PART 3

Social and Environmental Issues in Agriculture

INTRODUCTION TO PART 3

Social & Environmental Issues in Agriculture

People become interested in organic farming and gardening for a variety of reasons: to grow food in a more "natural" manner; to improve food security in urban neighborhoods; to open up new markets; to work with youth in organic school gardens; to take action to create a more sustainable future. As part of that interest, many seek to be active players in creating a food system that is more environmentally sound, economically viable, and socially responsible, and that will serve as a foundation for future generations.

Creating a more sustainable food system requires understanding the existing food system. What is it? How did become what it is? What are the consequences of its current structure? What has already been done to change it? These are the questions that are addressed in the following four units.

Unit 3.1 includes three lectures. The first two explore the history and development of the U.S. food system. They outline the rapid rise from subsistence farming to agricultural globalization, and detail the primary factors that have influenced the food system's current shape. The third lecture defines a food system, and provides a snapshot of its many features as they exist today.

Unit 3.2 chronicles the social impacts and workings of the current system. Three major themes are explored in two lectures—labor, concentration, and health.

Unit 3.3 examines the most common practices used in conventional agricultural production, and the major agricultural, environmental, and human health concerns that have emerged as a result of their use over the past century.

Unit 3.4 outlines the various resistance movements that have arisen to oppose the conventional U.S. agricultural system. These struggles and resistance movements started, along with larger changes in the agricultural system, in the mid 1800s. The first two lectures examine the resistance to the agricultural system, and the third lecture more specifically outlines social justice-related activities.

Along with the specific learning objectives for each section, it is hoped that through these lectures students will come to understand that the current U.S. agriculture and food system did not just "spring up." Human decisions and actions, along with environmental contexts, led to the system we see today. Understanding why we are where we are, and what has gone before us to make change, is a first and critical step to understanding how to contribute fully to the larger effort of creating a more sustainable food system.

3.1

The Development of U.S. Agriculture

Introduction: The Development of U.S. Agriculture

UNIT OVERVIEW

To better understand the current food and agriculture system, we need to see where it comes from and how it developed. This unit provides students with this historical context for current issues in the U.S. agriculture and food (agrofood) system. It chronicles the comparatively rapid rise from subsistence farming to agricultural globalization. It shows the many factors that influenced the shape of the system today—including political, economic, social, ecological, and technological factors, innovations, and failures.

The first lecture begins with an outline of general trends in the development of the United States agrofood system. The ways in which historical land use practices, settlement policies, and labor management practices have influenced agricultural development in the U.S. are then covered, followed by an outline of the increasing emphasis on science and technology-intensive inputs that characterizes much of U.S. agriculture. This includes an overview of the federal policies responsible for the development of the U.S. agricultural research complex. This complex has generated the innovations in agricultural technologies that have shaped both the production and processing of food and fiber in America.

The second lecture begins with a discussion of the ways in which large-scale capital investment, enabled by advances in agricultural science and technology, has entered U.S. agriculture, and the structural changes that have resulted. Corn is examined as a case study of how science, capital, and policy interact in the context of agricultural development. The lecture next outlines the effects of the confluence of policy, technology, and capital on agricultural development. These effects are overproduction and surplus, the cheap food policy, and the technology treadmill. Finally, the lecture explores how these themes play out globally, to understand the larger context within which the U.S. food system operates.

The third lecture focuses on the current U.S. food system. It starts by defining what a food system is, then provides a snapshot of what is happening in its various components.

MODES OF INSTRUCTION

> (3 LECTURES, 50 MINUTES EACH)

Lectures 1 and 2 cover the historical development of the U.S. food and agriculture system, focusing on the circumstances that have been largely responsible for its current structure. Lecture 3 focuses on the current food system. References given in the lecture outlines are described in the References and Resources section.

LEARNING OBJECTIVES

CONCEPTS

- The history of U.S. agricultural development, from before the Common Era (pre-A. D.) to the early 1700s
- The changes in control over the means of production (land, capital, and other resources) in the U.S. food system from approximately 1900–2000
- The way that historical land use practices, land settlement policies, and labor management strategies have influenced U.S. agricultural development
- U.S. federal policies that have been responsible for the development of the U.S. agriculture research complex and the innovations in technologies that have shaped the direction of U.S. agriculture
- The influence of investment capital on the adoption of agricultural technologies and the concentration of ownership in food and agriculture
- The food system is composed of a supply chain—production, processing, distribution and consumption—but it both impacts, and is impacted by a broader economic, political, social and environmental context

Lecture 1: History & Large-Scale Changes in Agriculture & the Food System

A. Early U.S. Agriculture

1) Pre 1600s
   a) Native Americans, in the North American region of the continent, were possibly farming as early as 5000 B.C.
   b) By A.D. 800, corn or maize was considered one of the most important crops
   c) By A.D. 1000, many Native Americans were cultivating corn, beans, and squash – a staple that is considered to provide a steady food supply for villages
   d) Tobacco was another common crop. Foraging and hunting were also food generation strategies.
   e) Land tenure was generally held by the village claiming sovereignty over an area. Some tribes allowed individual control of fields within these regions. In some villages, this control was passed down to family members, generally from mother to daughter.
2) 1600s
   a) Most early colonists were not farmers, and not here to farm. Many were religious dissenters, adventurers, or those seeking fortune. Even those that did intend to farm found conditions different than what they were used to. However, community survival depended on learning to farm.
   b) Agricultural practices were mostly learned from Native Americans – particularly growing corn for food and tobacco to trade. Other common crops grown include beans and squash as staples. Wheat was common in the middle colonies, and cattle in the north.
   c) Technology consisted primarily of few tools, such as the ax and hoe. Plows were often scarce or homemade.
   d) These hand-intensive crops relied on lots of labor, which was primarily from large families in the North (where religious groups came as families), and indentured servants and slavery in the South. Indentured servitude made up the primary labor for the tobacco growing regions of Maryland and Virginia during this time.
3) Early 1700s
   a) Meat production became more in demand, and corn was used to feed both people and animals
   b) Regions became specialized in what they produced. Other grains became important for feeding cities (wheat in particular). Tobacco, rice, and indigo became primary crops in the South.
   c) Labor trends changed, with slavery becoming more established and indentured servitude decreasing
   d) Technology still consisted primarily of hand tools. A sickle or cradle scythe was used to harvest grains—which one skilled person could use to harvest 3 acres in a day.

B. Large-Scale Changes

1. Land use and settlement (see Cochrane 1993, chapters 4 and 5; Hurt 1994; Walker 2004)
   a) Agriculture was the dominant land use and economic activity of the early United States
      i. >90% of U.S. populace was involved in agriculture pre-1900
   b) Early U.S. government considered land its most abundant resource
      i. Native Americans' rights to land were not acknowledged and lands were taken from them

c) During the revolutionary war and shortly after, colonists view of land tenure changed
   i. They considered land as no longer just being held by the king of Great Britain, a small group of English noblemen, and a handful of men granted large tracts of land by the English nobility. The colonists decided that states and the federal government were to have control of how to distribute the land.

d) Encouraged extensive agricultural development
   i. Since land was considered to be a nearly limitless resource, farmers had few incentives for soil conservation or long-term soil fertility management
   ii. Effect: Exploit native fertility until depleted, then move on to more fertile soils

e) Early federal land settlement and development policies had several effects
   i. The landscape to the west of the Appalachian mountains was quickly populated with people from the East engaged in agriculture
   ii. Native Americans were displaced by military force, treaties, and federal policy, establishing the reservations on fractions of the land they once occupied

f) Key early federal land settlement and development policies
   i. Several early policies for land distribution favored the conservative trends, mostly enabling only speculators with abundant resources to buy land and re-sell tracts at higher prices (Ordinances of 1784 and 1785; Act of 1796; Act of 1800, etc.)
   ii. The Homestead Act of 1862 allowed for any "head of a family or [21-year old]… citizen of the United States" (or who had the intention of becoming a citizen) to gain access and eventual ownership (within five years' time) of up to 160 acres of "unappropriated public lands" for a low fee, providing that the individual resided upon the land
   - The Homestead Acts drove the transformation of land into agricultural uses, and, in combination with the development of the transcontinental railroad system, extended reach of the United States westward
   - Though the Homestead Act did not technically exclude African-Americans, Native Americans, or women from taking advantage of this opportunity, given the social and political realities of the time, White males were the primary targets for the program
   - A number of related acts and amendments followed the Homestead Act of 1862, each allowing the possibility for land grants to individuals, and driving U.S. agricultural development. These included The Southern Homestead Act of 1866, the Timber Culture Act (1873), and others during the early part of the 20th century.
   iii. Railroad land grants established infrastructure for distribution of food, fiber
   iv. Reclamation Act (1902): Irrigation projects opened up vast tracts of the Southwest and California for agriculture
   v. Exceptions: California, Southern U.S.—characterized by large landholdings and thus a form of large-scale capitalist agriculture (vs. individual small-holdings in other parts of the country) from the very beginning (Walker 2004)

2. Agricultural labor (see L. Jelnick 1979; M. Wells 1996; McWilliams 2000; Walker 2004 ; Hurt 1994)
   a) Slavery (1619–1865): Enabled exception to small-scale, family-scale farming that characterized much of early U.S. agriculture. Slavery allowed for large increases in the scale of production.
   b) Post-slavery, sharecropping was common in the South. In this system, tenant farmers were allowed to use the land, and received a percent of profits from the crop they grew. Sharecropping generally kept farmers in debt and poverty. Immigrants were brought in to fill the need as African-Americans started working in other industries (National Farm Worker Ministry, n.d.).

c) Immigrants were increasingly recruited to work in agriculture as wage laborers. Policy changes led to a succession of ethnic groups being recruited:
   i. Chinese immigrants were brought in as laborers until the Chinese Exclusion Act of 1882 prohibited immigration
   ii. Filipinos were brought in as farm laborers until they began to organize in the early 1930s
   iii. Japanese laborers were brought in as farmworkers and worked in that role until Japanese were sent to internment camps during WWII
   iv. Mexican laborers were recruited at several distinct points, including WWI; during the Bracero Program (1942–1964), a series of agreements between the Mexican and U.S. governments allowed temporary importation of Mexican workers into the U.S. Mexican laborers were deported or encouraged to leave when white U.S. farmers bankrupted by the dust bowl of the 1930s migrated west and became farmworkers (National Farm Worker Ministry, n.d.).
   v. Waves of immigration resulted in a continuous supply of low-wage workers with little status or political power to influence working conditions (L. Jelnick 1979; M. Wells 1996 ; McWilliams 2000; Walker 2004). (see Unit 3.2, Social Issues in Current U.S Agriculture, Lecture 1 for more information on impact to workers.)

3. The development of scientific agriculture (see Cochrane 1993, chapter 7; Hurt 1994, chapter 7; Hightower 1973, chapters 1–2; Gardner 2006, chapter 2)
   a) Pre-1860s
      i. Agricultural innovation and knowledge exchange were hands-on and farmer-to-farmer
      ii. Agricultural knowledge and innovation were created on-farm
      iii. Basic agricultural techniques and yields per acre had reached a plateau
      iv. Most agricultural labor was done by hand
   b) Federal policies established the scientific agricultural enterprise, which moved knowledge production from the farm and farmers to the university and scientists
      i. U.S. Department of Agriculture was established in 1860 and devoted to improvement of agriculture based on scientific inquiry
      ii. Land Grant Colleges of Agriculture were established to conduct research and development—Morrill Act (1862, amended 1890)
      iii. Agricultural experiment stations were established to work on practical agricultural problems—Hatch Act (1887)
      iv. Cooperative Extension service was established to diffuse innovations to farmers—Smith-Lever Act (1914)
      v. The Secretary of the Interior was authorized to develop irrigation and hydropower projects in 17 arid Western States—Reclamation Act (1902)
      vi. Agricultural economics were included within the research agenda of land grant universities—Adams Act (1920s)
   c) Some key technological developments derived from the scientific agricultural enterprise that spurned significant increases in total and per capita productivity
      i. Mechanization—in particular the tractor—spurred large early increases in productivity
         • New improvements in the 1930s led to the tractor's escalating adoption. By the 1950s, the use of the draft horse and mule were negligible.
         • Tractors allowed for more acreage to be cultivated. During WWII, tractors made it possible to add 9 million acres of corn and 2 million acres of wheat to U.S. farming production.

ii. Hybridization—both plants and animals
    - The first hybrid corn was commercially produced in the 1920s. It allowed the yield per acre of corn to double or triple and was adopted widely by the 1940s.

iii. Chemical pesticides (insecticides, herbicides, and fungicides) and synthetic nitrogen and phosphorus fertilizers were being developed during the early 1900s and adopted throughout the early and middle century
    - Commercial fertilizer use grew steadily starting in 1900, with a big jump in the use of synthetic nitrogen in the 1950s and 1960s (Gardner 2006, p. 22–24)
    - Chemical pesticides became widely used after WWII; many were a product of weapons development (Gardner 2006, p. 24-25)

iv. Reclamation and irrigation of the arid West increased productive capacity enormously
    - This effort started in 1902 with the Reclamation Act. Reservoirs, irrigation, and other projects were further subsidized during the Depression era, and continued both during and after WWII (Cochrane, p. 225–7).

v. Continued pressure for extension of seasons to allow for year-round availability of commodities

vi. The effects of widespread adoption of the above technological innovations in agriculture included:
    - Significant increase in the production and use of mechanization, synthetic pesticides, and synthetic fertilizers
    - Vast reduction in labor requirements on farms, which facilitated major rural-urban migrations and provided more workers for factories
    - Significant and rapid increase in farm size and decrease in the number of farmers that could remain in business
    - Huge expansion of scale of agricultural production
    - Specialization and monoculture production were encouraged; separated crop from livestock production, resulting in the biological simplification of agroecosystems
    - Input production (e.g., seed saving) and processing moved off-farm

Lecture 2: Capital, Politics, & Overproduction in Agriculture & the Food System

A. The Development of Corporate Influence in Agriculture

(see Goodman et al. 1987; Goodman 1991; Kloppenburg 2004; Heffernan 1998)
The impact of capitalism was another major influence shaping the development of the current agriculture and food system

