



Adapting South Asian Agriculture to Increasing Climatic Risks: Opportunities and Constraints



**Transitioning Cereal Systems
to Adapt to Climate Change**

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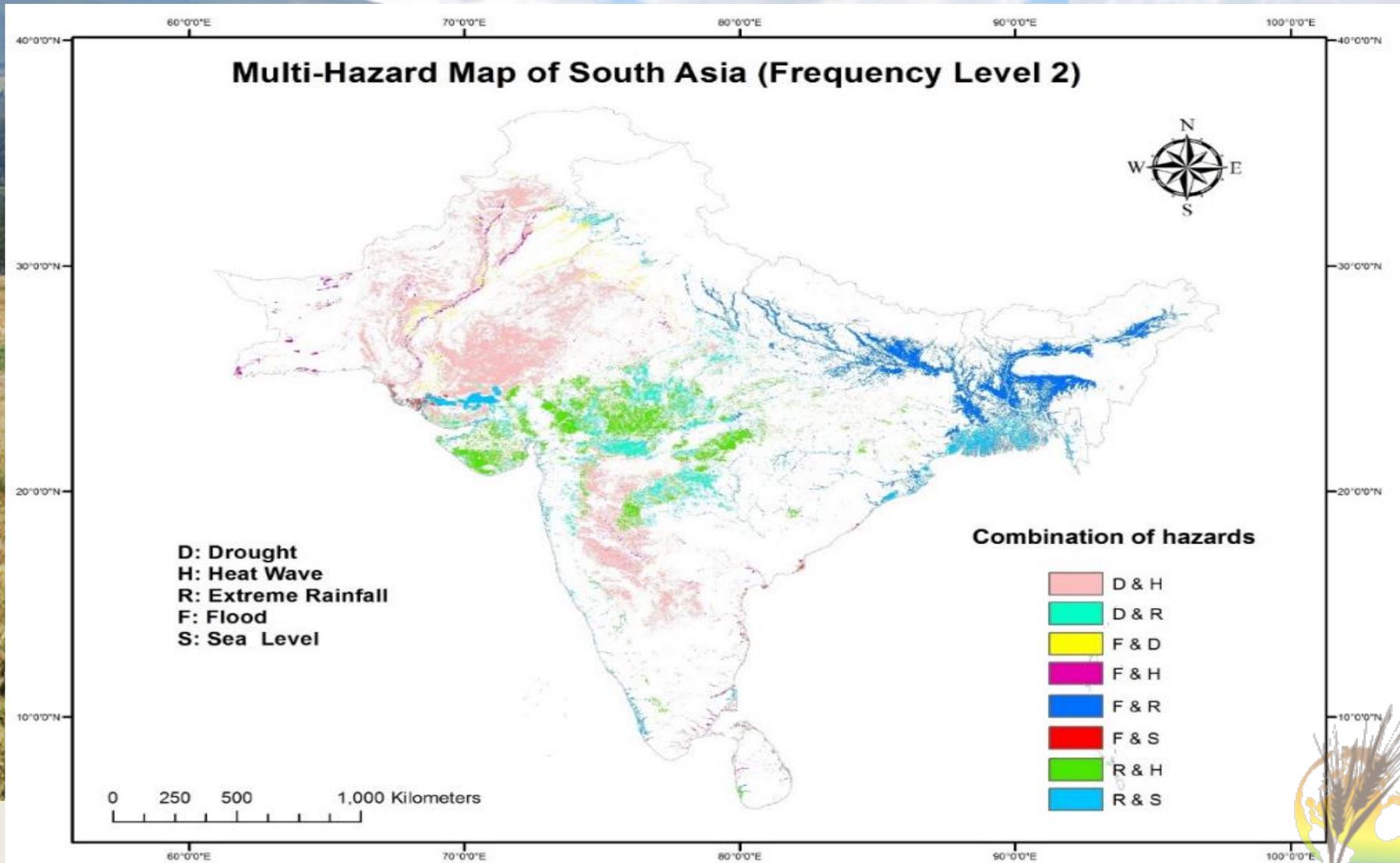
South Asia:

Home for 40% of World's Poor and Yet a Land of Opportunities

- > 1.6 billion people (17% world) on 2.4% of the world's land area
- Tremendous progress in last 4 decades
- Yet, 1/4th of the world's hungry; 40% of the world's malnourished children and women
- Agriculture is livelihood security of > 50% population
- Vulnerable to climatic risks

