Building the Capacity to Promote Equity in Agricultural Innovation Systems:

Empirical perspectives from Bihar, India

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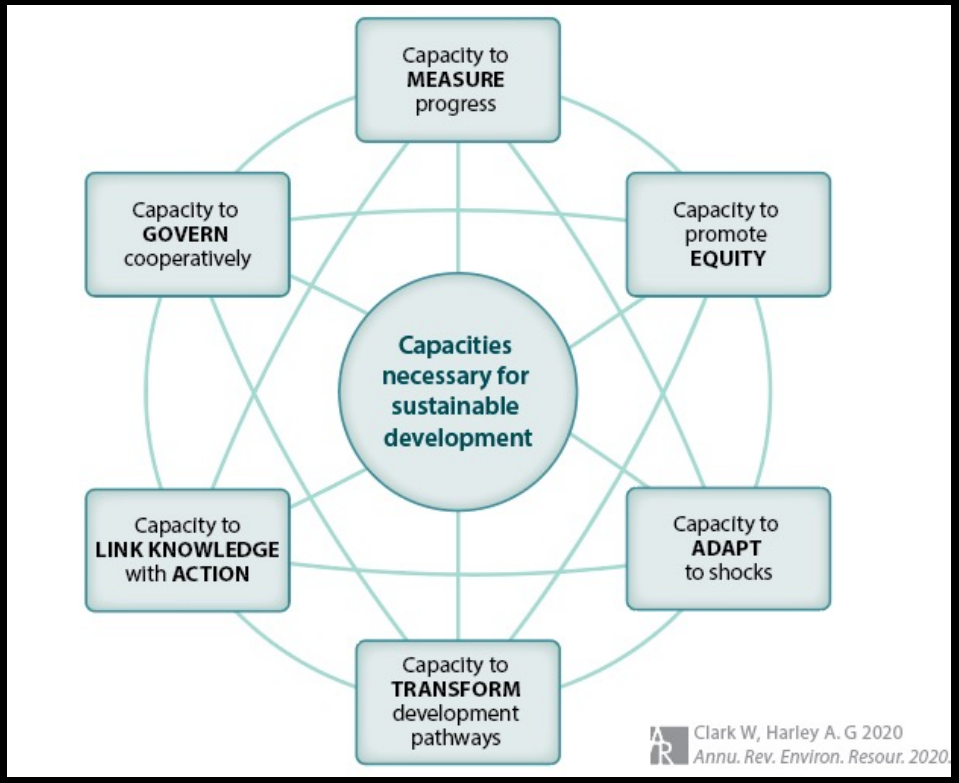
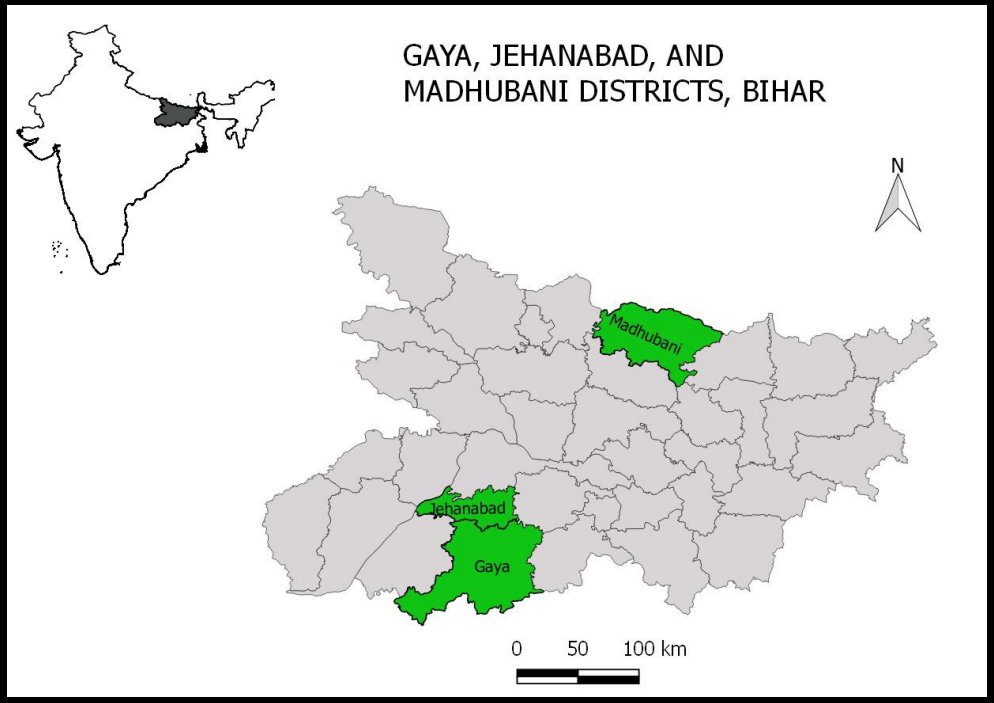
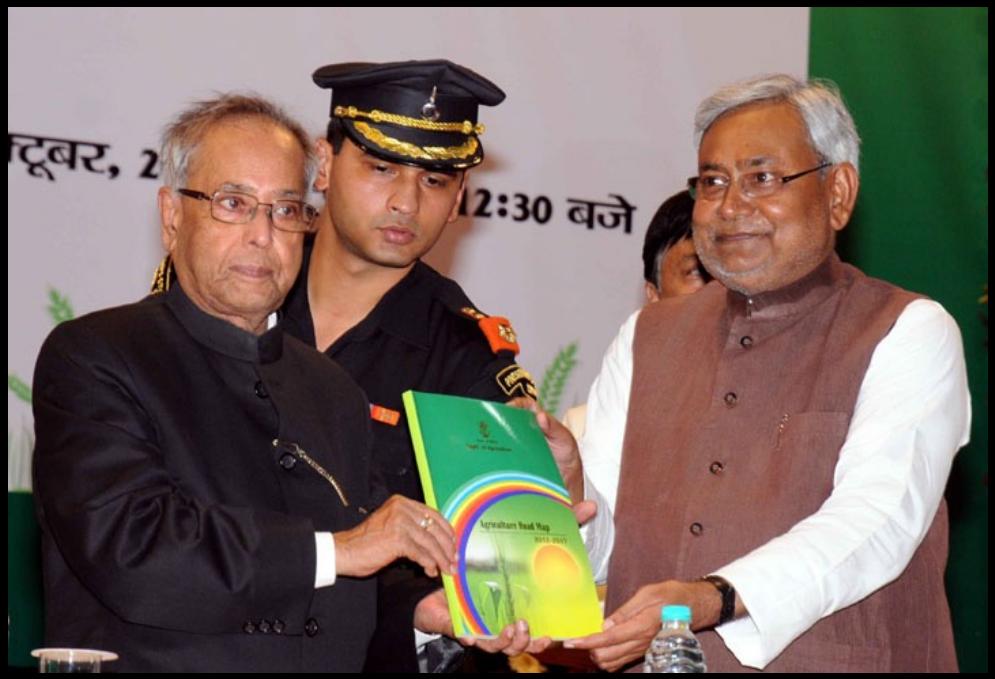


