



Structural Challenges in Fostering Green Revolution(s) in Sub- Saharan Africa

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Frequent Calls to “Bring a Green Revolution to Africa”

- NEPAD/CAADP
- Abuja Food Security Summit
- Gates/Rockefeller Foundation
- InterAcademy Council
- World Bank (WDR 2008)
- View that more dynamic agriculture needs to be a key element in poverty reduction strategies



Questions

- Is the Asian GR analogy appropriate for SSA?
- What are the most effective strategies to help the large number of small farmers who have little prospect of “farming their way out of poverty”?
- How to build upon SSA’s past and present agricultural revolutions?



Agricultural growth & poverty alleviation

- Strong empirical evidence that agricultural growth in low-income economies *can* contribute more strongly to poverty alleviation than growth in other sectors (Byerlee et al.,)
- But the link is not automatic. It depends on the type and pattern of growth.



Pathways between agricultural growth and poverty alleviation

- Direct participation
 - As family farmers
 - As farm laborers
- Indirect (linkage) effects
 - Backward linkages
 - Forward linkages
 - Investment and fiscal linkages
 - Consumption Linkages
- Wage-good effects



Pathways between agricultural growth and poverty alleviation

- Both direct and indirect effects depend both on technology *and* institutions, especially markets
- Experience of Green Revolution in Asia was that the *indirect* effects (especially the consumption linkage and wage-good effects) had bigger antipoverty effects than the direct effects.



Basic Asian-Style Green Revolution Model

- Productivity increase in staple crop→
 - Income increase of adopters
 - Some increase in labor demand for staples production
 - Increased labor demand in forward and backward linked industries
 - Big increase in employment in labor-intensive goods demanded by richer staple food producers (and those in linked industries)—often horticulture and animal products (e.g., dairy)
 - Lower staple food prices hold down wage rates, allowing expansion of non-agricultural employment



Model only works if.....

- There is a cost-reducing technological package
- Initial boost in agricultural incomes and/or in farm labor incomes is broad-based.
- There are few blockages to expansion of upstream and downstream activities
- These farmers re-spend their incomes on labor-intensive local products
- The supply of these local products is elastic
- Markets are competitive enough for increased productivity throughout the chain to be passed along to consumers, many of whom are farmers.
- Labor markets, land markets and migration opportunities work well enough to help people transfer out of agriculture



Is the Asian model appropriate for Subsaharan Africa?

- Structural differences between Asia and SSA and changes in the economic and social environment since the 1960s imply that Africa's green revolution(s) will look very different from those in Asia, suggesting the need for some different strategies.



A few key structural differences

- Size & diversity, incl. gender → diversity of farming systems
- Soils & rainfall → Technological challenges & risk
- Spatial issues
 - Landlocked
 - Localization of poverty
 - High transport costs →
 - Marketing costs as important as production costs
 - World of semi-tradables
 - Population density & infrastructure density
 - Marketing costs
 - Production/marketing risks
 - Investment challenges



A few key structural differences

- 48 separate states, many small
 - Importance of regional trade & transaction costs
 - Scale & spillovers
- Human capital investment, incl. impact of HIV/AIDS
- Late comer to rapid economic growth
 - Leap-frogging?
 - Different price & competitive environment



Changing context

- Globalization
 - New rules
 - Increased tradability (new markets & competitors)
 - New actors/investors (esp. Asian)
 - Flows of capital & technology



Changing context

Technologies

- Biological & who generates it
- Information
- Supply chains
 - Internationally
 - Nationally/regionally



Changing context

Environment/Demographics

- Increasing economic scarcity energy & water
- Climate change
 - Risk
 - New markets



