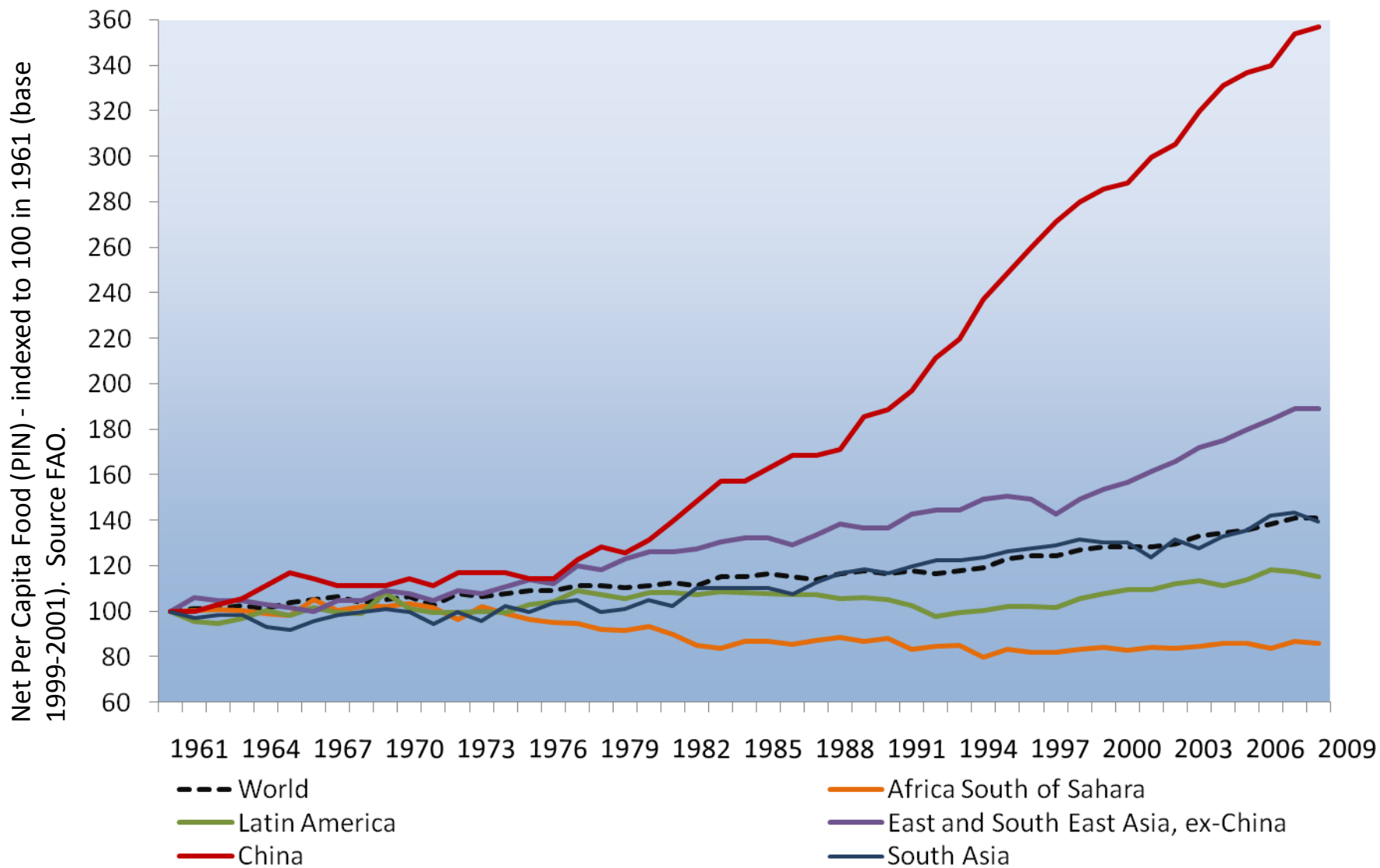


Integrated Approaches to Sustainable Agricultural Development in Africa

Glenn Denning
Professor of Professional Practice &
Director, Center for Globalization and Sustainable Development
The Earth Institute, Columbia University

