Are New Paradigms Needed for Sustainable Food Security in the Face of Uncertainties and Risks?

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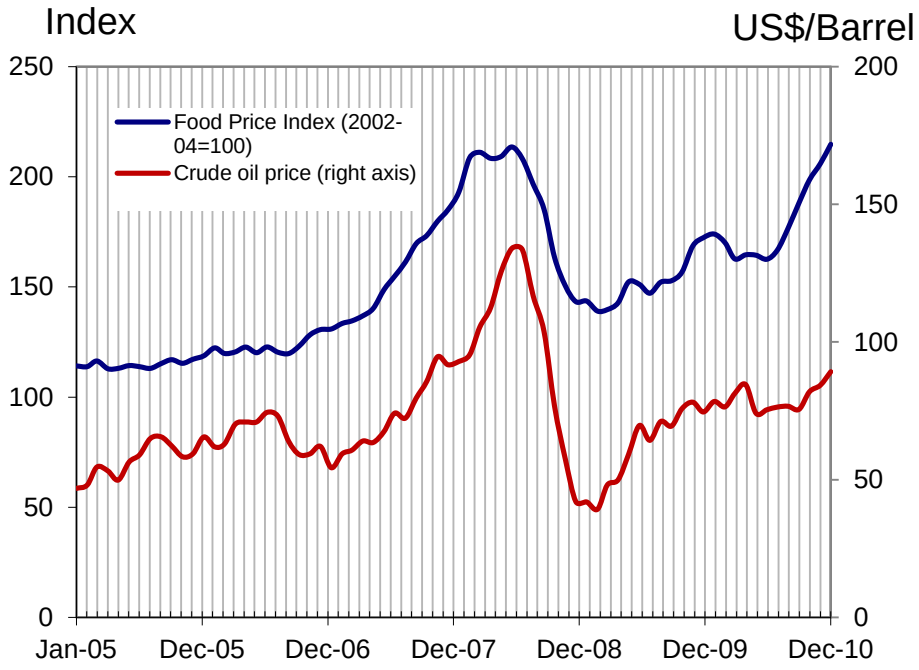
A Sustainability Challenge: Food Security for All
Workshop II: Exploring Sustainable Solutions
The National Academies, May 2 – 4, 2011
Washington DC

Rising food prices, supply-demand imbalance

Need to expand food production

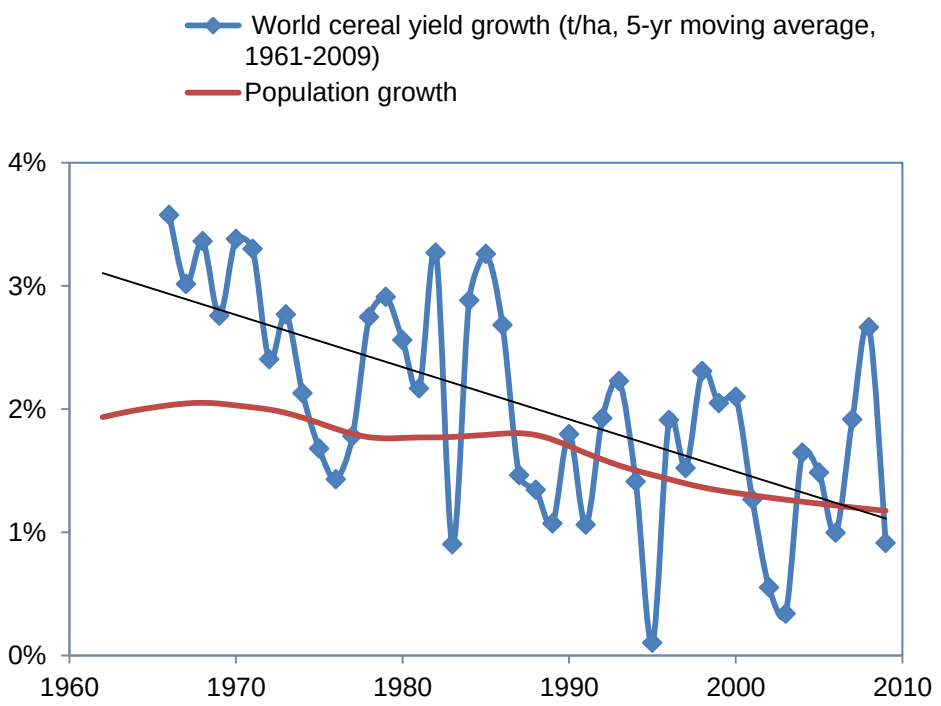


Short term factors

- Weather
- Export restrictions
- Low stocks
- Price of oil
- Dollar decline
- Biofuels
- Financial markets

'Structural' (long term) challenge

- Supply growth not keeping up with demand growth



Source: FAO Food Price Index; US Energy Information Administration; FAOSTAT

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India as a case in point

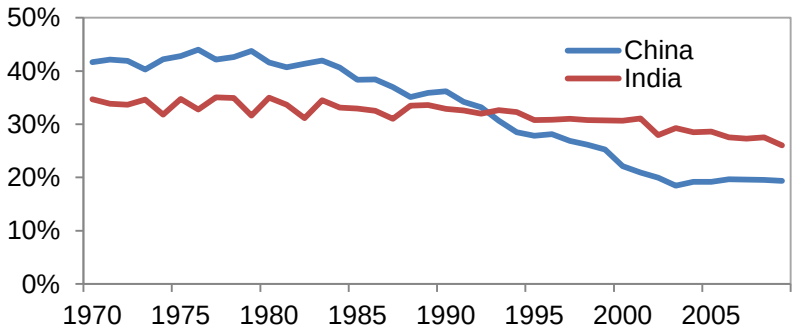
- Food price inflation
- Shortage of selected commodities
- Agriculture sector not growing enough
  - Straining to respond to the increasing and diversifying patterns of demand for food
  - Delivering less than its potential contribution to poverty reduction
  - Insufficiently supportive of overall economic growth
  - Unfavourable environmental profile (water)