Initial conclusion

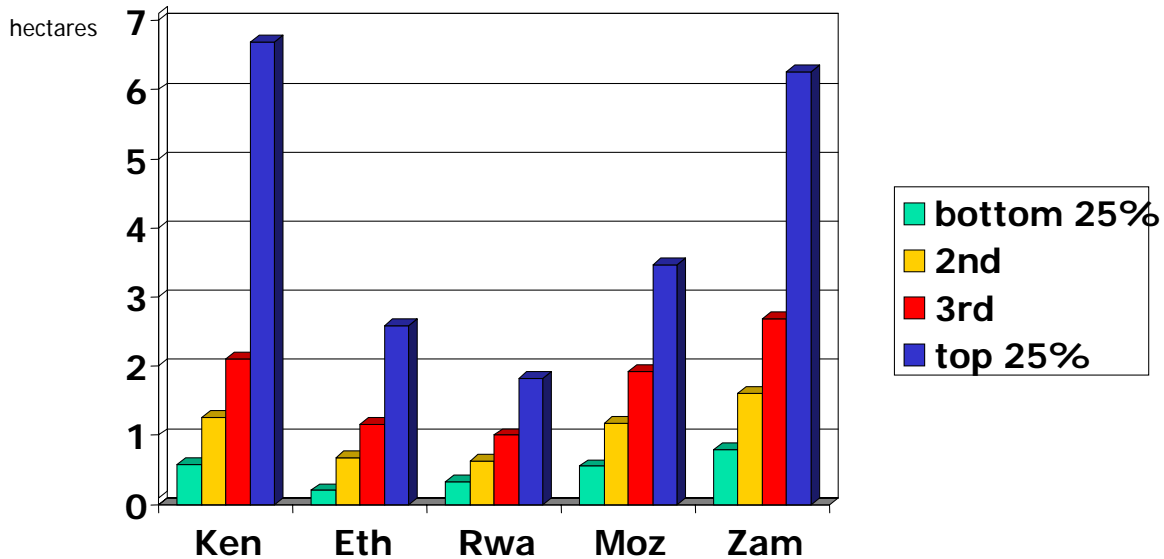
- GR strategies for SSA must take account of and build upon SSA's
 - Agro-ecological and economic diversity
 - Different macro-economic context than that which existed in Asia in the 1960s and 1970s.



Diversity of smallholders

- A minority of smallholders will be able to “farm their way out of poverty”
 - Size of farm
 - Asset base
 - Market involvement
- Therefore, the importance of the *indirect* impacts of ag growth become extremely important for poverty reduction as well as complementary investments to help the most resource-constrained move out of poverty agriculture

Farm size distribution: Small farm sector



Smallholder market involvement: staples

- In Ethiopia, Kenya, Mali, Mozambique, Rwanda, Senegal, Somalia, Zambia, and Zimbabwe **fewer than half of the smallholders are net sellers of staples**; the modal figure is closer to one-third.
- Net buyers varied between 33 and 72%; modal figure around 50%.
- Data from household surveys in Ghana, Nigeria, Malawi and Madagascar found similar patterns, with the amount of land owned being the strongest correlate of net sales position.



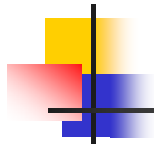
Implications for an ag strategy

- Different technological needs for different types of smallholders
- Commodity foci:
 - Staples (for wage-good effect)
 - High-value products, including for domestic and regional markets
 - Some scope for traditional exports



Challenges to making GR linkages work

- Direct participation
 - As family farmers – broadening the base
 - As farm laborers—mechanization policy; crop mix
- Indirect (linkage) effects
 - Backward linkages
 - Forward linkages
 - Fiscal and investment linkages – local governance
 - Consumption Linkages – consumption patterns; competing imports
- Wage-good effects – Trade as a double-edged sword.



