

As the Arctic melts, the Russians are eyeing new shipping routes

Environmental pain can be corporate gain.

New (business) Opportunities in the:
"booming business of global warming"

Three Views of Agriculture

1. Conventional (Agro-chemical Intensive) Agriculture
2. Traditional (low-input) Agriculture
3. Organic (environmentally proscribed) Agriculture

The Green Revolution:

Feeding the world; Poisoning the world

Alternatives: Organics and 'Traditional' Polycultures

What are the environmental consequences of eating like an American?



Achieving food security in the
face of climate change

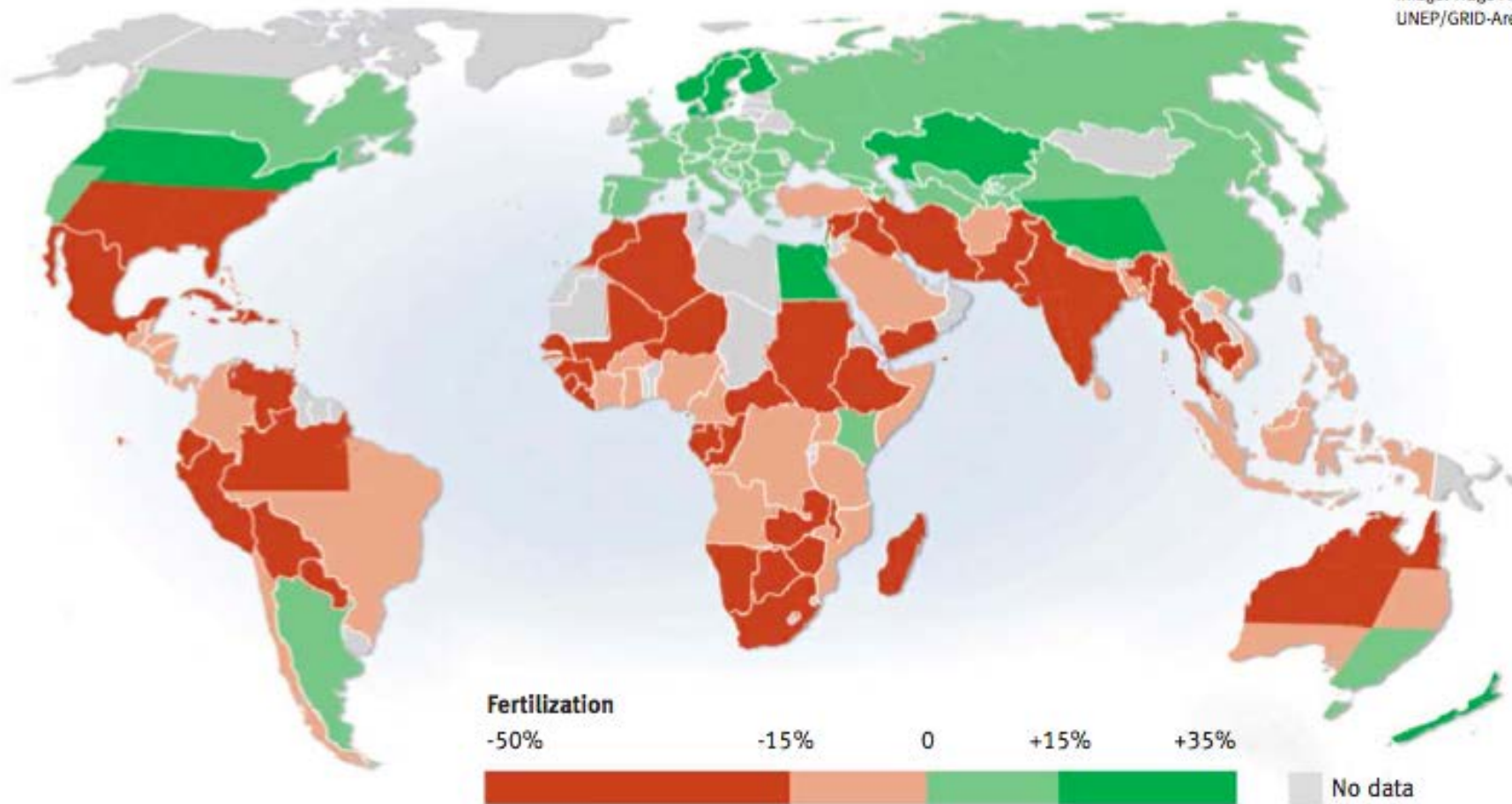


Figure 1. Projected changes in agricultural production in 2080 due to climate change²².

