

CLIMATE-SMART
Agriculture
20**15**



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Climate-smart agriculture in South Asia: Opportunities and constraints in scaling out

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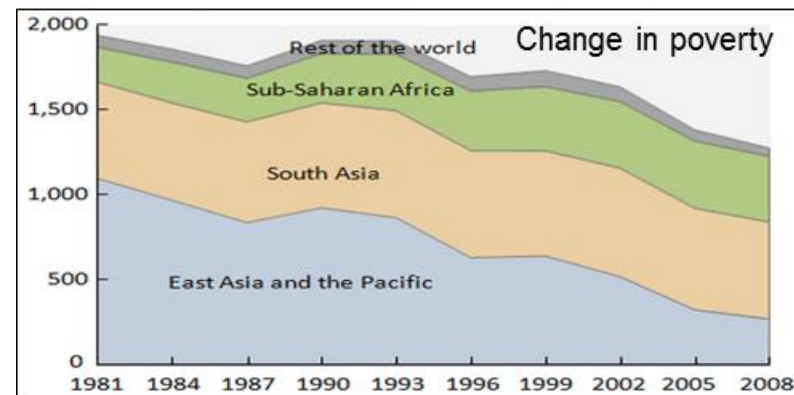
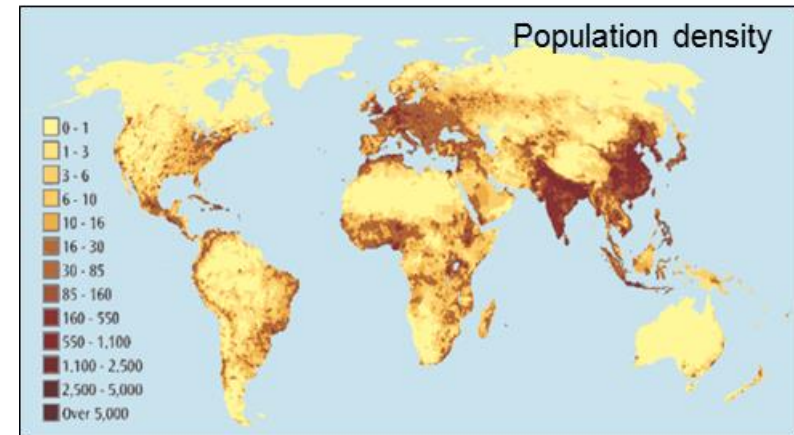
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South Asia: Home for 40% of World's Poor

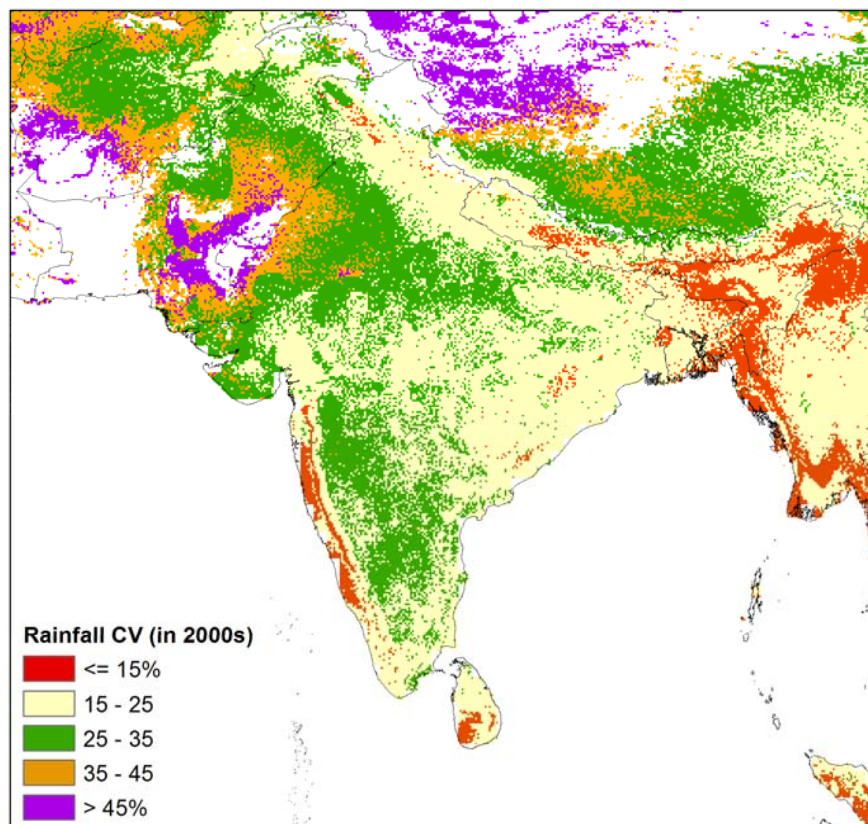
- > 1.6 billion people, 2.4% of the world's land area and 17% of world's population
- Still has high growth rate of population
- Tremendous progress in last 4 decades
 - Food consumption increased from 1900 kcals to > 2500 kcals
 - Average GDP growth >6%
 - Little food imports now
- Yet, 1/4th of the world's hungry; 40% of the world's malnourished children and women
- Lagging in MDGs
- Agriculture important for livelihood security of > 50% population
- Projected to be very vulnerable to climatic risks



Source: World Bank, 2015

Climatic stresses are common in South Asia

High CV of rainfall in Pakistan; northwest and south India



- Drought: 70% land
- Floods: 12% land
- Cyclones: 8% land
- Frost: Northern regions
- Heat: Frequent at many places
- Coastal salinity ingression
- One of the most vulnerable regions to climate change
- Food security and poverty are the key issues