Implications for a strategy

- Need to focus on making markets work for the poor
 - Product markets
 - Factor markets (labor, land, inputs, capital)
 - Locally produced consumer goods
 - Knowledge
- Complementary infrastructure investment (including rural electrification)



Making rural institutions work better

- Farmer and trader organizations for:
 - Collective action in input supply, marketing, and extension
 - Lobbying for more pro-agricultural policies
- Complementary investment to increase labor mobility, including intergenerationally
 - Rural education
 - Easing migration and remittances

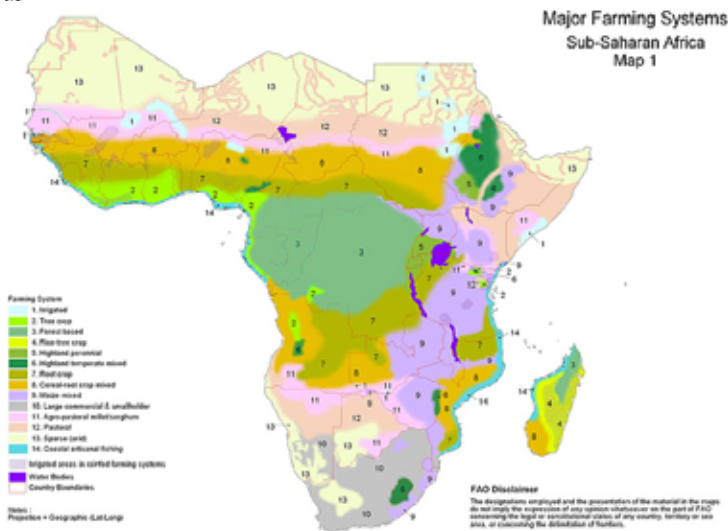
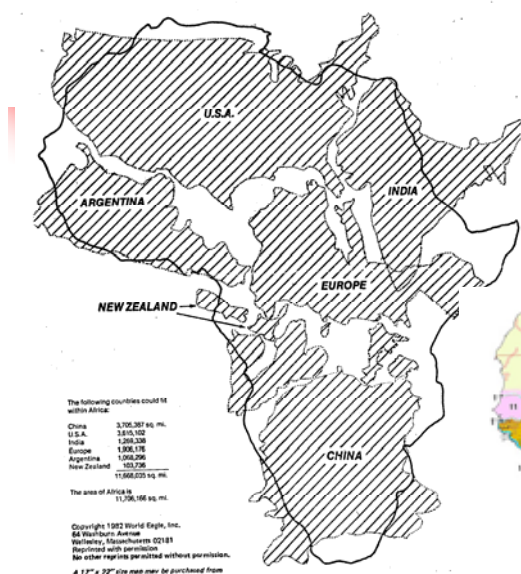


Implications for an ag strategy

- The organizational dilemma—Going from the decentralized to the regional, guided by the principle of subsidiarity.
 - Research
 - Ag. higher education
 - Trade
 - Governance
- Human capital needs

**Thank you
very much!**

Africa's size & diversity



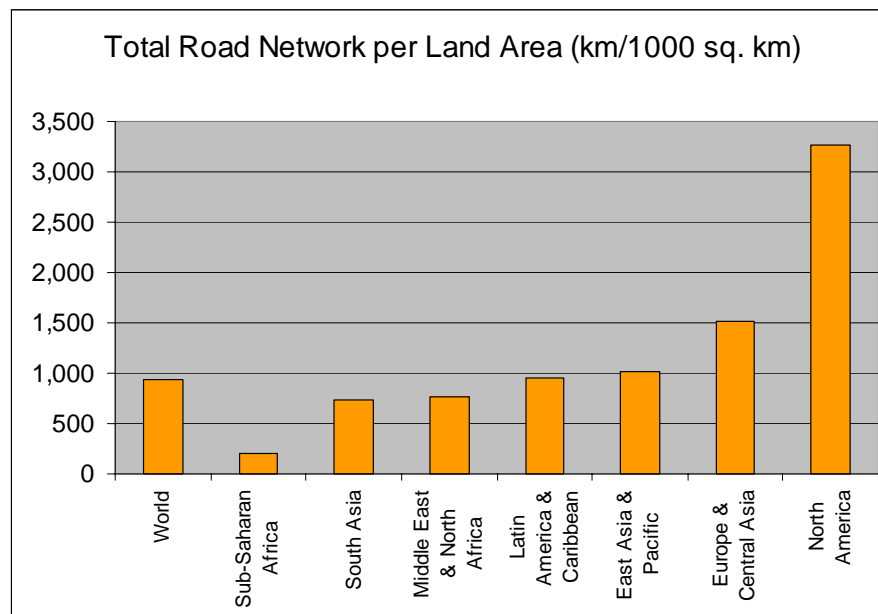
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Source of Calories Item	Countries/Regions			
	Philippines 1961	India 1961	SSA 2003	Ghana 2003
Total Calories available per capita	1745	2073	2218	2680
Percent of total Calories from:				
- Vegetal Sources	88.8%	94.5%	93.7%	95.5%
- Cereals (excluding beer)	56.3%	63.7%	46.9%	29.5%
- Rice	47.2%	34.5%	8.7% b	7.2% e
- Wheat	5.4% a	11.5%	7.2% c	4.0% f
- Maize	3.8%	3.1%	14.8% d	13.4%
- Millet & Sorghum	0.0%	13.2%	14.4%	5.0%
-Starchy roots & tubers	6.8%	1.1%	19.2%	42.2%
- Bananas & Plantain	3.1%	0.3%	2.8%	2.0%
- Pulses	0.7%	10.6%	4.0%	0%
Number of domestically produced staples accounting for 50% of total Calories	2	3	5	4
% of Calories accounted for by 4 most important staples	57.2%	59.2%	44.2%	56.0%
% of Calories from domestically produced rice, wheat, and maize	51.0%	49.1%	20.1%	15.0%