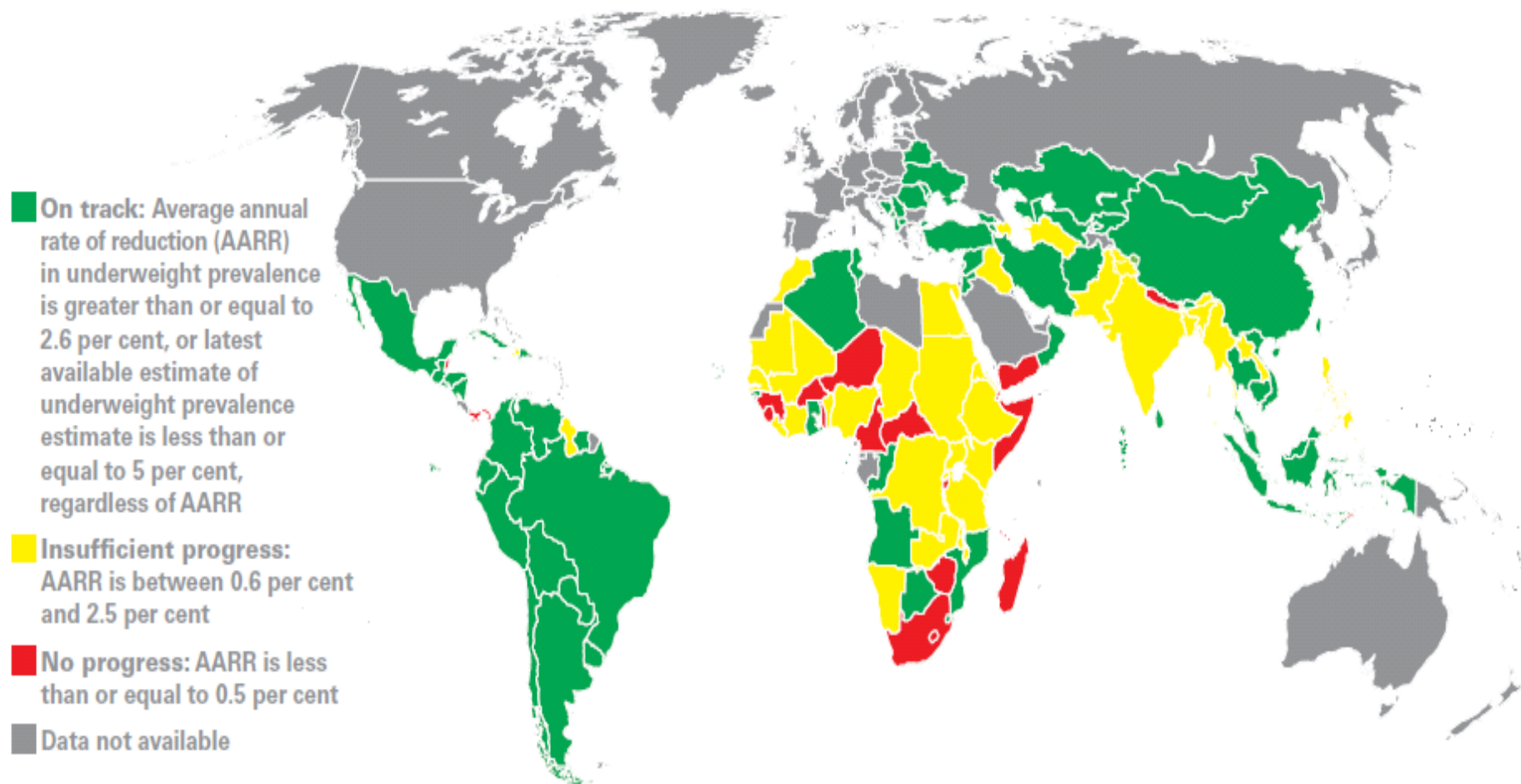
*Presentation on behalf of the Earth Institute and Millennium Promise
at the IFA Africa Forum, Montreal, May 26, 2011*

Per Capita Food Production 1961-2009



63 countries (of 117) on track to achieve MDG 1c (UNICEF 2009)

Progress is insufficient to meet the MDG target in 34 countries, and 20 countries have made no progress



Source: MICS, DHS and other national surveys, around 1990 to around 2008.