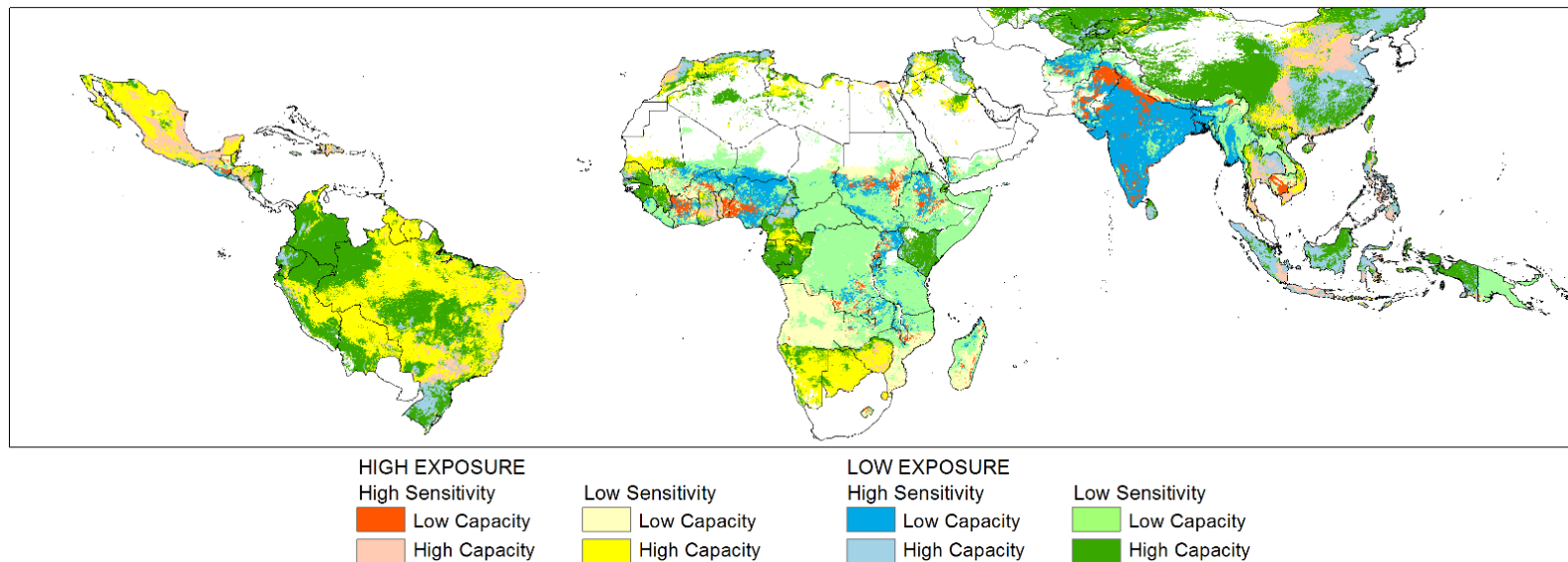
Different colors represent levels of significance



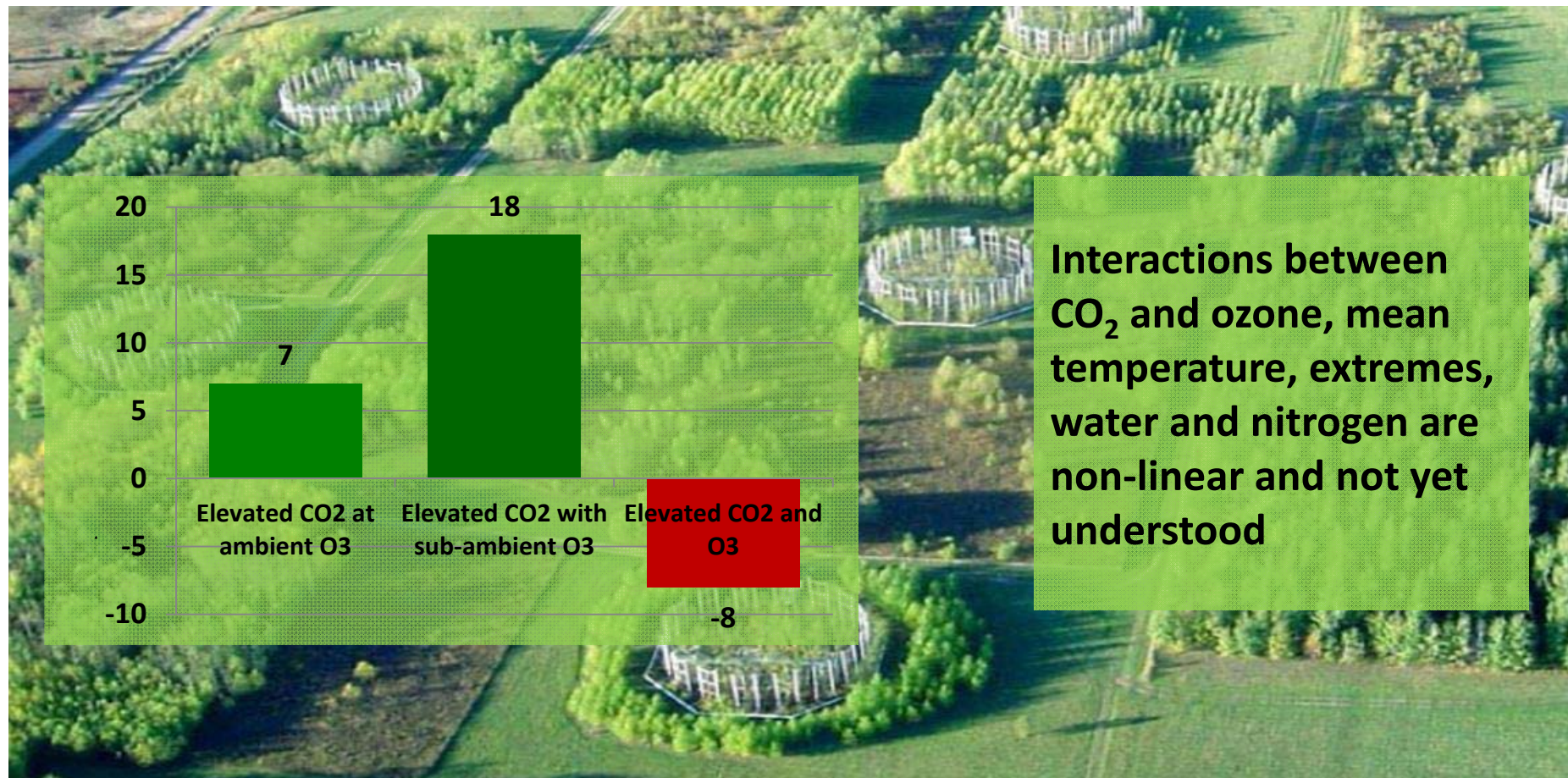
Climate change and agriculture-

South Asia is a major hotspot

- Climate change likely to reduce agricultural production by 10-50% by 2050 and beyond, if we do not start adapting now.
- Increased production variability due to more frequent droughts, floods, and heat events
- Large implications for intra- and inter-national trade.