Agricultural sector growth, why it must rise

Agriculture, value added (annual % growth)	1970-80	1981-90	1991-2000	2001-08
China	2.08	6.24	3.81	4.24
India	1.83	3.51	2.81	3.31
Sub-Saharan Africa	2.49	2.1	2.85	3.43
Latin America & Caribbean	3.45	2.12	2.01	3.71

Per capita ag value added (annual % growth)	1970-80	1981-90	1991-2000	2001-08
China	0.24	4.70	2.71	3.61
India	-0.45	1.35	0.99	1.81
Sub-Saharan Africa	-0.35	-0.81	0.12	0.89
Latin America & Caribbean	1.02	0.07	0.36	2.44

Source: WDI



Share of cereals in agriculture gross production -- suggestive of the scope for agricultural diversification

Source: FAOSTAT

All reasons linked to food security:

- Food availability
- Rural non-farm growth
- Overall economic growth
- Poverty reduction
- Income convergence
- Natural resource conservation

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How to raise growth?

- Investment (R&D, roads, human capital, policies and institutions)
- Area expansion an option where there are cultivable land reserves
- Mostly, however, irrigation, input use, technical progress

Intensification of input use can run into diminishing returns; therefore, the key source of agricultural growth ultimately is technical progress

Country/ Region	Agricultural TFP Growth Rates (%)						
	Crops		Livestock		Aggregate		
	1961-80	1981-2001	1961-80	1981-2001	1961-80	1981-2001	Average
China	1.39	3.63	2.58	6.59	1.76	4.76	3.26
India	1.54	2.33	2.63	2.66	1.92	2.41	2.16
Africa average	1.03	1.74	1.49	1.09	1.2	1.68	1.44

Source: Avila and Evenson , 2010

How is this linked to sustainability?

Long term food security for all unthinkable without sustainability

- ‘indefinitely meet the requirements for food, feed, and fibre at socially acceptable economic and environmental cost’ (Crosson, 1992)

Sustainability unthinkable without intensification and productivity growth

- there is huge scope to cut waste and raise the efficiency of food systems and resource use

Unrealized potential in land, yield, water, markets → the opportunity

Land (1/3)

Some untapped reserves

- Non-cultivated area suitable for cropping, that is non-forested, non-protected, and not densely populated, currently amounts to 446 million ha
- Concentrated in a limited number of countries, mainly in SSA, LATAM, Eastern Europe, Central Asia

Potential availability of uncultivated land in different regions

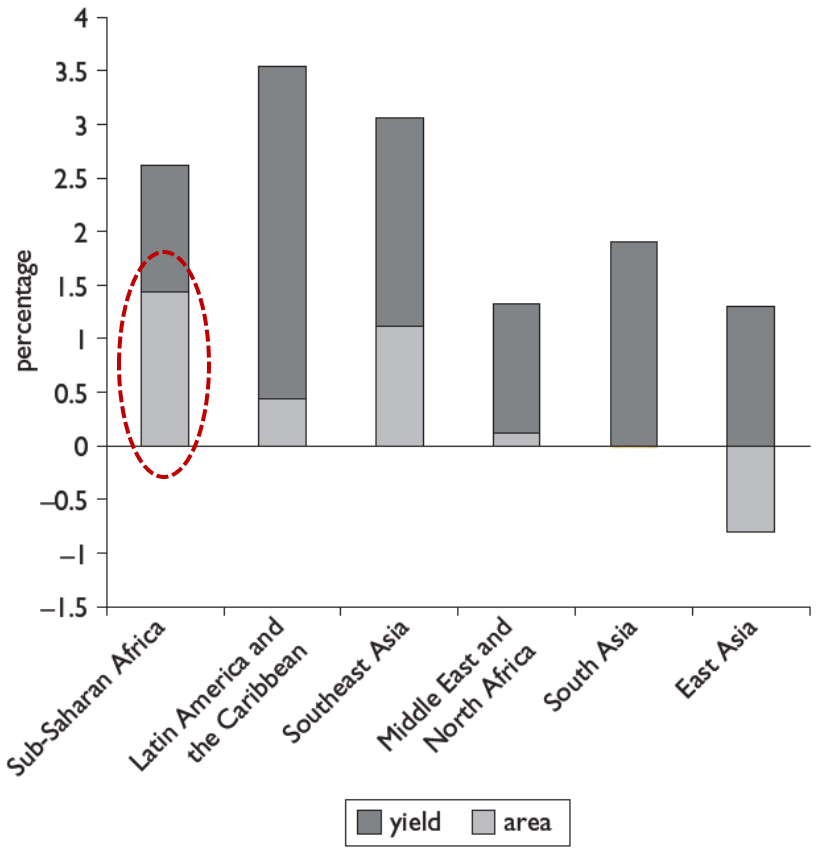
		Share of land with travel time to market (%)	
	Total area (1,000 ha)	< 6 hours	> 6 hours
Sub-Saharan Africa	201,546	47	53
Latin America and the Caribbean	123,342	76	24
Eastern Europe and Central Asia	52,387	83	17
East and South Asia	14,341	23	77
Middle East and North Africa	3,043	87	13
Rest of world	50,971	48	52
Total	**445,624**	59	41