1. There were several historical barriers to the industrialization of U.S. agriculture (see Mann and Dickinson 1978; FitzSimmons 1990, pp. 13–14; Lyson 2004, p. 16)
   a) The primary barrier is the presence of "nature" in agriculture: The vagaries of seasons and the inability to control environmental conditions. Agriculture does not work the way factories do, where all the conditions can be structured and controlled. This lack of control leads to more risk in investment for businesses.
2. Although production itself had barriers, private capital (businesses) found other roles to play in the food system (see Heffernan 1998; Goodman 1991)
   a) As technologies of all sorts developed, investment capital moved in to manufacture and distribute them. This includes seeds, fertilizers, tractors, etc.
   b) Distribution and processing of farm products is the other area where private investment and capital flowed into the food system (Heffernan 1998)
      i. Railroads were an early private distribution system farmers were dependent upon in the expanding U.S. As farmers moved West, their consumers were still in the East. Farmers depended on railroads to transport their crops.
      ii. Animal slaughtering and processing, as well as grain storage and processing, were other areas for capital investment
3. The creation of the "Cost-Price Squeeze"
   a) Competitive advantage is gained by farmers who adopt capital-intensive technologies—and then make more money based on the economy of scale
      i. For example, those that invested in tractors, hybrid seeds, or fertilizers could get higher yields and make more money
   b) These technologies increase farmers' dependence on inputs they must purchase from companies. As the prices of those inputs increase, so do the costs of production for the farmer.
   c) Increasing private and corporate ownership of the agricultural inputs, food processing, and retail sales sector of the economy begins to appropriate increasing proportion of food dollar, and thus power over the food system
   d) Farmers are "sandwiched between a monopoly-controlled agriculture input sector and a monopoly-controlled output (processing and retail) sector" (Lobao 1990, p. 27)
   e) Farmers become "price-takers"—they must take market price set by the small number of corporation buyers, resulting in decreased prices paid and thus dwindling share of the food dollar to farmer
   f) Farmers gradually lose power, autonomy, economic self-determination
      i. The loss of economic self-determination shows in recent statistics: Small to mid-sized farms, defined as those grossing between $100,000 and $250,000, only had average net earnings of $19,274 in 2009, and that figure includes subsidy payments (Wise 2011)

4. As sector matures, concentration of input suppliers/processors/retailers into monopolies and oligopolies expands. This dynamic of concentration has been picking up in the last half of the 20th century, but particularly in more recent decades (see Heffernan 1998).
    a) Industrial consolidation
        i. Post-harvest transportation and storage: Cargill, Cenex Harvest States, ADM, and General Mills were responsible for 60% of the grain handling facilities as of 2002 (Hendrickson and Heffernan 2002)
        ii. Processing and value-adding: ADM, Bunge & Cargill, and Ag Processing did 85% of the crushing of soybeans; Cargill CHS, ADM, and ConAgra did 52% of the grain milling as of 2006 (James, Hendrickson & Howard, 2012)
        iii. Retail: Walmart, Kroger, Safeway, and Supervalu commanded between 42–51% of the market in 2010 (James, Hendrickson and Howard, 2012)
        iv. Other food industry consolidation in pictorial form: Seeds, organic industry, soft drinks, etc.: See *www.msu.edu/~howardp/infographics.html*
    b) Example of consolidation for growers: Chickens (see Unit 3.2, Lecture 2, for examples)

B. Modern Corn: A Case Study in Research, Capital, and Politics in Agriculture

(see Berlan and Lewontin 1986; Kloppenburg 2004; Pollan 2006, section I)

1. The corn seed as an example of the above processes operating in agriculture
    a) In seed form, corn is both a productive commodity (i.e., grain) and has reproductive capacities (seed)
    b) Seed is a strategic point of control for capitalist penetration of agriculture: The control of seed = control of the self-sufficiency (or market dependency) of farmers and farming
    c) The story of modern corn is a story of a struggle for that control; and the use of agricultural research and science as a tool of private capital, facilitated by publicly funded research and policy
2. Pre-1920s: Farmers saved a portion of crop as seed to plant the next year
    a) Maintained a degree of autonomy from purchased inputs
    b) High degree of genetic diversity and regional variation
3. Hybridization
    a) Developed in 1920s by Pioneer Hi-Bred, with help from USDA and U.S. patent protection laws
    b) Doubled and tripled yields resulted from hybrid seed strains
    c) Facilitated mechanization of production: Uniform height and maturation time
    d) Consequence: Would not "reproduce true to type"—forced farmers to buy seed every year
    e) Almost universally adopted by early 1930s
4. Other factors
    a) Inexpensive and synthetic fertilizers, along with hybrid seeds, made greatly increased yields possible. Corn needs large amount of nitrogen, and thus farmers were even more dependent on inputs purchased from outside the farm.
5. Contemporary developments in agricultural technology: Genetic engineering
    a) Further application of agricultural science in the service of private capital
    b) Created and sold as "technology packages" (e.g., Roundup Ready™ seed and Roundup™)
    c) Novel methods of intellectual property protection (see Supplement 1, Genetic Engineering in Unit 1.4, Transplanting and Direct Seeding, for more information)

i. Technology use agreements: Power of seed companies puts growers in a disadvantaged relationship (see Unit 3.2, lecture 2 and Supplement 1 in Unit 1.4). They have to pay much more for these seeds and have limited control of their use (cannot legally replant them, but must buy new seeds each year).

C. Impacts of History of Development: Chronic Surplus, Overproduction, Export Agriculture, and Global Food Trade

(see Holt-Giménez and Patel 2009, Chapter 4; Cochrane 1993, Chapter 8; Friedmann 1993; Lobao 1990, Chapter 1; Danbom 1995, Chapter 11)

1. Surplus and overproduction
   a) Fueled by development of agricultural technology and labor-saving devices
   b) Exacerbated by federal farm subsidies, commodity payments, price supports to largest producers
   c) Keep crop prices paid to farmers chronically low
   d) Those farmers not receiving subsidies are placed at an economic disadvantage
   e) Farmers' status as price-takers and the cost-price squeeze give them little margin for error
   f) Overproduction has been constant since 1880s (with exception of wartime periods)
   g) Slim profit margins discourage farmers from adopting conservation farming practices that do not show economic return or that require reinvestment of capital
2. The "cheap food policy": Examples of effects
   a) Food processing and grain trade industries such as Cargill and ADM are the primary beneficiaries of inexpensive grains. Low grain prices are also good for the grain-fed U.S. meat industry.
   b) Chronic overproduction keeps some food prices low (for consumers)
   c) Hurts farmers seeking economic viability
   d) Important for feeding the population of industrial workers who earn low wages
3. Export agriculture
   a) Surpluses exported, formed the basis for global food trade
      i. Major source of revenue and catalyst for U.S. overseas economic development
      ii. Overseas commodity markets of major strategic importance to U.S.
      iii. Key component of bi-lateral and multi-lateral Free Trade Associations (FTAs) and the World Trade Organization (WTO)
4. The "production treadmill"
   a) Increases in overall U.S. production typically result in decreased prices. Farmers have little control over this aggregate production, and must continually increase their own yields just to obtain the same revenue.
   b) Encourages farming in monocultures and on marginal lands; discourages conservation
   c) Creates a climate in which early adopters of capital-intensive, yield-increasing technologies are rewarded (e.g., GMO corn, soy), or penalized less
   d) Those who do not adopt technologies are driven out; leads to familiar pattern of bankruptcy and consolidation

D. Global Food System and Its Relationship With the U.S.

(see Holt-Giménez and Patel 2009, Chapter 3)

Many of the trends happening in the U.S. were implemented worldwide

1. Science and capital together: The green revolution (1960–1990)
   a) The green revolution aimed to keep countries fed and willing to resist communism. It was a huge effort by a few foundations and Western governments to create hybrid seeds that would be well adapted to local conditions. These seeds "…were dependent on 'packages' of credit, fertilizers, and timely irrigation" (Holt-Giménez and Patel 2009, p. 27). The results of this technology-intensive system were similar to those that occurred in the U.S., in that they system benefited the larger farms, and mostly disenfranchised smaller farms.
   b) It did not work for poor and women
   c) It led to more concentration of land ownership
   d) Farmers forced off the land became part of the urban cheap labor force
   e) The green revolution " . . . also produced as many hungry people as it saved." (Holt-Giménez and Patel 2009, p. 24)
2. Structural adjustment programs (SAPs), which started in the 1980s, were instituted by the International Monetary Fund (IMF) and the World Bank when they made loans. Under the premise that "free trade" will lift all boats and work best to help countries "develop," supports to agriculture were cut. This includes price supports, research infrastructure, and trade tariffs to protect the internal agricultural product prices in the South. These SAPs created situations that benefited the corporations dominating agriculture.
3. Free trade agreements (FTAs) and the World Trade Organization (WTO) codified the structural adjustments, and instituted other policies that benefited Northern corporations at the expense of Southern countries
4. Overproduced food in the U.S. and Europe sent as "food aid" overseas often undercut prices of production for local farmers. Similarly, through FTAs and WTO agreements, the U.S. and Europe have continued subsidizing their agriculture, while the Southern countries are not allowed to do this, continuing the undercutting of Southern farmers.
5. Thus, many countries are not able to protect their food system or sovereignty. " . . . by 2005, 72% of all countries in the global South had become net food importers" (Holt-Giménez and Patel 2009, p 44).
6. Together, these systems create consolidation, drive smaller shareholder farmers from the land, encourage immigration for work, and decrease sovereignty

Discussion Questions, Lecture 1 & 2

DEVELOPMENT OF U.S. AGRICULTURE, LECTURES 1 & 2

1) Why do you think it is important to understand or study the development of the food system?

2) What did you learn from these 2 lectures that was surprising to you? Why was it surprising?

3) What are some of the most concerning aspects of the current, dominate U.S. food system?

4) Who do you think most benefits from the current system? How?

5) Are there any parts of this history that you are interested in learning more about? Why?

6) How does learning about this history impact what you plan to do with the food system in the future (as a farmer, activist, consumer, etc.)?

Lecture 3: The Current U.S. Food & Agriculture System

The U.S. food system as it exists today is the culmination of conditions, events, and actions taken over time. Some of the conditions and actions were described in Lectures 1 and 2. This lecture explores what defines and comprises a food system, and looks at the food system in the U.S. today. Footnotes are used in this lecture due to the large number of references and links, to enable easier access to the source documents.

A. What is a Food System?

(see Goodman et al. 1987; Goodman 1991; Kloppenburg 2004; Heffernan 1998)
The impact of capitalism was another major influence shaping the development of the current agriculture and food system

1. Definitions
   a) A food system encompasses everything involved in feeding people. This includes the production, processing, distribution, consumption, and disposal of food. It also includes inputs (such as soil, water, energy, knowledge, capital, machinery) that go into the various steps of the process. The food system operates within a larger context—which it influences and by which it is influenced. This includes biological, economic, political, and social systems.
   b) "The modern food system has really come together since the Second World War. As The Oxford English Dictionary defines a system, it is a 'set or assemblage of things connected, associated or interdependent so as to form a complex unity, a whole.' The food system reflects the prevailing social and economic influences around the world and is a system largely developed, run, and promoted world-wide by economic institutions in the rich and powerful industrial nations." (Tansey and Worsley, 1995, p. 2)
   c) " . . .the modern world of food is not a random series of 'facts' and 'events', but a complex and ever-changing web of industrial, technological, economic, social and political factors that shape the journey food takes from its production on the farm to the eventual consumers." Millstone and Lang 2008, p. 9
   d) Some people talk about the entire food system. Others talk about the multiple systems, such as the local food system, or a community food system. There is no universal or accepted definition of a food system.
2. Aspects of the food system
   a) Appendix 1, Food System Graphics, shows three figures depicting the food system. Figure #2 is the simplest version, and Figure #3 gives the most detail. Additional graphical depictions can be found on-line, and several of these are referenced under Web-based Resources at the end of this unit.
   b) These depictions frequently start with a food chain—generally beginning at the point of food production—then proceeding through processing, distribution, consumption, and then to the waste stream. They also include the context or system that influences, and is influenced by, the food chain. These include social, economic, and environmental factors.