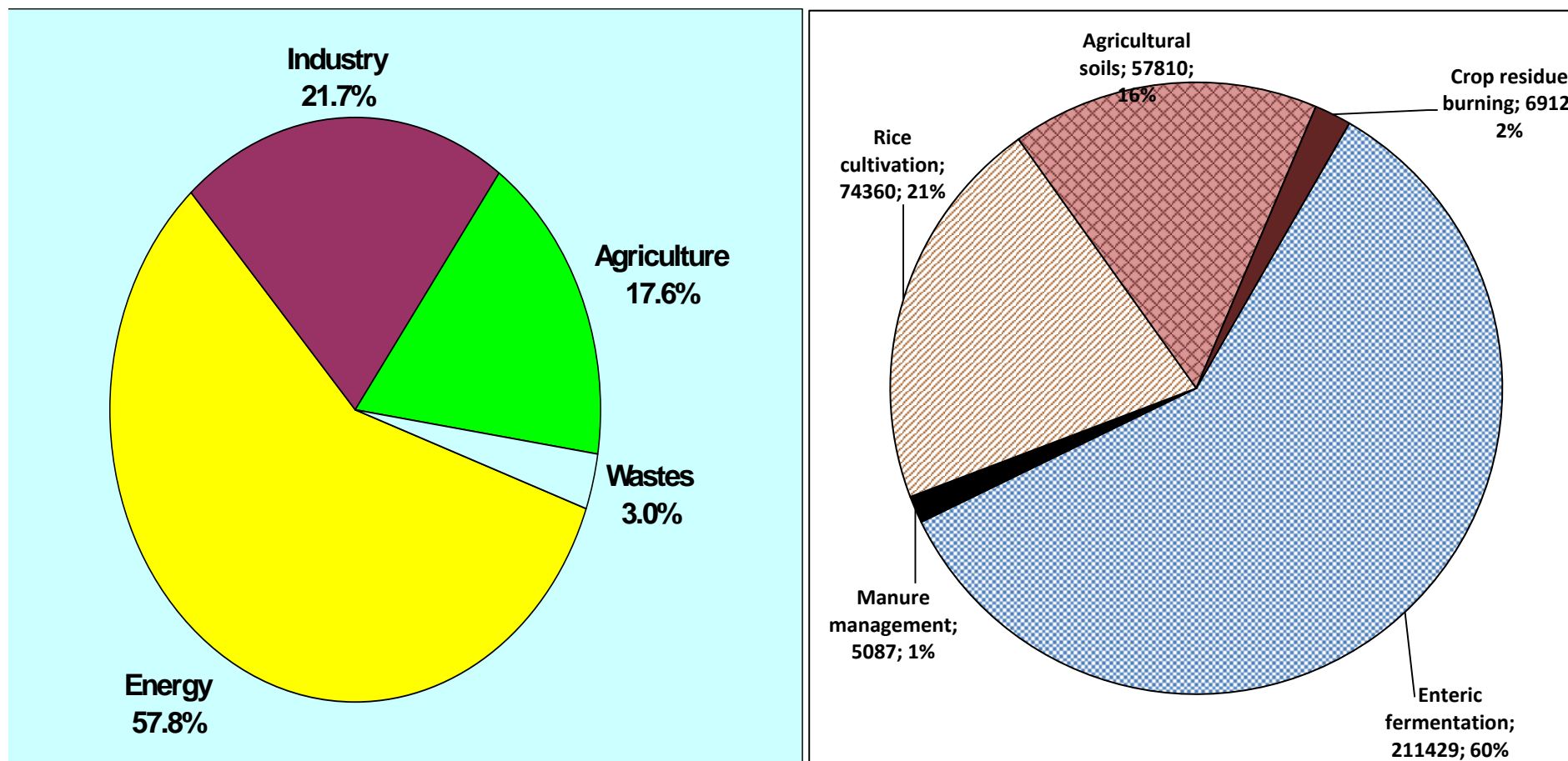


Elevated tropospheric ozone can reduce the benefits of CO₂ on crop yields (*high confidence*).



Source: IPCC-AR5 2014;
Bhatia et al. 2015 personal comm

Agricultural emissions from the region



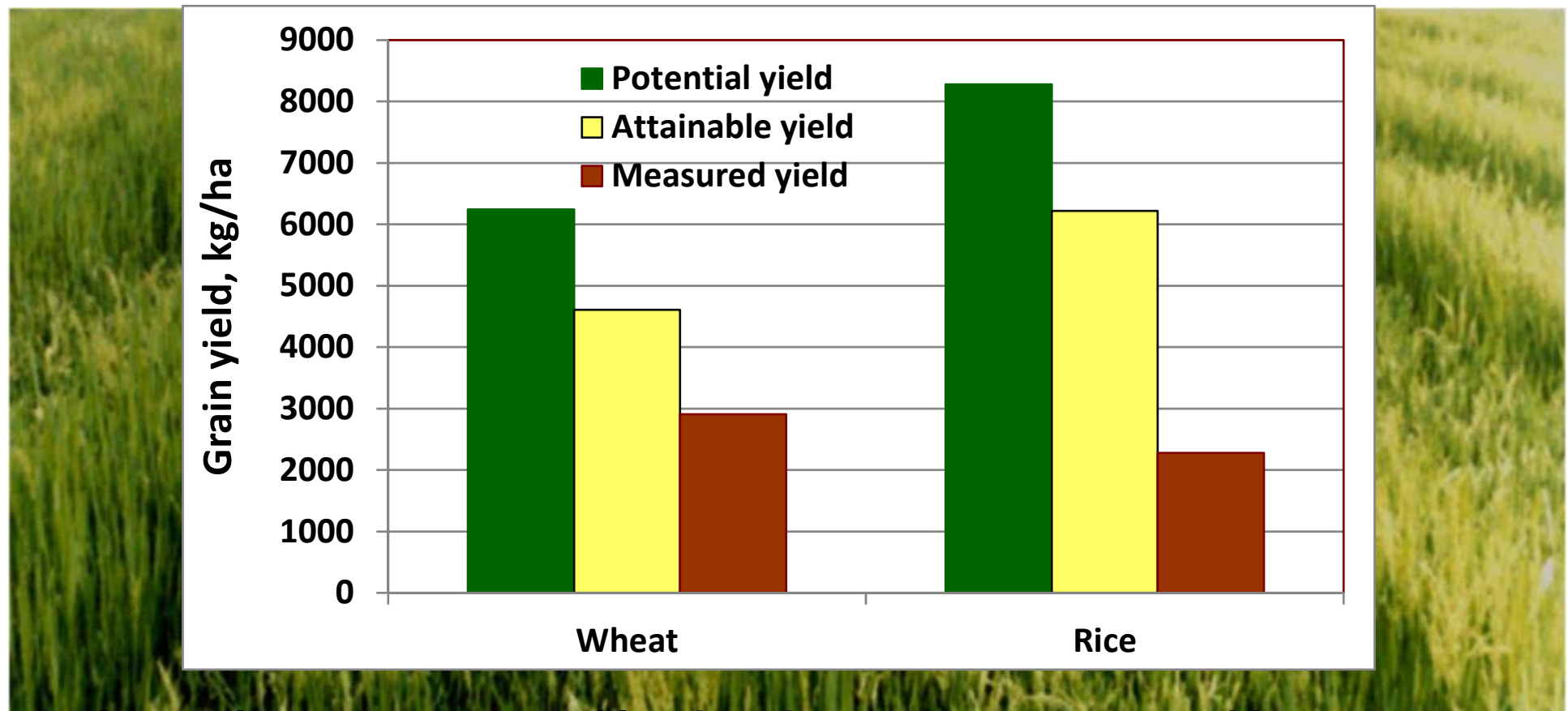
Adapting South Asian Agriculture to Climate Change and Declining Resources: Need for CSA

