FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

INNOVATION LAB FOR FOOD SECURITY POLICY

Overview and Application to Sustainable Intensification

USAID FROM THE AMERICAN PEOPLE

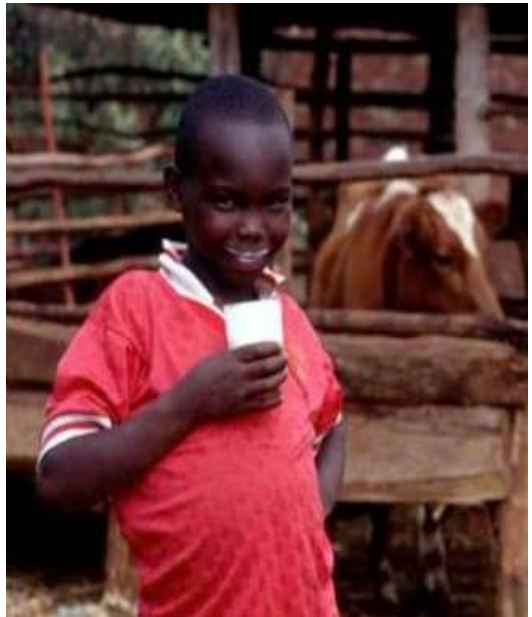
MICHIGAN STATE UNIVERSITY

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

IFPRI INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

Challenges

Rapid growth in global food demand and new challenges arising from climate change require effective policies to ensure food security for all without degrading scarce natural resources.