Climate and food: a negative feedback loop

– carbon-intensive food production, more climate change

= either less food, OR greater carbon intensity,

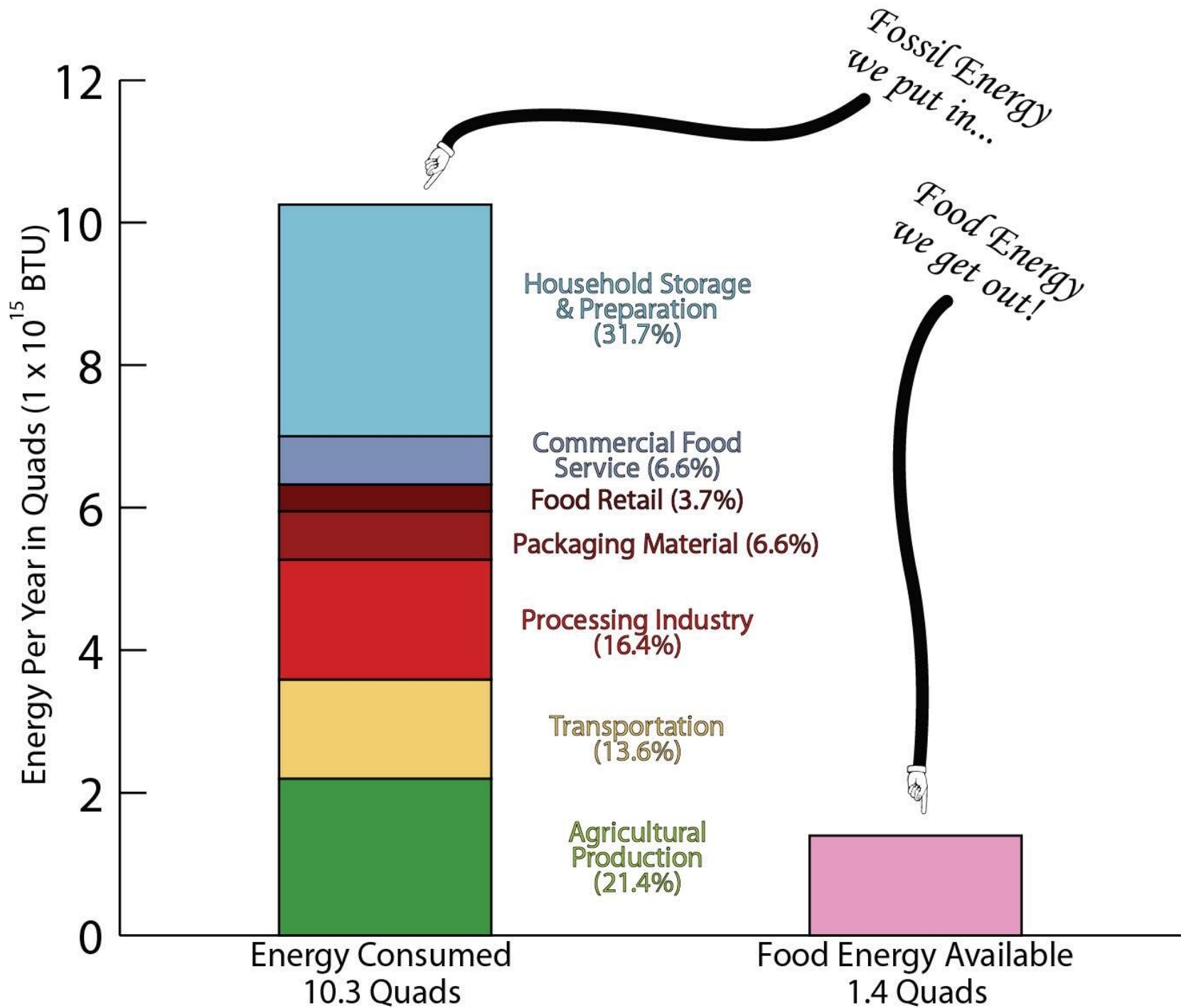
OR change the food production system, the way that we grow food