Six Capacities Necessary for the Pursuit of Sustainability

Capacity to promote equity in agriculture systems

What are the barriers preventing the poorest farmers from realizing greater benefits from agricultural technology?





A 21st century green revolution in Bihar, India

Factor by which poorest farmers are less likely to use a technology than wealthier farmers

Number of Farmers in Category →	Caste Category Upper Caste (OBC and UC) - 248; Lower Caste (SC/ST) - 250	Landholding Size* Marginal (<2.5 acres) - 283; Non-Marginal (>2.5 acres) – 55
Technology	**Factor by which a lower caste farmer is less likely to use a technology compared to an upper caste farmer**	**Factor by which a marginal farmer is less likely to use a technology than a non-marginal farmer**
Diesel engine	1.01	1.16
Tractor	0.98	0.95
Improved seeds	0.93	0.92
Rubber pipes	0.89	0.93
Vermi-compost	0.69	0.31
Electrical motor pump	0.63^	1.23^
Intercropping	0.58	0.67
Introduced new crop	0.52	0.93
System of Rice Intensification	0.34	0.34
Drip Irrigation	*NA*	*NA*
Solar Irrigation Pumps	*NA*	*NA*

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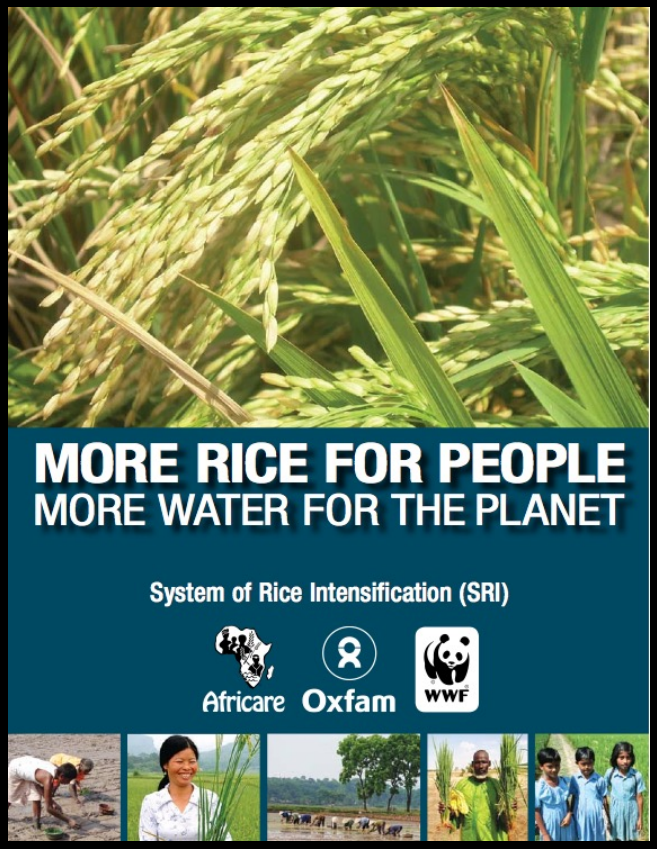
Socio-technical Barriers to Technology Adaption

1. Lack of financial assets
2. Inappropriate technology design
3. Missing market linkages
4. Lack of access to credit
5. Missing infrastructure
6. Ineffective extension services
7. Lack of individual farmer capacity
8. Weak capacity for collective action
9. Structure of land tenure regimes
10. Misaligned incentives
11. Corruption & security

Which barriers are biggest for the poorest quintile of farmers in a context you know well?



System of Rice Intensification (SRI)

SRI: A Pro-Poor Technology?

India's rice revolution

In a village in India's poorest state, Bihar, farmers are growing world record amounts of rice - with no GM, and no herbicide. Is this one solution to world food shortages?

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"SRI is set to change the face of paddy cultivation in the state as hundreds of thousands of small and marginal farmers have been adopting it following encouraging results" ~ Alok Kumar Sinha, Bihar Ag Production Commissioner (as quoted in state newspaper 'Business Standard' in 2013).

"Farmers who adopt SRI will not be affected by drought because it uses less water." ~A.K. Sinha, Principal Secretary of Agriculture as Quoted in Times of India in 2011

SRI Study Findings

- Despite potential benefits of SRI to the poorest farmers, survey data from Bihar, India suggests that poorest farmers are the least likely to adopt SRI.
  → Only 10% of farmers in poorest quintile among SRI users

- Why:
  i. Lack of water availability and control
  ii. Design of subsidy program
  iii. Ineffective extension services

Technology / Socio-technical Causal Mechanisms	Solar Irrigation Pumps	System of Rice Intensification	Drip Irrigation	Electric Motor Pumps	Rubber-*Walla* Pipes	Improved Seeds Varieties
(STCM)	(SIP)	(SRI)	(MIS)	(EMP)	(RWP)	(ISV)
Lack of financial assets	High	Low	Medium	Medium	Low	Low
Inappropriate technology design	Medium	Low	High	Low	Low	Low
Missing market linkages	Low	Low	Medium	Low	Low	Low
Lack of access to credit	High	Low	Medium	Medium	Low	Low
Missing Infrastructure	Medium	High	High	High	Medium	Medium
Ineffective extension services	Medium	High	Medium	Low	Low	Low
Lack of individual farmer capacity	Medium	Medium	Medium	Low	Low	Low
Weak capacity for collective action	Medium	Medium	Low	Medium	Low	Low
Structure of land tenure regimes	Medium	Medium	Medium	Medium	Low	Medium
Misaligned incentives	High	High	High	Medium	Low	Medium
Corruption & security	High	Low	Low	Medium	Low	Low

Ranked Barriers for Poorest Farmers in Bihar, India

STCM	Raw Score	Weighted Score
Missing infrastructure	21	2.3
Misaligned incentives	19	2.1
Structure of land tenure regimes	10	1.1
Lack of financial assets	9	1
Lack of access to credit	9	1
Ineffective extension services	9	1
Corruption & security	7	0.8
Inappropriate technology design	7	0.8
Lack of individual farmer capacity	6	0.7
Weak capacity for collective action	6	0.7
Missing market linkages	2	0.2

Bottom Line

1. Understanding which barriers impact the poorest farmers is an empirical questions
2. Whether the poorest farmers benefit from technology is almost always impacted by three attributes of the technology
   i. The physical design of the technology
   ii. The laws, regulations and incentives or managerial practices around the technology
   iii. The availability of infrastructure and complementary technologies to the poorest farmers

Thank you

Rubber Pipes

Improved Seeds

Electric Pump Sets

System of Rice Intensification

Drip Irrigation

Solar Powered Irrigation Pumps