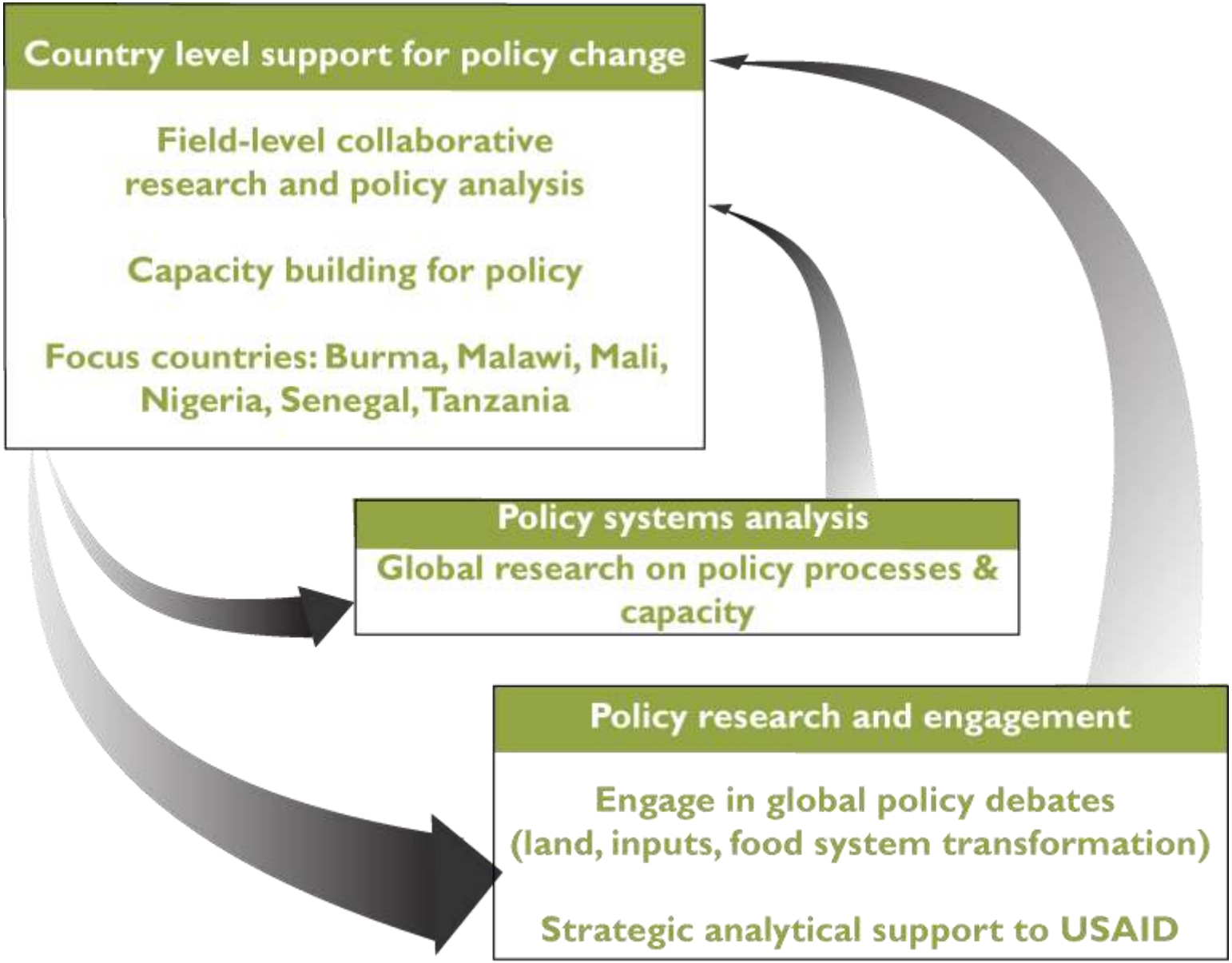
Goal

To promote gender and youth inclusive agricultural productivity growth, improved nutritional outcomes, and enhanced livelihood resilience through improved policy environments.

Objectives

1. **Address critical evidence gaps for informed policy debate and formulation at country, regional and global levels.**

2. **Foster credible, inclusive, transparent and sustainable policy processes at country level.**


Country level support for policy change
Field-level collaborative research and policy analysis
Capacity building for policy
Focus countries: Burma, Malawi, Mali, Nigeria, Senegal, Tanzania
Policy systems analysis
Global research on policy processes & capacity
Policy research and engagement
Engage in global policy debates (land, inputs, food system transformation)
Strategic analytical support to USAID

FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Toward a Holistic and Sustainable Strategy for Raising Agricultural Productivity in Sub-Saharan Africa

Milu Muyanga & T.S. Jayne
Agricultural, Food and Resource Economics Department
Michigan State University

Presentation at the Feed The Future Innovative Lab Partners Meeting
Lilongwe, Malawi
April 21, 2015