- **Increasing demand for (quality) food**
- **Increasing competition for resources**
- **Increasing degradation of resources**
- **Increasing climatic risks**
- **Increasing variability of global supplies, and prices**

Addressing climate change and agriculture in South Asia



1. Make full use of untapped potential of currently available technologies



Invest in management of land and water resources, and input delivery and market linkage mechanisms

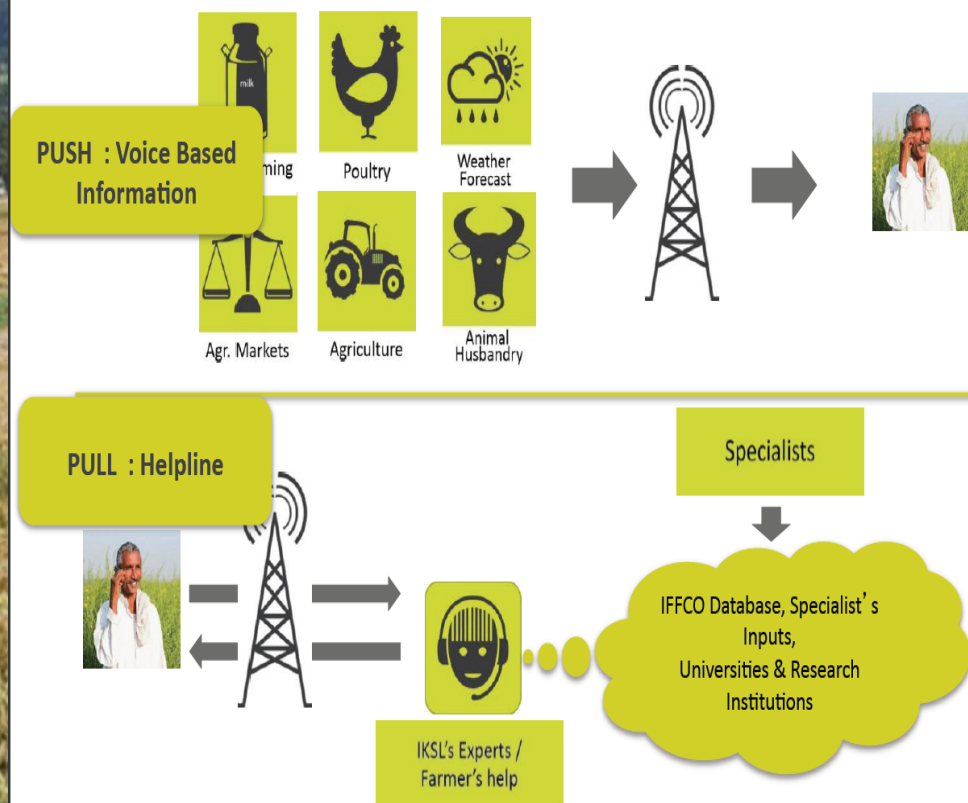
2. Identify and exploit potential benefits of climate change

- Change in temperature zones
- Increase in rainfall
- Shorter crop durations
- Shorter life cycle of fish

3. Improved climatic services

Scaling-out weather -based agro-advisories

Architecture & Service Construct



Source: IMD and IKSL

Current status

- > 3 million farmers in India; pilots in other countries
- High dropout rate
- Generic advice; need to make this demand driven
- Cheap android phones; crowdsourcing and cloud computing could increase effectiveness and also facilitate scaling-out

3. Improved climatic services

Innovative crop Insurance schemes for improved management of climatic risks

- 30 million insured farmers in India; linked to credit; most are dissatisfied with products and services
- Pilots in other countries

Innovations needed

1. AEZ specific 'indices' for rainfall/temperature
2. MRV schemes managed by farming communities
3. Bundling crop insurance with other financial instruments and risk mitigating technologies
4. Improved models for delivery- PPP models
5. Direct benefits transfer: 110 million bank accounts in last 6 months