The fact is that **livestock farming accounts for a whopping 15 per cent of all greenhouse gas emissions.**

We can't all go veggie, so just how much meat can an eco-citizen eat?

In 2007, Colin Butler of the Australian National University in Canberra estimated that we can eat about one burger and one small chicken breast per person every two days to meet the 2005 emission level targets.





Three types of food production systems

Traditional

Output:

Local Buyer

Or

Subsistence:

Corn bread/Tortillas

Corn



On-Farm inputs:

- **Manure**
- **Weeding**
- **Tillage, Mules/
Horses**
- **Inter-planting**
- **Seeds held back
from year
previous**

Conventional

High-Fructose

Corn Syrup

Oils, Waste

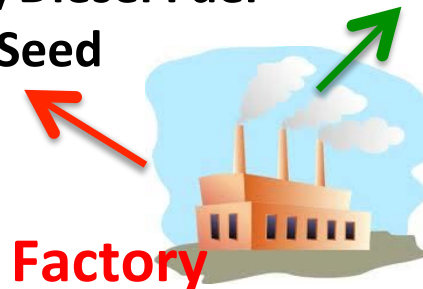
Agro-Processor

**Grain Elevator: Gas
Drying**



Purchased Inputs:

- **Fertilizer**
- **Pesticide/Herbicide**
- **Tractor/Diesel Fuel**
- **Hybrid Seed**



Factory

Organic

Tortilla Chips, etc.

Organic Processor



**Purchased or On-
Farm**

Inputs:

- **Compost, manure,
potash**
- **Biodegradable
pesticides**
- **Non-Genetically
Modified Seed**
- **Inspections!**

Green Revolution

Conventional Characteristics:

Package of Inputs and Modern Varieties (MVs, HYVs)

('view from the plant')

**i. get more energy to grain height, foliage reduction
increased nutrient uptake**

ii. Agrochemical nutrient and biocide packages facilitate changes: BUT ALSO enforces MONOCULTURE

Characteristics of Traditional Agriculture

Package of inputs and Traditional Varieties

('view from traditional plant')

i. high, leafy stature to reduce weed competition

ii. A. lower nutrient uptake adapted to low nutrient levels

B. 'mutualist' relationships with other plants (corn/beans) maximize total productivity

Green Revolution

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('view from the plant')

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Photo Credit: University of Nebraska, 2004

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Characteristics of Traditional Agriculture



ii. A. lower nutrient uptake adapted to low nutrient levels,
B. 'mutualist' relationships with other plants (corn/beans) maximize total productivity **nitrogen-fixing**

Conventional, Modern Varieties

**Method of generating
stable, dependable yields
without agro-chemicals**

- i. Fertilizer increases yields**
- ii. Pesticides protect
monocultures**
- iii. Herbicides**
 - a) Reduce weeds which
overcome shorter
stature of crops**
 - b) Enforce
monocultures by
division specificity**

Traditional varieties

**Method of generating
stable, dependable yields
without agro-chemicals**

- i. Fertilizer from animals**
- ii. High crop diversity, both
intra/interspecific reduces
risk of pests**
- iii. Crops naturally resistant:
small, multiple grain heads
more resistant to insects
(field and storage)**
- iv. stability enhanced
through multiple, diverse
croppings (beans vs. fava
beans)**

The Green Revolution and Global Peasant Agriculture

1. Applies (Global) Northern agro-tech to the Global South
Institutions were created with international capital to 'adapt' this technology to local conditions
2. Historical Context: Developing World governments joined with the Rockefeller Foundation to create regional centers modeled along US extension agencies to 'disseminate' high-yield technologies and credit programs and finance technology transfer (e.g. CYMMIT [corn/wheat], IRI[rice], CIAT[tropical crops])
3. Green revolution technology has only met with partial acceptance due to the social and ecological context of farming
4. Government policy is often bifurcated between the **traditional** and **conventional** sectors as they try to bolster many sectors