Source: Fischer and Shah 2010.
Note: Data identify uncultivated land with high agro-ecological potential in with population density of less than 25 persons/km2

Land (2/3)

Intensification the main source of production growth

Area expansion and yield growth (1990-2007)



Source: Deininger et al., 2011

- **70%** of the increase in crop production between 1961 and 2005 was due to yield increases, **23%** to the expansion of arable area, and **8%** to the intensification of cropping (Bruinsma 2009)
- Note declining agric area East Asia (China's urbanization / industrialization)
- Drivers for expansion of cultivated land
  - Demand for food, feed, pulp etc driven by growth in pop and income
  - Demand for biofuel feedstocks
  - Shifts to cheaper land where scope for productivity growth higher
  - Irrigation and climate change
  - Forestry plantation
- 6 million ha/year of additional land expected to be brought into production through 2030

Land (3/3)

Acquisitions happening

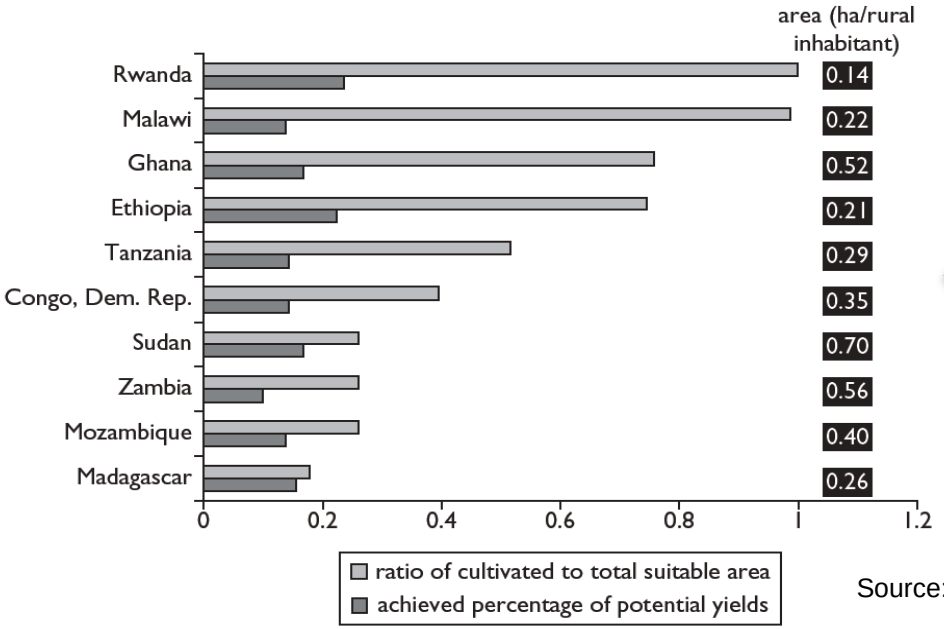
Large land acquisitions in selected countries

Country	Projects	Area (1,000 ha)	Median size (ha)	Domestic share[a]
Cambodia	61	958	8,985	70
Ethiopia	406	1,190	700	49
Liberia	17	1,602	59,374	7
Mozambique	405	2,670	2,225	53
Nigeria	115	793	1,500	97
Sudan	132	3,965	7,980	78

Note: Data are for the 2004–09 period except for Cambodia and Nigeria where they cover 1990–2006.
a. Domestic share is the proportion of the total transferred area allocated to domestic investors (vs. foreign investors).

Issues:

- land governance
- local people
- compensation
- country capacity
- transparency
- voluntary transfer
- job creation
- LT local food security
- Env'tal sustainability