B. Characteristics of the Current U.S. Food System Supply Chain

1. Production
   a) Who is producing the food?
      i. As in the rest of the food chain, there is significant concentration in production. In 2012 in the U.S., 4% of farms produced 66% of the food (based on value/price of the food).[1]
      ii. In 2012, principal farm operators were primarily white males (83%).[2] However, there has been growth in the number of minority-operated farms between 2007 and 2012.[3] The percentage of women farmers stayed close to the same between the 2007 and 2012 (from 13.9% to 13.7%).[4]
      iii. The average age of farmers increased from 55.3 in 2002 to 58.3 in 2012 [5]
      iv. In 2007, there were 2,636,509 hired farm workers on 482,186 farms in the U.S. About a third of these workers spent more than 150 days working on the farm.[6]
   b) What do we produce?
      i. In 2007, grains and oilseeds made up 79.5% of crop production (in harvested cropland, in acres) and 62.7% of all food production (including animal production). Vegetables and melons comprised 2.5% of crop production (in harvested cropland) and 1.9% of all food production.[7]
      ii. Corn is the primary crop—making up 44.6% of all the oilseed and grain farming, in harvested cropland. Wheat farming comprised 14.9% of the harvestable cropland for oilseeds and grain.[8]
      iii. In 2013, the majority of soybean, corn, and cotton crops planted in the U.S. were from genetically modified seeds (to resist pests, intensive herbicide use, or both) [9]
      iv. Animal production comprised around 50% of total market value for food production in 2007. Cattle ranching and farming made up 59.6% of the animal production, in market value sold, hog and pig made up 11.7% of the market value, and chicken and egg production made up 24.3% of the value.[10]
      v. "Although large concentrated animal feeding operations (CAFOs) make up only 5 percent of all animal feeding operations (AFOs), they contain 50 percent of all animals and produce 65 percent of livestock manure." [11]

---

1 USDA. 2014. Farm Economics: Record high agriculture sales; income and expenses both up. 2012 Census of Agriculture Highlights. *www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Highlights_Farm_Economics.pdf*

2 USDA. 2014a. Preliminary report: U.S. and state data. 2012 Census of Agriculture. *www.agcensus.usda.gov/Publications/2012/Preliminary_Report/Full_Report.pdf*

3 USDA. 2014b. Preliminary report highlights: U.S. farms and farmers. 2012 Census of Agriculture. *www.agcensus.usda.gov/Publications/2012/Preliminary_Report/Highlights.pdf*

4 USDA. 2012. 2012 Census Volume 1, Chapter 1: U.S. National Level Data. Table 56. Women Principal Operators – Selected Farm Characteristics: 2012 and 2007. *www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_US/st99_1_056_056.pdf*

5 USDA. 2014b.

6 USDA. No Date. Farm Labor. 2007 Census of Agriculture. *www.agcensus.usda.gov/Publications/2007/Online_Highlights/Fact_Sheets/Economics/farm_labor.pdf*

7 USDA. 2007. Selected characteristics of farms by North American industry classification system: 2007. Table 46. 2007 Census of Agriculture – United States Data. *www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_US/st99_1_046_046.pdf*

8 USDA 2007, ibid..

9 USDA. 2013. Adoption of genetically engineered crops in the U.S. Economic Research Service. *www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx#.UiD7FLzkBQ8*

10 USDA 2007, op. cit..

11 Gurian-Sherman, Doug. 2008. CAFOs Uncovered: The untold costs of confined animal feeding operations. Cambridge, MA: Union of Concerned Scientists. *www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf*, p. 9

2. Processing
   a) According to a USDA Economic Research Report, 8 of the 9 processing industries studied lost 1/3 of their processing plants and let go of 20% of their employees (between 1972 and 1992). These industries include animal processing and packing, corn and flour milling, animal feed production, soybean processing, cheese production, and milk processing.[12]
      i. See Lecture 2, Concentration and Health, in Unit 3.2, for more examples of current consolidation, and James, Hendrickson, and Howard 2012
      ii. ADM and Cargill are frequently in the "top 4" in processing, across different industries. Cargill is in the top 4 of beef and turkey slaughtering, beef production (feedlots), animal feed, corn milling, and soybean processing. ADM is in the top 4 of animal feed, as well as corn, flour and soybean processing.
   b) Between 1997 and 2007 the organics industry grew rapidly; during that period, ownership of organic processing companies consolidated.[13] See the chart of consolidation at: *https://www.msu.edu/~howardp./organicindustry.html*
3. Distribution
   a) The U.S. exports a large proportion of its food—over $11 billion in value for 2012. However, the U.S. also imports a large amount of food, over $8 billion worth in the same year.[14]
   b) The U.S.'s largest imports in 2012 were cereals and bakery items, followed by fruits. Vegetables were the next largest import, in terms of metric tons. Live animals were the fourth most imported item.[15] In terms of food product value, the most money was spent on fish, shellfish, and fruits.[16]
4. Consumption
   a) In a 2013 Gallup poll 47% of respondents said they eat at a fast food restaurant at least once a week [17]
   b) According to purchase studies conducted in between 1998–2006, Americans' food purchases don't match federal nutrition guidelines. Across incomes, regions, and ethnicities, people were more likely to not eat enough vegetables, whole fruits, legumes, or whole grains. On average, sugar intake was much higher than recommended, as was the consumption of refined grains and frozen and refrigerated entrees.[18]
   c) Americans have been found to eat 31% more packaged than fresh food. Additionally, they purchase much more packaged foods than people in other countries.[19]

---

12 Ollinger, Michael, Sang V. Nguyen, Donald Blayney, Bill Chambers, & Ken Nelson. 2005. Structural change in the meat, poultry, dairy, and grain processing industries. USDA, Economic Research Service. Economic Research Report 3. *www.ers.usda.gov/media/850597/err3.pdf*

13 Howard, Philip H. 2009. Consolidation in the North American Organic Food Processing Sector, 1997 to 2007. International Journal of Sociology of Agriculture and Food, vol (16), No (1). Pp. 13-30. *www.ijsaf.org/archive/16/1/howard.pdf*

14 Calculated from "Total value of U.S. agricultural trade and trade balance." Updated 8/6/13. *www.ers.usda.gov/data-products/foreign-agricultural-trade-of-the-united-states-%28fatus%29/latest-us-agricultural-trade-data.aspx#.UijbKrzkBQ8*

15 USDA, Economic Research Service. Summary data on food import values for 14 food categories, annual data since 1999. Updated 3/27/14. *www.ers.usda.gov/data-products/us-food-imports.aspx#25418*

16 USDA, Economic Research Service. Summary data on food import volumes for 14 food categories, annual data since 1999. Updated 3/27/14. *www.ers.usda.gov/data-products/us-food-imports.aspx#25418*

17 Dugan, Andrew. 2013. Fast food still major part of U.S. diet. Gallup Well-Being. *www.gallup.com/poll/163868/fast-food-major-part-diet.aspx*

18 Guthrie, Joanne, Biing-Hwan Lin, Abigail Okrent & Richard Volpe. 2013. Americans' food choices at home and away: How do they compare with recommendations? USDA Economic Research Service. *www.ers.usda.gov/amber-waves/2013-february/americans-food-choices-at-home-and-away.aspx#.Uijwf7zkBQ8*

19 Fairfield, Hannah. 2010. Factory Food. New York Times, Business Section. April 3. 2010. *www.nytimes.com/2010/04/04/business/04metrics.html?_r=0*

5. Waste
    a) Food is one of the primary materials filling landfills and incinerators. In 2011, 36 million tons of food waste were created, with only 4% of that volume being diverted for composting.[20]
    b) Forty percent of all food in the U.S. is thrown away [21]
    c) The economic value of wasted food in the U.S. is an estimated $165 billion each year [22]

C. The Supply Chain's Interactions With Larger Systems (see Appendix 1, Food System Graphics)

1. Economic
    a) Loans are critical to farmers, who need to have money up front to buy seeds and other inputs, and in most cases can't earn money from their crop until it is harvested and sold
        i. Access to capital (money, loans, etc.) is the biggest barrier to entry for new farmers [23]
    b) Land rents/costs—access to land is the second biggest barrier for new farmers trying to enter the profession [24]
    c) Federal Agricultural Subsidies
        i. The Environmental Working Group 2013 Farm Subsidy Database report on crop insurance states that ". . . the largest 1percent of policy holders annually receives about $227,000 while the bottom 80 percent receives about $5,000." [25]
        ii. Approximately10% of California's farmers receive direct subsidies. Most of the subsidies go to growers of five crops: cotton, rice, wheat, livestock, corn (but primarily the subsidies go to rice and cotton). Fruit, nut, and vegetable producers (California's specialty crop growers) make up 50% of the state's $36 billion agricultural economy, and receive close to zero direct support.[26]
2. Social/Cultural
    a) Access issues: Not everyone has equal access to food—see food deserts discussion in Unit 3.2, Lecture 2
    b) Inequality
        i. People of color are more likely to live in food deserts, have less access to healthy foods, work in the most difficult and poorly paying food industry jobs, and be affected by environmental hazards due to working in or living near agriculture (see Unit 3.2, Lecture 1)
        ii. U.S. courts found the USDA responsible for denying African Americans and Native Americans access to agricultural loans, or access to other agency programs (see *Teaching Direct Marketing and Small Farm Viability: Resources for Instructors,* Unit 1)
    c) Research: Academic research is more frequently being supported by the private sector, which provided 25% of funding for land grant agricultural research in 2010. There are concerns that this funding encourages researchers to pursue work that meets private rather than public goals. Examples—universities and percent of research budget from private entities: [27]

---

20 US EPA. 2014. Reducing food wast for businesses. Updated on 3/10/2014. *www.epa.gov/foodrecovery/*

21 Gunders, Dana. 2012. Wasted: How America is losing up to 40 percent of its food from farm to fork to landfill. National Resource Defense Council issue paper. IP:12-06-B, August 2012. *www.nrdc.org/food/files/wasted-food-IP.pdf*

22 Gunders, Dana. 2012.

23 Shute, Lindsey. L., Avery Anderson. Hannah Bernhardt, Tierney Creech, Severine Fleming, Emily Oakley & Benjamin Shute. 2011. Building a future with farmers: Challenges faced by young, American farmers and a national strategy to help them succeed. *www.youngfarmers.org/reports/Building_A_Future_With_Farmers.pdf*

24 Shute, L.L, et al 2011

25 Environmental Working Group. Crop insurance badly in need of reform. *farm.ewg.org*

26 Hamerschlag, Kari. No Date. Farm subsidies in California: Skewed priorities and gross inequities. Environmental Working Group. *farm.ewg.org/pdf/california-farm.pdf*

27 Food and Water Watch. 2012. Public research, private gain: Corporate influence over university agricultural research. *documents.foodandwaterwatch.org/doc/PublicResearchPrivateGain.pdf*

i. Iowa State University Entomology: 52% (Syngenta, Bayer)
ii. University of California Nutrition: 49% (Mars, Novo Nordisk)
iii. Texas A & M Soil and Crop Sciences: 56% (Monsanto, Cotton Inc., Pioneer Hi-Bred)

3. Political Systems
   a) Different levels of government regulate various aspects of the food system, and can affect efforts to develop a more sustainable food system. For example, federal regulations affect:
      i. Food safety: There are concerns that regulations such as the Food Safety Modernization Act may favor industrial agriculture and make farming untenable for smaller-scale growers
      ii. GMO rules: Current rules governing genetically modified crops favor GMO producers over consumers concerned about GMO products; e.g., there is currently no labeling requirement for foods containing genetically modified ingredients
      iii. Organic certification: The National Organic Program (NOP) regulates and certifies organic producers; many states also have certification and regulation programs. Both often offer "cost share" programs to reduce the economic impact of certification on smaller-scale producers.
   b) The Farm Bill is a multi-faceted federal bill that is revised and reauthorized every 5 years. The Farm Bill has a tremendous impact on the food system by providing (or withholding) funding for programs such as crop insurance and other subsidies via price and income supports; nutrition programs for low-income Americans such as the Supplemental Nutrition Assistance Program (SNAP, also referred to as food stamps) and federally funded school lunch programs; conservation programs such as the Conservation Stewardship Program and Environmental Quality Incentives Program (EQIP); and efforts to support new farmers, such as the Beginning Farmer and Rancher Development Program. (see National Coalition for Sustainable Agriculture, *sustainableagriculture.net*, for more information.)

4. Environmental/natural resources
   a) Biodiversity
      i. 91% of the wetlands in California have disappeared [28]
      ii. Overall, U.S. commercial beekeepers have been losing about a third of their hives each winter between 2006 and 2012, which are unprecedented losses [29]
      iii. "The 'human footprint' analysis of Sanderson et al. (2002) estimated that 80–90% of lands habitable by humans is affected by some form of productive activity" [30]

---

28 Scherr, Sara J., and Jeffrey A. McNeely. 2008. Biodiversity conservation and agricultural sustainability: Towards a new paradigm of 'ecoagriculture' landscapes. *Philosophical Transactions of the Royal Society B*. Vol (363), No. (1491). *rstb.royalsocietypublishing.org/content/363/1491/477.full#ref-133*

29 Holland, Jennifer S. 2013. The plight of the honeybee: Billions of dollars—and a way of life—ride on saving pollinators. *National Geographic Daily News. news.nationalgeographic.com/news/2013/13/130510-honeybee-bee-science-european-union-pesticides-colony-collapse-epa-science/*

30 Scherr and McNeely. 2008. op. cit..

b) Climate change

i. Agricultural production of greenhouse gases has generally increased between 2008 and 2012[31]

- Carbon dioxide (CO_2) from ammonia production (80% of which is for agricultural use/ fertilizer) is up
- Manure management has only increased output of nitrous oxide (N_2O) slightly, but is putting out much more methane (CH_4), a major greenhouse gas
- Methane from field burning of agricultural residues has remained approximately the same
- However, there has been a decrease in CO_2 output from land remaining in cropland

5. Environment/Inputs

a) Critical fertilizer resources are nearing the peak of easy and accessible production. As demand continues to rise and production decreases, these resources get increasingly expensive, pushing up the price of food.

i. Phosphorous is a required ingredient for growing all plant life. It cannot be manufactured. It is found primarily in human and animal waste, but for industrial agriculture it is primarily mined. The U.S. has 25 years of phosphate rock left, and imports much from Morocco (which has close to 85% of the phosphate rock).[32]

ii. Synthetic nitrogen fertilizer production requires natural gas. Thus, fertilizers are subject to price fluctuations, as are other fossil fuels used in agriculture.[33]

b) Topsoil in the U.S. is disappearing 10 times faster than it can be replaced[34]

c) Freshwater resources are decreasing in the U.S., at a time when there are more demands being put on water use, and when, it is predicted, there will be more droughts and changing precipitation patterns due to climate change. In the U.S., agriculture uses approximately 40% of the water from surface and ground water sources for irrigation.[35]

d) Seeds: Most of the U.S.'s primary commodities are grown from genetically engineered seeds: 93% of soybeans, 88% of cotton, 86% of corn and 54% of canola.[36] See Unit 1.4, Supplement 1, for additional discussion of genetically engineered seeds.

