

# INTERNATIONAL FOOD SECURITY: THE ROLE OF SCIENCE

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Presentation to President's Council of Advisors on  
Science and Technology (PCAST)

March 12, 2010

# VARIETIES OF FOOD INSECURITY

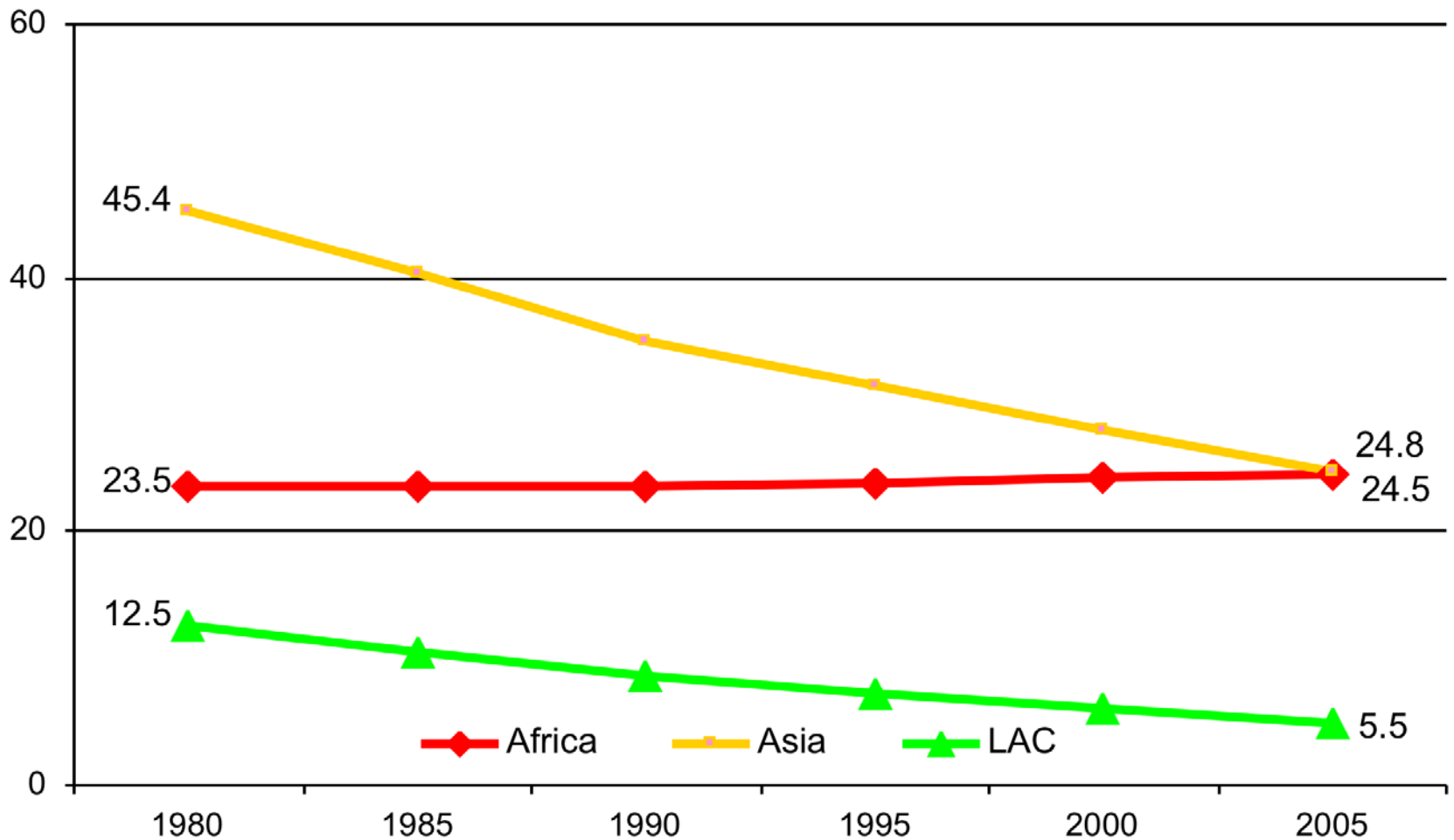
- Starvation (famine)
- Chronic under nutrition (long term energy deficits, micronutrient deficits, or both)
- Episodic under nutrition (temporary deficits, due to factors such as fluctuating income or food costs)

# FAMINE IN RETREAT

Country	Famine Dates	Numbers dead
USSR (Ukraine)	1932-33 Collectivization	6 million
USSR (Leningrad)	1943 war	700,000
Bengal	1943-44 war “boom”	3 million
People’s Republic of China	1958-61 Great Leap	30 million
African Sahel	1972-74 drought	300,000
Bangladesh	1974 floods	400,000
Ethiopia	1984-85 drought/war	1 million
Mozambique	1991-92 war	200,000
Somalia	1992 war	300,000
Sudan	1998 war	70,000
North Korea	1996-99 post-cold war	200,000 up to 3.5 million