4: Maximize synergies among interventions

‘Climate-smartness’ of interventions

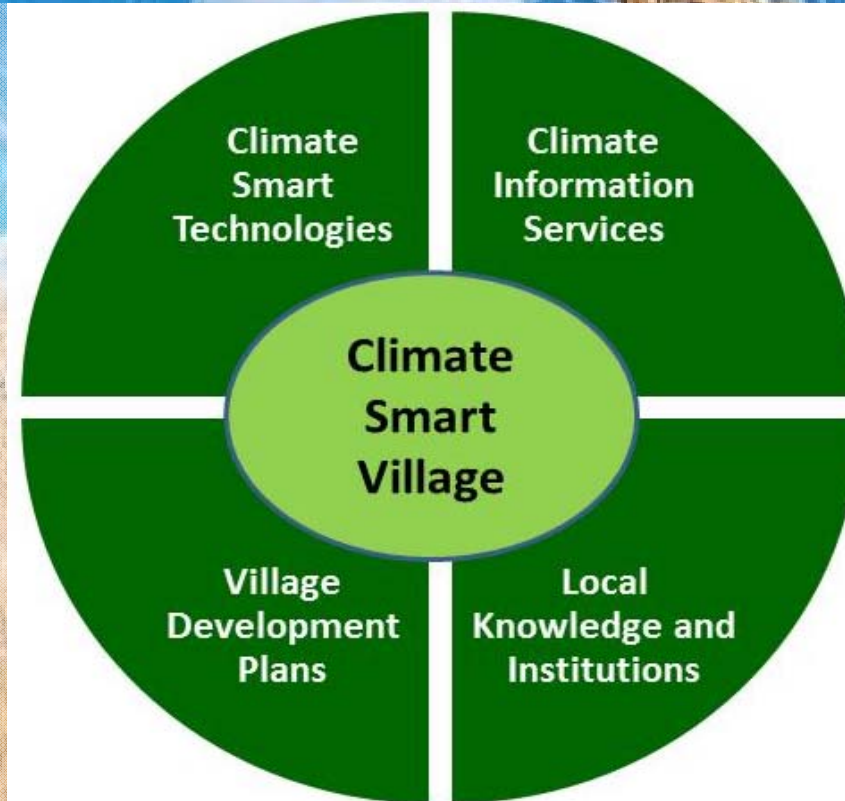
Intervention	Yield	CV	GHG emissions	Emission intensity	Investment	Income
Higher inputs	↑	?	↑	?	↑	↔
Zero tillage	↔	↓	↔	↓	↓	↑
Laser levelling	↑	↓	↓	↓	↑	↑
Residue management	↑	↓	↔	↓	↔	↑
N sensors	↔	↔	↓	↓	↓	↑
Tensiometers	↔	↓	↓	↓	↔	↑
Climatic services	↔	↔	?	?	↑	↑
Crop insurance	↔	↔	↔	↔	↑	↑
Climate-smart village	↑	↓	↓	↓	?	↑

Climate-smart villages: Integrated solutions leading to higher income, resilience, adaptation and mitigation

Several initiatives; top-down approach;
lack of synergy among interventions;
limited capacity of stakeholders

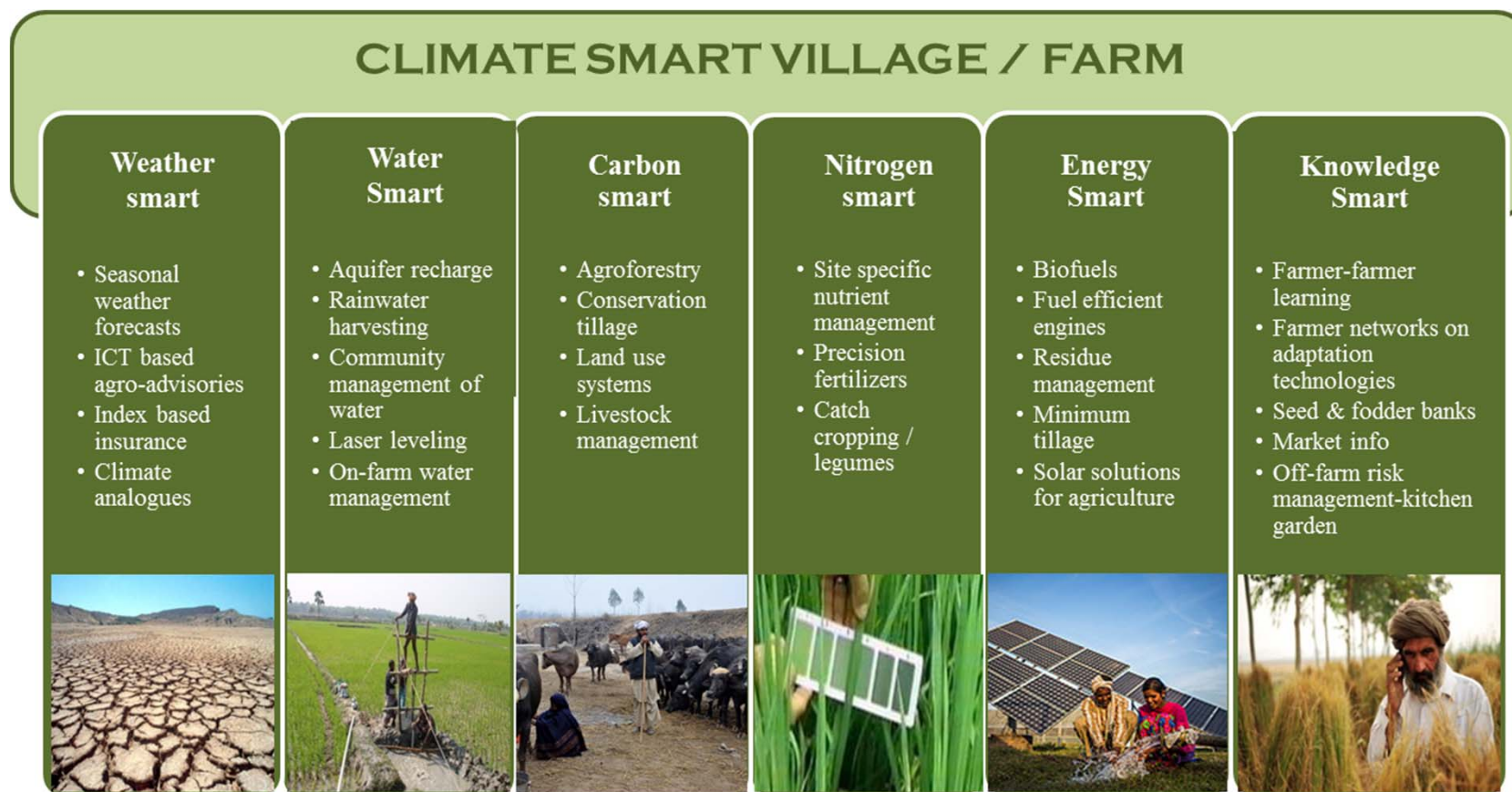
Strategy

- Integrated farmer participatory approach
- Builds on local knowledge and plans
- Precision agronomy principles-sensors
- Use of modern ICT tools
- Capacity strengthening and technology targeting



