Food for all forever

*The challenge of sustainable agriculture*

Michael Bomford
More People…

Population growth, 1750-2050

- More Developed Countries
- Less Developed Countries

1999: 6 Billion


Economist Video on Population
Fewer Farmers...
Less Soil...
Less Water...

San Joaquin Valley Hydrology

Area of land subsidence

More Fertilizer & Pesticide...

Global Pesticide Sales 1950-1999

Source: Agronova

Annual World Pesticide Sales 1980 -1999

Source: British Agrochemical Association Annual Reports
Less Energy...
Ag Energy Use in North America

- Animal Production: 8%
- Irrigation: 13%
- Transportation: 16%
- Machinery Operation: 19%
- Fertilizer Manufacturing: 31%
- Crop Drying: 5%
- Pesticide Production: 5%
- Misc.: 3%

B.A. Stout, 1984
Energy Use and Management in Agriculture
Organic Production Standards

Organic agriculture is “a production system that is managed in accordance with the Act and regulations in this part to respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.”
Old and New…

• Released by UN-FAO, June 2011
  – Small, diverse farms
  – Soil & water conservation
  – Natural pest management
Albert Howard (1873-1947)

- British agricultural scientist.
- 25 years in India.
- Critical of reductionist agricultural science and specialization.
- Blamed fall of past civilizations on unsustainable agriculture.
- Wrote *An Agricultural Testament* (1940).
Howard on Eastern agriculture

“The small-holdings of China, for example, are still maintaining a steady output and there is no loss of fertility after forty centuries of management.”

- Tiny farms
- Labor intensive
- Integration of crops and livestock
- Lots of legumes
- Little cultivation
Howard on Western agriculture

- Large, growing farms
- Monocultures
- Mechanization
  - Machines consume resources but do not contribute urine/dung
- Synthetic fertilizer dominates
- Food prices too low… farmers forced off land
• U.S. organic food sales have grown between 17 and 21% each year since 1997 (total U.S. food sales over this time have grown in the range of 2-4% a year)

• Organic food sales represent approximately 2% of U.S. food sales.
  
  – (Organic Trade Association’s 2004 Manufacturer Survey)