TABLE 1: Countries at risk of humanitarian impacts of international food price increases

Extreme risk Identified by 3	High risk Identified by 2		Moderate risk Identified by 1	
Afghanistan	Benin	OCHA/FAO	Armenia	OCHA
Burundi	Burkina Faso	OCHA/FAO	Bangladesh	WFP
C.A.R.	Cambodia	OCHA/WFP	Cameroon	FAO
Chad	Cote d'Ivoire	OCHA/FAO	Cape Verde	OCHA
Comoros	Georgia	OCHA/FAO	Egypt	FAO
Congo, Dem. Rep	Kenya	OCHA/WFP	Ghana	WFP
Djibouti	Madagascar	FAO/WFP	Honduras	FAO
Eritrea	Mali	OCHA/FAO	Jordan	OCHA
Ethiopia	Mauritania	OCHA/FAO	Korea, Dem Rep.	OCHA
Gambia	Mongolia	OCHA/WFP	Malawi	WFP
Guinea	Senegal	OCHA/FAO	Maldives	OCHA
Guinea-Bissau	Tajikistan	FAO/WFP	Morocco	FAO
Haiti	Timor-Leste	OCHA/FAO	Nepal	WFP
Lesotho	Togo	FAO/WFP	Nigeria	FAO
Liberia			Pakistan	WFP
Mozambique			Papua New Guinea	WFP
Niger			Rwanda	WFP
São Tomé & Príncipe			Solomon Islands	WFP
Sierra Leone			Sudan	OCHA
Somalia			Swaziland	WFP
Yemen			Syria	FAO
Zimbabwe			Tanzania	WFP
			Uganda	WFP
			Uzbekistan	FAO
			West Bank and Gaza	WFP

Agricultural Productivity



Africa

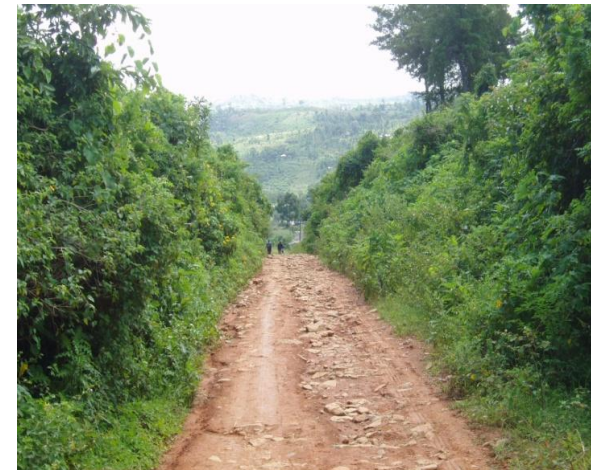


Asia

Why did the Green Revolution not reach Africa?

- Diversity of African agriculture
- Rice and wheat not important crops
- African crop land is 96% rain-fed
- Health burden, especially malaria
- Poor transport infrastructure
- Low population densities
- Political instability and urban bias
- Structural adjustment and failure of markets to develop; weak private sector
- Lack of investment by governments and donors (WB)

resulting in **unsustainable low external input use and low productivity**



So why don't most African farmers use fertilizer?

- Fertilizer is expensive (unusually so because of high transport costs and low volumes)
- They don't have the cash
- Credit institutions poorly developed
- Private suppliers not operating in subsistence farming areas
- No access to improved seeds and extension services
- Donors have opposed subsidies
- Fertilizer use: 10 kg nutrient/ha
- Maize yields of 1 t/ha



Agriculture is not a Closed System: Nutrient Imbalances in Corn-based Systems

Inputs and outputs	Nutrient balances by region (kg ha ⁻¹ year ⁻¹)					
	Western Kenya		North China		Midwest U.S.A	
	N	P	N	P	N	P
Fertilizer	7	8	588	92	93	14
Biological N fixation					62	
Total agronomic inputs	7	8	588	92	155	14
Removal in grain and/or beans	23	4	361	39	145	23
Removal in other harvested products	36	3				
Total agronomic outputs	59	7	361	39	145	23
Agronomic inputs minus harvest removals	-52	+1	+227	+53	+10	-9