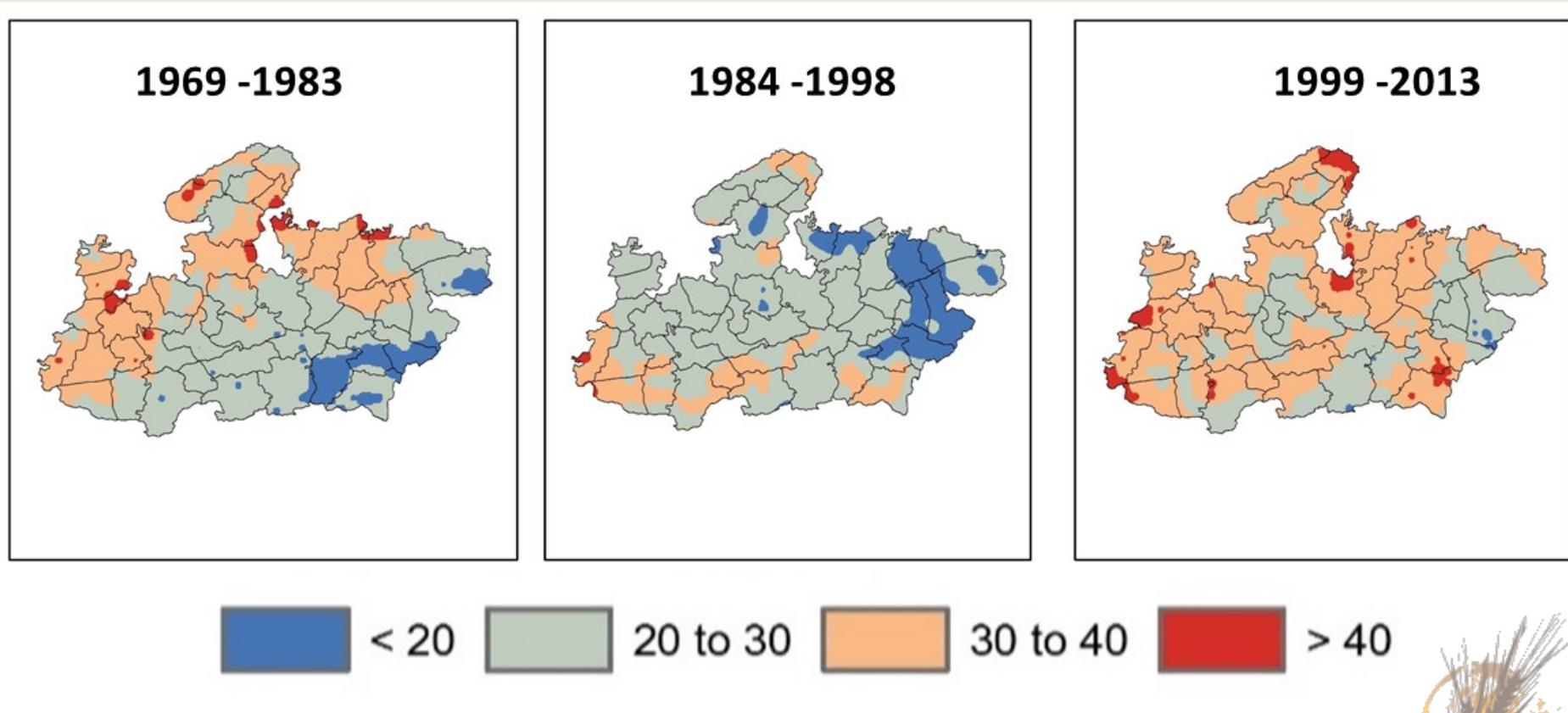


Climatic stresses are common in South Asia



Increasing climatic variability is one of main reasons for agrarian distress in South Asia

CV of monsoon rainfall- Madhya Pradesh, %

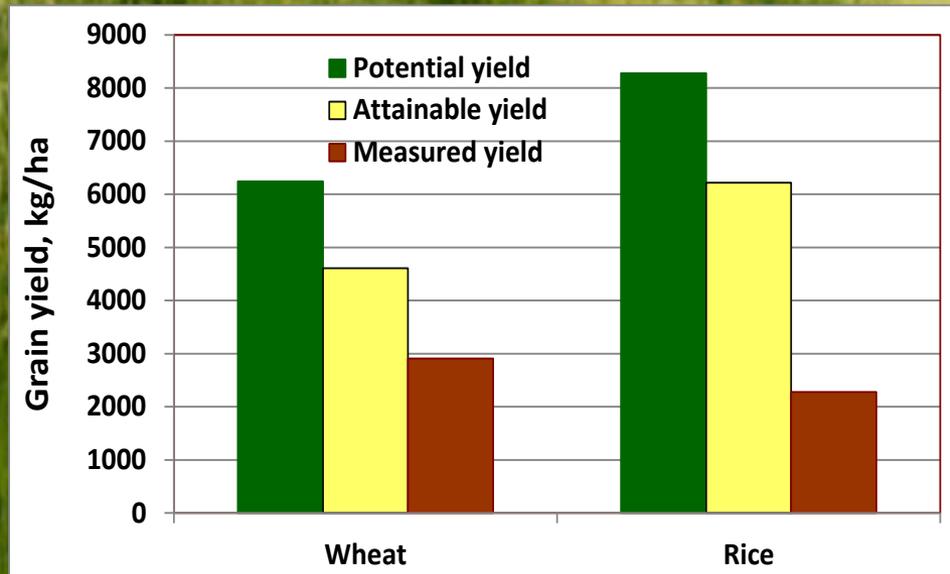


South Asia:

Home for 40% of World's Poor and Yet a Land of Opportunities

Opportunities

- Huge and increasing demand for (quality) food
- Untapped potential: Large yield gaps
- Diverse agro-climates
- ICT and Big data
- Climate change: increase in rainfall; new temperature zones