---

31 US EPA. 2014. Inventory of U.S. greenhouse gas emissions and sinks: 1990-2012. *www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2014-Main-Text.pdf*

32 Cho, Renee. 2013. Phosphorus: Essential to life – Are we running out? Phys.org. 4/2/13. *phys.org/news/2013-04-phosphorus-essential-lifeare.html*

33 Funderburg, Eddie. 2001. Why are nitrogen prices so high? The Samuel Roberts Nobel Foundation. *www.noble.org/Ag/Soils/NitrogenPrices/Index.htm*

34 Lang, Susan S. 2006. "'Slow, insidious' soil erosion threatens human health and welfare as well as the environment, Cornell study asserts." *Cornell Chronicle*. Cornell University. March 20, 2006. *www.news.cornell.edu/stories/2006/03/slow-insidious-soil-erosion-threatens-human-health-and-welfare*

35 Megdal, Sharon B., Richard Hamann, Thomas Harter, James. W. Jawitz, and J. Michael Jess. 2009. "Water, people, and the future: Water availability for agriculture in the United States." CAST Issue Paper, No. 44. November 2009. *www.cast-science.org/download.cfm?PublicationID=2950&File=f030727a50f063579836506a748341f2f310*

36 Freese, B. and G. Kimbrell. 2013. Seed giants vs. U.S. Farmers. Center for Food Safety & Save Our Seeds

Discussion Questions, Lecture 3

DEVELOPMENT OF U.S. AGRICULTURE, LECTURE 3

1) Why do you think it is important to understand or study the food system?

2) What are other components of a food system, that aren't discussed here?

3) What parts of the food system are you most interested in learning more about? Why?

4) How many people (or roles they play in the food system), would you guess have been a part of the food you ate this morning? Describe all the roles you think were involved.

5) What are some of the most concerning aspects of the current, dominate U.S. food system?

6) What might an alternative food system look like? See Nourish website for more discussion questions: *www.nourishlife.org/pdf/Food_System_Map_Study_Guide.pdf*

References & Resources

SUGGESTED READINGS FOR LECTURES 1 & 2 FOR STUDENTS (DESCRIBED BELOW)

- Buttel, Frederick H. and Howard Newby, eds. 1980
- Clapp, Jennifer. 2012. .
- Cochrane, Willard W. 1993.
- Gardner, Bruce L. 2002.
- Heffernan, William D. 1998.

SUGGESTED READINGS FOR STUDENTS FOR LECTURE 3 (DESCRIBED BELOW)

- Ingredients of the Food System. 2010.
- Millstone, Erick and Tim Lang. 2008.

PRINT REFERENCES & RESOURCES

Berlan, Jean Pierre and Richard C. Lewontin. 1986. The Political Economy of Hybrid Corn. *Monthly Review* 38(3), 35-47.

Buttel, Frederick H. and Howard Newby, eds. 1980. *The Rural Sociology of the Advanced Societies: Critical Perspectives*. Montclair, N.J.: Allanheld Osmun.

A pivotal collection of essays covering a range of social and environmental issues in modern agriculture. This book and its contributors would help to define and direct a new, richly critical sociology of agriculture. Especially Newby and Buttel, "Toward a critical rural sociology;" and Buttel, "Agriculture, environment, and social change: Some emergent issues."

Center for Sustainable Systems. 2012. *U.S. Food System Factsheets*. University of Michigan, Ann Arbor, MI. *css.snre.umich.edu/css_doc/CSS01-06.pdf*

This fact sheet provides other pieces of information that make up the food system.

Clapp, Jennifer. 2012. *Food*. Cambridge, UK: Polity Press.

This book describes how the current global food system developed, by exploring issues such as corporate influence, skewed trade rules, and financial system changes.

Cochrane, Willard W. 1993. *The Development of American Agriculture: A Historical Analysis*. Minneapolis: University of Minnesota Press.

An excellent critical history of U.S. agricultural development. Full of insightful analysis and commentary as well as exhaustive history. Introduces the concept of the "technology treadmill" as a major problem in U.S. agriculture.

Danbom, David B. 1995. *Born in the Country: A History of Rural America*. Baltimore: Johns Hopkins University Press.

An important history of the effects of agricultural policy and development on rural life and rural people. See especially Chapter 11, "The production revolution and its consequences."

FitzSimmons, Margaret. 1990. The social and environmental relations of US agricultural regions. In *Technological Change and the Rural Environment*. London: Philip Lowe et al. London, David Fuller.

Friedmann, Harriet. 1993. The political economy of food: a global crisis. *New Left Review*: 197.

A succinct history, overview and contextualization of trends in global food trade. Discusses national agriculture and trade policies in the context of international geopolitical relations; and their effects on agricultural development.

Gardner, Bruce L. 2002. *American Agriculture in the Twentieth Century: How It Flourished and What It Cost*. Cambridge, MA: Harvard University Press.

A straightforward, uncritical, but data-intensive and encyclopedic overview of trends in American agricultural development during the 20th century. Full of valuable charts and graphs. An excellent reference.

Goldschmidt, Walter R. 1978. *As You Sow: Three Studies in the Social Consequences of Agribusiness*. Montclair, N.J.: Allanheld Osmun.

A groundbreaking and often-cited study of two agricultural communities in California with different structures of farm ownership. Goldschmidt found that concentration in ownership and corporate control of farms

had negative impacts on such indicators of social welfare as income distribution, civic participation, and quality of education.

Goodman, David, Bernard Sorj, and John Wilkinson. 1987. *From Farming To Biotechnology: A Theory of Agro-Industrial Development.* Oxford, New York: Basil Blackwell.

An integrated theory of the nexus of research, policy, technological development, and capitalist penetration in agricultural development. Considered a seminal work in modern political economy of agriculture.

Goodman, David. 1991. Some recent tendencies in the industrial reorganization of the agro-food system. In *Towards a New Political Economy of Agriculture.* William Friedland, ed.). Boulder, CO: Westview.

A distillation and update of the concepts developed in From Farming to Biotechnology *(Goodman et al. 1987); and an overview of the encroachment of industrial capital into the agrofood system.*

Heffernan, William D. 1998. Agriculture and monopoly capital. *Monthly Review* 50: 46 (July/August).

An analysis of who controls the agro-food system. A discussion of the historical and modern trends toward oligopoly and monopoly that characterize firms operating in the agro-food sector, and the consequences for the structure and development of agriculture. This topic is Heffernan's specialty.

Heffernan, William D. 2000. Concentration of ownership and control in agriculture. In Hungry for profit: The agri-business threat to farmers, food, and the environment. *Monthly Review Press,* pp 61–75.

Hendrickson, Mary, and William Heffernan. 2007. Concentration of agricultural markets. *www.foodcircles.missouri.edu/07contable.pdf*

Hendrickson, Mary, and William Heffernan. 2002. Concentration of agricultural markets. *www.foodcircles.missouri.edu/CRJanuary02.pdf*

Hightower, Jim, and Agribusiness Accountability Project. Task Force on the Land Grant College Complex. 1973. *Hard Tomatoes, Hard Times; A Report of the Agribusiness Accountability Project on the Failure of America's Land Grant College Complex*. Cambridge, MA: Schenkman Pub. Co.

A high-profile critique of the research and education agenda of the land-grant university complex in the U.S. Hightower argues that the Land Grant Universities serve and promote large-scale, corporate agriculture at the expense of small-scale, family farmers, and have actively contributed to the decline in family-scale agriculture.

Holt-Giménez, Eric, and Raj Patel. 2009. *Food Rebellions! Crisis and the Hunger for Justice*. Oxford, UK: Pambazuka Press.

This book explores the reasons for the 2008 food crisis, which still continues for many. It looks at both the immediate and underlying causes of hunger in the food system. It provides a concise and clear overview of the issues involved.

Hurt, R. Douglas. 1994. *American Agriculture: A Brief History.* Ames, IA: Iowa State University Press.

A good, but uncritical, survey of American agricultural development with an emphasis on pre-World War II history.

James, Harvey S., Jr., Mary Hendrickson, and Philip H. Howard. 2013. Networks, Power and Dependency in the Agrifood Industry. Pp. 99-126 in *The Ethics and Economics of Agrifood Competition*, Harvey S. James, Jr., ed. New York: Springer.

Kloppenburg, Jack R. 1988. *First the Seed: The Political Economy of Plant Biotechnology, 1492–2000*. Cambridge; New York: Cambridge University Press.

A gripping and well-documented analysis of the "commodification of the seed." Kloppenburg starts from the thesis that the seed is an important locus of power and autonomy in agriculture, and goes on to show how control over the seed has been transferred from the public domain—farmers and peasants—to a handful of large private corporations; and this transferral's effects on the structure of the agrifood system.

Lobao, Linda M. 1990. *Locality and Inequality: Farm and Industry Structure and Socioeconomic Conditions.* Albany: State University of New York Press.

A Marxian analysis of the structural economic conditions governing agricultural development.

Lyson, Thomas A. 2004. *Civic Agriculture: Reconnecting Farm, Food, and Community.* Medford MA: Tufts University Press.

Mann, Susan A., and Jones M. Dickinson. 1978. Obstacles to the development of a capitalist agriculture. *Journal of Peasant Studies,* Vol. 5, No. 4: 466–481.

McConnell, Grant, and American Farm Bureau Federation.1969. *The Decline Of Agrarian Democracy.* New York: Atheneum.

A history and analysis of agrarian populist movements in the U.S. Good discussion of farmers' resistance strategies in the face of increasingly powerful corporate control over the food system.

McWilliams, Carey. 1935. *Factories in the Fields: The Story of Migratory Farm Labor in California.* Berkeley, CA: University of California Press.

Excellent and critical historical analysis of farm labor in California. Special emphasis is placed on the ways in which ethnicity and the seasonality of labor demand combine with industrial capitalism's infiltration of agriculture to create an unjust labor system.

Millstone, Erick, and Tim Lang. 2008. *The Atlas of Food: Who Eats What, Where and Why.* Revised and Updated. Berkeley, CA: University of California Press.

This is an excellent summary of the global food system. The book's intention is to describe the global food system, and to provide readers with the background about how this system came to be and where it is likely to go in the future. It explores the current situation, identifying important trends and explores how it may be improved.

National Farm Worker Ministry. No date. Timeline of Agricultural labor in the U.S. *nfwm.org/education-center/farm-worker-issues/timeline-of-agricultural-labor/*

Patel, Raj. 2007. *Stuffed and Starved*. Brooklyn, NY: Melville House Publishing.

Excellent book that provides an overview of current food system and the results of the choices made by corporations, governments, farming communities and others. Topics covered include farmer suicides, migration, trade agreements and development, agribusiness winnings, control of the seed, and the example of soybeans – where all the factors described come together. Also incudes a focus on the power of the supermarket industry and how people are constrained as consumers.

Pollan, Michael. 2006. *Omnivore's Dilemma: A Natural History of Four Meals*. New York, NY: Penguin Books.

Schafer, Joseph. 1936. *The Social History of American Agriculture*. New York, NY: The Macmillan Company.

A dated but entertaining history of pre-chemical American agriculture, with an emphasis on social organization.

Tansey, Geoff, and Tony Worsley. 1995. *The Food System: A Guide*. London: Earthscan Publications Ltd.

This book's focus is on understanding the food system. It explores what a food system looks like, who are the players and what are the various mechanisms of control.

Wells, Miriam J. 1996. *Strawberry Fields: Politics, Class, and Work in California Agriculture*. Ithaca, NY: Cornell University Press.

Worster, Donald. 1990. Transformations of the Earth: Toward an agroecological perspective in history. *Journal of American History* 76(4): 1087.

A preeminent environmental historian's discussion of agriculture as the fundamental way in which humans relate to, transform, and are themselves transformed by their environments. A call for the reorientation of agriculture towards a more ecologically informed approach.

CALIFORNIA AND COASTAL CALIFORNIA RESOURCES

Daniel, Cletus E. 1981. *Bitter Harvest: A History of California Farmworkers, 1870–1941*. Berkeley, CA: University of California Press.

Jelinek, Lawrence J. 1979. *Harvest Empire: A History of California Agriculture*. San Francisco: Boyd & Fraser.

Lydon, Sandy, and Linda Yamane. 2002. The challenges of interpretation: A conversation. In *A Gathering of Voices: The Native Peoples of the California Central Coast,* Linda Yamame, ed. Santa

Cruz County History Journal #5. Santa Cruz, CA: Museum of Art & History.

This article contains some descriptions of Native American's experiences in agriculture in the Central Coast.

Walker, Richard. 2004. *The Conquest of Bread: 150 Years of Agribusiness in California*. New York: The New Press.

Wise, Timothy. 2011. *Still Waiting for the Farm Boom: Family Farmers Worse Off Despite High Prices*. Global Development and Environment Institute. Boston: Tufts University. *www.ase.tufts.edu/gdae/Pubs/rp/PB11-01FarmIncomeMarch2011.pdf*

WEB-BASED RESOURCES

Howard, Phil. Information Graphics.

www.msu.edu/~howardp/infographics.html

Excellent information graphics depicting concentration in the food system.

National Sustainable Agriculture Coalition (NSAC)

sustainableagriculture.net

NSAC is an advocacy coalition of grassroots organizations that promotes opportunities for small and medium-scale growers and beginning farmers, encourage sustainable and organic practices, and advocates for expanded on-farm research for sustainable agriculture. Their website is an excellent resource for information on current legislative efforts affecting sustainable agriculture.

CURRICULUM RESOURCES

Center for Ecoliteracy. Nourish Curriculum Guide: What's the Story of Your Food?.

www.nourishlife.org/teach/curriculum/

The nourish curriculm includes a 26-minute movie, and a series of lesson plans/activities for students to participate in. The curriculum is aimed at students from later elementary school through early high school.

Discovering the Food System: An Experiential Learning Program for Young and Inquiring Minds

www.discoverfoodsys.cornell.edu/

This curriculum provides experiential activities to learn about the food system from a hands-on perspective. By starting "in our backyard," youth learn about how the food system works, who is a part of it, and how they fit within and influence it. It is meant for grades 7 thru 12, but could also work well for college courses.

Gault, Ryan. 2013. *Community and Regional Development (CRD) 20: Food Systems*. Syllabus. UC Davis. Fall 2013.

hcd.ucdavis.edu/faculty/webpages/galt/personal/Galt_Faculty_Page/CRD_20_files/CRD_20-Syllabus.pdf

Gault, Ryan, and Damian Parr. 2013. *Lab Manual Version 3.3 for Food Systems*. UC Davis. Fall 2013.

hcd.ucdavis.edu/faculty/webpages/galt/personal/Galt_Faculty_Page/CRD_20_files/CRD%2020%202013%20Lab%20Manual%20Version%203_3.pdf

Sustainable Agriculture Education Association (SAEA)

sustainableaged.org/ (see "Curriculum Library")

Starting in 2014, SAEA will roll out a place where educators can share syllabi, class exercises, assignments, and information about their degree programs.