Mining African soils: estimated nutrient losses in African countries, 2002-2004

<i>Moderate/low (less than 30 kg/ha/year)</i>		<i>Medium (from 30 to 60 kg/ha/year)</i>		<i>High (more than 60 kg/ha/year)</i>	
	<i>kg/ha</i>		<i>kg/ha</i>		<i>kg/ha</i>
Egypt	9	Libya	33	Tanzania	61
Mauritius	15	Swaziland	37	Mauritania	63
South Africa	23	Senegal	41	Congo, Rep. of	64
Zambia	25	Tunisia	42	Guinea	64
Morocco	27	Burkina Faso	43	Lesotho	65
Algeria	28	Benin	44	Madagascar	65
		Cameroon	44	Liberia	66
		Sierra Leone	46	Uganda	66
		Botswana	47	Congo, Dem. Rep. of	68
		Sudan	47	Kenya	68
		Togo	47	Central African Rep.	69
		Côte d'Ivoire	48	Gabon	69
		Ethiopia	49	Angola	70
		Mali	49	Gambia, The	71
		Djibouti	50	Malawi	72
		Mozambique	51	Guinea Bissau	73
		Zimbabwe	53	Namibia	73
		Niger	56	Burundi	77
		Chad	57	Rwanda	77
		Nigeria	57	Equatorial Guinea	83
		Eritrea	58	Somalia	88
		Ghana	58		

Source: Henao and Baanante 2006.

kg = kilogram; ha = hectare.

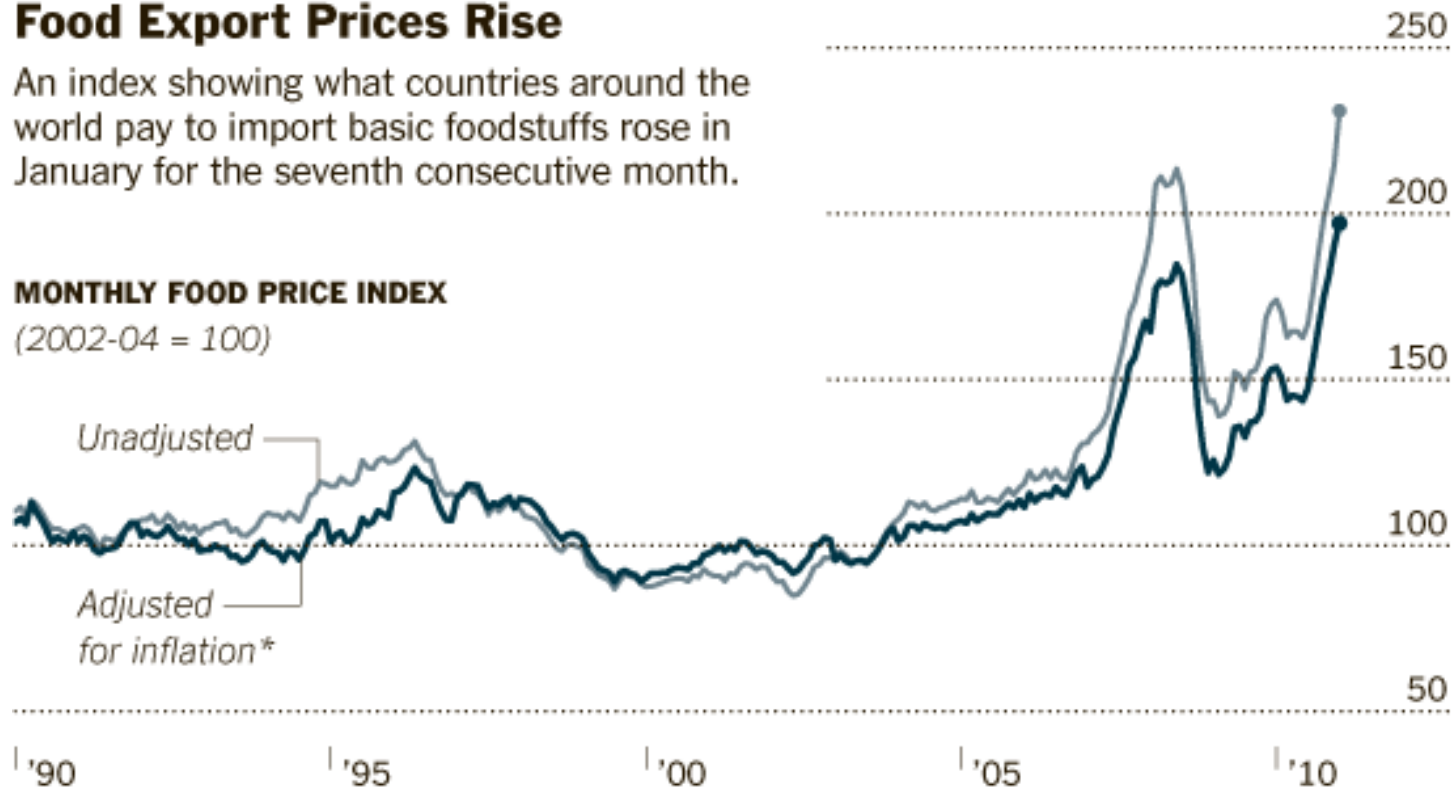
Reason for hope or despair in Africa?