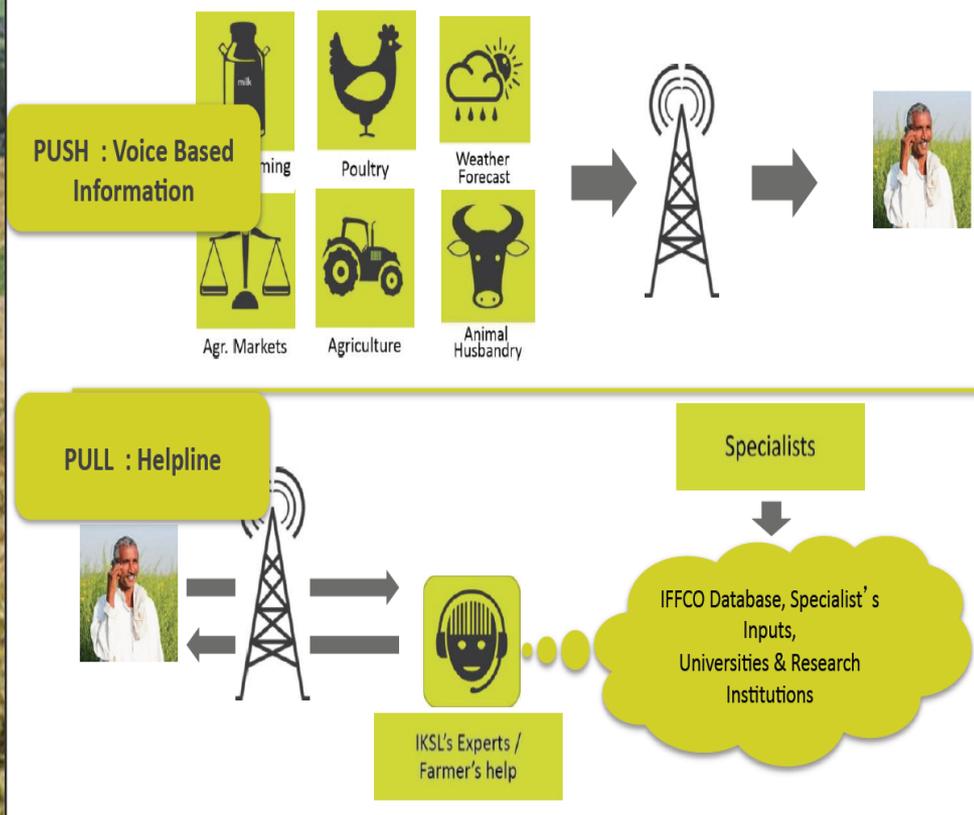
Adapting South Asian Agriculture to Increasing Climatic Risks

Six Key action points



1. ICT and Weather –based agro-advisories

Architecture & Service Construct



Current status

- > 5 million farmers in India
- 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

Source: IMD and IKSL

2. Crop insurance for improved management of climatic risks

30 million insured farmers but dissatisfied;
Industry and government also

Innovations needed

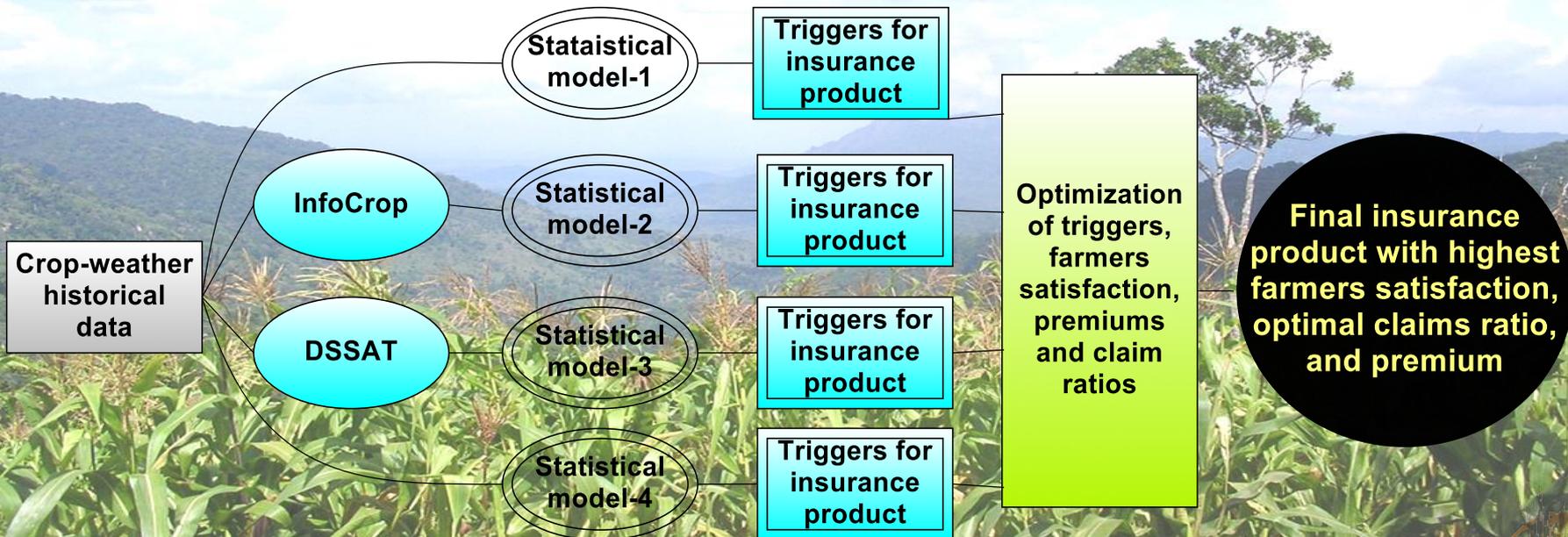
1. Improved 'indices' for rainfall/temperature
2. Remote sensing for loss assessment
3. Bundling crop insurance with other financial instruments and CSA interventions
4. Improved PPP models for delivery
5. Direct benefits transfer: 110 million bank accounts in last 6 months