Healthy soils are the foundation of food production

2015
International
Year of Soils

healthy soils for a healthy life

Low maize-fertilizer response rates on farmer-managed fields

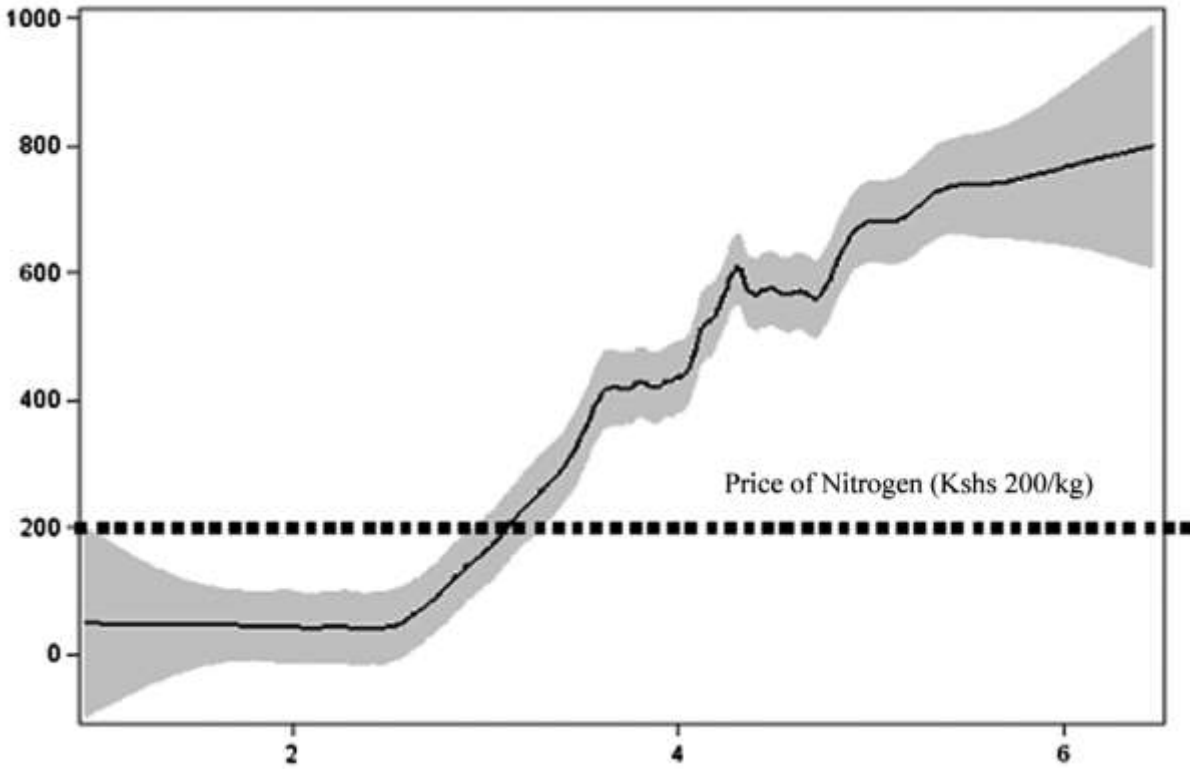
Study	country	Agronomic response rate (kgs maize per kg N)
Morris et al (2007)	W/E/S Africa	10-14
Sheahan et al (2013)	Kenya	14-21
Marenya and Barrett (2009)	Kenya	17.6
Liverpool-Tasie (2015)	Nigeria	8.0
Burke (2012)	Zambia	9.6