Food Export Prices Rise

An index showing what countries around the world pay to import basic foodstuffs rose in January for the seventh consecutive month.

MONTHLY FOOD PRICE INDEX

(2002-04 = 100)



*The adjusted food price index is the unadjusted index deflated by the World Bank Manufactures Unit Value Index (MUV).

Source: Food and Agriculture Organization of the United Nations

"There's nothing more basic than food. If people don't have it, one of three things happen: they revolt, they migrate or they die"

Josette Sheeran, Exec Dir WFP



REUTERS

Two Pathways of Hope: Intensification and Extensification



Table 2 Potential Availability of Uncultivated Land in Different Regions

	Total area (1,000 ha)	Share of land with travel time to market (%)	
		< 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

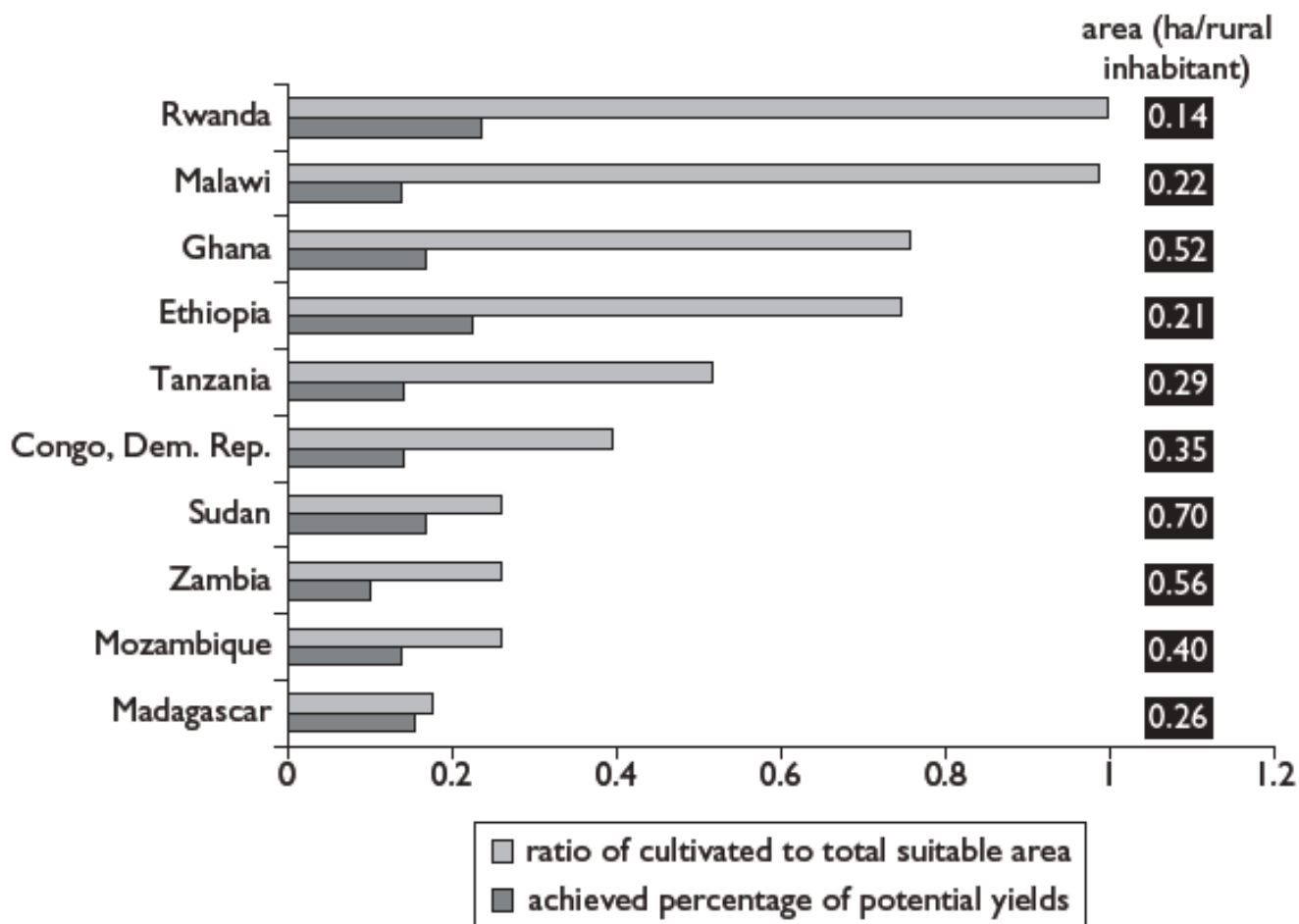
Source: Fischer and Shah 2010.