Yield gap, availability of uncultivated land, in SSA

Source: Deininger et al., 2011

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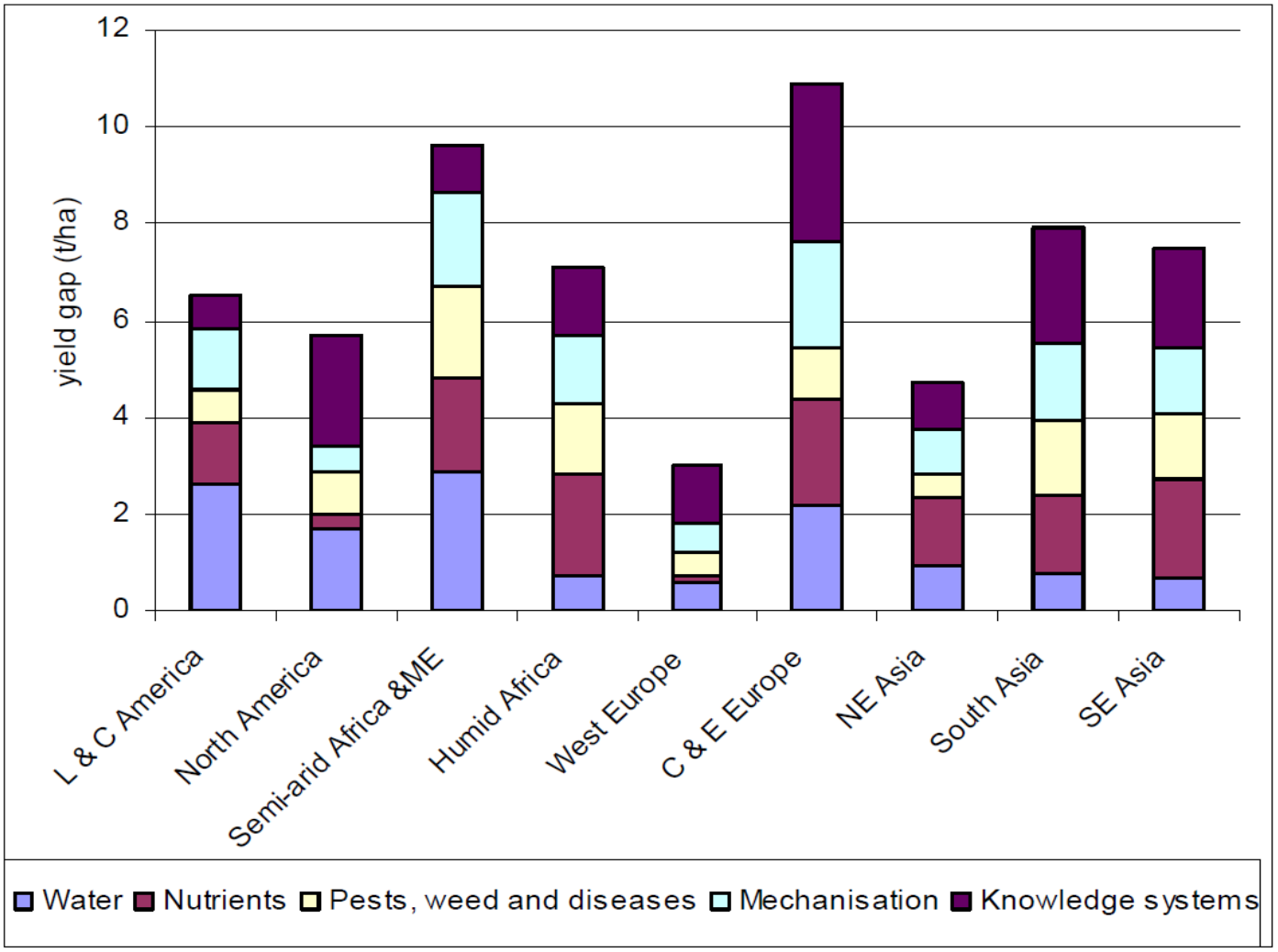
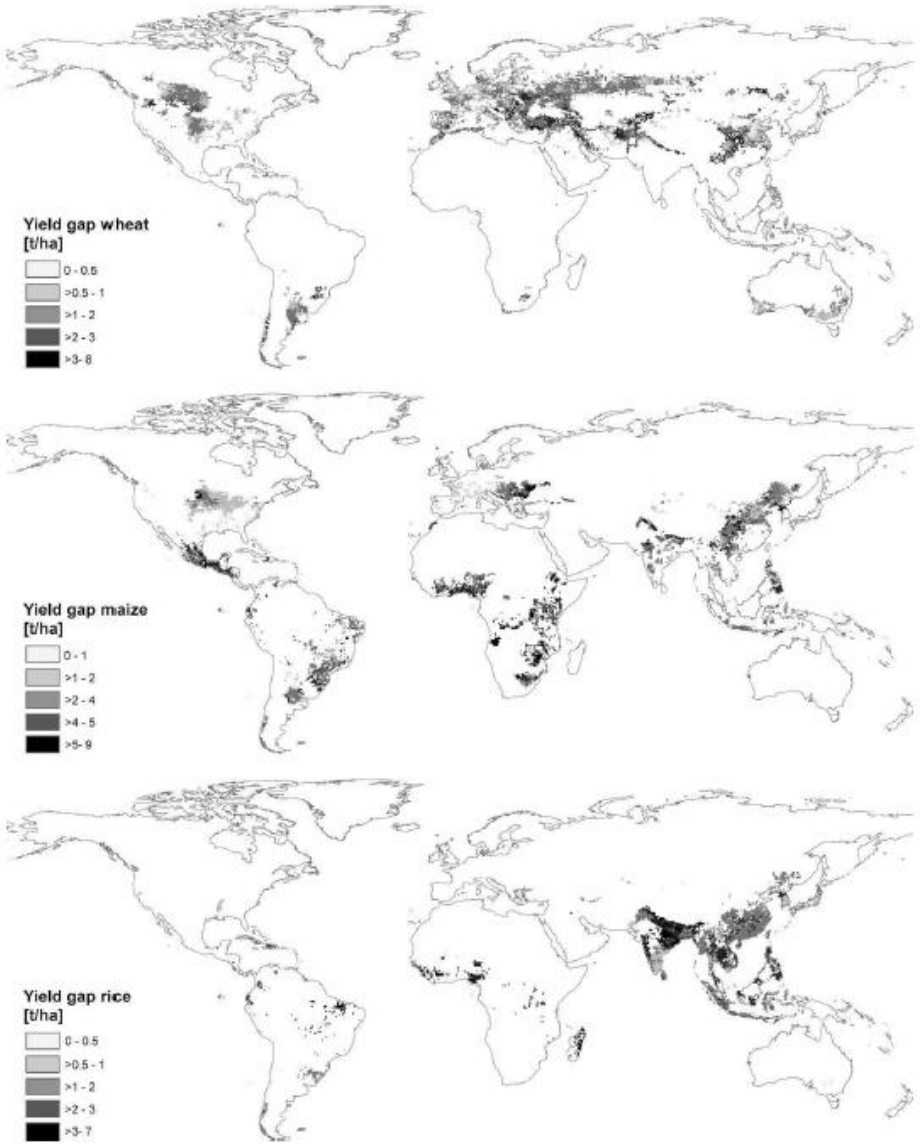
Yield (1/3)