Snapp et al (2013)	Malawi	7.1 to 11.0
Holden and Lunduka (2011)	Malawi	11.3
Pan and Christiaensen (2012)	Tanzania	8.5 to 25.5
Minten et al (2013)	Ethiopia	11.7

Factors depressing NUE of inorganic fertilizer use

1. Low soil organic matter
    - Significant decline in SOM over past 20 years in Malawi (Mpeketula and Snapp)
2. Acidification
3. Micro-nutrient deficiencies

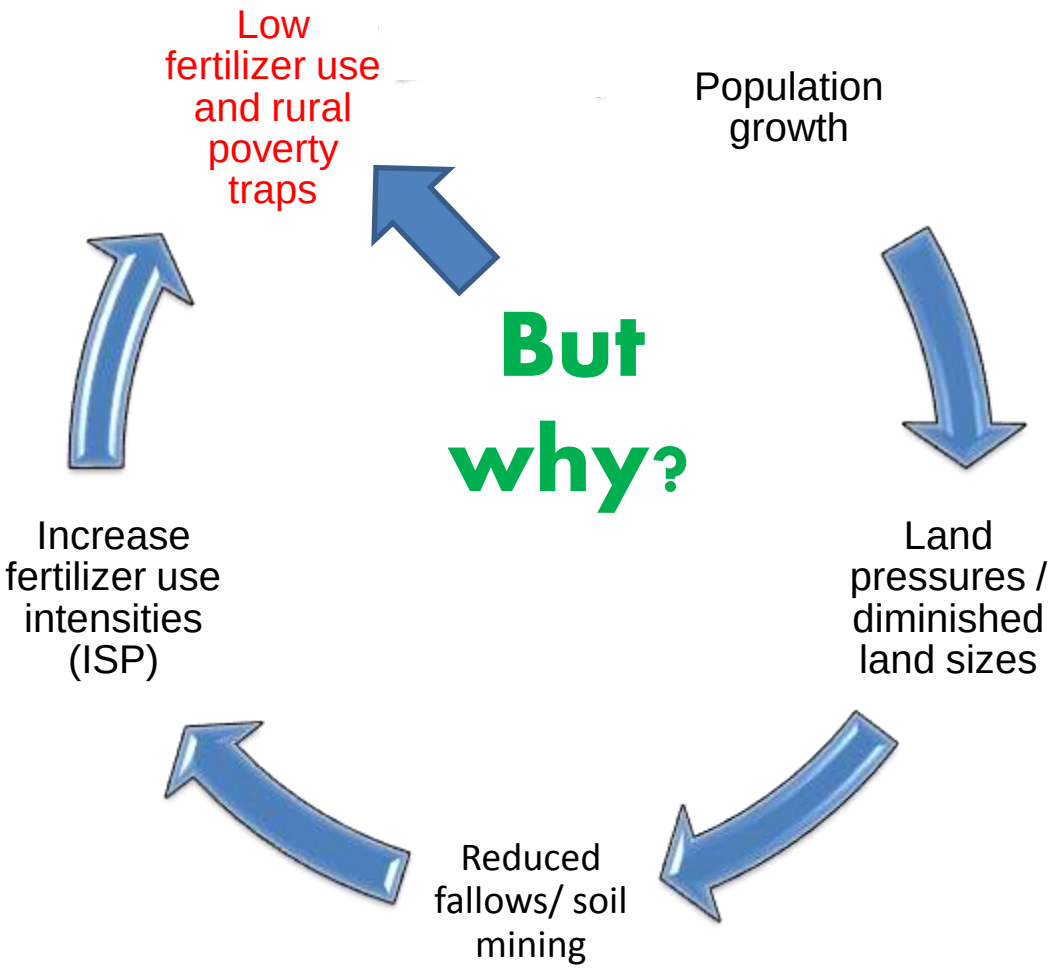
Fertilizer response rates in degraded areas

