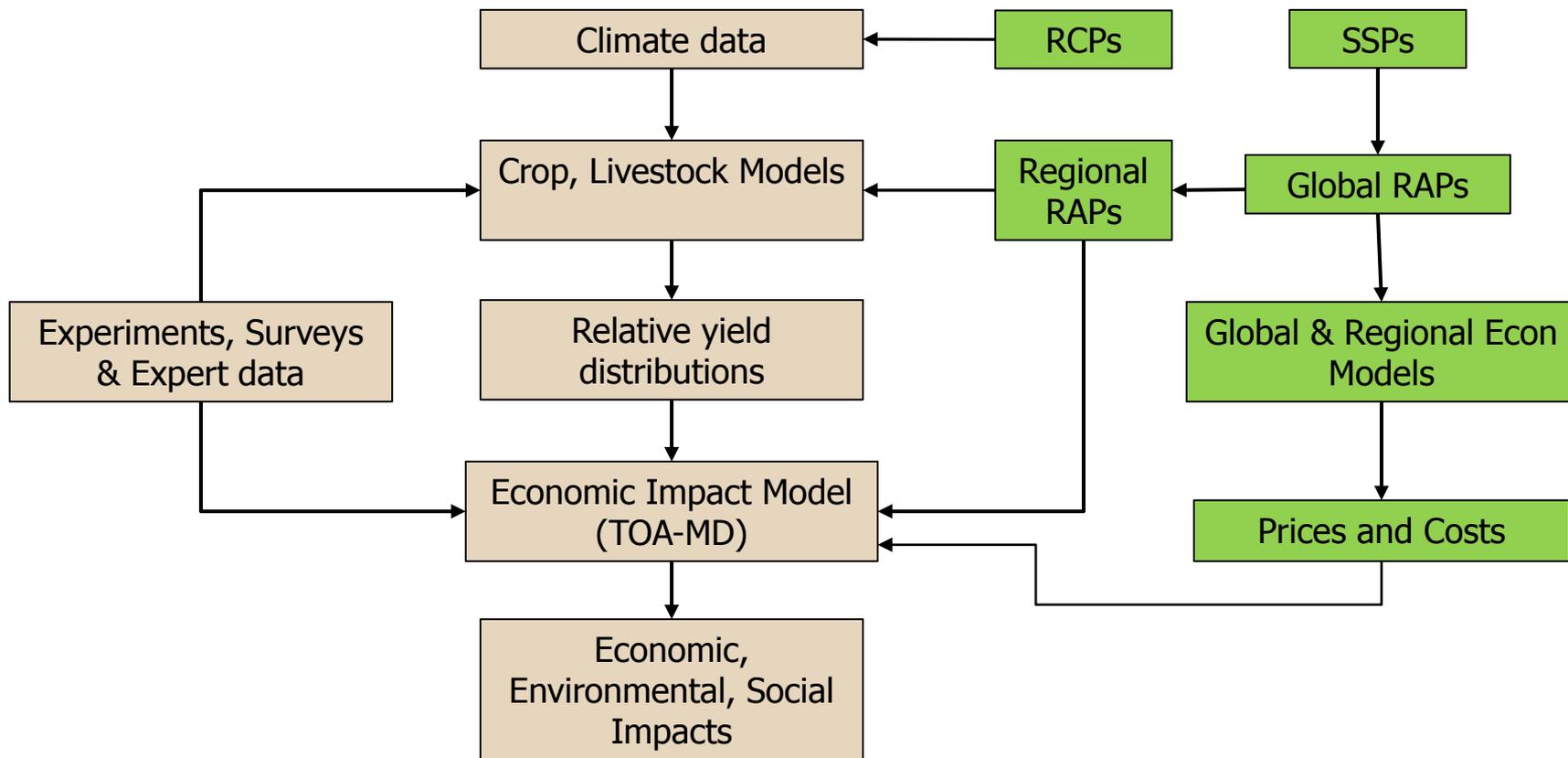
- economic & social development narratives
- soil & water resource trends
- agricultural technology trends
- prices and costs of production
- ag, mitigation & other policy

Representative Agricultural Pathways (RAPs): linking agriculture-specific pathways to SSPs



- 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 that can't be modeled, but are 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
- Adaptation and Mitigation Strategies
 - need meaningful level of detail on changes in systems:
 - system characterization (crop vs livestock, etc), crop and livestock varieties, crop mix, management (fertilization...)