Note: Data identify uncultivated land with high agro-ecological potential in areas with population density of less than 25 persons/km².

World Bank (2011) Rising interest in farmland p. xxxiv

Also note: **this is non-forested land; 1/3 of current cropped land**

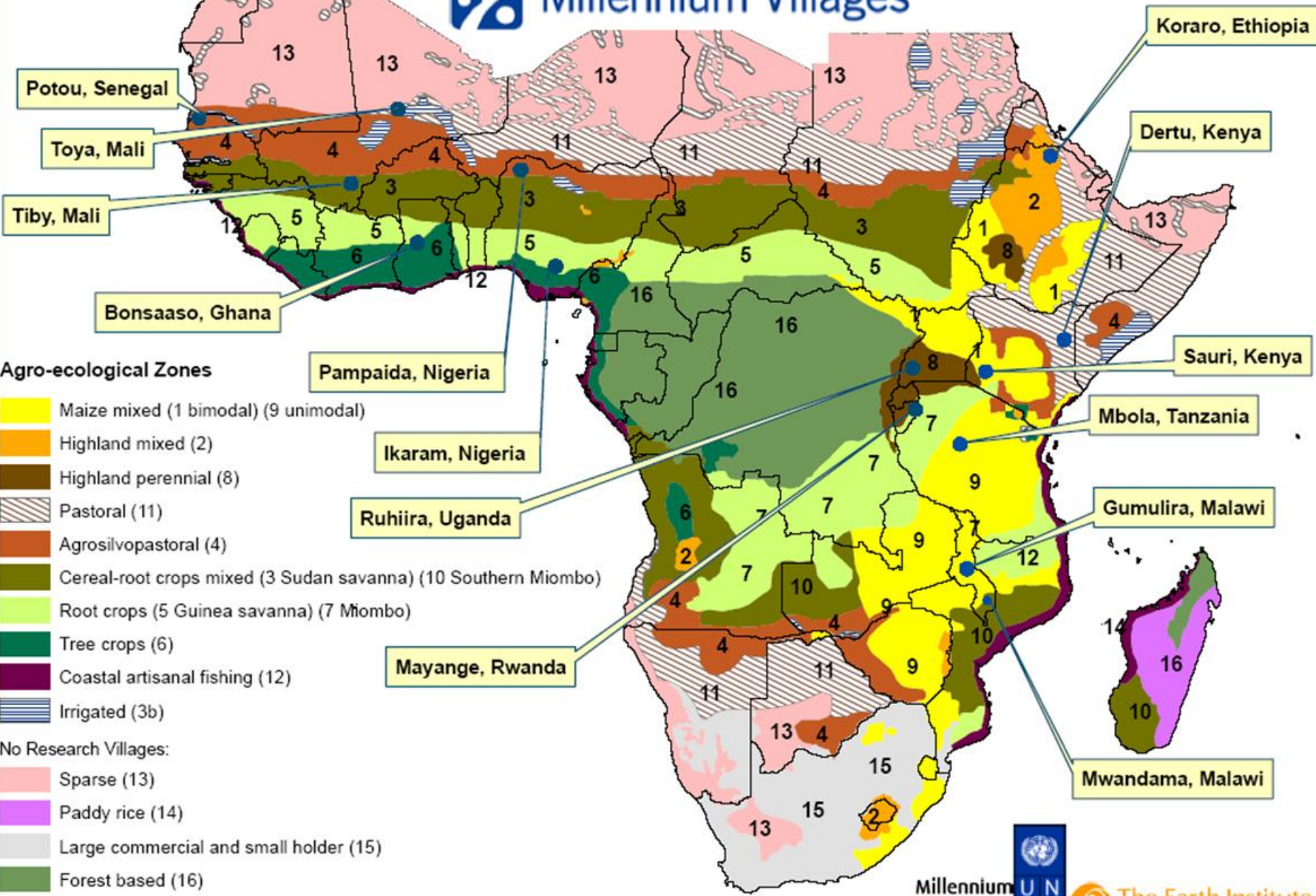
Figure 2 Yield Gap, Availability of Uncultivated Land, and Area Cultivated per Rural Inhabitant, Selected Countries in Sub-Saharan Africa



