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?
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.
Energy Per Year in Quads ($1 \times 10^{15}$ BTU)

- Household Storage & Preparation (31.7%)
- Commercial Food Service (6.6%)
- Food Retail (3.7%)
- Packaging Material (6.6%)
- Processing Industry (16.4%)
- Transportation (13.6%)
- Agricultural Production (21.4%)

Energy Consumed: 10.3 Quads

Food Energy Available: 1.4 Quads
Three types of food production systems

**Traditional**
Output: Local Buyer  
Or Subsistence: Corn bread/Tortillas

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

**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
Conventional Characteristics:

Package of Inputs and Modern Varieties (MVs, HYVs) ('view from the plant')
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Characteristics of Traditional Agriculture

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Green Revolution
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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, diversecroppings (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

Vs Peasant Agriculture

http://www.youtube.com/watch?v=HucSCNQ01X4&feature=related
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 can’t 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 can’t 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

http://www.youtube.com/watch?v=jvZZg5uia-Y
Critiques of the Green Revolution

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USDA figures
Critiques of the Green Revolution

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Critiques of the Green Revolution

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   GR crops designed to take up lots of nutrients: if farmers can’t afford fertilizer, the crops strip the soil
3. Crops are not resistant: too genetically uniform (no intra-specific diversity); too few crops (most land devoted to a handful of crops)
4. Crops are not adapted to local conditions: micro-climatic diversity – especially true of corn
5. Green revolution crop biocide requirements prevent polycultures
6. They really aren’t needed anyway:
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Prince charles
Critiques of the Green Revolution

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2. soil degradation
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Source: The World Bank

Critiques of the Green Revolution

How is land used? What portion goes to food?
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?
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 that 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?