Teaching the Food System—A Curriculum

www.jhsph.edu/research/centers-and-institutes/teaching-the-food-system/curriculum/

This is an excellent resource for teaching about a number of food system topics, such as what a food system is, the history of food, agriculture and ecosystems, food processing, food distribution, diet and hunger and food security.

ADDITIONAL FOOD SYSTEM GRAPHICS

- infothread.org/Foods/Global%20Food%20System.jpg
- vodaplan.com/wp-content/uploads/2011/08/SLC-Food-System-1.jpg
- www.vsjf.org/assets/files/tables_figures/execsummary/1-Food%20System%20Diagram.jpg

For pictures of sub-components of the food system, go to:

www.msu.edu/~howardp/infographics.html

VIDEO RESOURCES

The Food System: An Overview

www.tansey.org.uk/news/FStalk.html

This 30-minute video by Geoff Tansey provides a succinct overview of today's food system. The video is divided into five sections, which can be watched individually and discussed by the group, or watched in its entirety. The sections include: the basics, key actors, a changing world, tools for control, and food policy and practice.

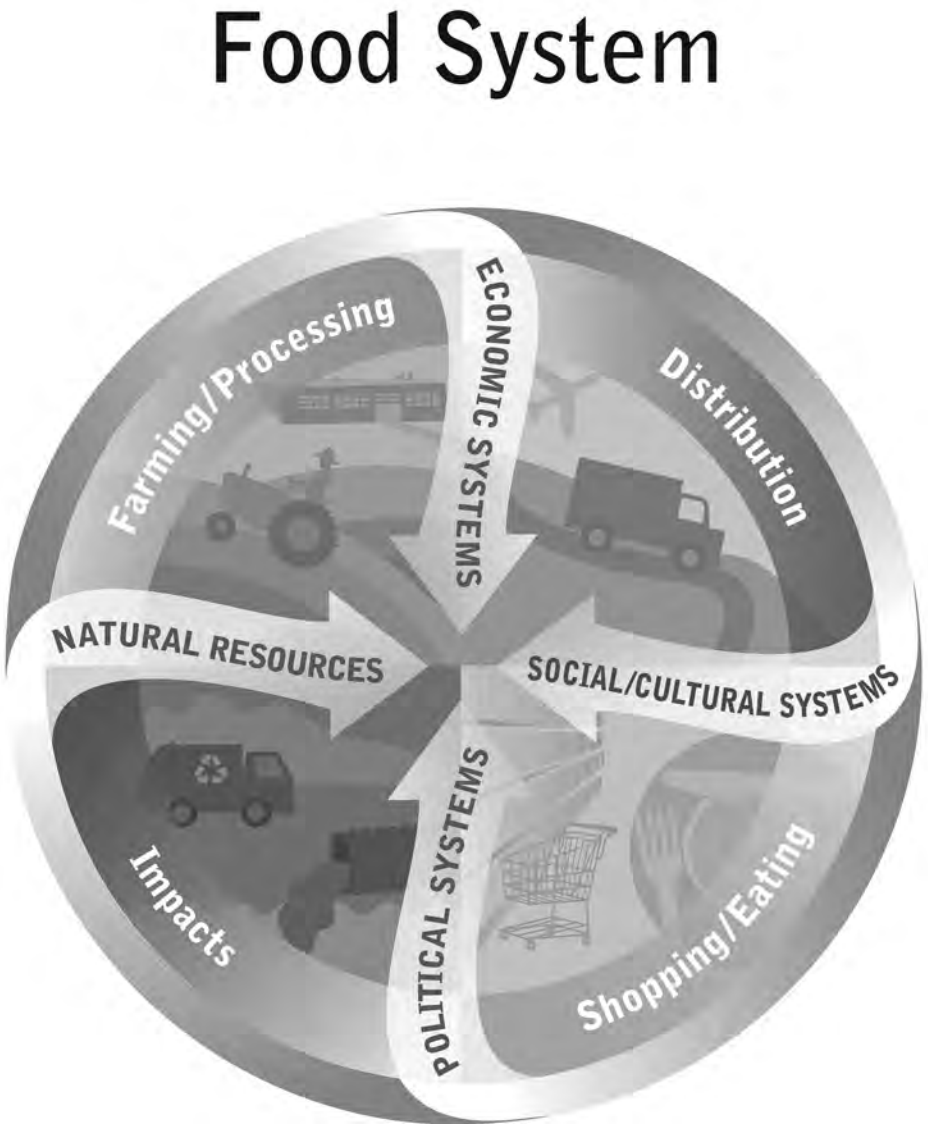
What's on Your Plate?

www.youtube.com/watch?v=AQlG710-mdw&feature=youtu.be

This 12-minute illustrated video, commissioned by the University of Vermont, introduces the issues in the dominant food system. It describes the food system in a manner that supports Lecture 3 of this unit, from 3:09 to 7:40.

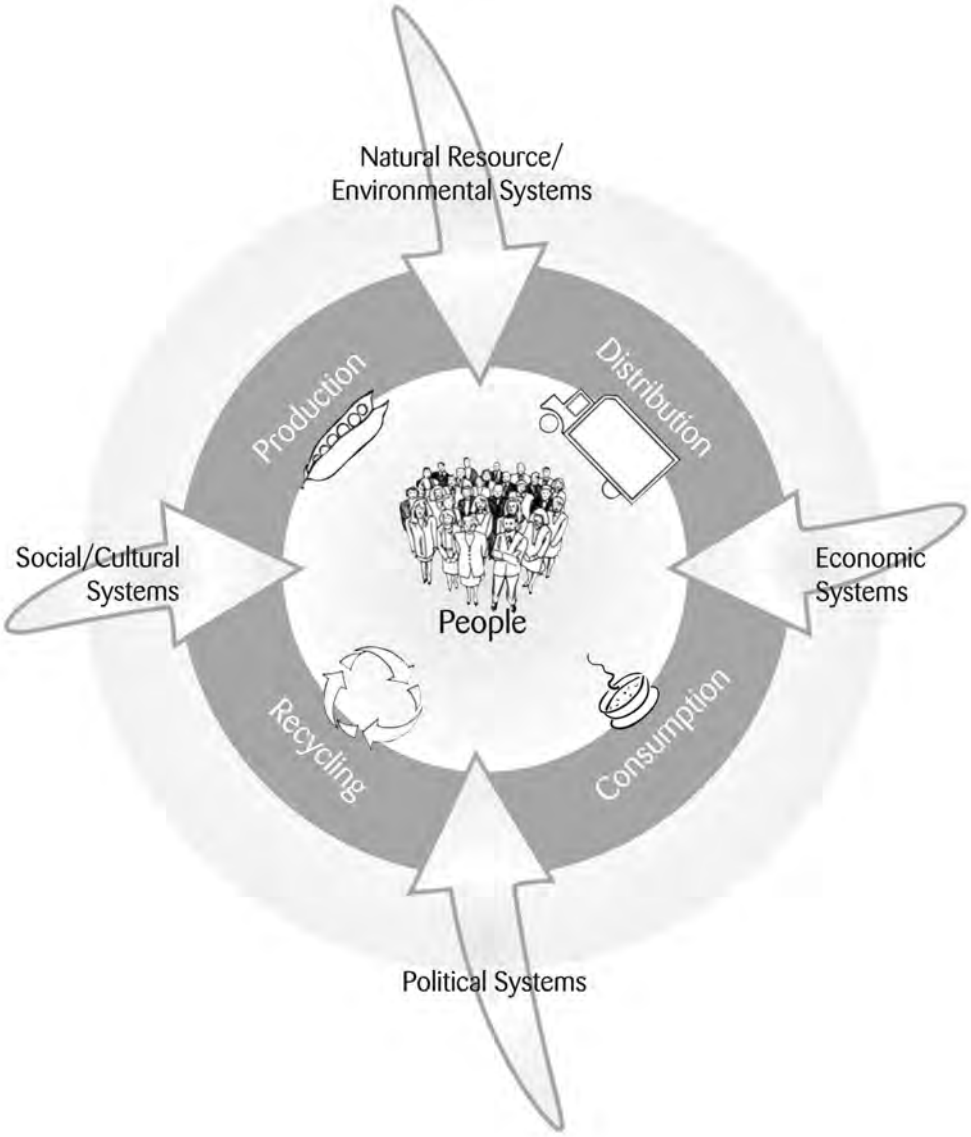
Appendix 1: Food System Graphics

Graphic #1: The Food System and Its Components



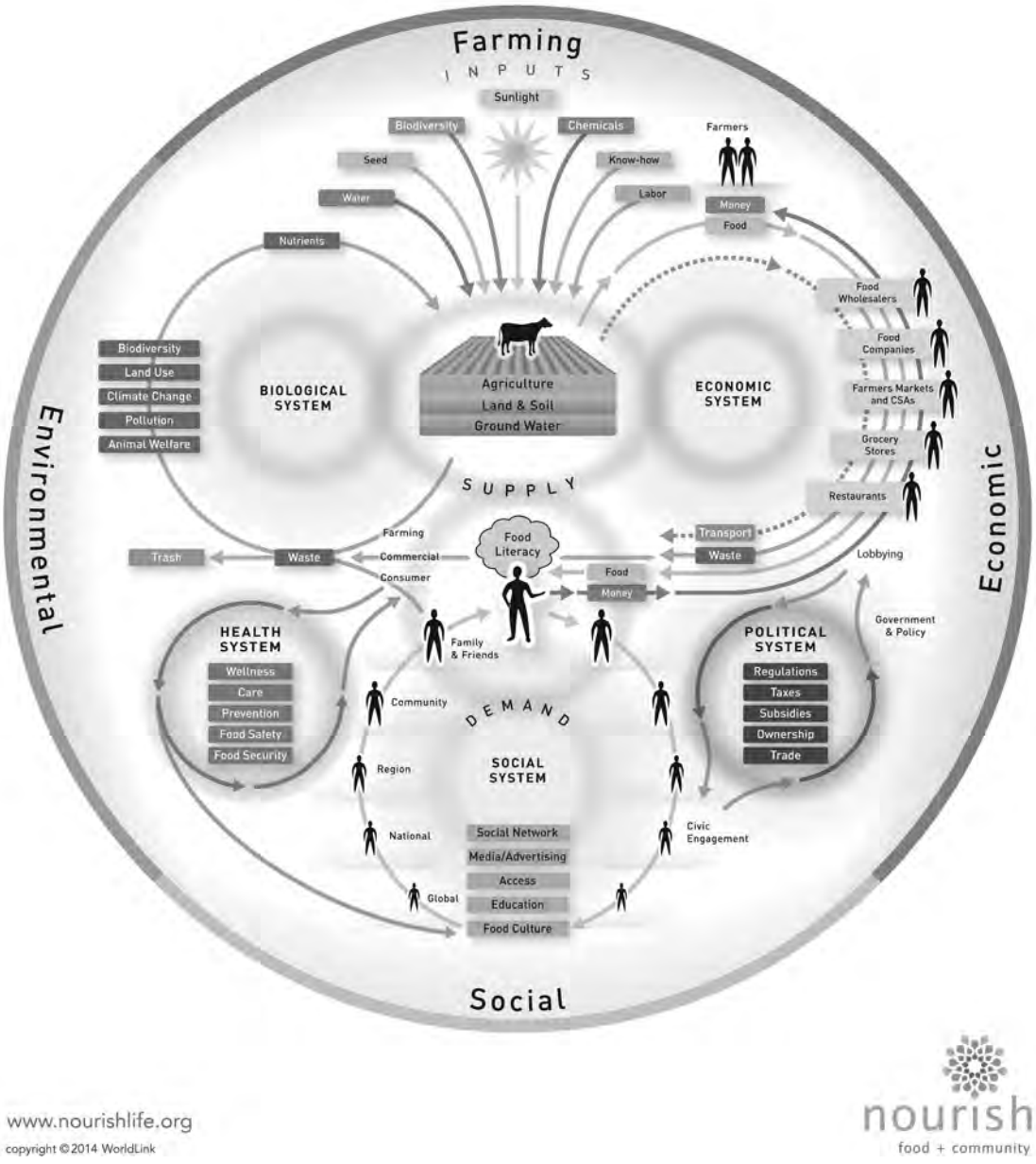
Developed by the Center for Agroecology & Sustainable Food Systems (CASFS).

Appendix 1 (cont.): Food System Graphics
Graphic #2: The Food System Model



This graphic, developed by the Food Systems Consortium, is published in the 2005 San Francisco Collaborative Food System Assessment. *www.sfgov3.org/Modules/ShowDocument.aspx?documentid=780*
Used by permission.

Appendix 1 (cont.): Food System Graphics
Graphic #3: Nourish Food System Map



3.2

Social Issues in Current U.S. Agriculture

Introduction: Social Issues in Current U.S. Agriculture

UNIT OVERVIEW

This unit introduces some of the significant social issues and social consequences of the development of U.S. agriculture. The unit's overarching goal is to convey to students how agricultural decisions and development impact people and social structures. This section examines the impact of consolidation and concentration of ownership on farmers and beyond, the impact to workers in the food system, and the effects on the rest of the population (food insecurity and health issues).

Lecture 1 examines social issues in the current food system in greater detail, starting with labor. The status of a majority of food workers, including farmworkers, food processors, and those in the food service industry are reviewed and the reasons for their current situation are explored.

Lecture 2 examines the social consequences of the current food system by focusing on the effects of concentration of ownership and consolidation, and the impact of the current food system on human health (e.g., food insecurity, obesity, antibiotic resistance) and other areas. The effects of recent food system changes on farmers and consumers are explored, along with problems associated with an increasing concentration of power.

MODE OF INSTRUCTION

> LECURES (2 LECTURES, 50 MINUTES EACH)

The lecture outlines cover the social issues associated with the evolution and current organization of the U.S. food system. References given in the outlines are described in the References and Resources section.