Maize yield gap by region and contribution of five production constraints



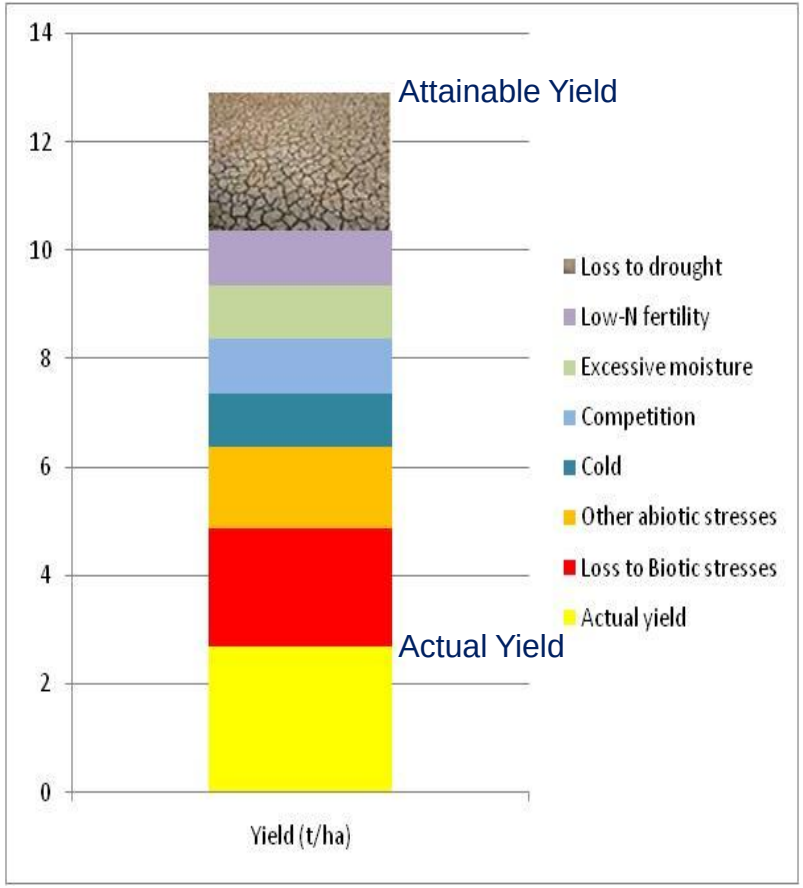
Source: Hengsdijk & Langeveld, 2009

Yield (2/3)



Source: Neumann et al., 2010

Maize yield gap in tropical South Asia



Source: Edmeades et al., 2003

Yield (3/3)

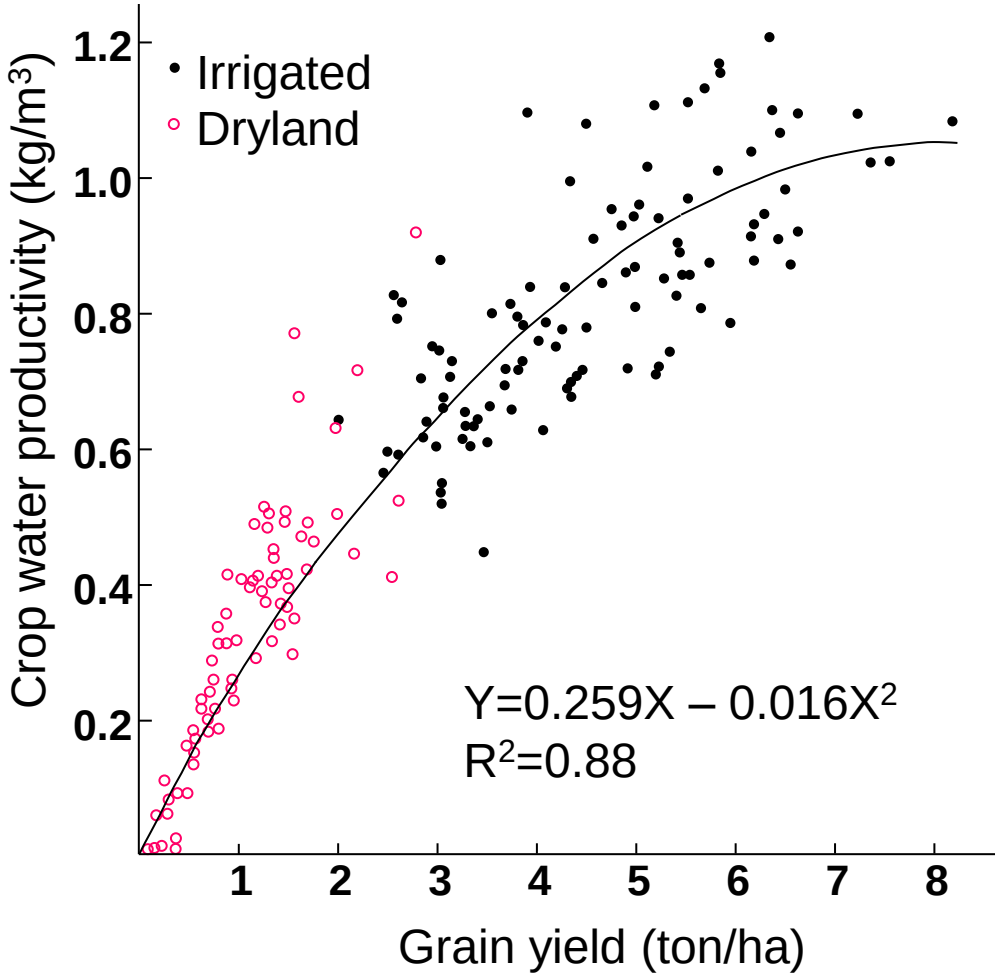
Progress under drought

Source: CIMMYT, Syngenta

Water

Yield/acre the first line of defense

Relationship of crop water productivity to grain yield (Wheat, U.S. Southern Plains)