# CHRONIC UNDERNUTRITION IN RETREAT, EXCEPT IN AFRICA

Prevalence of underweight in children 0-59 months old

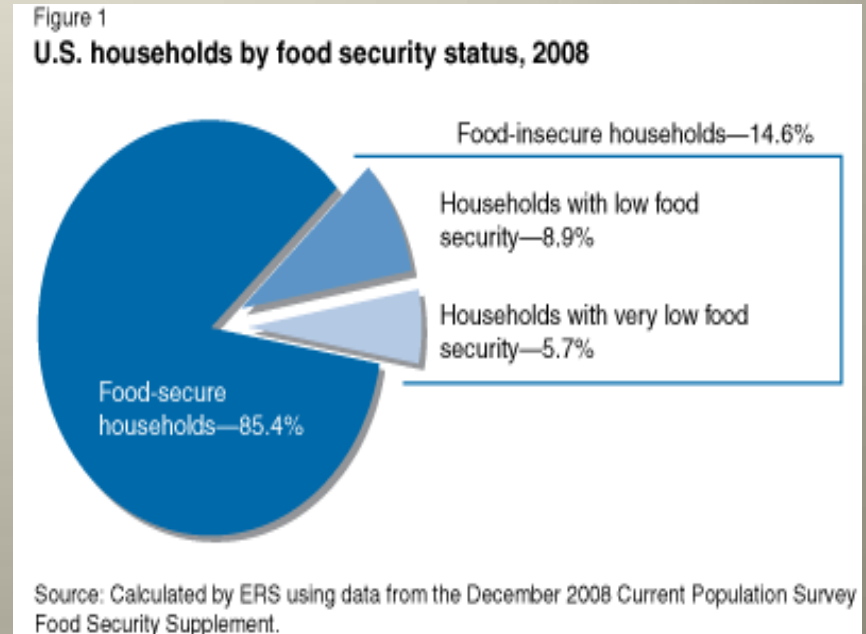


# EPISODIC UNDERNUTRITION: SOME DUBIOUS CLAIMS

2007-08 International price spike



2008-09 Recession in United States



# CAUSES OF CHRONIC UNDERNUTRITION: LOW PRODUCTIVITY OF LABOR IN FARMING



# CAUSES OF CHRONIC UNDERNUTRITION: PHYSICAL ISOLATION FROM MARKETS



# CAUSES OF CHRONIC UNDERNUTRITION: SOCIAL MARGINALIZATION





# DUELING APPROACHES TO HELPING THE RURAL POOR

## Green Revolution Model

- Introduce modern agricultural science
- Link the poor to private markets

## Food Sovereignty Model

- Avoid modern agricultural science
- Insulate the poor from private markets

# DUELING STUDIES

## 2008 WDR

- Places trust in agricultural R&D, markets, public goods investments, and assistance to LDCs
- Offers quantified projection of future food production needs
- Executive summary offers average of 59 quantified factual assertions per page

## 2008 IAASTD REPORT

- Warns of the unintended consequences of technology and celebrates “local and traditional knowledges” in addition to formal science
- Does not offer projection of future food production needs
- Synthesis report offers average of 4 quantified factual assertion per page

