



RESEARCH PROGRAM ON  
**Climate Change,  
Agriculture and  
Food Security**



# Prioritizing climate-smart agricultural land use options at a regional scale

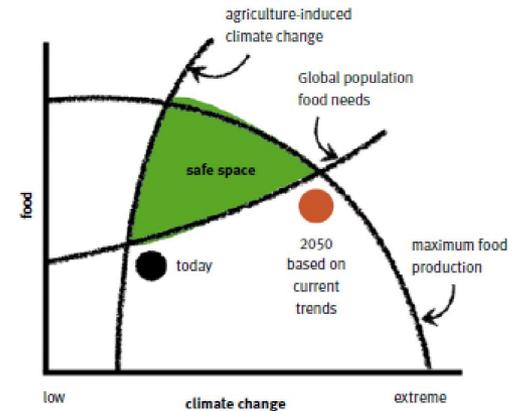
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# Need for CSA Prioritization

The global community must operate within three limits: the quantity of food that can be produced under a given climate; the quantity needed by a growing and changing population; and the effect of food production on the climate.



Source: Beddington et al., 2012

The promotion of CSA requires a clear understanding of its relative suitability, costs & benefits, and the environmental implications of various technological interventions in a local context under current and future climates.



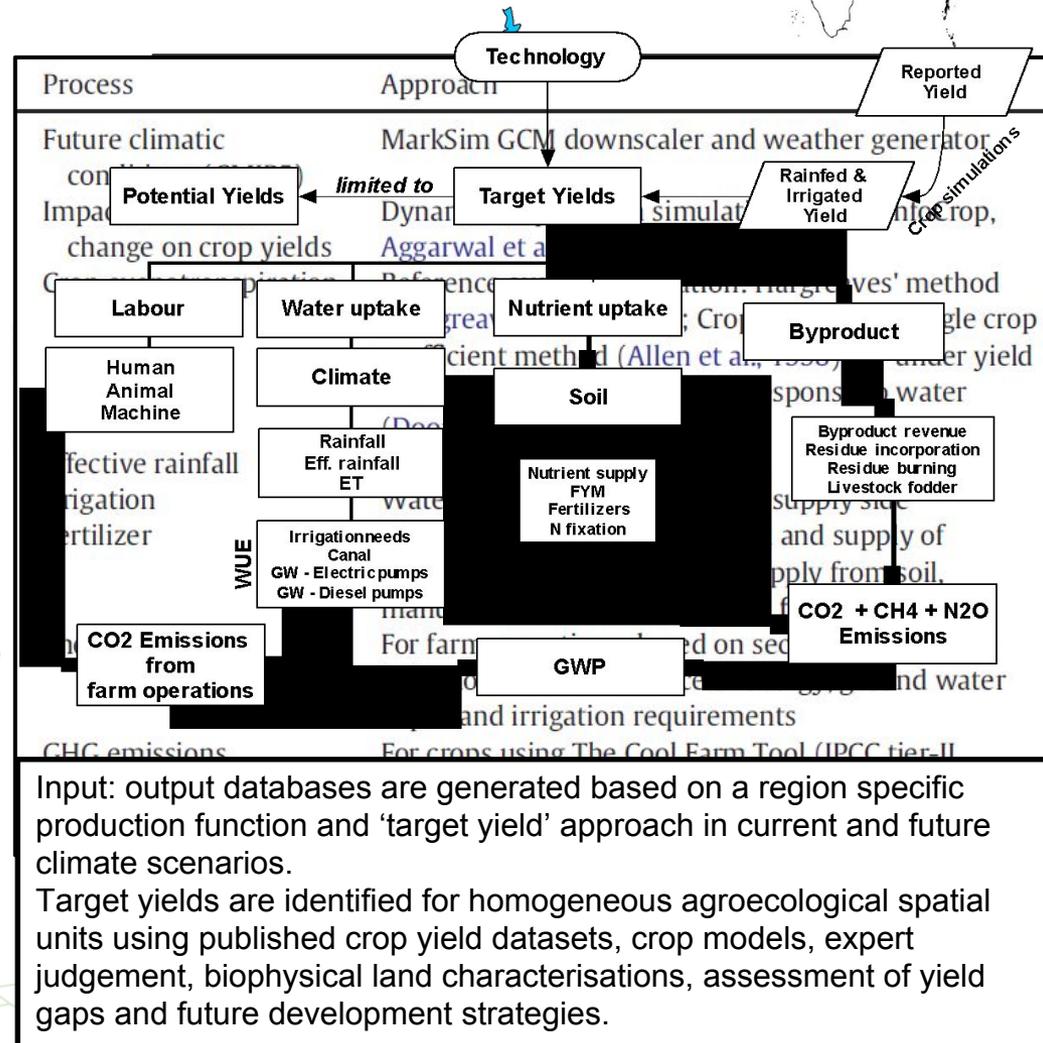
# Prioritizing CSA options

## A Case Study for Bihar, India



### Methodology

- Delineation of land units;
- Generation of input: output databases for crop-technological portfolio;
- Assess the climate smartness of land use options under current and future climate;
- Find robust land use plan covering the spectrum of future climatic uncertainties.