Source: Musick et al., 1994

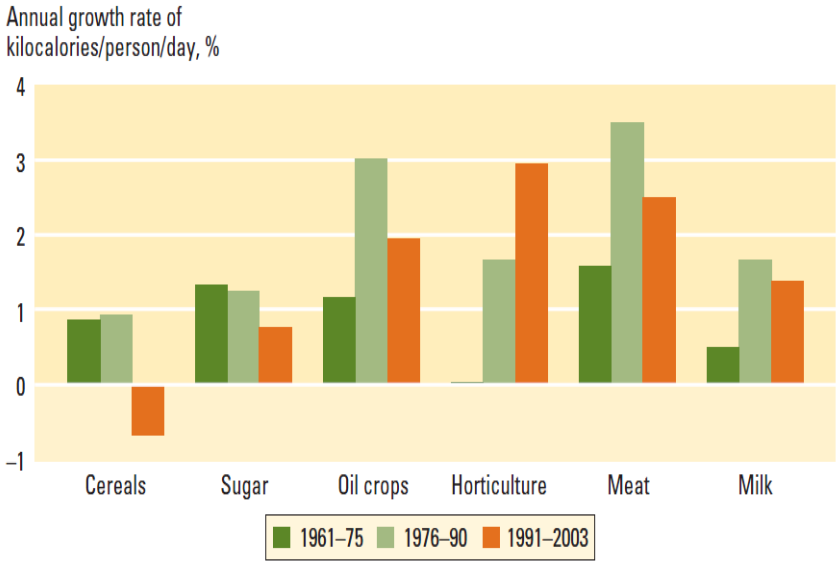
Counting crop per drop

- Genetics, WUE
- Crop enhancement chemistry
- Agronomic, engineering practices
- Rainwater harvesting
- Water reuse
- Precision agriculture
- Water pricing
- Virtual trade

Markets (1/2)

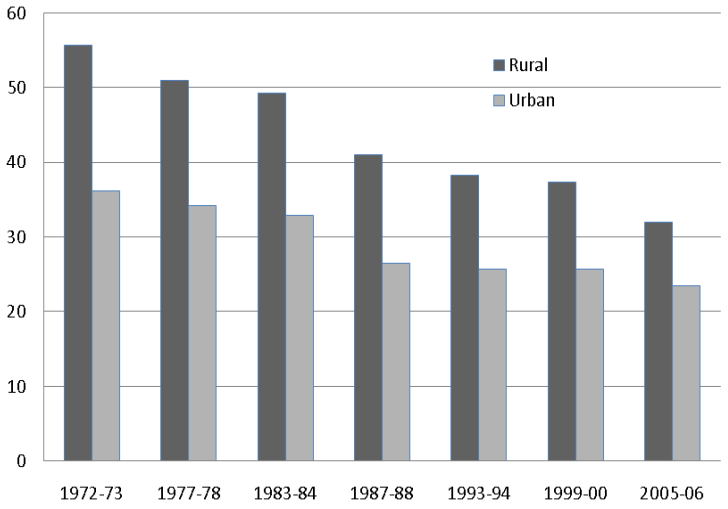
Growing markets enable diversification, farm income growth

- Growing incomes, urbanization, changing lifestyles
- New diets: high-value commodities and processed foods
- Modern supply chains: organized retail, processing, food service industry
- All implying new sources of growth for agriculture …
- … Enabling value creation → key to sustainable outcomes



Source: WDR, 2008

Share of cereals in monthly per capita expenditure for total food items in India



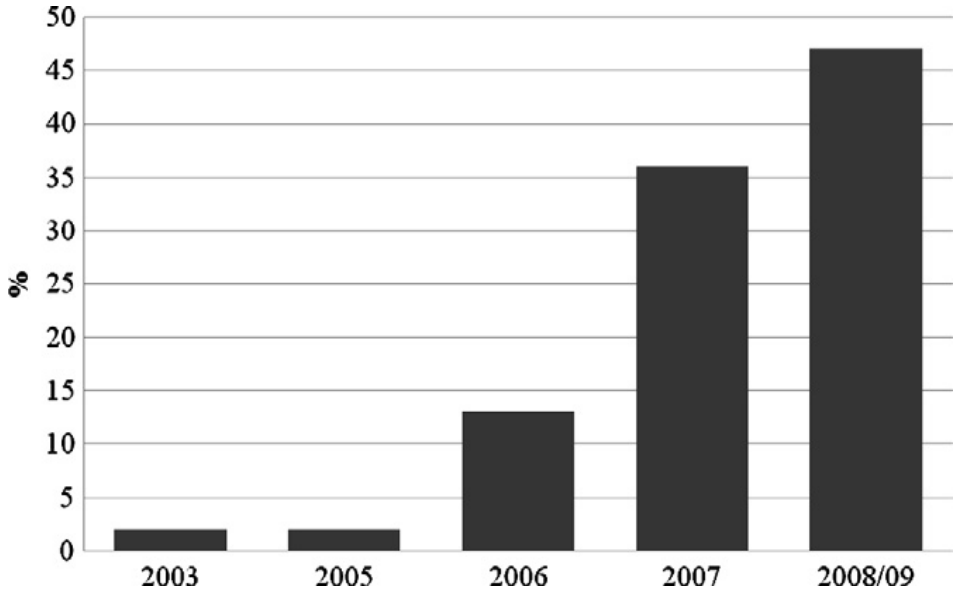
Source: Minten and Reardon, 2011 (from Indiastat)

Markets (2/2)

