Soil Science-based Policies to Reduce World Hunger in Tune with the Environment

Science Diplomacy Symposium
AAAS, 20 February 2011

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My Forays into Policy have been successful when:

- I led or was part of a multidisciplinary team
- Policymakers requested evidence-based solutions to a problem
- Done in partnership with local institutions
- Government, donors or “game changers” realized that the issue was the entry point , and that would be followed by a wider range of disciplines and institutions

My forays into policy were less successful when

- Ideas arose only out of scientific curiosity and did not form part of policymakers' or farmers' agenda at that time
- When I did not work with a team

Nevertheless

- Such initiatives contributed to science and graduate education
- Created research networks of young soil scientists in Latin America and later in Africa
- Changed paradigms in tropical soil science

Some initiatives take many years to incubate and get buy in

- ***Alternatives to Slash and Burn Agriculture:*** **Research started in Yurimaguas, Peru in 1972; became a CGIAR system-wide program in 1992, and continues**
- ***CGIAR Inter-center Working Group on Climate Change*** **—proposed to the CGIAR in 2001; now a "megaprogram" in 2011**
- ***Soil fertility depletion in Africa.*** **1995. Implemented in 2005**
- **Why? Multiple partners and complex interactions**

Some successful ones based on policymakers' needs

- 1968: Rice production in Peru. Achieved 1973
- 1972: Cerrado of Brazil. 1980
- 1975: Elimination of bulldozer land clearing Amazon tropical forests. 1992 in Indonesia
- 1992: Tenure rights for complex agroforesters in Sumatra. 1998.