Institutional Matrix:

Cimmyt: international center for corn and wheat improvement: Mexico

<http://www.youtube.com/watch?v=HucSCNQ01X4&feature=related>

Vs Peasant Agriculture



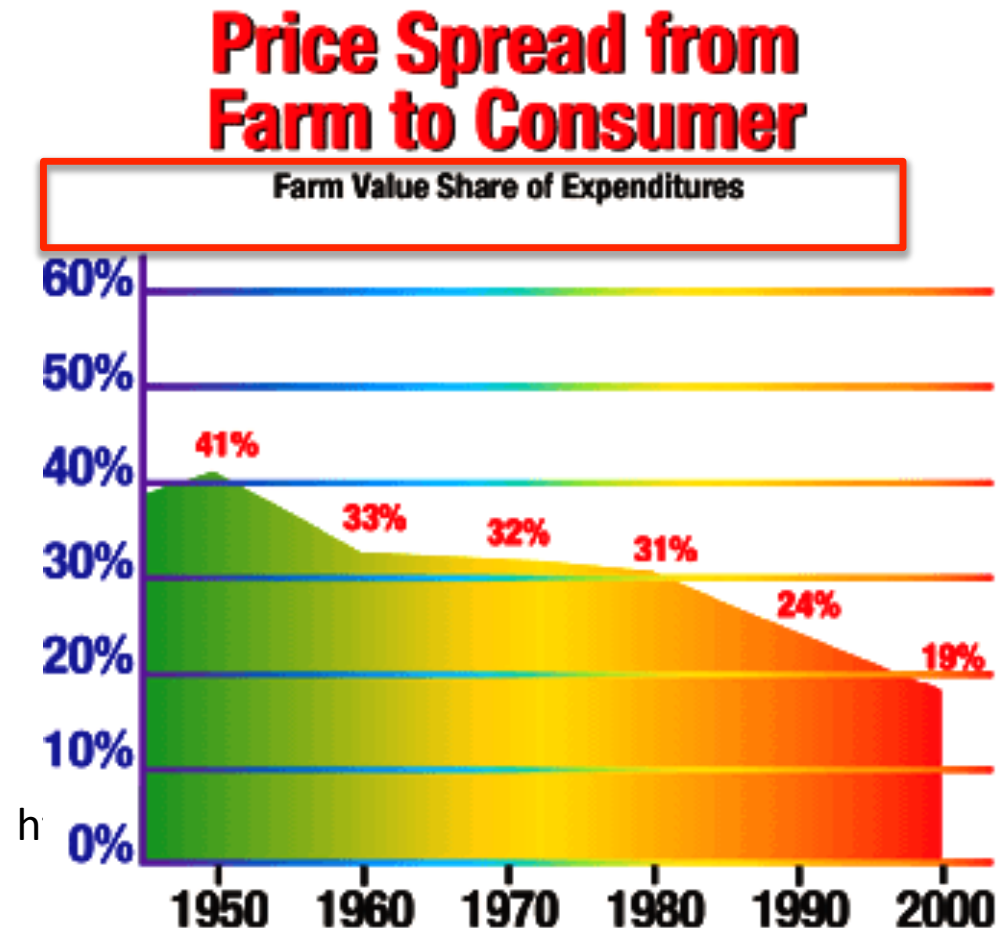
Critiques of the Green Revolution

1. Leads to income inequality and land concentration: only a few are able to benefit due to the high cost of GR inputs
GR crops require fertilizer, herbicide, pesticide and fungicide applications
2. Leads to soil degradation and soil mining: Lipietz
GR crops designed to take up lots of nutrients: if farmers cant afford fertilizer, the crops strip the soil
3. Crops are not resistant: too genetically uniform (no intra-specific diversity)
4. Crops are not adapted to local conditions: micro-climatic diversity – especially true of corn
5. As a result of chemical intensity, green revolution crops cant be intercropped (polycultures)
6. They really aren't needed anyway:
 - the real problem is lack of land and other assets
 - Plan Puebla in Mexico: farmers adapted their own corn to grow with extra fertilizer inputs