LEARNING OBJECTIVES

CONCEPTS

- The U.S. food system, as it has been developed and as it is now, has many impacts on people
- The extent to which the current system put the risks and burdens of agricultural production on those with the fewest choices and least resources
- The impacts of consolidation in the food system
- The basic information about how hunger continues, even in a system of agricultural overproduction
- How the current food system impacts human health

Lecture 1: Social Issues in U.S. Agriculture—Labor

A. Overview

1. The current food and agriculture system produces certain "externalities"—the social and ecological consequences ("hidden costs" of production) that have resulted from changes in the food system and for which no individuals or institutions are held legally or financially accountable
2. The externalized social costs of production are, among others: Increases in the concentration of ownership over the means of food production; the associated declines in small-farm viability and the life quality indicators of rural agricultural communities; declines in the working conditions and life quality of agricultural laborers; continued consumer and farmworker exposure to unsafe levels of pesticides; and the persistence of hunger in the context of the overproduction of food

B. Issues with Labor in the Food System

(Main sources: Allen and Melcarek 2013; Jayaraman 2013; Thompson and Wiggins 2002; VanDeCruze and Wiggins 2008)

1. The food system workforce
   a) People working in the food system include those who grow, process, distribute, and sell food. They also include unions, investors, input suppliers, researchers, government employees, and non-governmental organizations (NGOs). Workers in these groups range from owners of business to hourly hired labor.
   b) According to a National Commission on Agricultural Trade and Export Policy report (1986), around 23% of the workforce is involved in production agriculture and jobs that make up the food system as a whole
   c) The Bureau of Labor Statistics (BLS) 2012 survey estimates that the hired workers in the food chain— farmworkers, food processing workers, food preparation and serving workers—comprise 10.4% of the total US workforce. However, their agricultural labor numbers are far below that of the USDA's count, and front line supervisors are not included. Thus, the true percentage is likely higher than reported here.
   d) A BLS survey estimates that food preparation and serving workers comprise approximately 8.9% of the workforce, with 11.5 million workers. They also estimated that there were 720,970 food processing workers, and 372,060 meat processing workers.
   e) As of 2006, there were an average of just over a million hired farmworkers—which is a third of the people working directly in agriculture. The other 2 million were self-employed farmers and family members (unpaid); (Kandel 2008).
   f) According to a National Agricultural Workers survey, 83% of farmworkers identify themselves as part of an Hispanic or Latino group; 8% identified as indigenous, American Indian or Alaskan native; 4% identified themselves as Black/African-American (U.S. Department of Labor, No Date: a)
   g) Many of these jobs are required to produce our food. Farmworkers are necessary for the production of fresh fruits and vegetables, which mostly cannot be harvested by machines. Meat consumption requires human labor despite the machinery available for meat processing.

2. Underpaid and unrepresented
   a) A large portion of jobs in the food chain, what we will refer to as food system jobs, pay very low wages. These include food service, processing, and farmworkers.
      i. Farmworkers have the highest poverty rates among other workers in the U.S. Their income ranges from $10,000–$18,000 per year, but has also been reported at a median of $7,500.
      ii. Of all the lowest paying occupations in the U.S., 7 of the 10 jobs are in restaurant positions
      iii. The average salary for those in the food processing industry (which includes bakers, butchers, meat packers, etc.) was less than half of the salary average for what all occupations earned
      iv. Few in these jobs have paid sick days or health benefits
   b) Most of these jobs are also unrepresented, meaning that they don't have collective bargaining as a source to help balance the power and interests with very large organizations
      i. Only 16% of food processers were reported by the U.S. Department of Labor to have union contracts
      ii. As of the early 2000s, fewer than 10% of workers in strawberry fields were unionized with the United Farm Workers (Schlosser 2003)
   c) These jobs are often low wage due to special labor laws
      i. Federal law only requires a minimum cash wage for tipped employees of $2.13 per hour. Most states mandate a higher wage, but many don't (United States Department of Labor 2014). In fact, half of the states allow the wage to be between $2.13 and $3.00. (Jayaraman 2013).
      ii. Farmworkers were excluded from national labor protection laws until 1978, when those on larger farms were finally included in the Fair Labor Standards Act. However, they are still not included in overtime pay requirements. Farmworkers on small farms are excluded from a minimum wage as well (United States Department of Labor N.D.).
   d) It is not uncommon for food system workers to report that their wages have been shorted (they were not paid what they earned) or that overtime was withheld
   e) People of color often make less than whites. This holds true across the production, processing, distribution, and service sectors. People of color are also over-represented in the low paying food system jobs (Yen Liu and Apollon 2011).
   f) Similarly, women have earned less than men in food system jobs, such as farming, food processing and food services
3. Health impacts

   These low-wage jobs have a number of health impacts associated with them
   a) Food insecurity
      i. According to California Institute for Rural Studies research, 45% of Fresno County farmworkers, and 66% of Salinas Valley farmworkers are food insecure, despite living in two of the most agriculturally productive regions in the U.S. (Wadsworth 2014)
      ii. For those farmworkers who live in rural areas and unincorporated regions, there is little public transportation or access to healthy foods. Given that farmworkers have low rates of car ownership (39%), it makes access to food even more difficult. Being able to afford food is also difficult, considering the low wages they earn (Wadsworth 2014).
      iii. See Lecture 2 in this unit for more information on food security

b) Pesticides
   i. 4080 cases of sickness from pesticide residues were reported in California between1982–2007. Research shows that cases of pesticide exposure often go unreported. Oxfam American estimates that 300,000 U.S. farmworkers are sickened each year from pesticides.
   ii. Much exposure happens when workers are doing routine tasks that don't include applying pesticides. Farmworkers contact pesticides by breathing them, having them spilled or sprayed accidentally, or by coming in contact with plants with residues.
   iii. A North Carolina study found that being sprayed with pesticides or being aware of strong chemical smells while working were reported by half of the respondents
   iv. Children of farmworkers are often exposed to pesticides from working alongside their parents, living close to fields that are sprayed, and from residue that parents bring home on clothes, etc. Prenatal exposure has been associated with neurodevelopment problems, such as lowering of IQ, brain function, reflexes, and ability to connect (autism and Asperger-type conditions; Frienkel 2014).
   v. Pesticides can affect people in acute ways, causing headaches, nausea, vomiting, dizziness, rashes, and burns. They can also cause problems over time, leading to cancer or sterility. Birth defects and other reproductive risks are also problems.

c) Injuries
   i. Reported Injuries and illness are much higher for food system workers. The average rate for all private industry in 2006 was 4.4 injuries per 100 full time workers. For crop production the rate was 5.8, poultry processing was 6.6, and animal slaughtering (except poultry) was 12.5. The disability rate for farmworkers is three times that of the general population.
   ii. Farmworkers are subject to heat exhaustion, musculoskeletal issues (back problems are common), and accidents with ladders and machinery. Cuts, scrapes, and rashes are also issues.
   iii. Food processing involves using heavy machinery and cutting implements, and doing repetitive work. Food processing workers have high rates of carpal tunnel syndrome, which can be disabling. Animal slaughtering (excluding chickens) has lacerations as the most common injury—as most people on the quick-moving disassembly line are using a knife. Those processing animals are also exposed to viruses, bacteria, and other substances that contribute to respiratory diseases.

d) Access to health care
   i. Once injured, most food system workers have barriers to receiving health care—with few having health insurance or paid sick leave (the Affordable Care Act may provide or increase benefits to some [Farmworker Justice 2012]). They often lack needed money to pay for treatment and fear losing wages by taking time off to seek treatment.
   ii. Some are discouraged from seeking outside medical care to keep injury rate statistics and costs down (see Schlosser 2001, Chapter 8 for meat packers stories)
   iii. For farmworkers, workers compensation does not necessarily cover them in all states. Additionally, getting access to medical care is less likely due to lack of transportation and being unaware of available sources.

4. Food system workers' experience

   (see Rothenburg, Chapter 1, for individual farmworker stories, Jayaraman 2013 for food service industry workers, and Schlosser 2001, Chapter 3 for fast food worker and Chapter 8 for meat packing worker stories)

   a) Living situations
      i. For farmworkers, overcrowding in dwellings is a common issue. Two different surveys (one from 1980 and one from the late 1990s) show that 85% and 60% of units are filled beyond capacity. This mean that farmworkers were often sleeping in living rooms or on kitchen floors.
      ii. Research also reports significant structural damage to dwellings. One third showed sagging features (walls, ceilings, floors) or holes in the roof or both.
      iii. Given that one study showed that their average salary was around $850 per month, paying the average $200 per month for rent is a large portion of one's income. The average rent on a mobile home or duplex was at or just above $425. This situation doesn't allow people to have much money left for food, clothing, and other necessities.
   b) Working conditions
      i. Farmworkers do repetitive tasks for long periods of time, either bending over harvesting or reaching on ladders. This work is often done in extreme temperatures, including summer heat and autumn cold.
      ii. Food processing workers—particularly slaughterhouse workers—are subject to a variety of difficult working conditions. Many work at 40 degrees to keep the meat cool, while making many cuts per minute with knives. When people get injured they are encouraged not to go to the doctor, and treated better if they don't. Injuries are frequently under reported.
      iii. For restaurant workers, being overlooked for advancement in pay or position rank based on ethnicity or gender, is commonly reported
      iv. Reports of sexist comments and harassment are common from female food system workers across the types of work
      v. Forced overtime and failing to pay overtime rates are also reported
      vi. Meat packers in Colorado who have a major disability from an injury, such as loss of a body part, can only receive very limited compensation. They can get a maximum of $36,000 for the loss of an arm, or up to $4,500 for the loss of a finger. For unskilled and uneducated workers, these physical issues create a profound limitation on their future earning ability, which is not covered by these awards (Schlosser 2001).
   c) Despite the modest gains made during the 1960s–1970s with Cesar Chavez, agricultural labor remains poorly compensated, difficult, and dangerous work for millions of people

C. Factors That Contribute to Current Food Worker Situations

1. Long history of exploitation (VanDeCruze and Wiggins 2008; see also Unit 3.1, Lecture 1, History of U.S. Agricultural Development)
   a) The growth of large-scale agriculture in the Southern states relied on the enslavement of Native Americans and Africans
   b) Post-slavery, the sharecropping system was used widely in the South. Farmers would do the work in exchange for a small percentage of the crop, which usually went back to the land owner to cover debts, keeping people impoverished.
   c) Farm laborers were often from dispossessed groups with few options, such as immigrants to the U.S. Having little political power and limited economic choices, they could not contest working conditions or pay.

2. Immigration policy, consolidation, and free trade agreements have helped to keep wages low
    a) Significance of U.S. labor and immigration policies
        i. Carey McWilliams' thesis on the ethnic succession of agricultural labor: That the U.S. government has designed immigration policies that introduce new (ethnic-based) group of workers who are willing to work for low wages and live in sub-standard conditions
            - Organizing efforts of immigrants are undermined through the repeated introduction of new groups of workers (of a different ethnicity) to replace "recalcitrant" workers who protest working conditions (see McWilliams 1935, Introduction)
            - Examples of this cycle: Chinese, Japanese, Punjabi Indians, Dust-Bowl migrants, Filipino, and Mexican immigrant labor throughout the 20th century
        ii. Farmworkers from other countries who get documentation as part of the H-2A program are not protected by the federal legislation that oversees farmworker labor. They do not have the right to bargain collectively or unionize (Ahn et al 2004).
        iii. It is estimated that half of all hired farmworkers have an unauthorized immigration status (Kandel 2008). It is also estimated that 40% of food service workers in New York City are undocumented (Jayaraman 2013).
    b) The role of consolidation
        i. Consolidation of retail puts the larger corporations in the driver's seat, where they can set prices, particularly before the crop is even planted. This puts the risk of farming on the growers, pressuring them to cut costs—of which labor forms a significant part, particularly for fruits and vegetables (Ahn et al 2004).
        ii. Meat slaughtering and packing plants used to be unionized and offer decent-paying jobs. After one large company, IBP, mechanized the slaughtering process and moved out of the urban areas (where union support was strong), and into rural anti-union states, they were able to cut worker pay. Being a large company, IBP then undercut other companies enough to drive them to do the same thing—go rural and depend on immigrant labor (Schlosser, 2001).
            - IBP, a slaughtering/meatpacking business, has an office in Mexico City advertising jobs in the U.S. and offering transportation to get there (Schlosser 2001)
    c) The role of free trade—increasing immigration
        i. Free trade agreements (North American Free Trade Agreement, NAFTA, and the General Agreement on Tariffs and Trade, GATT), World Bank requirements, and policies favoring big business cut much of Mexico's agricultural support to farmers, which dropped 90% in the first 7 years after the signing of the NAFTA agreement. Many subsistence farmers were forced to look for work elsewhere, including the factories and food work in the U.S. Additionally, since U.S. corn is still greatly subsidized, it can undercut the price of Mexican corn, further driving small subsistence farmers out of business and forcing them to look for wage jobs in the U.S. (Ahn et al 2004).
3. Low wages and seasonality of agricultural work together to further impact farmworkers' economic situation
    a) Even though farmworkers might receive an hourly amount above minimum wage, much farm work is only needed seasonally, such as at planting and harvests times. They also are not paid for workdays cancelled due to rain or other weather issues. This leaves many farmworkers under- or unemployed for periods of time. They bear the costs of agriculture's intermittent and unpredictable nature (Rothenberg 1998).