a 100% imported; b 45% imported; c 79% imported; d 7% imported; e 68% imported; f 100% imported
Source: Calculated from food balance sheets available at (FAO, 2006).

Infrastructure Density

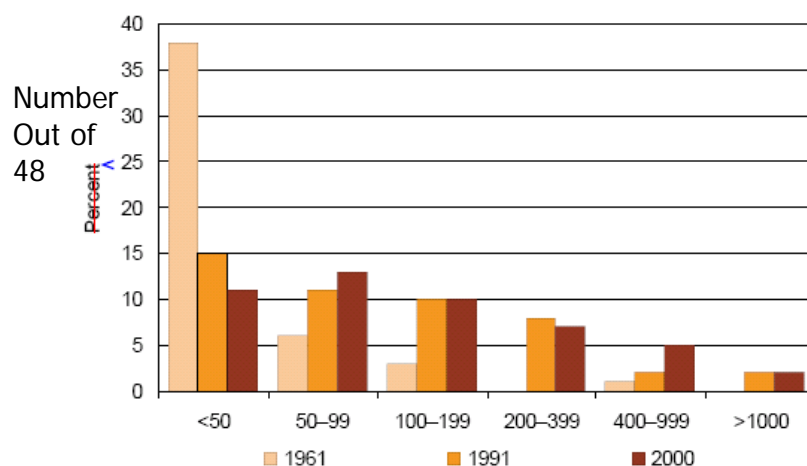
- % arable land irrigated
 - India, 1961: 15.8%
 - Dev. Asia, 1961: 21.5%
 - SSA, 2003: 3.5%
 - Cost of increasing Africa's irrigation to India's in 1961: at least \$114 billion
- Road density:
 - India, 1950: 730 km/1000 km²
 - SSA, 2003: 201 km/1000 km²



- India's road density is 6 times that of Ghana, 32 times that of Ethiopia and 255 times that of Sudan

Scale in Agricultural Research

Figure 9—Distribution of national agricultural R&D capacity by number of fte researchers, 1961, 1991, and 2000



Sources: 1961 and 1991 data are from Pardey, Roseboom, and Beintema (1997); 2000 data are compiled by authors from datasets underlying the ASTI country briefs and Roseboom, Beintema, and Mitra (2004).