# Climate Smartness of Current Land Use Options

Change (%) in yield, income and emission intensity (EI) for RCP8.5 at 2080 investigated baseline (2010) Bihar under current and future climate (RCP8.5, 2080)

Crop	Yield	Income	Emission intensity
Rice	↘	↗	↑
Maize (Kharif)	↓	↓	↑
Gram	↗	↓	↑
Khesari	↗	↓	↑
Lentil	↗	↘	↑
Mustard	↗	↘	↑
Maize (Rabi)	↘	↗	↑
Wheat	↓	↑	↑
Mung Bean	↗	↓	↗
Maize (Summer)	↓	↑	↑

< -20     ↓

0 to -20     ↘

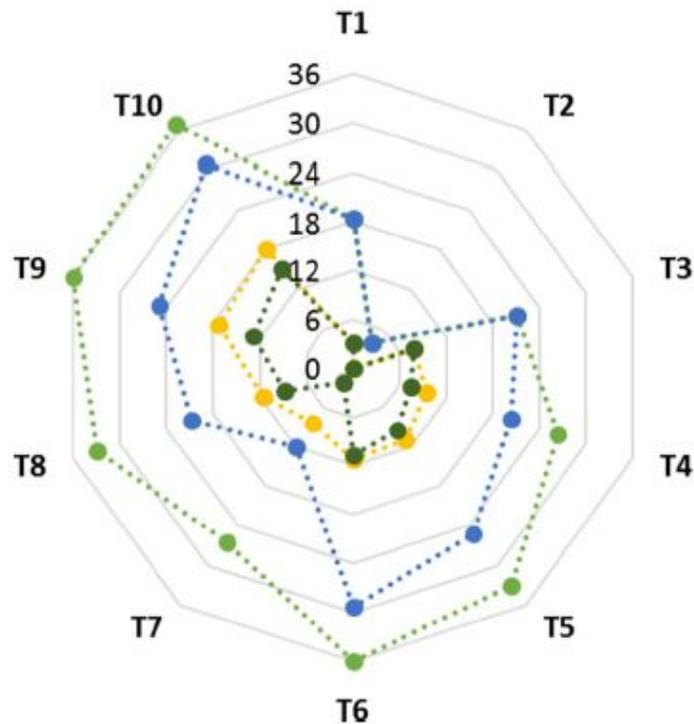
0 to +20     ↗

> +20     ↑

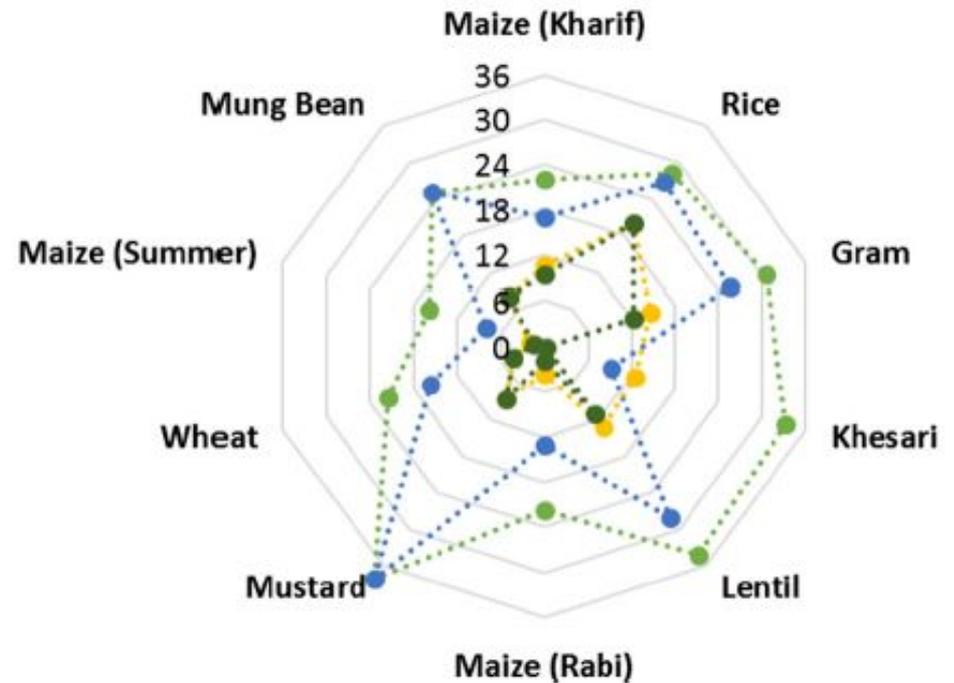


# Alternate technologies and crops for enhancing climate smartness

## Prioritized Technology Options



## Prioritized Crop Options



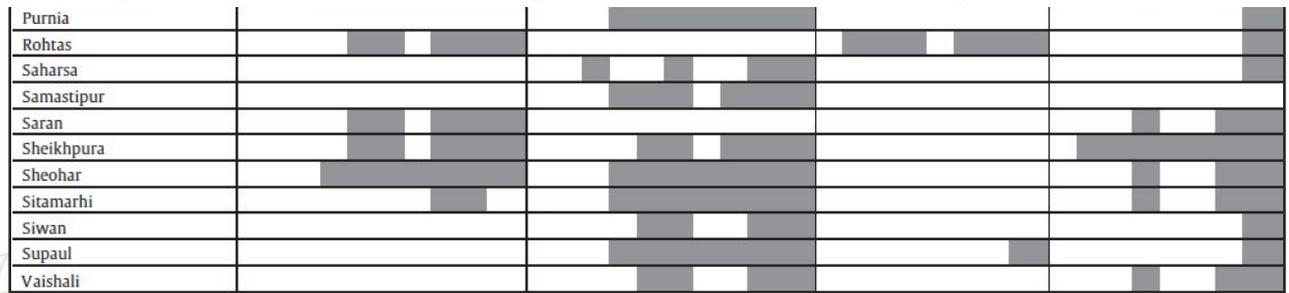
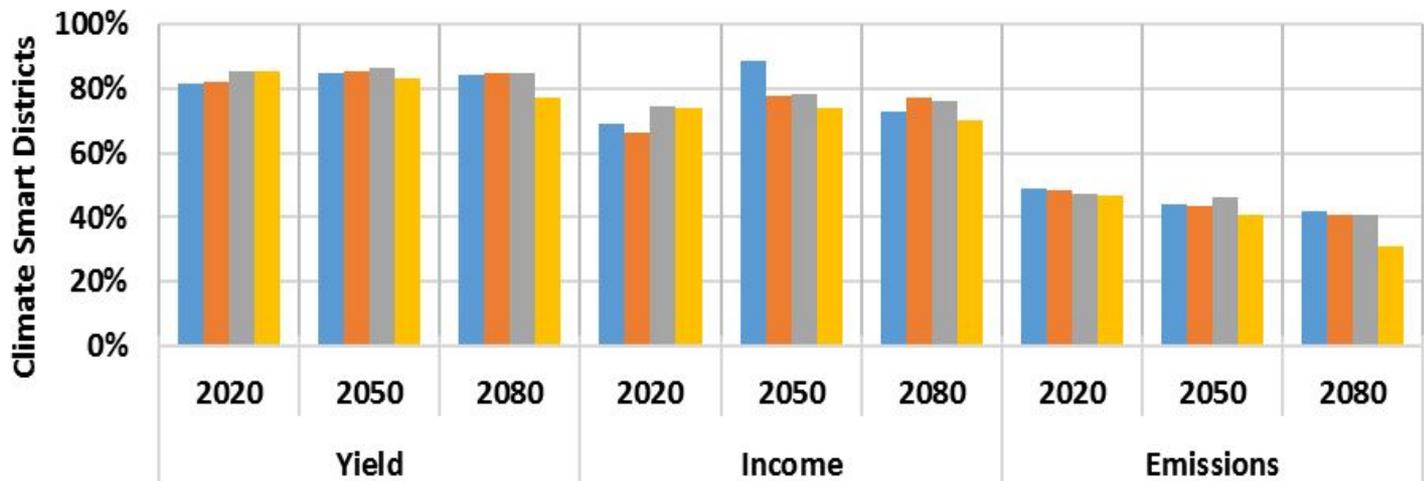
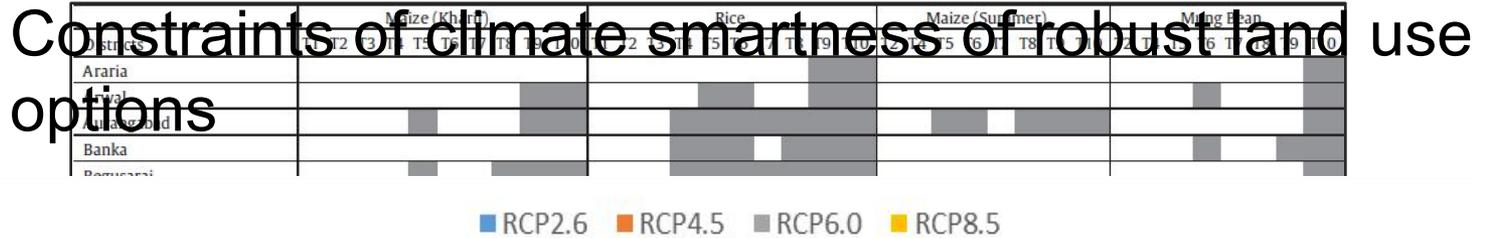
---●--- Yield    ---●--- Income    ---●--- Emissions    ---●--- Overall