Lecture 2: Social Issues in U.S. Agriculture—Concentration & Health

A. Impacts of Food System Concentration

1. Concentration across all sectors of the food system has increased greatly in the latter half of the 20th century (see Unit 3.1, Lectures 1 and 2). There are fewer and larger farms and many fewer farmers. Seed production, food processing, retail, and other sectors of the food system are often dominated by a handful of large companies.
2. Implications of concentration
   a) Concentration of power: Production consolidation means consolidation of power and decision making. Such corporations "have considerable power in dictating how and where agricultural production takes place" (see Lyson and Raymer 2000, p. 200) as well as what is available in the marketplace. For example:
      i. Walmart, being the largest retailer of food, exerts significant power. It has shifted the burden of risk to its suppliers, who now have to monitor the products they send, even on the shelves of Walmart itself. Walmart's contracts are nonnegotiable—suppliers must simply accept what is offered without modification. If a supplier isn't able to give all of the product agreed upon, or if there is an apparent discrepancy, the supplier agrees to be "fined." Since Walmart is the biggest buyer for food processors, processors have to do what the company says (Hauter 2012).
      ii. In a U.S. Department of Justice (DOJ) inquiry regarding seeds, corn and soybean growers have testified to that there is a lack of choice for seeds (both genetically modified and conventional), that they are paying much higher prices for seeds compared to the mid-1990s, and that their use of seeds is greatly restricted (U.S. DOJ 2012)
   b) This concentration of power allows a few firms in an industry to work together to set prices in their favor in an uncompetitive manner
      i. A USDA study found that big retailers had, in some cases, used their market power to set prices below competitive prices to suppliers, and above competitive prices to consumers (Dimitri, Tegene, and Kaufman 2003)
   c) Extended influence: Members of the boards of directors of these multinational corporations frequently overlap, and typically have very similar educational and social backgrounds, thus exacerbating the problem of power concentration. Thus, much of the power in the food industry rests in the hands of relatively few individuals who tend to share common worldviews regarding the environment, labor, and food safety issues.
   d) These very large corporations have significant influence over policy, often indirectly through networks and connections with organizations that promote political agendas. Other influence can be direct. For example:
      i. "In January of 1987, Mike Harper told the newly elected governor of Nebraska, Kay Orr, that ConAgra wanted a number of tax breaks—or would move its headquarters out of Omaha. The company had been based in the state for almost seventy years, and Nebraska's tax rates were among the lowest in the United States. Nevertheless, a small group of ConAgra executives soon gathered on a Saturday morning at Harper's house, sat around his kitchen table, and came up with the basis for legislation that rewrote Nebraska's tax code. The bill, drafted largely by ConAgra, sought to lower the state taxes paid not only by large corporations, but also by wealthy executives. Mike Harper personally stood to gain about $295,000 from the proposed 30 percent reduction in the maximum tax rate on personal income" (Schlosser 2001, pp. 163-164).

e) Large corporations are able to use the legal system in their favor. For example:
   i. Monsanto's own contracts acknowledge that seed matter can drift to other crops, but claim they are then not responsible for the contamination. On the other hand, Monsanto is able to prosecute farmers that might have crops in their fields contaminated by pollen from Monsanto seed, as the law does not require that the company prove intent on the part of the farmer. Farmers don't generally have the resources to contest Monsanto in court (Freese and Kimbrell 2013).

f) Large corporations are also less affected by other balances of power. For example:
   i. "In most businesses, a high injury rate would prompt insurance companies to demand changes in the workplace. But ConAgra, IBP and the other large meatpacking firms are self-insured. They are under no pressure from independent underwriters and have a strong incentive to keep workers' comp payments to a bare minimum. Every penny spent on workers' comp is one less penny of corporate revenue." (Schlosser 2001, p 184).

3. Other consequences of consolidation
   a) The number of small and mid-sized farms has been decreasing while the number of large farms increases (U.S. Department of Agriculture 2012 and U.S. Department of Agriculture 2007)
      i. Those grossing less than $100,000 (small farms) decreased 7%, from 1,847,663 in 2007 to 1,721,170 in 2012. Those grossing between $100,000 and $249,999 (often considered mid-sized farms), decreased 6%, from 147,500 in 2007 to 138,883 in 2012. These mid-sized farm decreased by 13% between 2002 and 2012.
      ii. The number of large-scale farms has been increasing. Those grossing $1,000,000 or more increased by 43%, from 55,509 in 2007 to 79,225 in 2012.
      iii. Farms of 2000 acres or more have increased by 11%, from 27,092 in 2007 to 30,158 in 2012
   b) Some growers are functionally being turned into "serfs" with unfair contract requirements. For example:
      i. Much broiler production is embedded in a vertically integrated system, where the industry produces the baby chicks and the chicken feed, and then purchases the birds for slaughter. Farmers have to buy all the chicks and feed from the corporation, but must build their own facilities to house the birds and sell the birds back to the same corporation. These buildings can cost $100,000 per unit. By the time they are paid off, they will need to be updated and modernized. Hence, it is difficult for the grower to get out of debt. Many farmers don't live close enough to more than one firm that buys birds, so they don't get to negotiate prices, but have to take what is offered. Additionally, companies can have informal agreements not to take on other companies' growers, thus leaving growers with few choices or options (Heffernan 1998).
   c) This loss of farms appears to impact rural communities
      i. In the late 1940s, researchers started exploring whether the increase in concentration in farms, and the decrease in small independent farms, had an impact on the communities' overall well being (Lobao and Meyer 2001)
      ii. Early research demonstrated that having more small farms was related to community well being—a finding that resulted in a huge backlash by corporations; as a result, the USDA shut down its unit that commissioned the research (Lobao and Meyer 2001)
      iii. The majority of later studies, including much larger quantitative studies, have shown similar results

4. Impacts on other areas
    a) Labor impacts
        i. The bargaining power of workers is diminished when there are few employers to choose from in an industry (Lynn 2010)
    b) Consumer impacts
        i. Consolidation is often claimed to make prices go down for consumers, but one recent study showed prices actually went up in 4 out of 5 cases (Ashenfelter and Hosken 2008)
    c) Animal welfare
        i. CAFOs severely restrict animals' movements, sometimes to the point of not even being able to turn around. This restriction can limit animals from expressing their normal behaviors, causing high levels of stress that can further impact physical health (Pew Commission on Industrial farm Animal Production 2009).
    d) Environmental and health (see also Unit 3.3, Environmental Issues in Modern Agriculture)
        i. Concentrated animal feeding operations (CAFOs) are replacing small and mid-sized animal production farms. CAFOs concentrate animal waste in much larger quantities than can be successfully handled by the land on which the operation resides. Waste products, including pathogens and nutrients, need special handling. Hormones, antibiotics, and pesticides also accumulate and can end up in local waterways (Pew Commission on Industrial farm Animal Production 2009).
        ii. CAFOs have impacts on animal welfare and on human health—from increasing antibiotic resistance to polluting the local community's air and water; see Unit 3.3, Environmental Issues in Modern Agriculture, for more information (Pew Commission on Industrial farm Animal Production 2009)
        iii. CAFOs also use large amounts of resources, from water to fossil fuels, much more than most other food production efforts (Pew Commission on Industrial farm Animal Production 2009)
        iv. Consolidation in the seed industry has led to a decrease in seed diversity (Freese and Kimbrell 2013), which in the long term could negatively impact overall food security

B. Impacts to Health

The current food system in the U.S. impacts human health and nutrition in many ways

1. Food security (Allen and Melcarek 2013; Coleman-Jensen et al. 2013)
    a) Not having enough to eat is associated with many serious health impacts (Troy et al 2011)
    b) Worldwide, according to 2011–2013 statistics, 842 million people (12%) are considered undernourished. While better off than a majority of countries worldwide, there are many in the U.S. who do not have enough food to eat (Food and Agriculture Organization, no date).
    c) "The World Food Summit of 1996 defined food security as existing 'when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life'." Access means both that people have the physical ability to get food and the economic resources. It also includes that people have access to preferred foods (World Health Organization, no date).
        i. Food security is made up of three factors:
            - "Food availability: Sufficient quantities of food available on a consistent basis.
            - Food access: Having sufficient resources to obtain appropriate foods for a nutritious diet.
            - Food use: Appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation."

d) During 2012, 14.5% of U.S. households were considered to be food insecure at some time during the year. This means that these households ". . . had difficulty at some time during the year providing enough food for all their members due to a lack of resources." Slightly over one-third of these people (5.7%) have very low food security. This means that ". . . at times during the year, the food intake of household members was reduced and their normal eating patterns were disrupted because the household lacked money and other resources for food" (Coleman-Jensen et al 2013, p. 5).

e) The percentage of food insecure households in the U.S. fluctuated between 10.1% and 11.9% between 1998 and 2007. After 2008 it rose above 14.5%, where it has stayed since.

f) Part of the reason for the increase in food insecurity starting in 2008 is the extreme rise in food prices during that time. During the food crisis in 2008, food prices rose significantly for some crops, such as rice and wheat (75% and 120% respectively). Globally, average food prices rose over 50%.

g) Food insecurity was higher for households living below the poverty line (40.9%), with children (20.0%), and headed by a single parent (35.4% for women and 23.6% for men). Food insecurity was also higher for Black and Hispanic households (24.6% and 23.3%).

h) A primary cause of food insecurity is poverty (Johns Hopkins Center for a Livable Future 2010)

i) One factor contributing to food insecurity is food deserts (Allen and Melcarek 2013; Agricultural Marketing Service, no date; Schafft, K., E. Jensen, and C. Hinrichs 2009)

   i. Many low-income areas are considered food deserts. Food deserts are described as " . . . urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food," (Agricultural Marketing Service, no date). These areas have no grocery stores. They may have no access to food, or only have access to fast food or convenience stores. Thus, the immediately accessible food is less healthy and/or more expensive.

   ii. Food deserts are also more common in low-income neighborhoods that are predominantly people of color

   iii. Food deserts, and food insecurity, appear to be related to health problems, e.g., research has found a relationship between food desserts and obesity and diabetes.

2. Obesity (Schoonover and Muller 2006)

   a) Extent of obesity: 2/3 of people in the U.S. are overweight and 1/3 are obese. The rates of obesity among youth have doubled and even tripled for different age groups since the 1970s

   b) Obesity is associated with many health effects, such as diabetes, heart disease, some cancers, and more.

   c) The causes of obesity are complex (see on-line interactive diagram at: *www.shiftn.com/obesity) Full-Map.html)*

   d) However, the current food system contributes several factors:

      i. Lack of access to healthy foods, which exists in food deserts, as well as easier access to less nutritious foods, are important components

      ii. Farm bill policies affect food prices

         • U.S. Farm Bill policies make commodities (corn and soy) much cheaper than fruits and vegetables

         • These commodities are used to make less healthy processed foods, and inexpensive sweeteners and oils. This makes less healthy food less expensive, and therefore more economical than healthier foods. For example, at McDonalds, it is more economical to buy a hamburger (partially due to cheap price of corn used to produce beef) than a salad.

- Due to economic constraints, many do not have to the capacity to buy fresh, healthier foods. Even for those that do have a choice, consumer research has found price to be a strong determining factor in what people purchase. One study found that lowering the price of healthier snacks in a vending machine encourages people to buy more of them. But when the prices returned to normal, they chose the less healthy snacks.

3. Antibiotic resistance (Center for Disease Control 2013; Pew Commission on Industrial Farm Animal Production 2009)
   a) Industrial farming is contributing to antibiotic resistance
      i. Many bacteria are becoming resistant to antibiotics. Antibiotic overuse is the main reason, and thus minimizing unnecessary use is critical. The two unnecessary uses are the over-prescription of antibiotics to humans, and the unnecessary use of antibiotics in animals. Currently CAFO operations use low levels of antibiotics regularly in animals as such a use has been found improve growth rates. It is estimated that up to 70% of the antibiotics used are for farm animals.
      ii. As antibiotics become ineffective, many more people will become sick, and many will die, from simple infections
4. Impact of agricultural chemicals (Pesticide Action Network, no date)
   a) Agricultural pesticides increase risks of a number of diseases, such as cancer, asthma, autoimmune diseases, and others
   b) Over 90% of Americans have tested positive for having pesticide metabolites in their blood, such as from DDT and chlorpyrifos (a neurotoxic insecticide)
   c) Those who work on farms, their families, and the broader rural community are most affected by these chemicals
5. Living in agricultural communities
   a) Pesticide drift/exposure
   b) CAFO impacts (Pew Commission on Industrial farm Animal Production 2009)
      i. Ground water contamination can affect the drinking water supply for a large area. Infectious agents, such as flu virus, can affect the community as well as spread through the meat processing chain.
      ii. Food-borne infections are more likely to happen due to the number of animals concentrated in one space
      iii. Increased asthma risk and problems with odor from the facilities are other frequently cited issues

Discussion Questions

SOCIAL ISSUES IN CURRENT U.S. AGRICULTURE, LECTURES 1 & 2

1. Why do you think it is important to understand the social or human impacts of the food system?
2. What did you learn from these two lectures that was surprising to you? Why was it surprising? What did you previously assume to be true?
3. What are some of the most concerning issues raised? Why?
4. Are there any topics from these lectures that you are interested in learning more about? Why? How will you go about learning it?
5. How does learning about this material impact how you intend to participate with the food system (as a farmer, activist, consumer, etc.)?

References & Resources

SUGGESTED READINGS (DESCRIBED BELOW)

LABOR

- Schlosser, 2001, chapters 7 and 8
- Rothenberg, 1998
- Steinbeck, 1939

CONCENTRATION

- Hauter, 2012

HEALTH

- Freinkel, 2014
- Allen and Melcarek, 2013

LABOR REFERENCES/RESOURCES

Ahn, Christine, Melissa Moore, and Nick Parker. 2004. *Migrant Farmworkers: America's New Plantation Workers*. Food First Backgrounder, Vol 10, No 2. March 2004. *www.foodfirst.org/fr/node/45*

Good short summary of issues, particularly regarding immigration and free trade policies.

Allen, Patricia, and Hilary Melcarek. 2013.*The Human Face of Sustainable Food Systems: Adding People to the Environmental Agenda.* Sustainability in the Balance Series. Center for Agroecology & Sustainable Food Systems. Santa Cruz, CA. *casfs.ucsc.edu/documents/issue-papers/sust_in_balance_5.pdf*

This document summarizes recent data related to injustice in the food system. It provides statistics on health and labor issues, as well as summarizing efforts attempting to address these disparities.

Bauer, Mary, and Mónica Ramírez. 2010. *Injustice on Our Plates: Immigrant Women in the U.S. Food Industry.* Southern Poverty Law Center. *www.splcenter.org/sites/default/files/downloads/publication/Injustice_on_Our_Plates.pdf*

This report documents the lives of 150 immigrant women from Mexico and Central America who work in the fields and food processing factories in the U.S. It depicts the brutality of their situation, and concludes by calling for legislation in different arenas to end the exploitation these workers frequently face.