New world of linking farmers to the market

- The transformation of supply chains creates opportunities and challenges when it comes to linking farmers to the market
- Farmer organization becomes essential to lower transaction costs from the buyer's perspective and raise farmers' bargaining power
- Issues: working with the private sector; product standards, certification; business environment and legislation shaping markets; contract negotiation and specifications; capacity of intermediary organizations; financing

Start-up year of modern retail in New Delhi



Possibly fastest in the history of 'waves' of the retail transformation in emerging markets

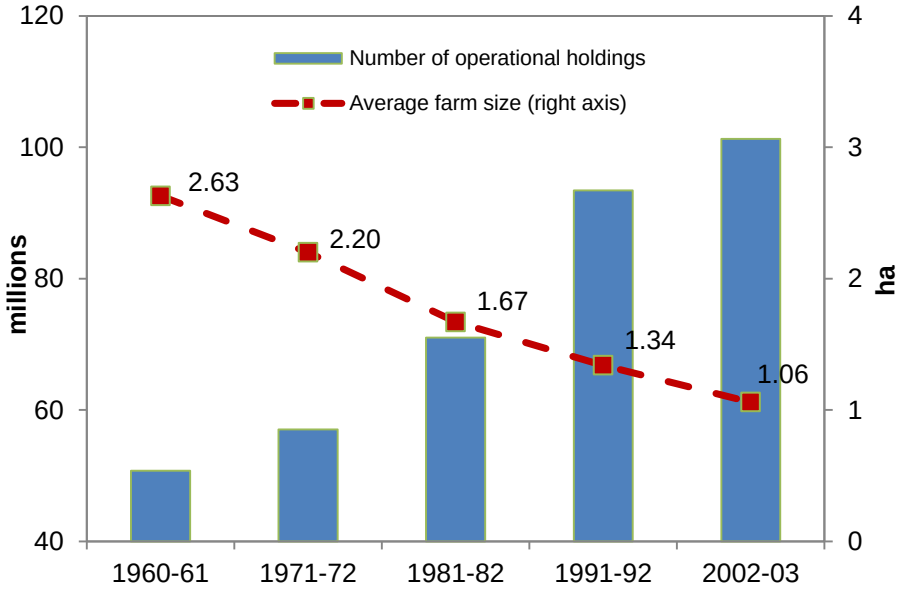
Source: Minten, Reardon, Sutradhar, 2010

Barriers

Realizing opportunities in land, yield, water and the market is fraught with challenges

- Governance and institutions serving agriculture and the farm population
- Public goods that should be, but are not provided
- Delivery of services to farmers
- Land fragmentation: when does it become an issue?

India land holdings trend



Source: NSSO, 2006

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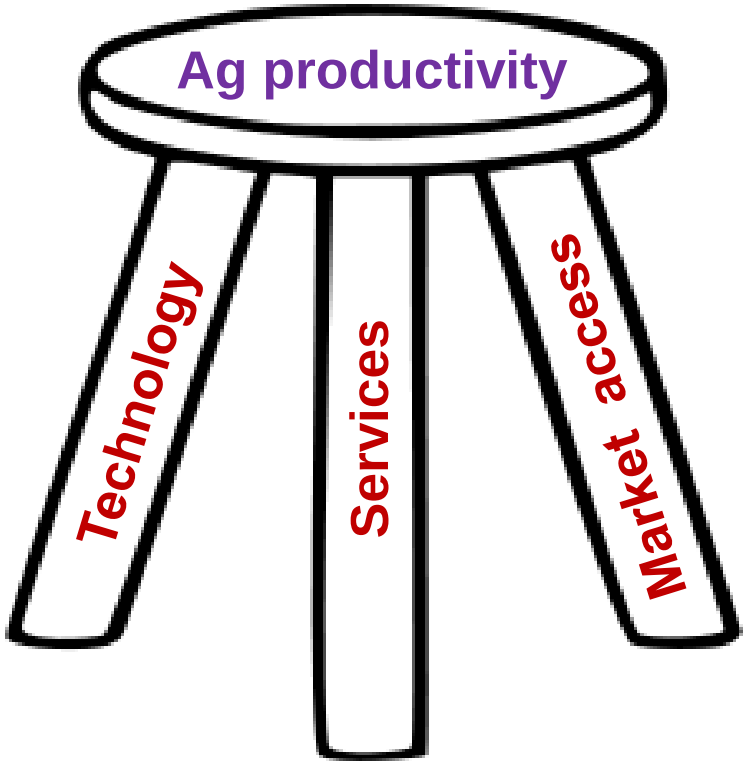
What farmers want



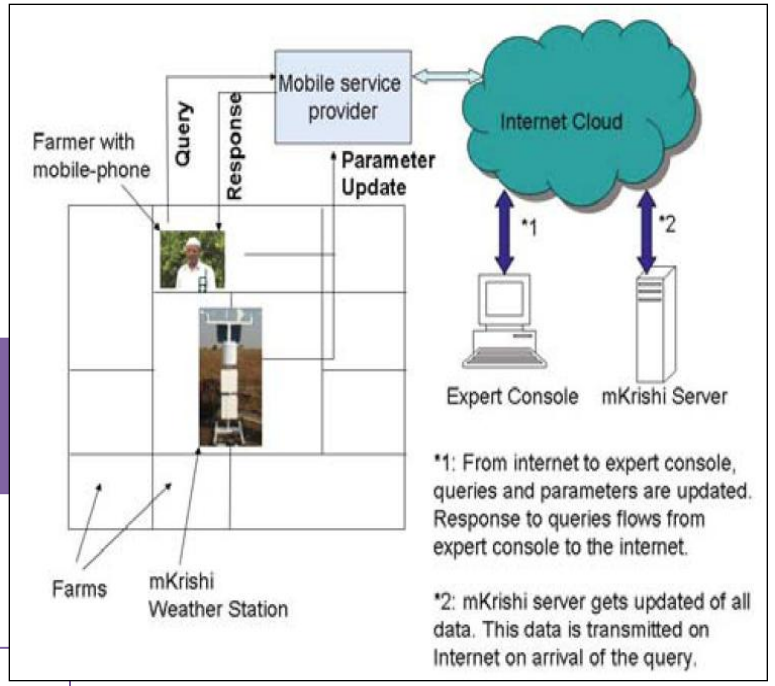
'Trilogy' underpinning productivity, livelihoods and sustainability at farm level