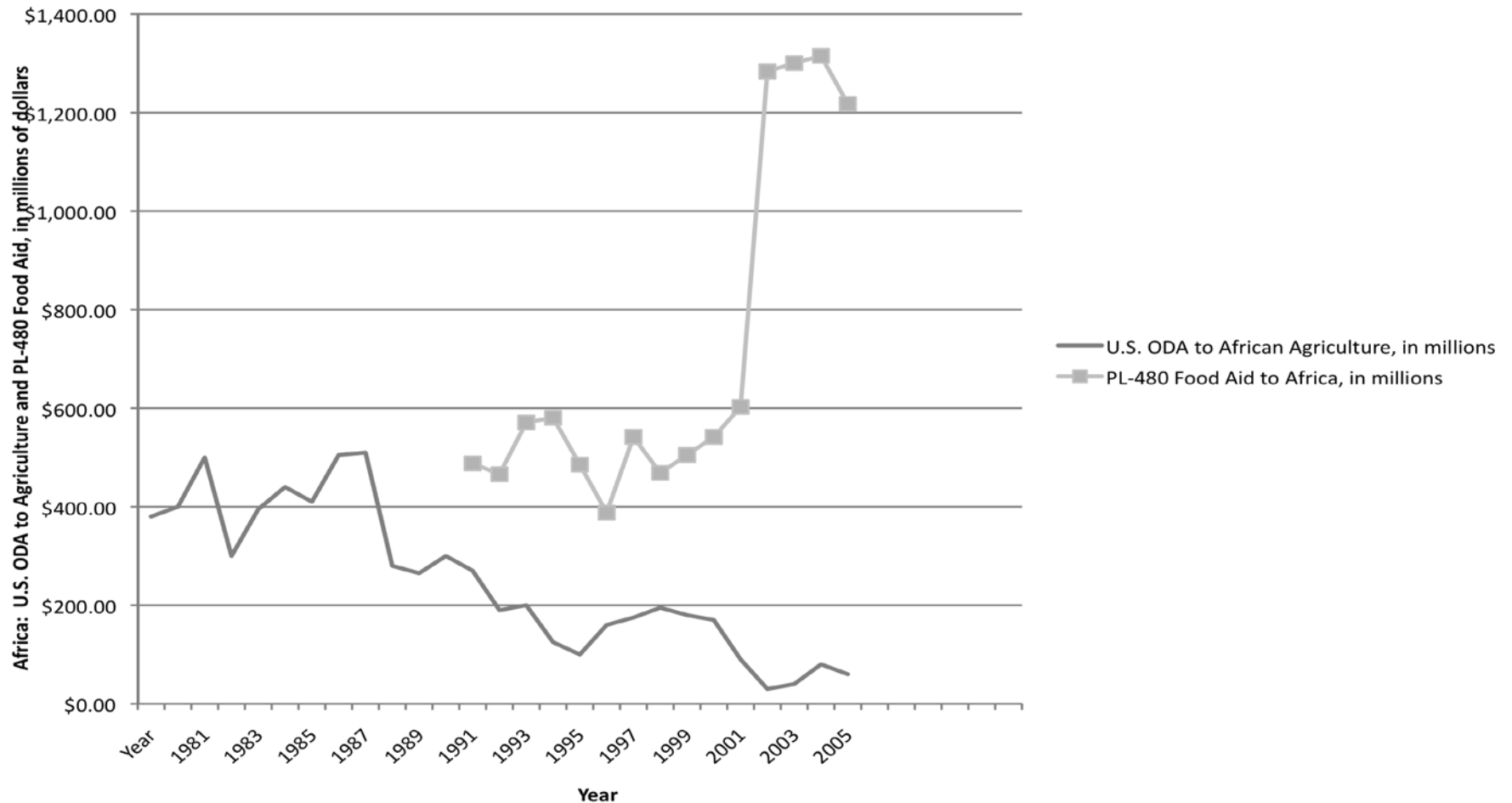
# IS SCIENCE-INTENSIVE FARMING SUSTAINABLE?

ENVIRONMENTAL PERFORMANCE OF AGRICULTURE IN OECD COUNTRIES, 1990-2004:

VOLUME OF FOOD PRODUCTION	+ 5 PERCENT
LAND AREA IN FARMING	- 4 PERCENT
WATER USE IN IRRIGATION	- 9 PERCENT
EXCESS NITROGEN USE	- 17 PERCENT
PESTICIDE USE	- 5 PERCENT
GREENHOUSE GAS EMISSIONS FROM AGRICULTURE	- 3 PERCENT
INCREASE IN TOTAL ENERGY USE IN AGRICULTURE	1/6 THE RATE OF INCREASE IN THE REST OF THE ECONOMY

# WHICH SIDE HAS BEEN WINNING THE ARGUMENT?

**Africa: U.S. ODA to Agriculture vs. PL-480 Food Aid (1980-2006)**



# RECENT SCIENTIFIC ASSESSMENTS THAT DO NOT REQUIRE DUPLICATION

- A technical projection of global food production potential compared to growing requirements, out to 2050:

R.A. Fischer, Derek Byerlee, and G.O. Edmeades (2009). *Can Technology Deliver on the Yield Challenges to 2050?*, Rome: FAO

- A technical projection of the impacts of climate change on global food production out to 2050:

G. C. Nelson, M. Rosegrant, J. Koo, et al. (2009). *Climate Change: Impact on Agriculture and Costs of Adaptation*. Washington, D.C.: IFPRI

# A GAP IN THE ASSESSMENT LITERATURE: JUDGING THE PROMISE OF PRECISION FARMING

- SOURCES OF R&D, AND RATES OF INNOVATION?
  - Applications of ICT, GPS, GIS, and remote infrared sensing
  - Drip irrigation and laser-leveling
  - Precision machinery and robotics
  - Bioengineering
- PATTERNS OF UPTAKE?
  - Mechanical and ICT applications: large or highly capitalized farms only?
  - Biological applications: scale neutral, and available to the poor?
- “ORPHAN” APPLICATIONS IN NEED OF PUBLIC R&D SUPPORT?