Critiques of the Green Revolution

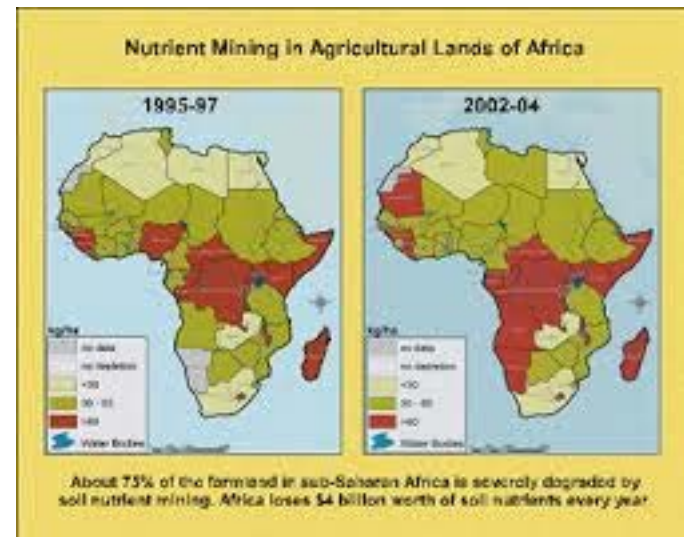
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**USDA
figures**



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GR crops designed to take up lots of nutrients: if farmers cant afford fertilizer, the crops strip the soil
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<http://www.youtube.com/watch?v=jvZZg5uia-Y>