Estimated marginal value product of nitrogen fertilizer conditional on plot soil carbon content

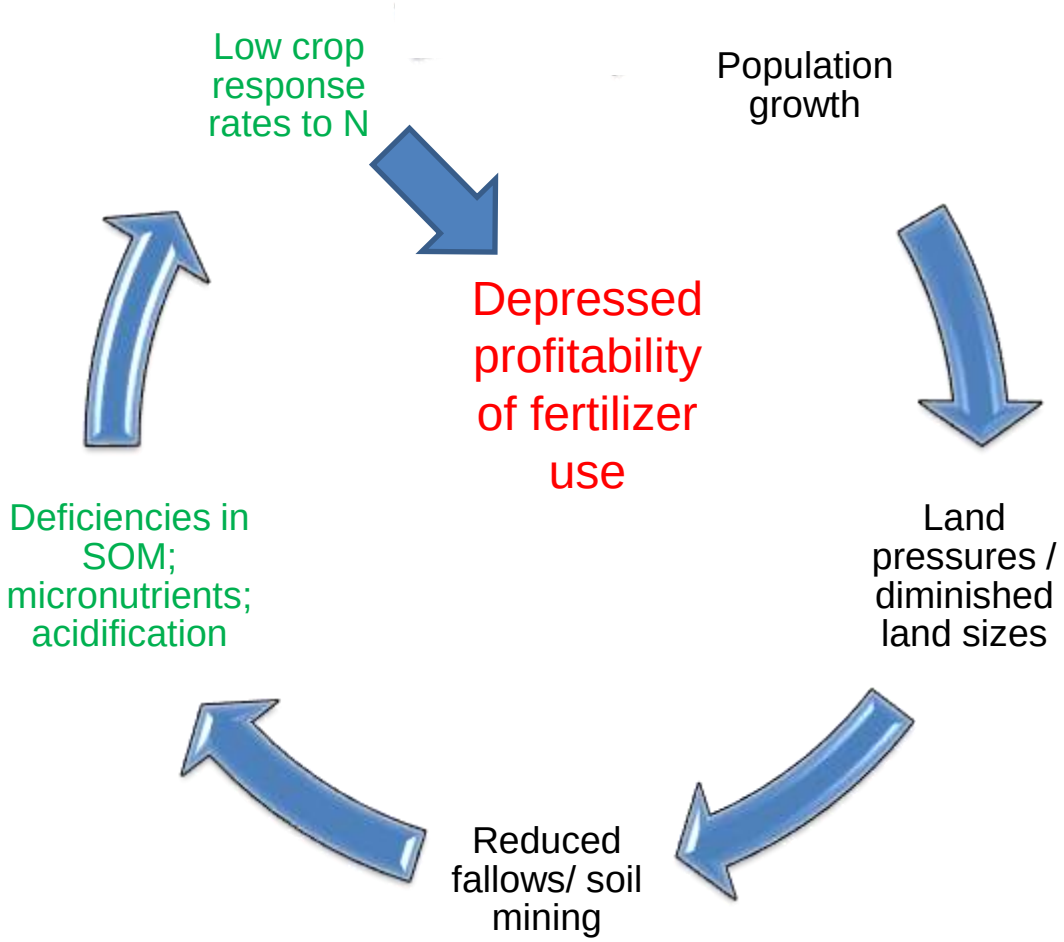


Source: Marenya & Barrett 2009

Conceptual framework



Conceptual framework



Policy questions relevant to Feed the Future

1. How to move from a situation where ISPs are the cornerstone of agricultural development to a holistic program of sustainable productivity growth?
2. What would such a holistic program look like?
3. How to achieve it?

Expenditures of Input Subsidy Programs

Country	Annual Program Cost (USD million)	% of Ag Budget
Malawi	152 to 275	47 to 71%
Tanzania	92 to 135	39 to 46%
Zambia	101 to 135	21 to 40%
Senegal	36 to 42	26 to 31%
Ghana	53 to 112	20 to 31%
Nigeria	108 to 190??	?? (officially 26%)
Kenya	22 to 81	9 to 26%

ZAMBIA: FISP fertiliser received (2010/11 crop season) by farm size category

Total area cultivated (maize + all other crops)	Number of farms	% of farms	% of farmers receiving FISP fertilizer	kg of FISP fertilizer received per farm household
	(A)	(B)		
0-0.99 ha	616,867	41.9%		
1-1.99 ha	489,937	33.3%		
2-4.99 ha	315,459	21.4%		
5-9.99 ha	42,332	2.9%		
10-20 ha	6,626	0.5%		
Total	1,471,221	100%		

Source: MACO/CSO Crop Forecast Survey, 2010/11

FISP fertiliser received (2010/11 crop season) by farm size category

Total area cultivated (maize + all other crops)	Number of farms	% of farms	% of farmers receiving FISP fertilizer	kg of FISP fertilizer received per farm household
	(A)	(B)	(C)	(D)
0-0.99 ha	616,867	41.9%	14.3%	
1-1.99 ha	489,937	33.3%	30.6%	
2-4.99 ha	315,459	21.4%	45.1%	
5-9.99 ha	42,332	2.9%	58.5%	
10-20 ha	6,626	0.5%	52.6%	
Total	1,471,221	100%	28.6%	

Source: MACO/CSO Crop Forecast Survey, 2010/11

FISP fertiliser received (2010/11 crop season) by farm size category

Total area cultivated (maize + all other crops)	Number of farms	% of farms	% of farmers receiving FISP fertilizer	kg of FISP fertilizer received per farm household
	(A)	(B)	(C)	(D)
0-0.99 ha	616,867	41.9%	14.3%	24.1
1-1.99 ha	489,937	33.3%	30.6%	69.3
2-4.99 ha	315,459	21.4%	45.1%	139.7
5-9.99 ha	42,332	2.9%	58.5%	309.7
10-20 ha	6,626	0.5%	52.6%	345.6
Total	1,471,221	100%	28.6%	77.1

Source: MACO/CSO Crop Forecast Survey, 2010/11

FISP fertiliser received (2010/11 crop season) by farm size category

Total area cultivated (maize + all other crops)	Number of farms	% of farms	% of farmers receiving FISP fertilizer	kg of FISP fertilizer received per farm household
	(A)	(B)	(C)	(D)
0-0.99 ha	616,867	41.9%	14.3%	24.1
1-1.99 ha	489,937	33.3%	30.6%	69.3
2-4.99 ha	315,459	21.4%	45.1%	139.7
5-9.99 ha	42,332	2.9%	58.5%	309.7
10-20 ha	6,626	0.5%	52.6%	345.6
Total	1,471,221	100%	28.6%	77.1

Source: MACO/CSO Crop Forecast Survey, 2010/11


SOHL PHYSICS

Ranking with respect to ***agricultural growth:*** Evidence from Asia

	The Economist	IFPRI
Policies	1	
Infrastructure investment	3	1
Agricultural R&D	2	2
Agricultural extension services	5	
Credit subsidies	7	3
Fertilizer subsidies	6	4
Irrigation	4	5

Oft-asked policy question

- Given that ISPs will continue, what concrete guidance can be identified to improve their effectiveness?