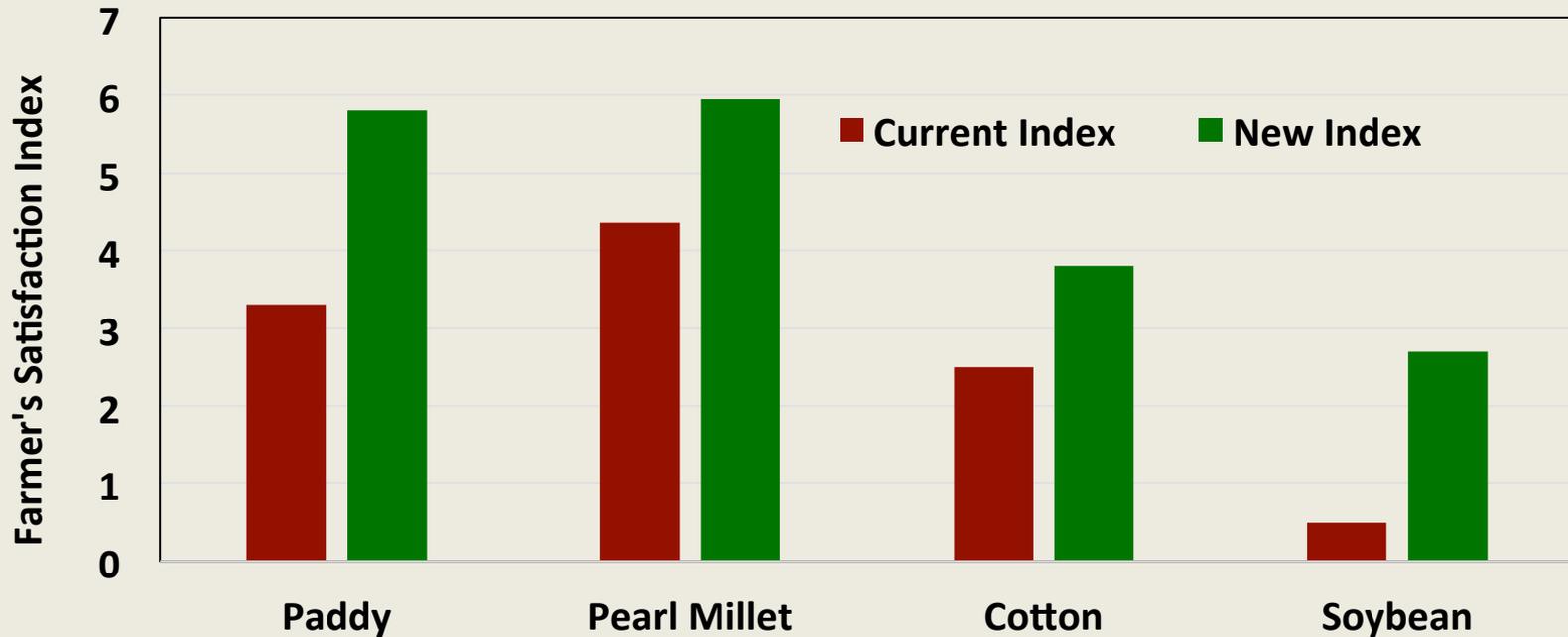
Scaling out crop insurance in India

Improved triggers for weather insurance: win-win products for farmers, industry and government

- Farmers satisfaction index-payment when due and in right amount
- Industry: 70-80 % claim ratio
- Government: reasonable premiums