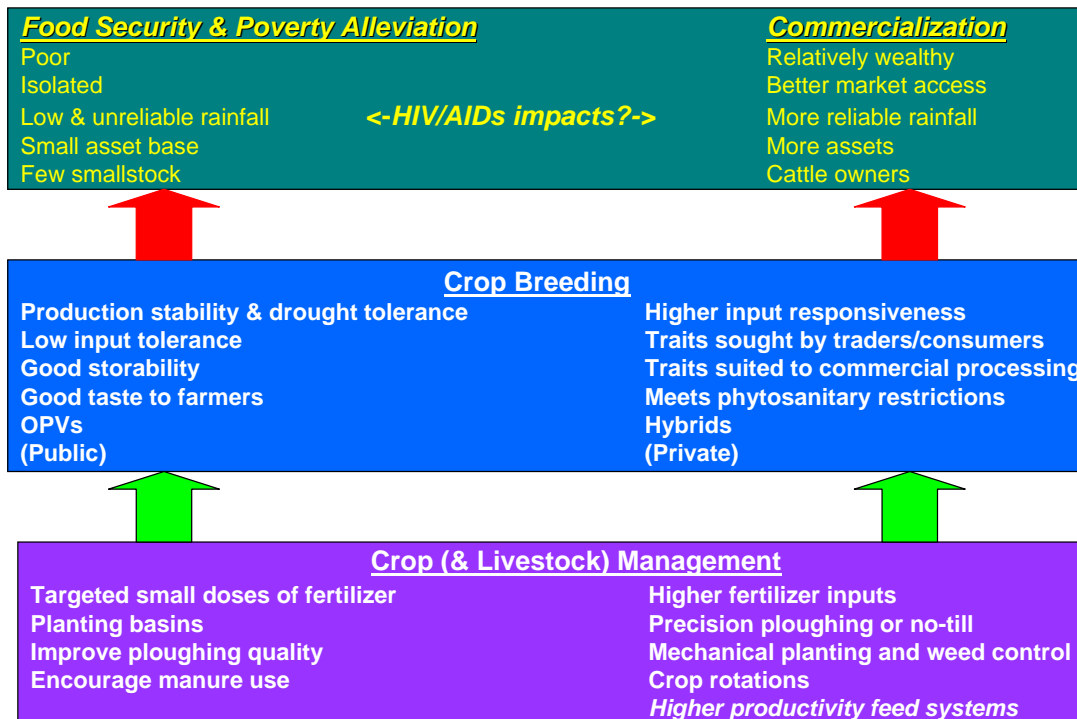
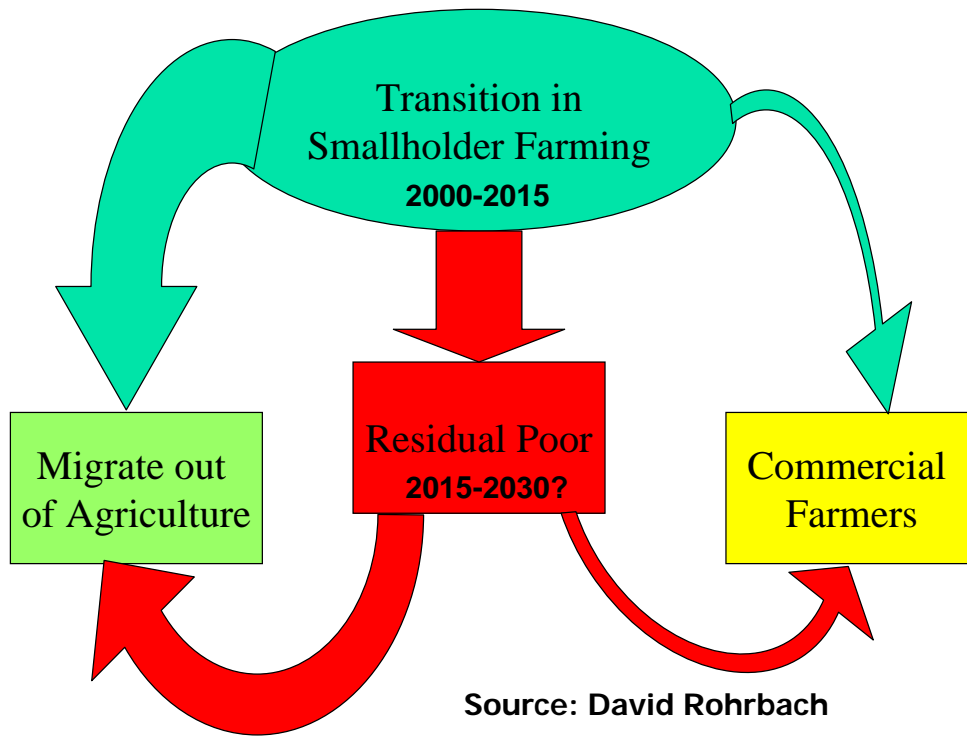
Note: Data includes all 48 Sub-Saharan African countries.