- Subsistence farming gone; aspiration is to be commercial
- The path: sustainable intensification, *enabled* by the 'trilogy', *delivered* through projects, partnerships, and markets
- Partnerships the catalyst of business development and innovation
  - Private-public; for-profit / non-profit
  - Social entrepreneurship
  - Flexible financing
  - Conducive governance and policy

So for example:

- Seed and input markets → *No. 1 seed issue is lack of availability, not lack of demand, or price*
- Knowledge and information services
- Mobile applications
- Credit; agricultural insurance
- Links to product markets

mKrishi Action Chart (www.tcs.com)



Emerging methods to link small farmers to markets

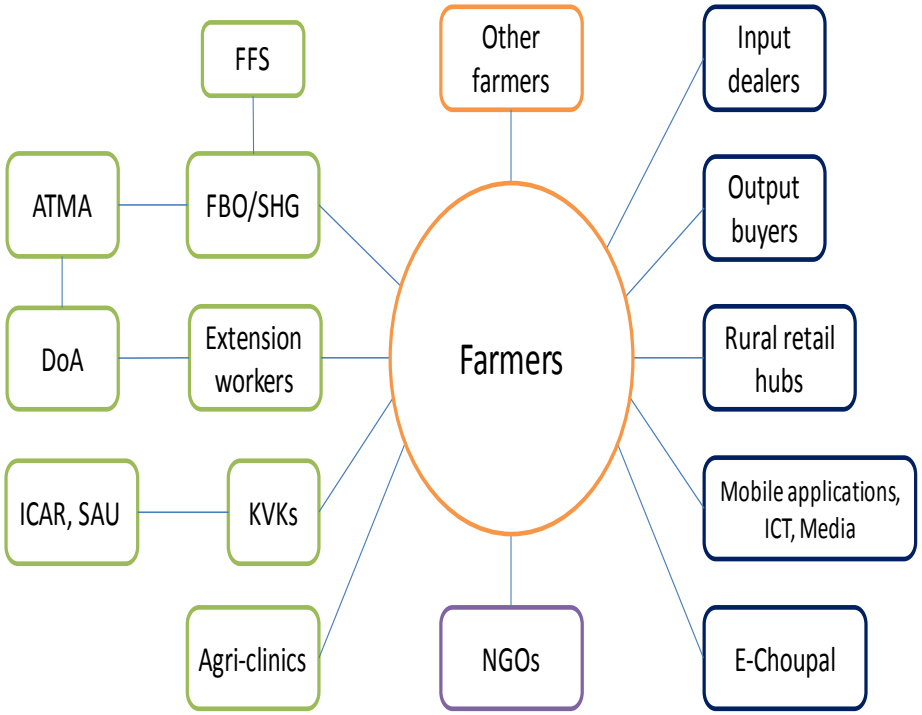
Supply chain segment of "Facilitator"	Function of facilitator	Examples of facilitation
Downstream (retail) and midstream (processing)	Dis-intermediation (cut out middlemen)	Supermarket collection centers
Midstream (wholesale)	Re-intermediation (cut traditional middlemen)	Hubs/platforms; modern wholesalers
Upstream (farm)	Dis-intermediation	Marketing cooperatives
Multi-segment	Re-intermediation	NGOs intermediating; facilitators + service providers

Image source: Physorg.com

Source: adapted from T. Reardon, 2011

Agricultural governance and institutions, India (1/2)

Providers of agricultural extension



Source: Glendenning et al., 2010

- Multiplicity of actors, schemes
- Implementation challenges
- Bright spots:
  - Cell phone revolution
  - Role of NGOs (community-based extension)
  - Growing commercial sector role and contributions
- Extensive reform efforts in publicly provided extension; performance of institutions and processes inadequately addressed
- Only 6% of small farmers reached by public extension workers

Agricultural governance and institutions, India (2/2)

- Important centrally driven agricultural support schemes and resource transfer – operating through under-performing institutional arrangements at state and local level that have not changed in decades
- Implementation is the problem
- But there are exceptions:
  - Gujarat (Krishi Mohatsav)
  - Andra Pradesh (SHG-based)
- Needed, according to many observers:
  - Credible institutional platforms at local level
  - Performing partnerships with the private sector and NGO service providers
  - Recognition of the stakeholders to be engaged and brought in as partners
  - Monitoring and evaluation

Source: Raturi, 2011

Emerging paradigms

- Sustainability and productivity inseparable
- No longer in Green Revolution mode: there are multiple reasons to seek accelerated agriculture growth
- Yield gap reduction, diversification and market growth the opportunities to be pursued; improved water management a key part of the deal
- Smallholders no longer in the Chayanovian labour-consumption balance mode; want skills, not charity and can be supported to participate in value chains
- Prospect for the private sector to drive agricultural and food systems in the context of value chains has arrived; public-private partnerships to get things started
- Food safety, product standards and the power of consumers part of the new reality to contend with
- Land acquisition code of conduct to be agreed and adhered to by all parties

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Thank you!

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