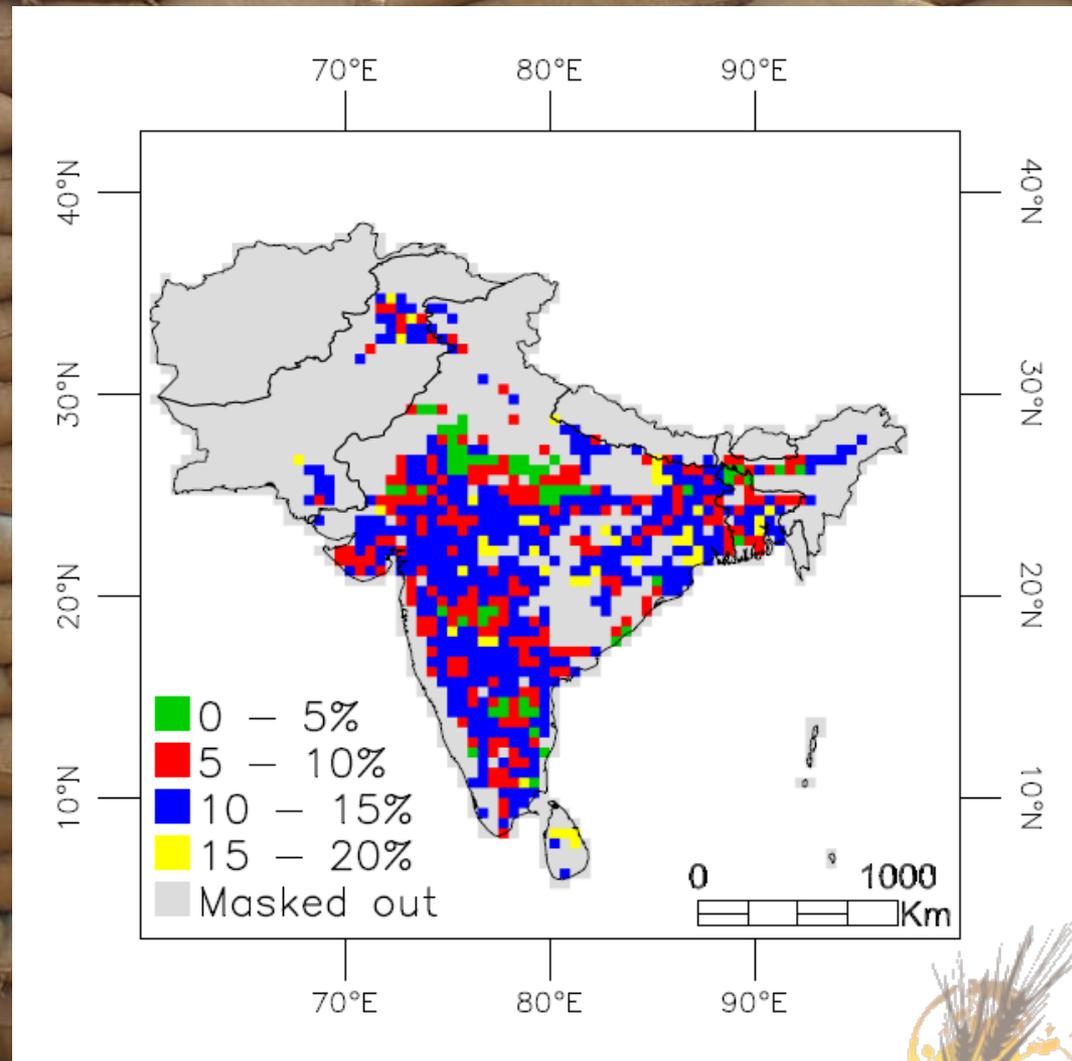


Farmer's satisfaction with index insurance: Example from Maharashtra



3. 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
3. Gridded data of last 50 years- Weekly SPI analyses- Drought weeks followed by normal rainfall
4. Percent years sowing of alternate short-duration crops is useful/seed banks required- only once in 5 to 6 years in SA
5. Adaptation/Mal-adaptation: Economic analyses?



4. 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

The approach we use, and what makes it different:

- Builds on existing initiatives
- Integration of technologies, practices and services
- Participatory approach
- Incorporates adaptation and mitigation
- Capacity strengthening
- Evidence for scale out, climate finance



For more details visit www.ccafs.org

Key Interventions in a Climate-Smart Village

CLIMATE SMART VILLAGE / FARM

Weather smart

- Seasonal weather forecasts
- ICT based agro-advisories
- Index based insurance
- Climate analogues



Water Smart

- Aquifer recharge
- Rainwater harvesting
- Community management of water
- Laser leveling
- On-farm water management



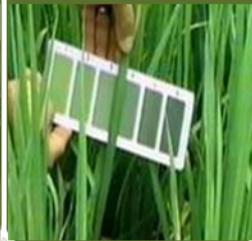
Carbon smart

- Agroforestry
- Conservation tillage
- Land use systems
- Livestock management



Nitrogen smart

- Site specific nutrient management
- Precision fertilizers
- Catch cropping / legumes



Energy Smart

- Biofuels
- Fuel efficient engines
- Residue management
- Minimum tillage
- Solar solutions for agriculture



Knowledge Smart

- Farmer-farmer learning
- Farmer networks on adaptation technologies
- Seed & fodder banks
- Market info
- Off-farm risk management-kitchen garden



Adaptation with mitigation co-benefits:

Precision nutrient management

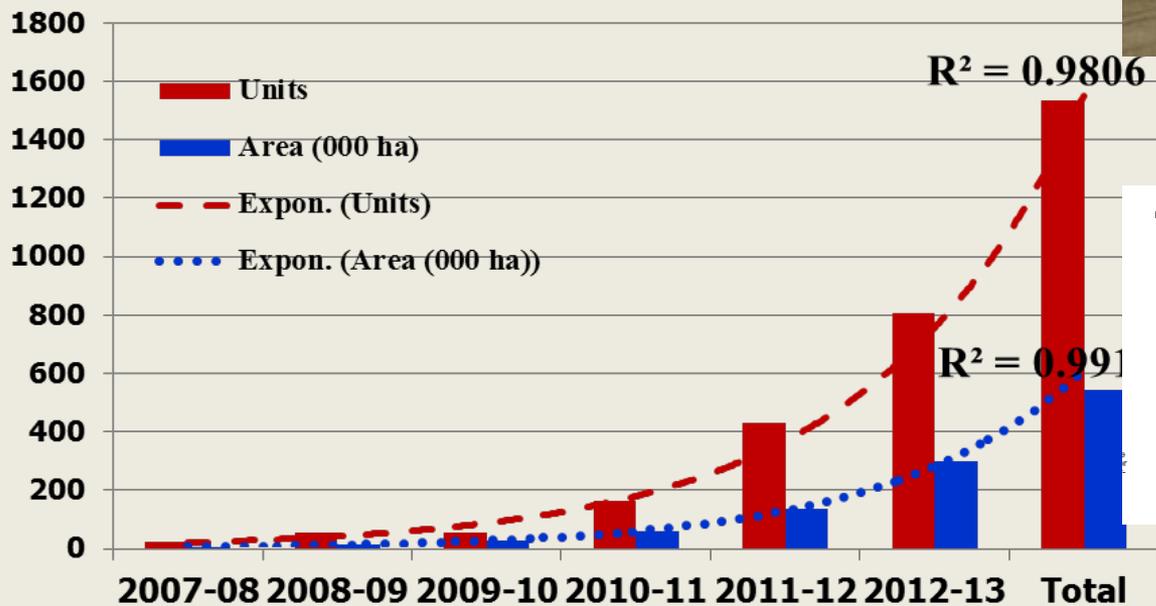
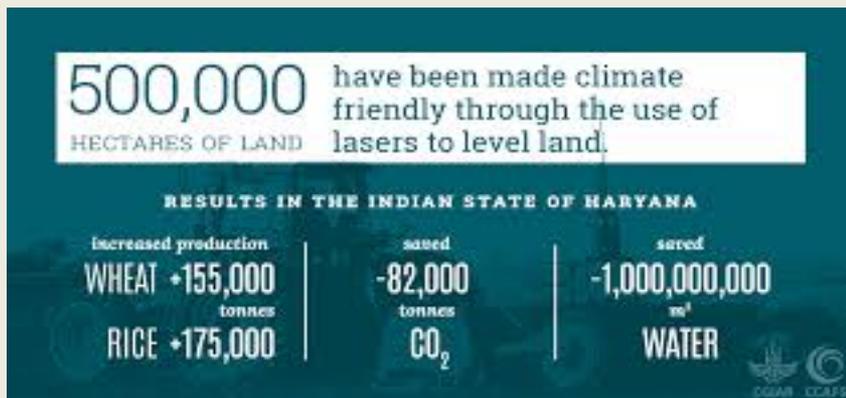


- Decision support software: Precision fertilizer recommendations for smallholders



- Optical sensors: e.g. GreenSeeker –reduced N use, same yield in wheat, 60 kgN/ha

Adaptation with mitigation co-benefits: Laser Land Leveling in IGP



13 Laser-Assisted Precision Land Leveling Impacts in Irrigated Intensive Production Systems of South Asia

M.L. Jat, Yadvinder-Singh, Gerard Gill, H.S. Sidhu, Jeetendra P. Aryal, Clare Stirling, and Bruno Gerard

Source: Jat et al (2015)

Climate-Smart Villages: More adapted to weather risks (Haryana: excess rainfall during rabi 2014-15)