Source: Beintema & Stads, 2006 (ASTI)

Nitrogen : maize price ratios, selected countries

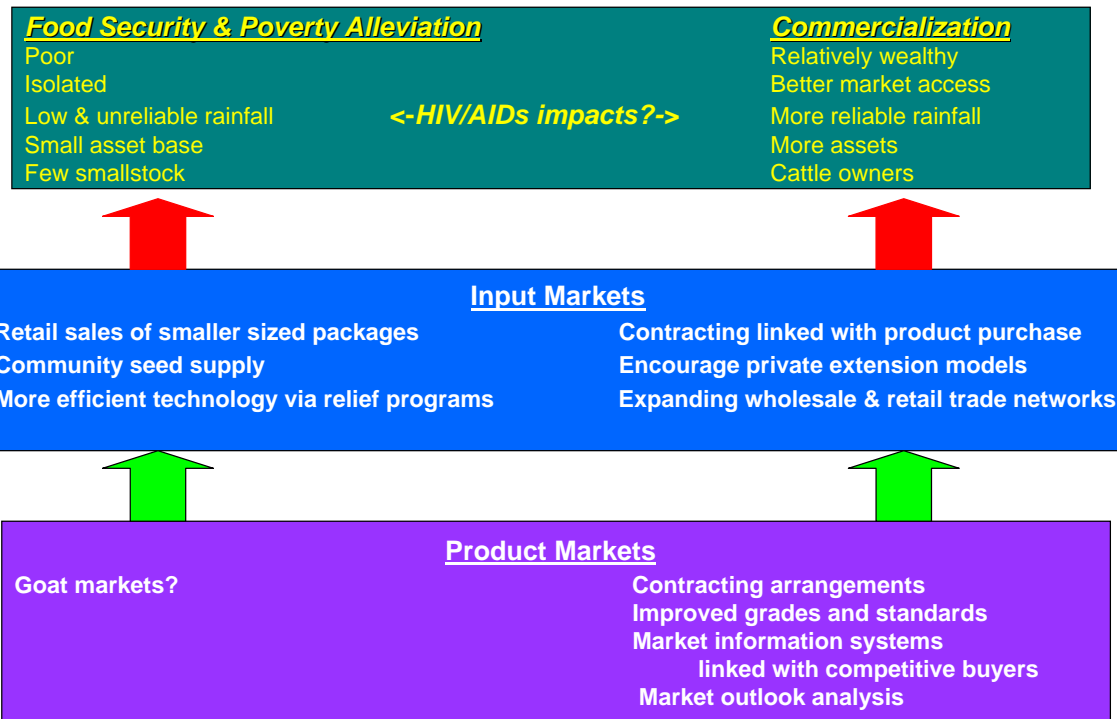
Country/Region	Period	Nitrogen : Maize Price Ratio (median)
Tanzania	1980-85	2.6
	1995	7.0
Kenya	1980-95	7.3
Malawi	1977-87	10.7
	1988-94	7.7
Zimbabwe	1980-94	6.4
Ethiopia	1983	6.4
	1992	1.9
Zambia	1971-89	3.3
	1990-94	5.4
Ghana	1982-87	2.2
	1991-94	10.2
Asia	1980-92	2.7
Latin America	1980-92	3.8

Source: Heisey and Mwangi, 1997.



Source: David Rohrbach

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Source: David Rohrbach