Source: Authors based on Fischer and Shah 2010.



Millennium Villages

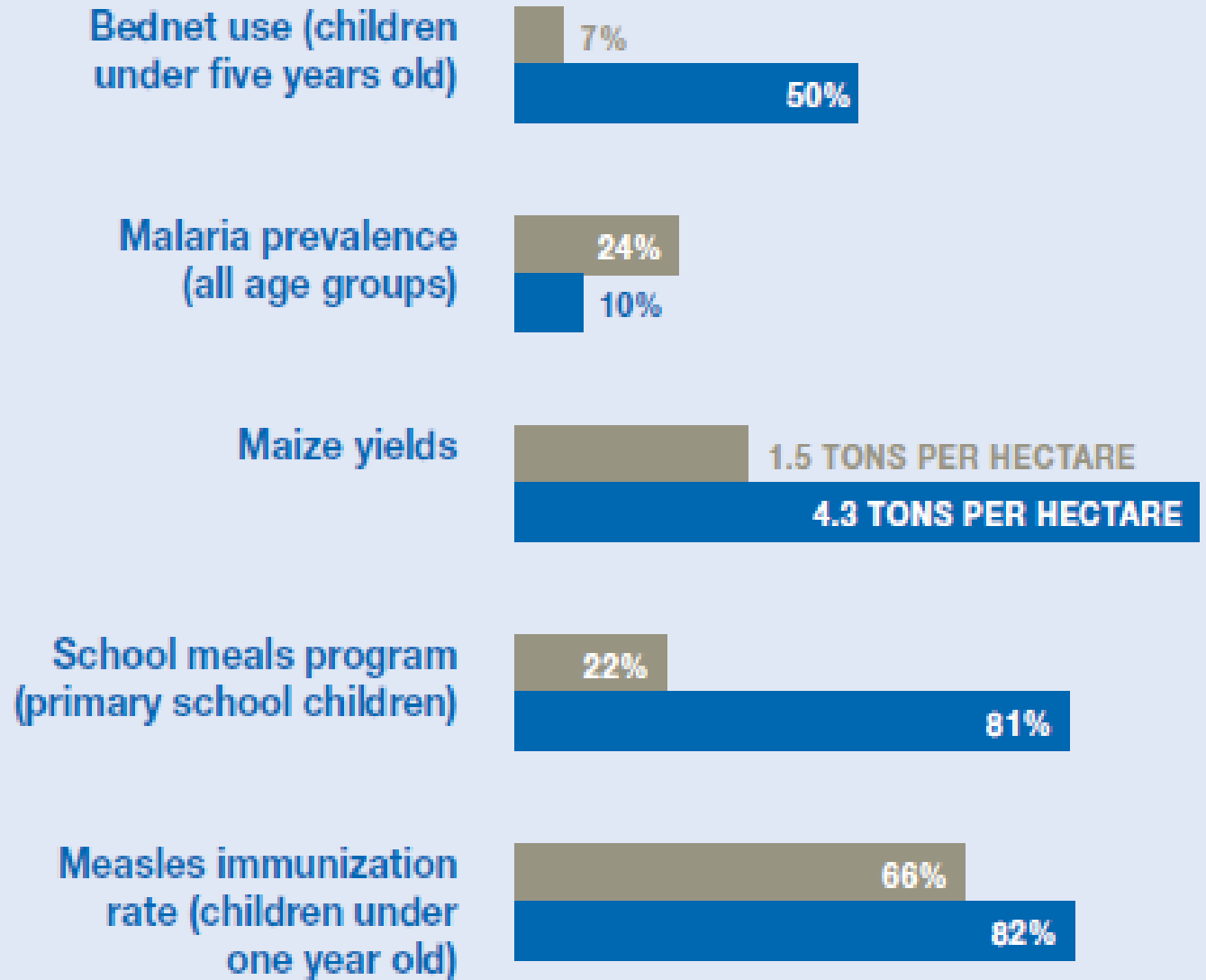


Adapted from Dixon et al. 2001. Farming Systems and Poverty. FAO

Why integrated approaches?



AVERAGE QUICK WIN PROGRESS



Lessons from the Millennium Villages Project

- Address soil fertility: requires a combination of inorganic and organic nutrient sources
- Combine soil nutrients with better varieties and improved crop management (weed control, plant spacing, etc)
- Increase irrigation, where possible, and improve rainfed water capture and management (green water)
- Reduce post-harvest losses
- Build in adaptation to climate change
- Build in recognition that women do most of the farming
- Beyond staples: include livestock and trees in the mix
- Support agribusiness development: value chain approach
- Recognition that on-farm production is an important source of nutrition: agriculture-nutrition-health nexus
- Take a more holistic integrated multi-sectoral approach creates synergies and improves sustainability

But can we take these results to scale?



Malawi Takes Action

- Failure of 2004/5 rains and delayed inputs...the worst maize harvest in 10 years
- Aug 2005, Government requested donor support for inputs; UN Appeal for food aid and inputs
- Donors unresponsive on inputs
- Government reallocated \$60 million for an inputs subsidy program
