Envisioning and Scaling ‘Climate-Smart’ Agriculture Into South Asia Cereal Crop Systems
Ganges Delta and Costal Odisha:
- Endemic poverty / migration
- Rice – fallows or pulses, low cropping intensity
- Low levels of irrigation
- Pockets of seasonal salinity
- Weak markets
- Disaster prone (floods, cyclones)
Eastern IGP:

- Thermal stress for wheat
- Wealth of water resources, but under-developed (< 50% land area)
- Rice – wheat, rice-maize systems
- Strengthening interest of private sector / GoI investments (e.g., BGREI)
- Small farms and fragmented landholdings
NW Breadbasket of India:
- Large farms
- Mechanized, irrigated, + intensive
- Rice-wheat, cotton-wheat
- Supportive, but distorting policies
- Contested resources and depletion
- Regional hub of innovation
Hill and Plateau Ecologies:
- Endemic poverty / migration
- Maize / upland rice, low cropping intensity, livestock integration
- Rainfed, poor soils
- Tribal, limited institutions
- Weak markets
- Remittances, development emphasis
Real wages doubling in the last decade

Pockets of resource depletion

(More?) Erratic climate patterns
IMPLICATIONS OF A LESS PREDICTABLE MONSOON?

2011 - Early onset
- DSR failures
- Inundation damage
- High yields in conventional rice

2012 - Late onset
- Delayed rice establishment
- Old rice seedlings / fallows
- Delayed rabi establishment

2013 - Mid drought, late excess
- Crop abandonment
- Direct damage from Phalin
- Harvest delays in heavy soils
TARGETING COPING STRATEGIES FOR RESILIENCE

• Facilitate market-led transitions to **less water-demanding crops** like soybean in drought-prone areas

• Champion **rice nursery enterprises** to ensure farmers have access to appropriately-aged seedlings

• Encourage cultivation of **shorter duration and drought tolerant rice cultivars and hybrids**

• Through agro-advisory, disseminate information on **optimal rice sowing and transplanting dates** based on historical rainfall probabilities and weather forecast information

• With research-based evidence, **highlight the promise of technologies** like DSR to establish rice when early rainfall is deficient
SYSTEMS APPROACHES ARE ESSENTIAL

- Medium-duration *rice*
- Timely *rice* establishment
- Mechanized *rice* harvest
- Zero-tillage for wheat
- Long-duration wheat
- *Revised recommendations and social marketing*

Bihar: Sowing date moved 5 d earlier, raising yield 0.25 t ha$^{-1}$

*Data: R.K. Malik et al.*
DIVERSIFICATION + CA + PA =

11% → 71% → 46% → 29% → 32%
Verifying CSA at nested scales: Simulation results suggest 75% reduction in irrigation with maize substituting for kharif rice. Much less impact on ‘consumptive’ water use (15% reduction in ET) and uncertain influence on groundwater decline.

*Data source: Balwinder Singh*
CONSIDERABLE INVESTMENT, BUT LITTLE CHANGE

• 22 m hectares of winter fallows in India

• More than 473,000 ha can be cropped in coastal Odisha alone with profitability > $750 ha per year

• Why doesn’t technical feasibility and apparent profitability always lead to positive change?
PRINCIPLE #1: STRENGTHEN THE SCIENCE OF DECISION MAKING OF HOW AND WHY DIFFERENT FARMER ‘TYPES’ CHOSE TO INVEST (OR NOT)
PRINCIPLE #2: TECHNOLOGIES AS STARTING POINTS WITHIN 'FIT FOR PURPOSE' ALLIANCES

Define + extend BMPs to enhance yield and $

Ensure grain quality with proper postharvest practices

Increase access to maize shellers

Pre-season planning and capacity development

Facilitate aggregation & timely procurement
PRINCIPLE #3: SEEK AND NUTURE BUSINESS OPPORTUNITES

2,909 ZT SP

43,800 ha (18% growth p.a.)

Growth of the service economy for ZT wheat

Zero tillage (ha)
FIELD-LEVEL DECISION TOOLS FOR SI

Daily Weather
- Tmax
- Tmin
- Solar radiation
- Precipitation

Who deploys the technology?

Pathways at coarser scales: more precise better than no adoption?

Salinity observation

Forecasted irrigation need (yes/no)

Soil water balance

Evapotranspiration

Ground Cover (%) from remote sensing

Water table depth

MODEL

PANI
Welcome to Irrigation Scheduling App! This App is designed to provide irrigation schedule and alert for farmers and LSPs. Please enter to access the service.

ENTER
DON’T FORGET THE SIMPLE THINGS

Considerable in-field variability wrt N management (*reduces yield and increases carbon intensity of production*)

Low-cost precision spreaders save time and increase profitability

7-15% increase in $AE_N$ with precision application
TAKE HOME MESSAGES

• The **IGP is diverse** and so are the entry points for CSA

• CSA programming based on single crops rather than **systems** misses significant opportunities

• **Scaling** considerations are just as important as technologies

• Avoid the RCT trap: **generalized ‘goods’ do not good**

• Process-based agronomy at nested scales (when necessary) to drive **foresight and targeting**
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THE CEREAL SYSTEMS INITIATIVE FOR SOUTH ASIA

NEPAL SEED AND FERTILIZER PROJECT (NSAF)