Minimum tillage

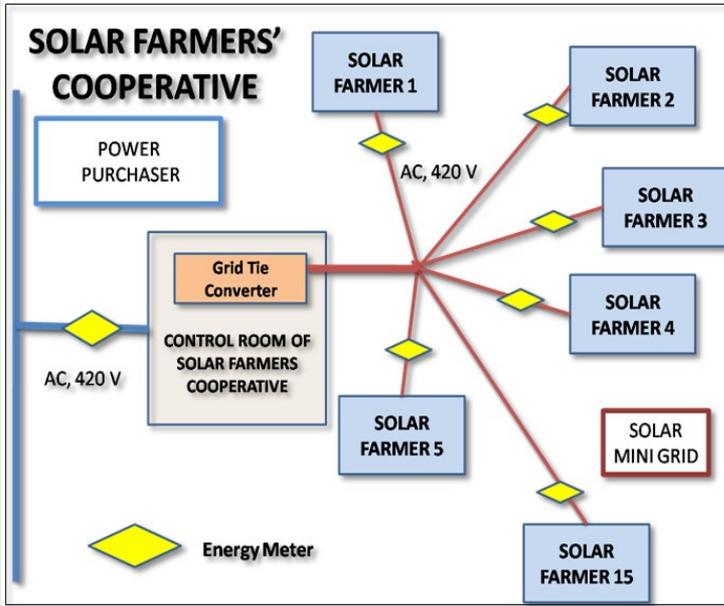
Conventional tillage



- ML Jat et al. CIMMYT unpublished



Climate-smart villages: 'Growing' solar power

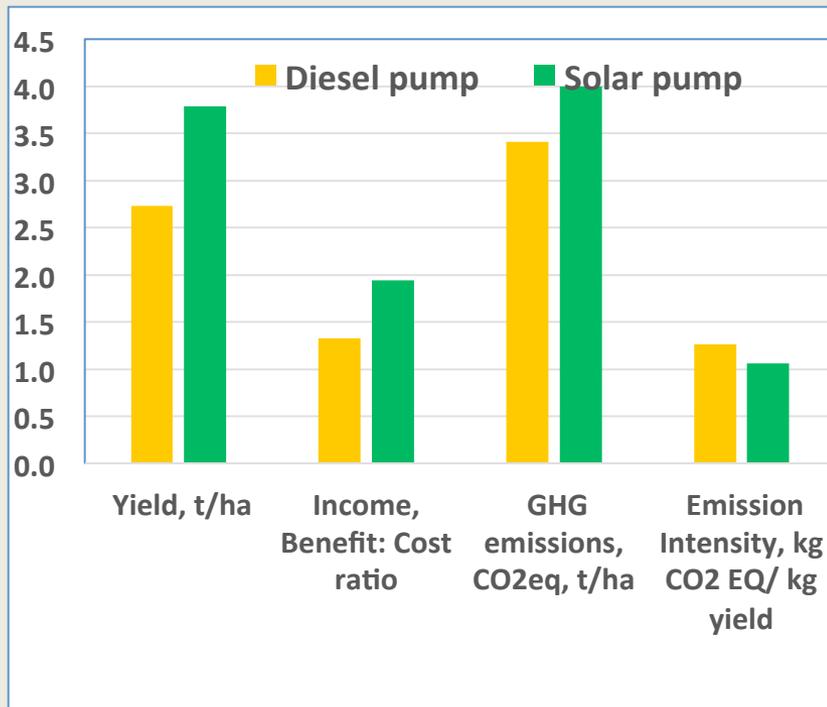


Climate-Smart Agriculture Cooperatives

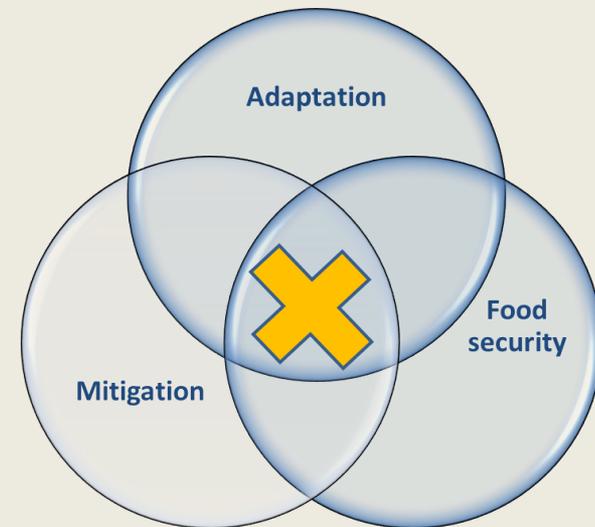
- Improved Seeds
- Green energy (solar)
- Water management
- Crop management

Community and individual solar irrigation systems are being tried in Bihar

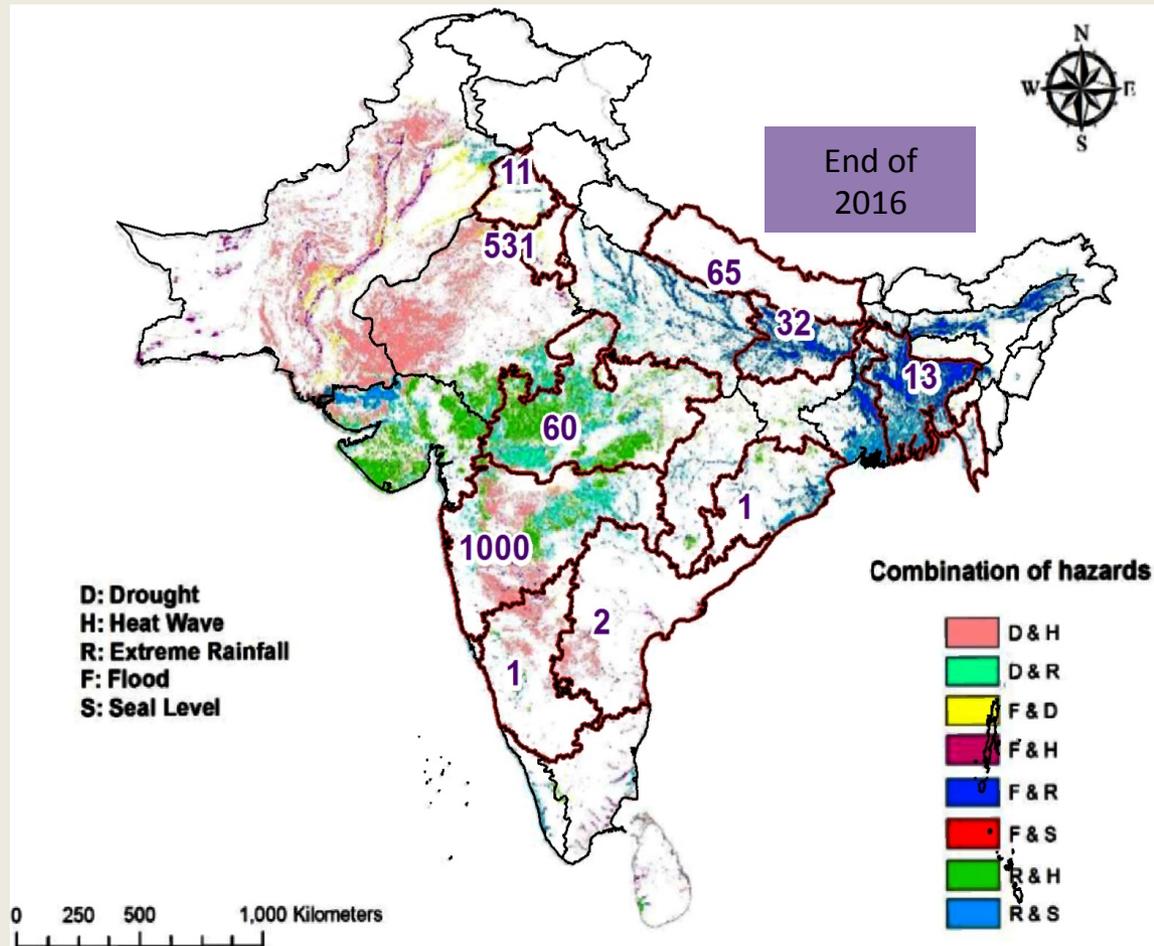
Impact of solar irrigation systems on maize in Bihar