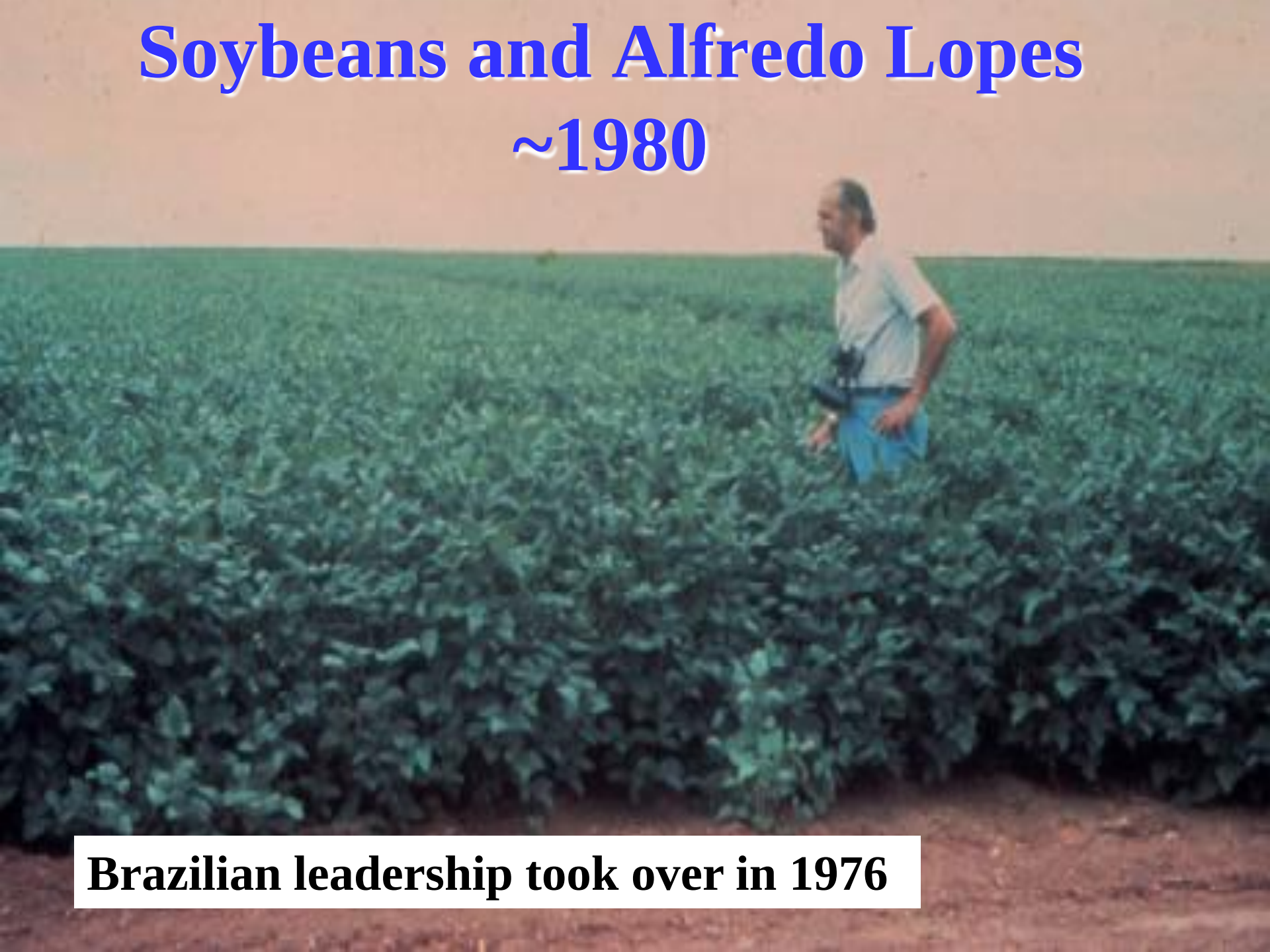
Major Government commitment and funding

Changed the plant type in Peru

Can this desert be productive? Roberto Meirelles de Miranda 1972


Joint design of Embrapa's
Cerrado Research Center
0.4 ppm P
80% Al sat
60% clay

Soybeans and Alfredo Lopes ~1980



Brazilian leadership took over in 1976

Bulldozer Clearing

- Disadvantages found in Yurimaguas and published 1995
- Ir. Muljadi, Director Crops Research Institute of Indonesia: “Now we know we are not alone”
- Policy rapidly applied in Transmigration areas

Krui
Complex
Agroforests
Sumatra

Minister of Forestry, Indonesia 1994

Soil Fertility Depletion in Africa

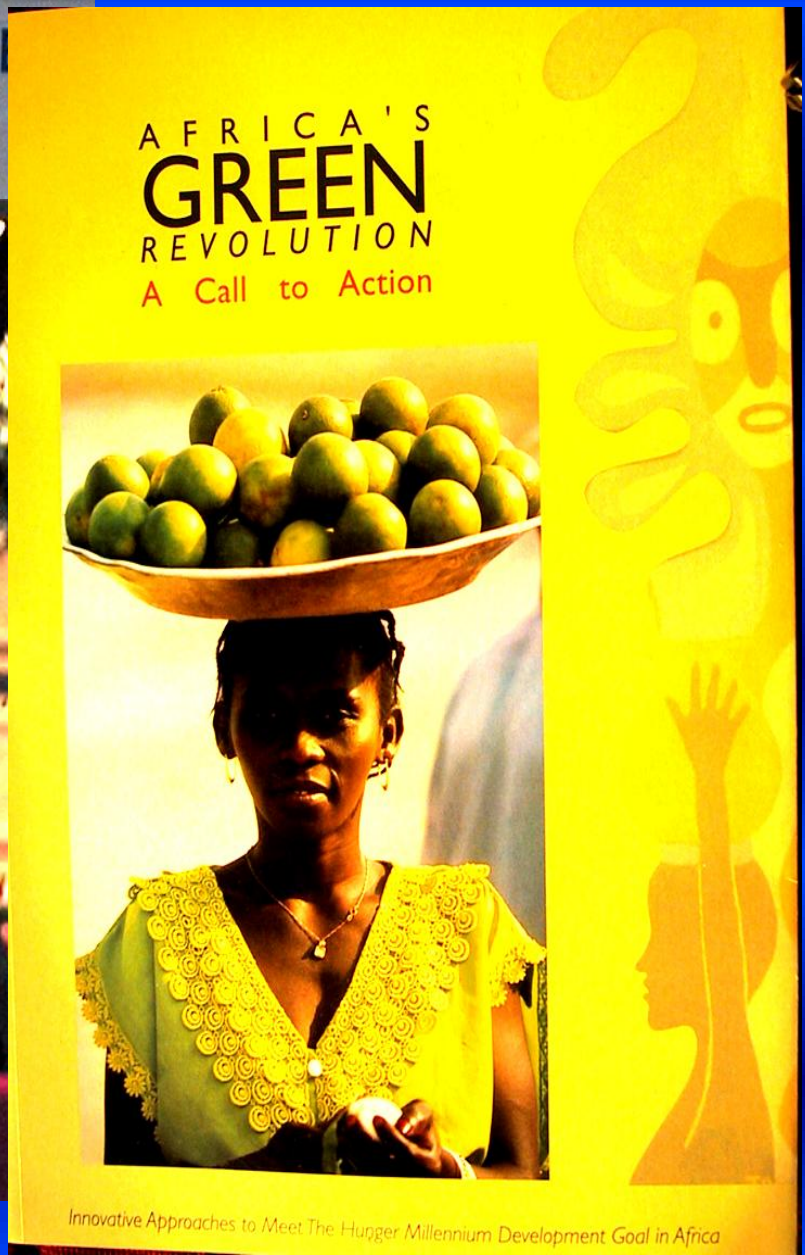
Scientific evidence started in 1975 and mounted in the 1990's

UN Millennium Project Hunger Task Force

Report launched by Kofi Annan July 2004;