For more details visit www.ccafs.org

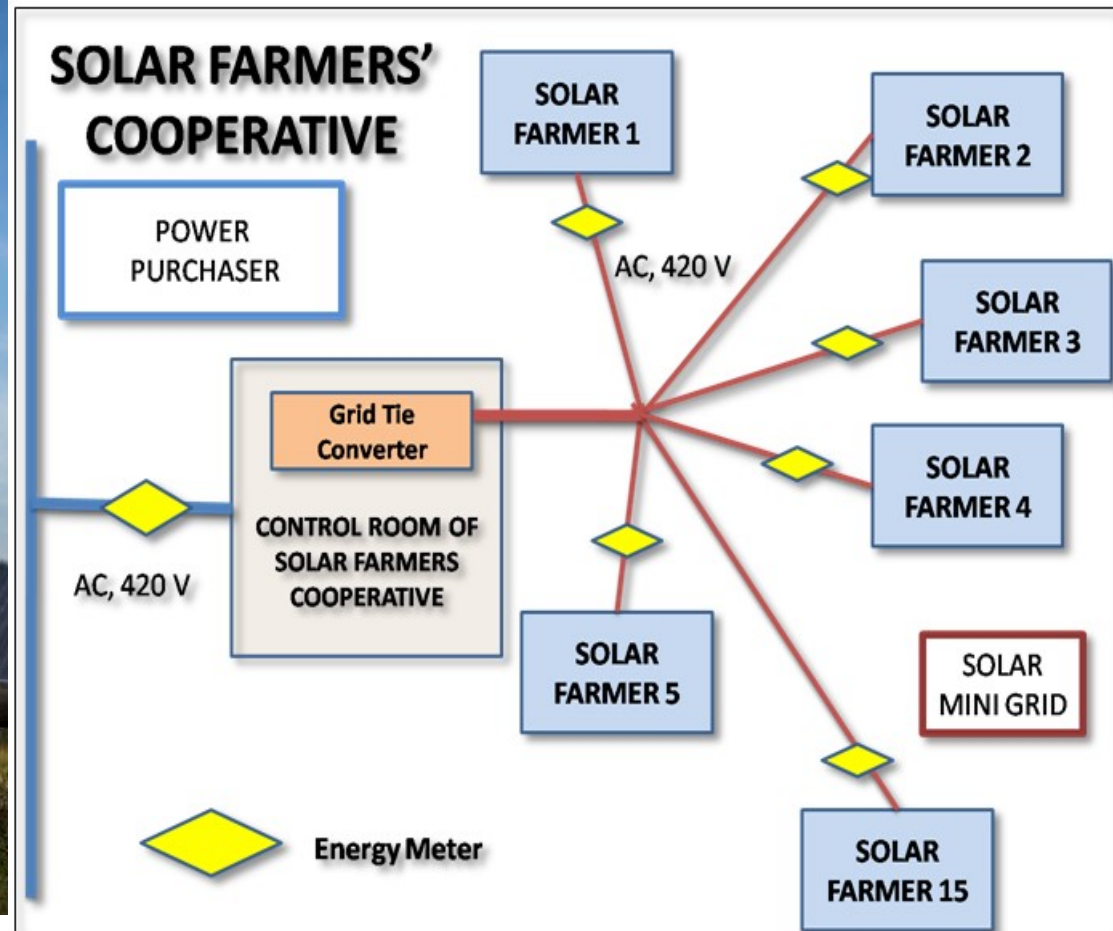
Key Interventions in a Climate-Smart Village



CSVs: Initial evidence from field

Technology	Yield gain/loss (kg/ha)	Economic gains/loss (USD NR/ha)	Water saving (M3/ha)- for water smart practice	Energy Saving (MJ/ha)	Increase in NUE (as kg/kg)	Reduction in GHG (CO ₂ -e kg/ha)
Zero tillage in wheat (without residue)	342	131	414	3040	1.44	1507 (from LCA)
Zero tillage with residue in wheat	468	190	550	2650	1.61	?
Permanent beds in maize/wheat	195	289	1650	?	1.33	?
Direct seeded rice	<u>±</u> 150	136	3000	?	-	420 (based on soil flux only)
Improved water management	375	97.51	405	?	1.40	-
Nutrient Expert in wheat	500	104	-	?	10	200
Laser leveling (RW svstem)	600	130	2500	?	?	330

Climate-smart villages: 'Growing' solar power as a remunerative crop



Source: T. Shah, IWMI

Progress/plans on CSVs in South Asia

- Evidence base- Bihar, Haryana, Punjab and Maharashtra (India), plains of Nepal, southern Bangladesh
- Farmer to farmer communication- 200 villages in Bihar, 8000 women in Nepal
- Maharashtra Govt- 1000 villages, 100,000 farmers
- Nepal reaching 15000 rice, maize, sugarcane farmers, funded by IFC
- Bhutan: proposal to establish CSVs
- Linking with on-going government programs