- Voucher system enabling smallholders to Access seed and fertilizer
- Repeated for 6 successive years... 6 successive bumper harvests
- 2011 projected to yield a 1.4 million MT surplus



Impact of Technology, Policies and Leadership

- Increased national food security
- Greatly reduced level of household food insecurity (down from 5 mil to 500,000 at risk)
- Higher wage rates (up 50%) and lower maize prices
- Increased local economic activity
- Better health, higher school attendance
- Export earnings
- Social and political stability



Unfinished Business

- Diversification of crops
- Soil and water conservation
- Post-harvest technology
- Smallholder credit systems
- Transport infrastructure
- Refining soil fertility recommendations
- Balanced development of other sectors

Take Home Messages

- Africa: the last frontier & the future of global food supply
- Heed the positive lessons of the Asian Green Revolution: technology, policies and leadership
- Avoid the failures: *Greener* GR 2.0
- Adapt to largely *rainfed* farming
- Embrace and apply creative ICT4Ag
- Scale up Integrated Approaches: Millennium Villages
- Partner along the Value Chain with governments and some non-traditional players
- Leverage infrastructure of the extractive industries
- Integration at multiple levels



“If words were food, nobody would go hungry”

What’s Needed to End Hunger and Under-nutrition in Africa?

The Leadership to Act!

