Food and the Environment
Honors A&S 220
Autumn 2006

Part I: The aggregate global story: yesterday, today and tomorrow
Part II: The US story: today and tomorrow (regional and global influence)
Part III: Evaluating alternatives to global agribusiness (organic, slow food, sustainable harvests …)
Part IV: Feeding 10B if everyone ate a western diet

Part I: The aggregate global story: yesterday, today and tomorrow

Lect 1: Wed 27 September
• Welcome; Overview of Course (syllabus and goals (evolving), format, assignments, perquisites, books and readings; website); Introductions (Prof, TA, Students); Schedule. Will focus on US and compare and contrast w/ other countries.
• Web page: http://faculty.washington.edu/battisti/food/index.htm
• Lecture:
  o Statement of the Problem:
  o Food and People now; Hunger problems now; Environmental problems now
  o Projected population growth and food demand in 2050; resource constraints (global) – water, energy, arable land, nutrients; resource constraints depend on region/country. (ref: Chapt 11-12 of Evans)
  o Define the nutritional needs for a human
  o Background: People and Food from 5M people in 8,000 BC to 1B people in 1825 AD (ref: chapter 1-5 of Evans)
    ▪ Preindustrial diet: omnivore, xx calories per day; daily requirements (ref: chapt 7 of Smil)
    ▪ Landmarks: domestication of grains; domestication of animals; nutrients, irrigation, the plow, crop rotation; conservation tillage
    ▪ Disasters: Romans, Maya (climate); Soil loss (dust bowl); Irish Potato Famine
Lect 2: Mon 2 October

- Lecture: Technology and information (plows, crop rotations): Industrial Revolution (power), irrigation, Fertilizer, Pesticides, Herbicides, Genetics
- Reading assignment for next lecture: Evans Chapter 6-9 (pgs 90-164);
  - Increasing production from 1825-1960
    - Mostly due to increase in area planted and classic genetics
  - Increasing yields from 1960-200: Why we can feed 6B people now: technology.
    - Increased production since 1960 is mainly due to irrigation and increased yields (rather than increased area)
      - Irrigation, mechanization
      - genetics: harvest index, decreased lodging – first in US and then in developing countries (Green Revolution; international research centers)
      - new seeds (hybrid rice); more crops per year
      - Herbicides and Pesticides, IPM
  - Disasters
    - Soil erosion; DDT; Groundwater depletion and quality; Deadzones
- What we eat now: an overview
  - Grains, animals
  - Regional differences: US, India, China, Africa
  - Malnutrition
  - Trade

Lect 3: Wed 4 October

- Discussion: Did the Green Revolution help developing nations reduce hunger? Did it increase or decrease population growth?
- Lecture: Problems today and tomorrow
- Reading assignment
  - Problems today:
    - salinification, groundwater pollution, biodiversity (pests and weeds), arable land, water
    - hunger (an economic and food availability problem)
  - Problems tomorrow:
    - population,
    - income distribution: increase demand for meat
    - biodiversity, climate change
    - global agriculture

Lect 4: Mon 9 October
Guest Lecture Dr. Rosamond Naylor, Stanford University
• ‘Tip of the Pork Chop’ and ‘Loosing the Links …’ and consequences of increasing demand of animal protein
• Readings:
  o Fearnside: Soybean cultivation as a threat to the environment in Brazil. Environ.Conserv.28, p23 (2001)
• Beef Cattle, Pork and Poultry
  ▪ Amount; history (trends); import/export/internal consumption/production/fraction used to feed people/to feed animals/for non-food use
  ▪ Put in context of world production/consumption
  ▪ Resource requirements
  ▪ De-linking feed and animal production
  ▪ Environmental Impact
  ▪ The role of policy/subsidies

Part II: The US story: today and tomorrow (regional and global influence)

Lect 5 Wed 11 October
• Lecture: Grains in the US
• Reading assignment for next lecture:
  o Chapters 1-6 of Pollen’s book “Omnivores Dilemma”
• Lecture
  o US production of grains
    ▪ Amount; history (trends); import/export/internal consumption/production/fraction used to feed people/to feed animals/for non-food use
    ▪ Put in context of world production/consumption
    ▪ Resource requirements
    ▪ Environmental Impact
    ▪ The role of policy/subsidies (global impact: price decrease; Lewontin, why did farming fail to attract capital investment?; food as international aid)
  o The Corn Story: Iowa
    ▪ The role of genetics and policy/subsidies
- Example of several key environmental issues: Monoculture, Deadzones; Groundwater quality; soil erosion
- diet

**Lect 6 Mon 16 October**

- Lecture: Impact of Industrial Agriculture: Biogeochemical Cycles, the Family Farms and Biofuels
- Readings:
  - Halweil, B., 2003: Where have all the farmers gone?. World Watch.