Solar irrigation in Bihar promotes CSA



Climate Smart Villages in South Asia



5. Identify and exploit potential benefits of climate change: New agronomy and new markets

- Change in temperature zones
- Increase in rainfall
- Shorter crop durations



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

CSVs designed to address these to some extent

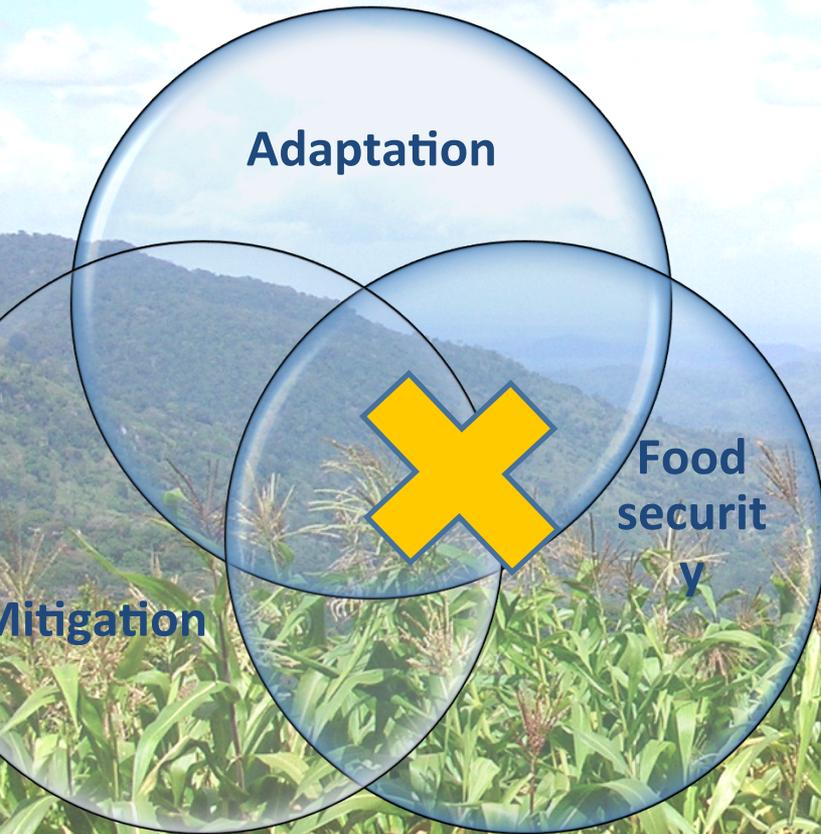


Not discussed in this paper but critical

- **Improved seeds**
- **Seed replacement rate**
- **Water storage and efficient utilization**
- **Pests and diseases**
- **Arresting land degradation**



Adapting South Asian Agriculture to Increasing Climatic Risks: Key points



1. Climatic risks have always been there and are now increasing.
2. Vulnerability limits adaptation in developing countries.
3. Several options are available.
4. Need for right incentives, investments, institutions and policies.



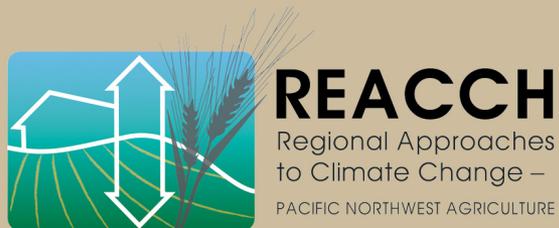


Thank you!

University
of Idaho



United States Department of Agriculture
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Pacific Northwest
Farmers Cooperative



Monsanto