Figure shows number of districts where CSA indicators (yield, income, emission and all three together) are improved over the baseline across all RCPs



# Robust Climate Smart Land Use Options for Bihar

Climate smartness of districts under different crop-technology portfolios for Kharif and summer crops (Grey filled boxes indicates suitability of crop-technology under four RCPs and three future time periods 2020s, 2050s and 2080s)



# Conclusions

- The methodology used to derive inferences for prioritizing climate smart land use options, by exploring adaptations strategies for climate change through bio-economic land unit level analysis.
- The case study for Bihar shows:
  - the current land use will not remain climate smart under future climate;
  - the climate smartness increases with advanced technologies and
  - yield is the least limiting while emission is the most limiting factor across the entire crop-technology portfolio for climate smartness.





Thank you  
for your  
interest!

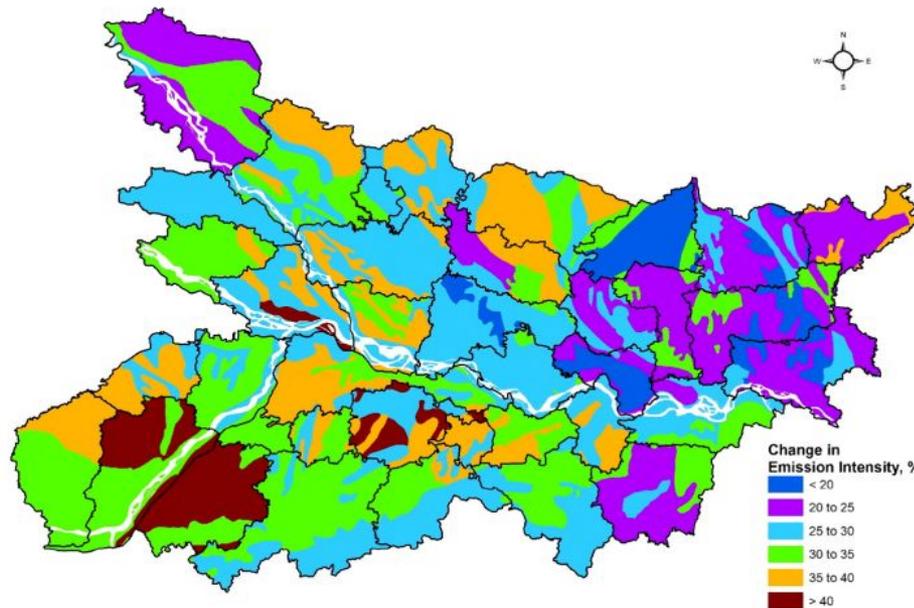


# Climate Smartness of Current Land Use Options

Change in emission intensity of current technology (T2) for RCP8.5 at 2080 over baseline (2010)

Yield, income and er  
Bihar under current

Crop	Yield, kg/ha	
	Current climate	F
Rice	1683	1
Maize (Kharif)	1865	1
Gram	1846	2
Khesari	1784	2
Lentil	1589	1
Mustard	1897	1
Maize (Rabi)	3384	3
Wheat	2335	1
Mung bean	582	6
Maize (summer)	2865	2



ated technology) in

on intensity, kg CO <sub>2</sub> EQ/kg Yield	
it climate	Future climate (RCP8.5, 2080s)
	2.26
	0.60
	0.42
	0.38
	0.46
	0.44
	0.32
	0.35
	1.48
	0.82