- Biogeochemical cycles, ecology and deadzones (Vitousek et al)
- The Family Farm (Halweil)
- Biofuels and the Future of Grain Production (Hill)

**Discussion of research**
- Written paper due on Dec 6; presented orally on Saturday 2 December
- Option 1: “Where does your food come from?” “Are there issues associated with it (pollution, land use, energy use, water use and/or quality, cultural ….)”
- Option 2: Scenario building: choose a food type or a country and evaluate choice of where/how/what food you chose for the 21st Century, and the impact these choices/policies will have on all sectors of environment & on society.
- Choose one of the options as your research project. Submit an outline (2-3 pages) with 5 references. Outline due on Oct 23.

**Lect 7 Wed 18 October**

- Lecture: Water
- Reading assignment:

**Lect 8 Mon 23 October**

- Genetically Modified Foods
- Movie: “Future of Food” by Garcia.
Lect 9 Wed 25 October
• Lecture: GMOs and its impact on Human Health and Ecosystems
• Readings:
  o Chapter 2 of the FAO report "The state of food and agriculture 2003-4". I strongly recommend you read this first, as it will explain what is meant by genetic markers, GMOs, etc.
  o Chapter 5 of the same report

Lect 10 Mon 30 October
• Lecture: Soils. Climate Change
• Readings:
  o Intergovernmental Panel on Climate Change: Summary for Policy Makers.

  • Soils: loss and degradation
  • Climate Change

Lect 11 Wed 1 November
• Lecture: Climate Change and its impact on agriculture (cont)
• Readings:

  • Climate Change and its impact of Global Warming on Agriculture
    ▪ Increasing Carbon Dioxide
    ▪ Changing minimum temperature on yields
    ▪ Drying of continents in summer
    ▪ Changes in patterns of tropical rainfall
    ▪ Disease and Pests

Lect 12 Mon 6 November
Guest Lecture: Steve Harrell (china)

• Reading assignment for next lecture:

Lect 13 Wed 8 November
Guest Lecture: Yu Huang Aquaculture, and a specific example of aquaculture and china
• Reading assignment for next lecture:

Lect 14 Mon 13 November (Indo)
Guest Lecture: Yu Huang (The Cultural Aspect of Food Consumption)

Lect 15 Wed 15 November
• Lecture: Yaqui Valley: an example of all that can go wrong in 20th Century Agriculture

Part III: Evaluating alternatives to global agribusiness (organic, slow food, sustainable harvests, community supported agriculture ...)

Lect 16 Mon 20 November
• Lecture: Sustainable Agriculture, Organics and Alternative Food Movements
  o What does Sustainable Agriculture mean?
  o Is it possible (no), or is it an ideal?
• Organic Food
• Organizations:
  o Community Supported Agriculture
  o Slow Food Movement
• Alternatives to Industrial Dairy:
  o My brother’s story
  o Field trip to a Skagit: big time dairy, organic dairy?

Part IV: Feeding 10B if everyone ate a western diet

Lect 17 Wed 22 November
• The Human Diet: Feeding 10B people: Part I: Western Diets
  o Is it possible to feed 10B people a Western diet?
    ▪ What food do we (in the US) eat now?
      • Meat: how much, what kind?
      • Grains: how much, what kind?
      • Fruit and vegetables: how much, what kind?
    ▪ Energy: how much and from what sources?
    ▪ Protein: how much and from what sources?
  o Deleterious health consequences for the Western Diet
    ▪ Heart conditions, obesity and its consequences,
    ▪ Health care cost
    ▪ Employment loss
    ▪ Comparison to other health risks (smoking, lead in gasoline, etc).
  o How could we do it?
• What are the resource requirements (water, energy, land) for 10B on a Western diet?
• What are the major constraints?
  • water and arable land

• The Human Diet: Feeding 10B people: Part II: Realistic Assessments
  o Nutritional needs?
  o Where would the food be grown and where would it be eaten?
    ▪ Increasing Production: increasing the yield and number of crops per year
    • The role of genetics and genetic modification
    ▪ Increasing the supply of animal protein: the role of aquaculture
    ▪ Reducing inefficiency in the production-to-consumption pathway
  ▪ References: Smil’s book.
    o The concept of food security; anti-bioterrorism; invasive species; where is food produced; disease spread (mad cow disease & bird flu)
    o What would be the impact on the environment?
      ▪ All the same problems we have now (how to reduce them?)

Lect 18 Mon 27 November
  Guest Lecture: Devon Pena (food and environmental justice)
  • Devon Pena: Food and Environmental Justice (Food Fights: Globalization, Food and Culture, GIS 169)

Lect 19 Wed 29 November
  Agricultural Stories
  • Nova’s “Will the World Starve?”

Symposium: Saturday 2 December (9am-5pm)
  Presentations on the results from your own survey:
  • Where does your food come from? Are there issues associated with it (pollution, land use, energy use, water use and/or quality, cultural ….)

Lect 20 Mon 4 December
  • Discussion of Symposium Presentations

Lect 21 Wed 6 December
  • Summary and discussion: Feeding 10B and its impact on the environment