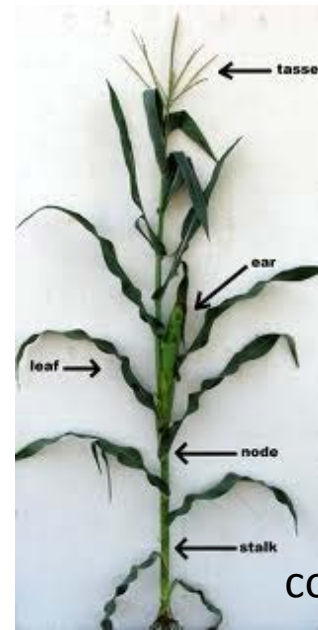
Prince charles

Critiques of the Green Revolution

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dicots



corn

monocots

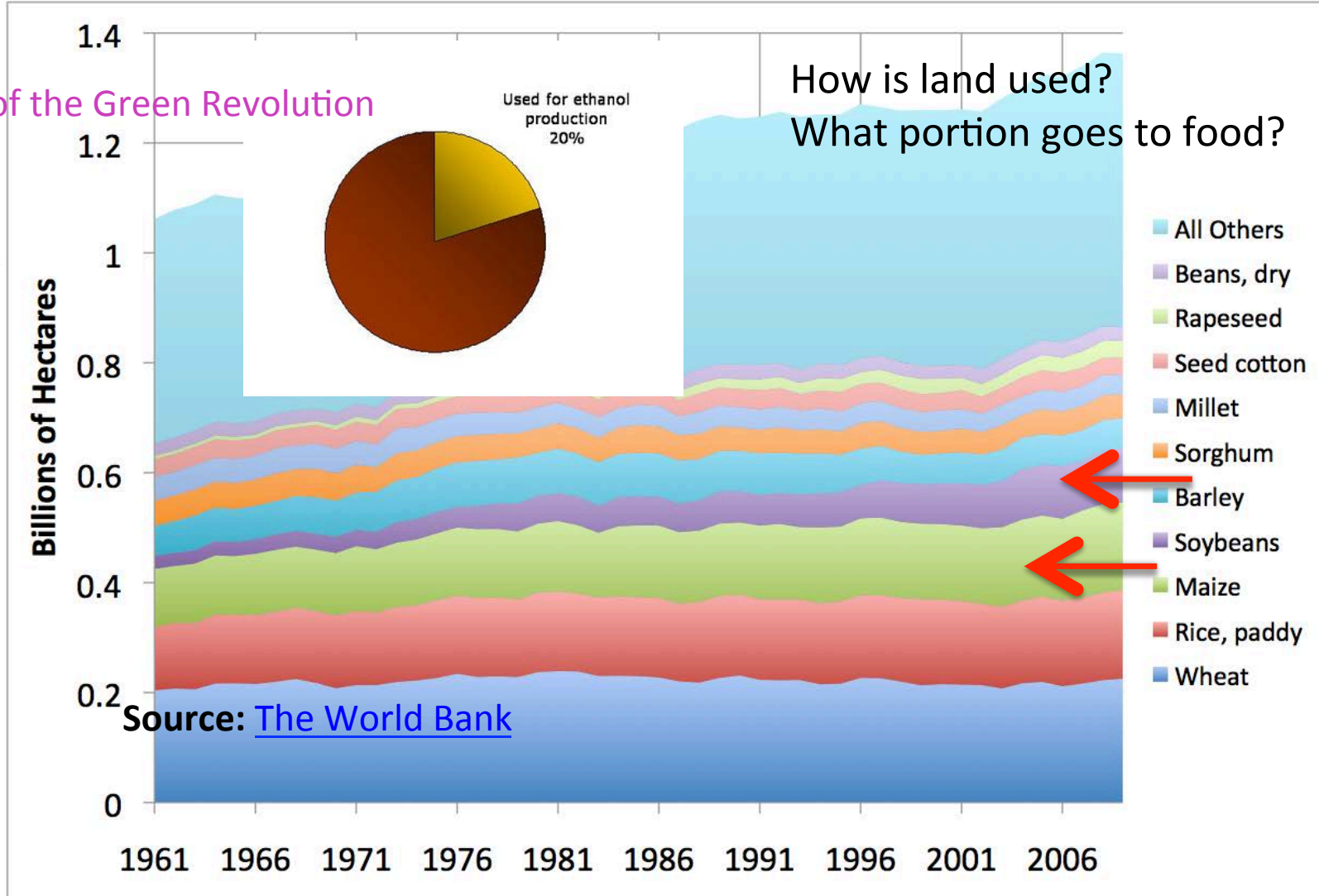


rice



wheat

Critiques of the Green Revolution



6. GM crops really aren't needed anyway:

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- Plan Puebla in Mexico: farmers adapted their own corn to grow with extra fertilizer inputs

Dual sector: two agricultural sectors exist in Global South: Traditional and Conventional

– Why do governments support Conventional agriculture?

traditional sector:

- **Peasant, family labor**
- **small surplus produced**
- **low labor productivity**
- **high factor productivity**
- **environmentally conserving**
- **stimulates biodiversity conservation/production**
- **low, no chemical utilization**

modern sector:

- **wage labor, family labor**
- **large surpluses supplied to urban centers, urban working class, export markets**
- **consumes agricultural inputs, stimulates industry**
- **high labor productivity, low factor productivity**
- **environmentally destructive**
- **eliminates biodiversity**
- **environmental contamination**

Summary Questions: (that you should now be able to answer...)

1. Why is it environmentally destructive to 'eat like an American'?
2. What is the difference between 'traditional', 'organic', and 'conventional' agricultures?
3. What is the 'feed' and 'fuel' versus 'food' concern?
4. What is corn used for besides food?
5. How are 'traditional' plants different from high-yielding varieties?

FIN

Genetically-Modified Organisms

Agriculture is desirable as a key component of industrialization:

1. The problems of income inequality, esp. in the peasant economy (primary sector) make straightforward technology introduction problematic. Rather than benefiting all peasants, only the better off benefit.

2. politics is central to the relationship between agriculture and industry

- Reduce food prices: cheap urban food**
- industrial relations: inputs and outputs**
- Micro politics: local officials, businesses develop relationships with farmers, they have to play the politics game at the local level**
- internal politics: how are work points assigned, what are the incentive systems in place, who determines and analyzes the work, and how is surveillance organized?**