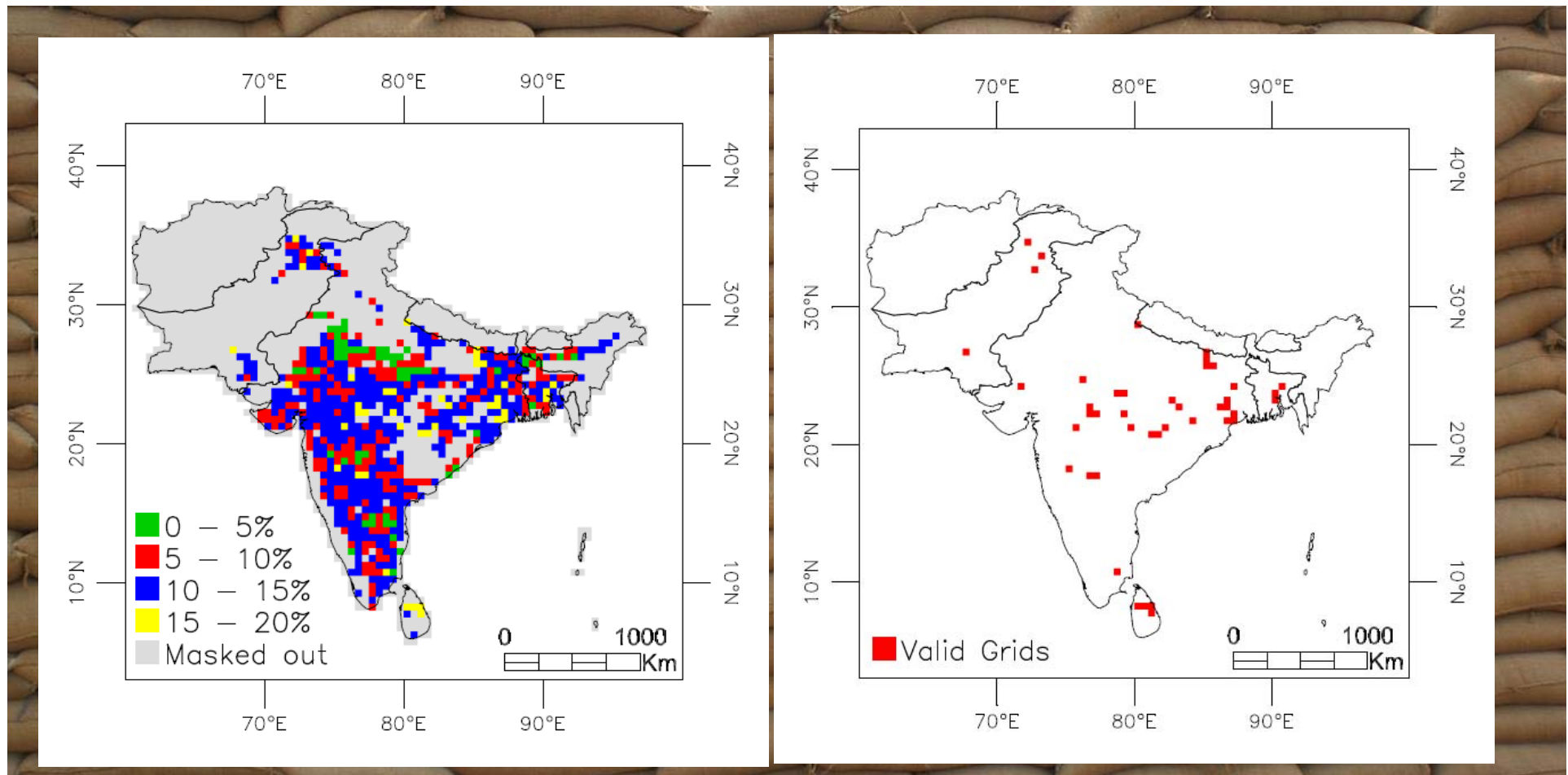
5. Improved targeting of technologies and policies

What technologies and policies lighten the load for women in climate risk regions?



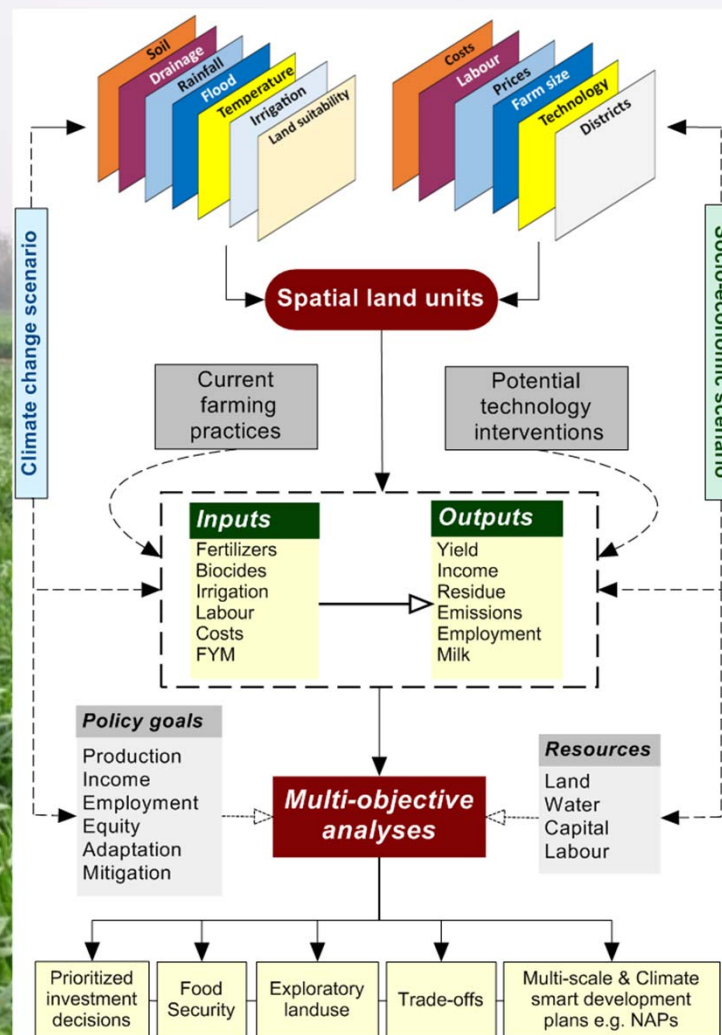
5. Improved targeting of technologies and policies: Do we need Seed banks to manage climatic risks?

1. Seed banks considered an important risk management/ adaptation strategy
2. Costs and logistics involved are large



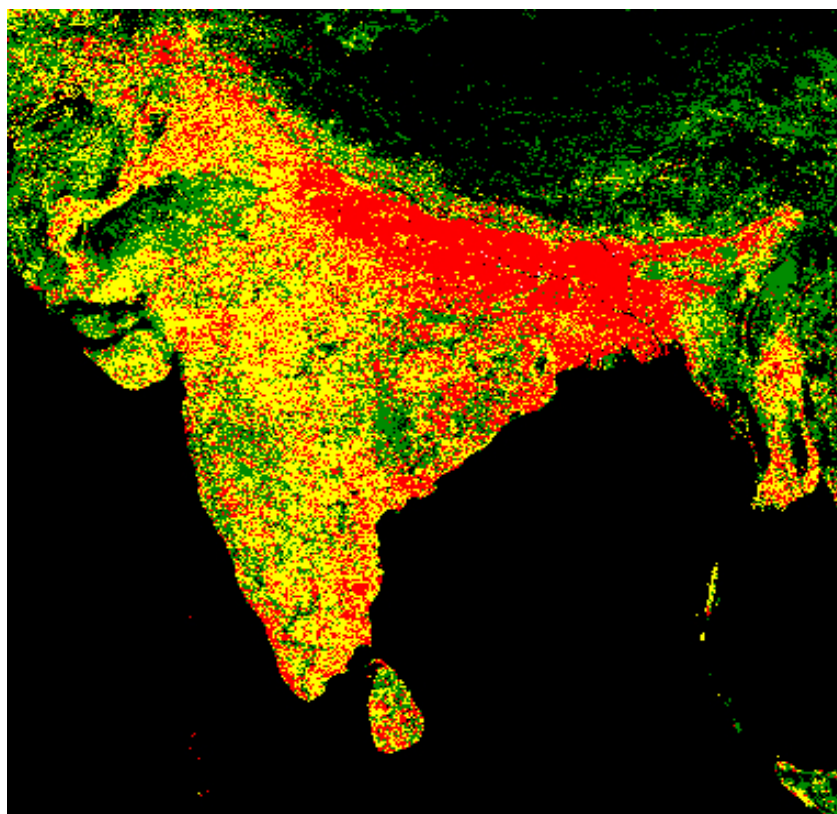
5. Improved targeting of technologies and policies: CSA-enabled development plans- Prioritizing interventions