- We identify 3 proposals:
  1. Raise public investment in agronomic research and extension programs to enable farmers to use fertilizer more efficiently
  2. Reconsider targeting guidelines to achieve more equitable development impacts
  3. Greater political will for ensuring that the subsidies go to the intended beneficiaries

Food Security Policy: Contact Information

USAID Activity Manager:
David Atwood
Bureau for Food Security
US Agency for International Development
Washington, DC
datwood@usaid.gov
Phone: 202-712-4496
www.feedthefuture.gov

Food Security Policy Program Director:
Duncan Boughton
Michigan State University
East Lansing, MI
boughton@msu.edu
Phone: 517-432-6659

Food Security Policy Program Deputy Directo
Xinshen Diao
International Food Policy Research Institute
Washington, D.C.
xdiao@cgiar.org
Phone: 202-862-5600

The University of Pretoria Program Leaders:
Sheryl Hendriks and **Johann Kirsten**
sheryl.hendriks@up.ac.za
johann.kirsten@up.ac.za
Phone: +27 12420 3811/3248

Project web site:
http://fsg.afre.msu.edu/fsp/index.htm

INNOVATION LAB FOR
FOOD SECURITY
POLICY

www.feedthefuture.gov

Factors depressing NUE of inorganic fertilizer use

1. Low soil organic matter
    - Significant decline in SOM over past 20 years in Malawi (Mpeketula and Snapp)
2. Acidification
3. Micro-nutrient deficiencies


From Larson and Oldham,
Mississippi State University Extension Service, 2008.
4.3
5.3
Source: Burke, 2012

Photo courtesy of Dingi Banda,
Lusaka Province, Zambia

Factors depressing NUE of inorganic fertilizer use

1. Low soil organic matter
    - significant decline in SOM over past 20 years in Malawi (Mpeketula and Snapp)
2. Acidification
3. Micro-nutrient deficiencies

Elements of a holistic strategy

1. R&D (national ag research systems)
2. Extension programs / soil testing
3. Programs to help farmers restore soil quality
4. Conservation agricultural practices
5. Physical infrastructure
6. Reducing costs in input supply chains
7. More appropriate fertilizer use recommendations

Factors affecting N use efficiency

1. Soil organic carbon
2. Acidification (pH) – mainly affects basal
3. Micronutrients
4. Soil moisture – N response on irrigated > rainfed fields
5. Timing of fertilizer application
6. Timely and sufficient weeding
7. Rotation of crops on a given plot
8. Contours / ridging to prevent erosion on sloped fields

- → Fixation with N
- → ISPs need to be part of a more holistic approach so that N can get sufficiently high crop response

Ranking of Alternative Investments: Meta-Study Evidence from Asia and Africa

	The Economist	IFPRI study
Policies		
Infrastructure investment		
Agricultural R&D		
Agricultural extension services		
Credit subsidies		
Fertilizer subsidies		
Irrigation		

Ranking with respect to ***agricultural growth:*** Evidence from Asia

	The Economist	IFPRI
Policies	1	
Infrastructure investment	3	1
Agricultural R&D	2	2
Agricultural extension services	5	
Credit subsidies	7	3
Fertilizer subsidies	6	4
Irrigation	4	5

Ranking with respect to ***poverty reduction:*** Evidence from Asia

	The Economist	IFPRI
Policies	1	
Infrastructure investment	2	1
Agricultural R&D	3	2
Agricultural extension services	4	3
Credit subsidies	7	4
Fertilizer subsidies	5	6
Irrigation	5	5