Published January 2005

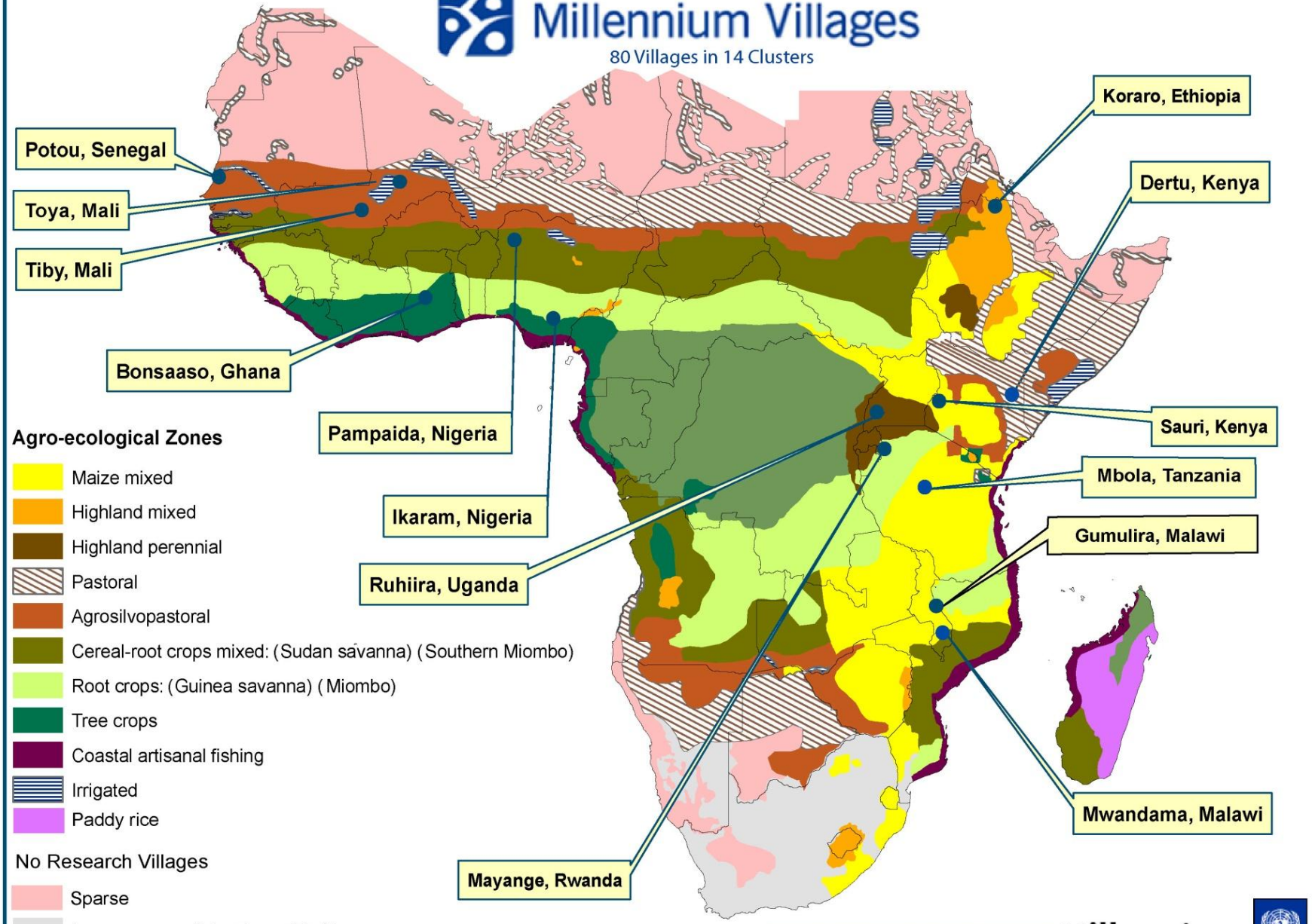
21st Century African Green Revolution



Follow-ups: Working at Local, National and Global Scales

Millennium Villages

80 Villages in 14 Clusters



The Earth Institute AT COLUMBIA UNIVERSITY

Millennium Promise
Extreme Poverty Ends Here

UNDP

Community leads / Science-based

Agreed at Presidential Level in Each Country


5 tons/ha, Sauri, Kenya 2005
Input costs $135 to grow an extra ton of maize

Fertilizer, Hybrid Seed

$135 to produce an extra ton of food

Food Aid Delivered

$812/ton

Sanchez, Nature 458: 148 (2009)

Malawi—The First African Green Revolution

Harvest Year	Million tons	Food requirement	Yield (tons/ha)	Officially
2005	1.3	- 43%	0.8	drought
2006	2.4	+ 18%	1.5	good
2007	3.3	+ 57%	2.7	good
2008	2.8	+32%	1.6	good
2009	3.6	+58%	2.2	good
2010	2.9	+33%	1.9	drought

2007:
Subsidy cost: $70 million
Benefit: $688 million

Denning et al, 2009 Plos Biology, and Ministry of Agriculture data for 2008-2010

Scaling up

Bellagio, 21 February 2008

GPAFS launched, but low funding

- Clarity of goals
- Persistence
- Mentor teams of young scientists
- Engage range of stakeholders—farmers to government leaders
- Attribution goes to the policymakers
- Knowing when to step aside