- Builds from bottom-up biophysical and socio-economic datasets
- Spatially explicit, integrated modeling framework
- Addresses climatic and socio-economic scenarios
- Supports multi-objective trade-off analyses
- Supports more informed decision making
 - What crops to cultivate;
 - Which CSA technologies and practices to invest in;
 - Where to target that investment, and
 - When those investments should be made.
- NAPAs/ NAPs/NAMAs



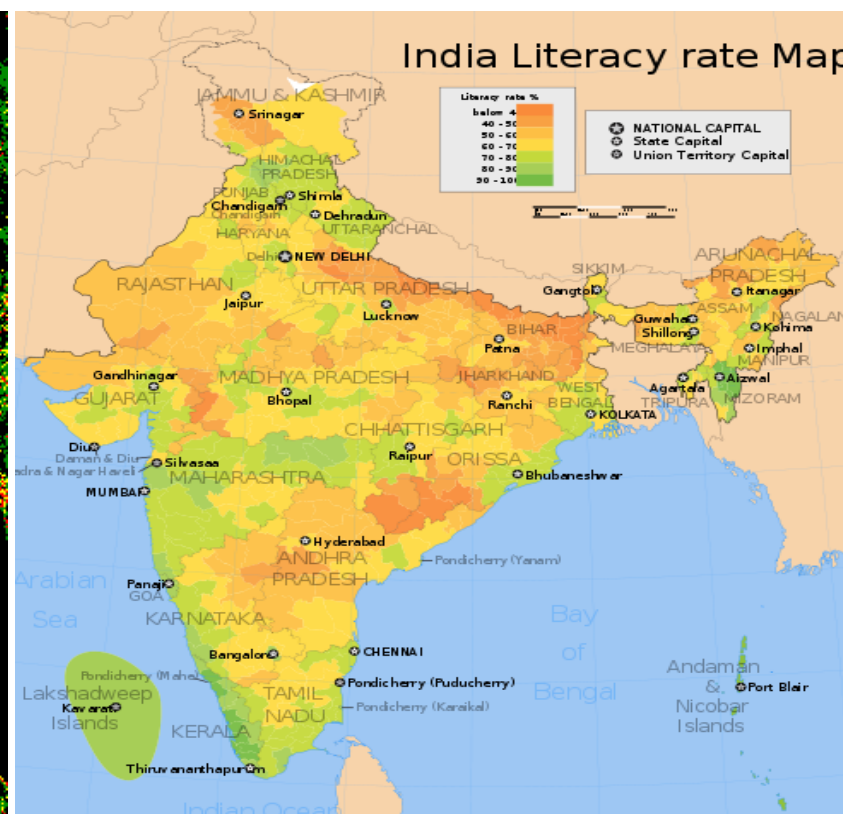
6: Address simultaneously poverty, governance, institutions, and human capital which limit agriculture growth even today

Poverty
Population at \$2/day or less



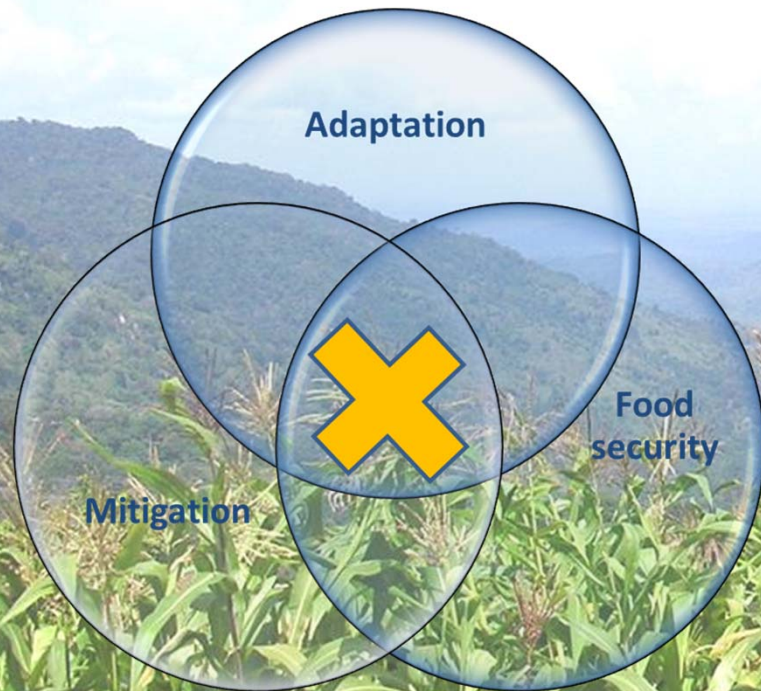
Green 1-10, Yellow 11-50, Red > 50

Human capital
literacy rate



Conclusions:

Scaling-out CSA: Key ingredients



1. **Scaling-out CSA- challenges similar to intensification**

- **Good evidence base:** technology targeted for AEZs and farmer typologies – resources, priorities
- **Impact pathway:** key actors, partners, R4D.
- **Business models:** bundling interventions; institutional mechanisms: local govts; PPP
- **Capacity strengthening** of key actors: farmers, industry, planners,....
- **Policy support**

2. **CSA has additional challenge since this is knowledge intensive**

A photograph of a man in a blue and white checkered shirt carrying a large, shallow, woven basket filled with green leafy vegetables and cauliflower on his shoulder. He is standing in a field of similar crops. A green text box is overlaid on the right side of the image.

Increased investment
in climate-smart
agriculture will
ensure global peace,
equity and prosperity



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