AgMIP Regional IA Framework: Parallel development of system design, data and modeling to couple crop & livestock models with economic impact models



Representative Agricultural Pathways

- Economic, social and bio-physical development narratives
 - agricultural technology trends
 - prices and costs of production trends
 - ag, conservation, other policy
- These “pathways” are combinations of economic, technology and policy drivers that represent **a plausible range of possible futures**.
- They are not meant to be predictions, but rather provide researchers with a range of plausible scenarios that can be used to simulate possible future outcomes in a consistent and transparent way.

RAPs narratives provide a framework in which **qualitative** information can be translated into model parameters
(quantification!)

RAPs Development Process

First meeting:

1. Start with a "Business as usual" (BAU) RAP
2. Team members identify key parameters that will likely be affected by higher level pathways and draft RAP narrative
3. Team members are assigned variables for research
4. Team members conduct research –use of templates for reporting and supporting documentation
5. Templates can be distributed to experts for feedback

Second meeting:

5. Team members report findings and discuss storylines for each variable
6. BAU RAP is finalized
7. Additional RAPs are identified
8. Process similar to BAU is carried out
9. Additional background research

Create Additional RAPs

RAPs distributed to stakeholders and outside experts

Modelers develop scenarios



Tools for RAPs development:

- **DevRAP matrix and software:** Construct RAPs narratives and quantify scenarios parameters for TOA-MD. Template to parameterize TOA-MD and document model scenarios
- **Reporting Templates:** Help team members document background information specific to drivers under research
- **Pathways summary trends table:** Helps to visually inform users about trends and magnitudes of key driver changes included in RAP narratives

DEV RAP Matrix

Research and Re

RAPs Trend Table

CATEGORY	VARIABLE / INDICATOR	Leader	R
Prices from Global/ National Models	Wheat	Antle	pr
			pl
			di
			id
	Corn	Antle	pr
			pl
			di
			id
Fossil Fuels	Antle		

CATEGORY	VARIABLE/INDICATOR	RAP1 (Business-as-Usual)	RAP2 (Dysfunctional World)	RAP3 (Aggressive Climate Policy)
Bio-Physical*	Soil erosion			
	Crop genetic improvement (yield potential)			
	Water supply -irrigated land and dryland			
	Pests, weeds and diseases			
Institutional/Policy*	Subsidies			
	Conservation programs			
	Environmental regulation			
	Governance (quality & functioning v.s laws & regulations)			
Socio-Economic*	Farm Size -commercial size and small numbers			
	Commodity prices			

supply and demand from 2000 to and for Agricultural Commodities to 10)

10 from IFPRI report of "2011 global food

supply and demand from 2000 to for agricultural commodities to 2050", e, 2010)

10 and 2050 from IFPRI report of "2011 re 1)

see Figure 2)

Definition	No change	Low increase	High increase	Small decrease	Large decrease
Arrows					

AgMIP Regional Teams: RAPs development and implementation summary

Regional Research Team	Location	RAPs type	Stakeholder involvement	Number of Model Scenarios
CLIP	Zimbabwe, Matabeleland	Positive	Yes	3
CLIP	Zimbabwe, Matabeleland	Negative	Yes	2
CLIP	Mozambique, Manica	Positive	Yes	1
CLIP	Mozambique, Manica	Negative	Yes	0
East Africa	Kenya, Embu	Positive	Yes	n/a
SAMIIP	Namibia	Postive	Yes	2
SAMIIP	South Africa	Positive	Yes	2
CIWARA	Senegal, Niore	Negative	No -Planned Nov '13	n/a
CIWARA	Senegal, Niore	Positive	No -Planned Nov '13	n/a
South India	India - ANGRAU	Positive	Some	1
IGB	India - IGB	Negative	Yes	2
IGB	Nepal - IGB	Postive	No	0
Pakistan	Pakistan, Wheat-Rice Region	Positive	Yes	2-4?
Sri Lanka	Sri Lanka, Kurunegala dist	Positive	n/a	n/a
Sri Lanka	Sri Lanka -FECT	Positive	n/a	1

Note: This list includes RAPs reported by teams by October 30, 2013

n/a : Not reported

Acknowledgements:

- AgMIP Regional Teams for providing current RAPs status
- Regional Approaches to Climate Change (REACCH) Project (US Pacific Northwest) for their contribution to methodology for RAPs development

Thanks!