Carrasquillo, Nelson. 2011. Race and ethnicity from the point of view of farm workers in the food system. Farmer workers in the food system. *Race/Ethnicity* Vol. 5. No.1. *www.cata-farmworkers.org/Nelson%20Article.pdf*

This article offers a brief history of farm work in the U.S., with a specific East Coast perspective.

Farmworker Justice. 2012. *Health Reform and Farmworkers.* Farmworkerjustice.org. *www.farmworkerjustice.org/sites/default/files/documents/Health%20Reform%20and%20Farmworkers.pdf*

Freinkel, Susan. 2014. Warning signs: How pesticides harm the young brain. *The Nation.* March 11. *www.thenation.com/article/178804/warning-signs-how-pesticides-harm-young-brain#*

This article summarizes new research on neurological effects of pesticides, particularly on the the children of farm workers.

Jayaraman, Saru. 2013. *Behind the Kitchen Door.* Ithaca, NY: Cornell University Press.

An excellent book about the food service industry. The author unveils the extent to which food service workers live below the poverty line, endure illegal treatment (withholding of wages and overtime pay), and endure race and gender discrimination. She also points out how even restaurants focused on qualities of the food movement, such as promoting local and sustainable, don't necessarily treat their employees well or even fairly. She also points to the many reasons why it matters, from human rights and dignity to the simple correlation in research that restaurants that don't treat their workers well are more likely to have health-related food practice violations. Very engaging to read. Stories can be useful for class discussions. She also provides potential solutions, with her primary goal to improve the lives of those working in the food service industry.

Kandel, William. 2008. *Profile of Hired Farmworkers: A 2008 Update.* Economic Research Report No. 60, Economic Research Service, U.S. Department of Agriculture. *www.ers.usda.gov/media/205619/err60_1_.pdf*

Lopez, Ann A. 2007. *The Farmworkers' Journey.* Berkeley: University of California Press..

This book explores the lives and situation of migrant farmworkers who routinely travel between west-central Mexico and central California to make a living. Ten years of conducting ethnographic research in California and Mexico led to the production of this book. Depictions of the lives of farmworkers, and subsistence farmers in Mexico, are presented along with the structural policies, institutions, and context that keep these people in perpetual poverty and this particular way of life.

McWilliams, Carey. 1935. *Factories in the Fields: The Story of Migratory Farm Labor in California.* Berkeley, CA: University of California Press.

Excellent and critical historical analysis of farm labor in California. Special emphasis is placed on the ways in which ethnicity and the seasonality of labor demand combine with industrial capitalism's infiltration of agriculture to create an unjust labor system.

The National Commission on Agricultural Trade and Export Policy. 1986. *New Realities: Toward a Program of Effective Competition.* Washington D.C.: U.S. Department of Agriculture.

Pollan, Michael. 2002. Power Steer. *New York Times Magazine*. 3/31/02. *www.nytimes.com/2002/03/31/magazine/power-steer.html?pagewanted=all&src=pm*

Enlightening investigative article navigating the U.S. beef industry.

Rothenberg, Daniel. 1998. *With These Hands: The Hidden World of Migrant Farmworkers Today.* New York: Harcourt Brace and Company.

This book describes the lives of farmworkers and the system within which they work. Interviews with farmworkers, contractors, farmers, and others in this area and presented in their words. Background research and the author's conclusions are also included. This wide variety of interviews gives the reader an education on the power relations and structure of employment in U.S. agriculture, as well as a fair treatment of a very wide set of perspectives and first-person testimonies of the difficult racial, class, and citizenship problems associated with migrant labor.

Schlosser, Eric. 2001. *Fast Food Nation: The Dark Side of the All-American Meal.* New York: Houghton Mifflin Company.

This book focuses on all the components behind the production of fast food. Three chapter focus on labor issues. Chapter 3 looks at food service labor in the fast food restaurant. Chapter 7—Cogs in the Machine—give a brief history of the current meat packing industry, showing how it got to where it is today. Chapter 8 details what it is like working in the new meatpacking plants.

Schlosser, Eric. 2003. In the Strawberry Fields, in *Reefer Madness: Sex, Drugs, and Cheap Labor in the American Black Market.* New York: Houghton Mifflin Company.

Steinbeck, John. 1939. *The Grapes of Wrath*. New York: Viking Penguin Books.

At minimum, the first twelve chapters are recommended for their poignant and compelling discussion of the human and environmental impacts of agricultural modernization. The parallels between the experiences of the characters in this novel and today's migrant laborers should not be overlooked.

Thompson Jr., Charles D., and Melinda F. Wiggin eds. 2002. *The Human Cost of Food: Farmworkers' Lives, Labor, and Advocacy.* Austin, TX: University of Texas Press.

This edited book covers several topics related to farm labor, such as health, housing and immigration issues. Other chapters explore the how farmworkers are excluded from labor laws, history of the guest worker program, challenges facing migrant students, and the history of labor organizing. Includes an outline for developing a syllabus for a more extensive education, aimed at farmworker advocacy.

U.S. Department of Labor. 2012. Occupational Employment Statistics—May 2012 National Occupational Employment and Wage Estimates in the United States. Bureau of Labor Statistics. *www.bls.gov/oes/current/oes_nat.htm#35-0000*

U.S. Department of Labor. 2014. *Minimum Wages for Tipped Employees*. Wage and Hour Division. January 1, 2014. *www.dol.gov/whd/state/tipped.htm#foot1*

U.S. Department of Labor. No Date. *elaws—Fair Labor Standards Act Advisor.* Office of the Assistant Secretary for Policy. *www.dol.gov/elaws/esa/flsa/screen75.asp*

U.S. Department of Labor. No Date:a. *The National Agricultural Workers Survey.* Employment and Training Administration. *www.doleta.gov/agworker/report9/chapter1.cfm*

VanDeCruze, Denise, and Melinda Wiggins. 2008. *Poverty and Injustice in the Food System: Report for Oxfam America*. Student Action with Farmworkers. Durham, NC. *ducis.jhfc.duke.edu/wp-content/uploads/2010/06/Poverty-and-Injustice-in-the-Food-System.pdf*

This paper summarizes the situation of farm workers and food processing workers in the Southeastern U.S. It documents the current situation and demographics, explores the history of food workers, and discusses solutions to the particular issues in this region of the country.

Wadsworth, Gail. 2014. What Does Food Justice Mean for Farmworkers? *Food First Blog post*. January 14, 2014. *www.foodfirst.org/en/What+Does+Food+Justice+Mean+for+Farmworkers%3F*

Yen Liu, Y. and D. Apollon. 2011. *The Color of Food*. Applied Research Center. February 2011. *www.foodfirst.org/en/node/3305*

This report graphically displays statistics about food system workers throughout the supply chain. It is an excellent resource, available for free on the web.

CONCENTRATION REFERENCES/RESOURCES

Ashenfelter, Orley, and Daniel Hosken. 2008. *The Effect of Mergers on Consumer Prices: Evidence from Five Selected Case Studies*. National Bureau of Economic Research Working Paper Series, Working Paper 13859. Cambridge, MA. *http://www.nber.org/papers/w13859*

Dimitri, Carol, Abebayehu Tegene, and Phillip Kaufman. 2003. *U.S. Fresh Produce Markets: Marketing Channels, Trade Practices, and Retail Pricing Behavior.* ERS Research Brief. AER-825. Economic Research Service. U.S. Department of Agriculture. September 2003. *www.ers.usda.gov/publications/aer-agricultural-economic-report/aer825.aspx#.UwviQF6V8pc*

Freese, Bill, and George Kimbrell. 2013. *Seed Giants vs. U.S. Farmers*. Center for Food Safety and Save Our Seeds. *www.centerforfoodsafety.org/files/seed-giants_final_04424.pdf*

Hauter, Wenonah. 2012. *Foodopoly: The Battle over the Future of Food and Farming in America*. New York, NY: The New Press.

This book looks at issues around concentration and monopoly in the food system. Hauter's main thesis is that we cannot change the food system simply by voting with our pocketbooks, but that we must address the concentration, deregulation and corporate control in the biological sciences (seed) and processing/distribution realms.

Heffernan, William. D. 1998. Agriculture and monopoly capital. *Monthly Review* 50: 46 (July/August).

Loboa, Linda, and Katherine Meyer. 2001. The great agricultural transition: Crisis, change and social consequences of twentieth century U.S. farming. *Annual Review of Sociology,* 27:103-124.

Lynn, B., and P. Longman. 2010. Who broke America's jobs machine: Why creeping consolidation is crushing American livelihoods. *Washington Monthly.* March 4. *www.washingtonmonthly.com/features/2010/1003.lynn-longman.html*

Lyson, Thomas A., and Annalisa Lewis Raymer. 2000. Stalking the wily multinational: Power and control in the U.S. food system. *Agriculture and Human Values* 17: 199-208.

Discusses multinational corporation's newfound control over the U.S. food system; the degree of concentration of control within the leadership of these firms; and the implications of this consolidation for growers, workers, and consumers.

Mitchell, Stacy. 2011. Eaters, beware: Walmart is taking over the food system. *Grist*. December 30, 2011. *grist.org/food/2011-12-30-eaters-beware-walmart-is-taking-over-our-food-system/*

Pew Commission on Industrial Farm Animal Production. 2009. *Putting Meat on the Table: Industrial Farm Animal Production in America.* A Project of The Pew Charitable Trusts and Johns Hopkins Bloomberg School of Public Health. *www.ncifap.org/_images/PCIFAPFin.pdf*

This document provides an excellent overview of the broad issues and problems stemming from large-scale animal production. It reviews how the current situation developed, public health issues, environmental impacts, animal welfare issues, effects on rural residents, and suggested solutions.

U.S. Department of Justice. 2012. *Competition and Agriculture: Voices from the Workshops on Agriculture and Antitrust Enforcement in Our 21st Century Economy and Thoughts on the Way Forward. www.justice.gov/atr/public/reports/283291.pdf*

U.S. Department of Agriculture. 2012. *Table 2: Market Value of Agricultural Products Sold Including Landlord's Share and Direct Sales: 2012 and 2007.* Census of Agriculture. *www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_US/st99_1_002_002.pdf*

U.S. Department of Agriculture. 2007. *Table 2: Market Value of Agricultural Products Sold Including Landlord's Share and Direct Sales: 2007 and 2002.* Census of Agriculture. *www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_US/st99_1_002_002.pdf*

HEALTH REFERENCES/RESOURCES

Agricultural Marketing Service. No Date. *Food Deserts.* United States Department of Agriculture. *apps.ams.usda.gov/fooddeserts/foodDeserts.aspx*

Allen, Patricia, and Hilary Melcarek. 2013. *The Human Face of Sustainable Food Systems: Adding People to the Environmental Agenda.* Sustainability in the Balance Series. Center for Agroecology & Sustainable Food Systems. Santa Cruz, CA. *casfs.ucsc.edu/documents/issue-papers/sust_in_balance_5.pdf*

This document summarizes recent data related to injustice in the food system. It provides statistics on health and labor issues, as well as summarizing efforts attempting to address these disparities.

Center for Disease Control and Prevention. 2013. *Antibiotic Resistance Threats in the United States: 2013.* U.S. Department of Health and Human Services. *www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf*

Coleman-Jensen, A., M. Nord, and A. Singh. 2013. *Household Food Security in the United States in 2012.* Economic Research Report Number 155, Economic Research Service, United States Department of Agriculture. *www.ers.usda.gov/publications/err-economic-research-report/err155.aspx#.Uwu0wF6V8pd*

Food and Agriculture Organization of the United Nations. No Date. *Hunger Portal. www.fao.org/hunger/en/*

This interactive website give statistics on hunger world-wide, by country and year.

Freinkel, Susan. 2014. Warning signs: How pesticides harm the young brain. *The Nation.* March 11. *www.thenation.com/article/178804/warning-signs-how-pesticides-harm-young-brain#*

This article summarizes new research on neurological effects of pesticides, particularly on the children of farm workers.

Johns Hopkins Center for a Livable Future. 2010. Hunger and Food Security: Background Reading. From *Teaching the Food System Curriculum. www.jhsph.edu/research/centers-and-institutes/teaching-the-food-system/curriculum/_pdf/Hunger_and_Food_Security-Background.pdf*

This 6-page document provides a useful introduction to hunger and food security. It is intended as an overview for students.

Perkins, Tracy. 2009. 25 Stories from the Central Valley. *twentyfive.ucdavis.edu/exhibit.aspx*

This online photo exhibit documents the health impacts from agriculture pesticides and pollution on the primarily of color and poor residents of California's central valley, as well as actions of the women activists working for environmental justice.

Pesticide Action Network. No Date. *www.panna.org*

This is a useful website for information on pesticides, including their impacts on health and the environment.

Pew Commission on Industrial Farm Animal Production. 2009. *Putting Meat on the Table: Industrial Farm Animal Production in America.* A Project of The Pew Charitable Trusts and Johns Hopkins Bloomberg School of Public Health. *www.ncifap.org/_images/PCIFAPFin.pdf*

This document provides an excellent overview of the broad issues and problems stemming from large scale animal production. It reviews how the current situation developed, public health issues, environmental impacts, animal welfare issues, effects on rural residents and suggested solutions.

Rosset, Peter, Joseph Collins, and Francis Moore Lappé. 2000. Lessons from the Green Revolution: Do we need technology to end hunger? *Tikkun Magazine* 15(2) (March/April 2000): 52-56.

Good "Food First" connection of the issues of hunger, agricultural technology, ecology, income, and power.

Schafft, Kai A., Eric B. Jensen, and Clare Hinrichs. 2009. Food deserts and overweight school children: Evidence from Pennsylvania. *Rural Sociology* 74(2), pp. 153-177

Steingraber, Sandra. 2010. *Living Downstream: An Ecologist's Personal Investigation of Cancer and the Environment.* Philadelphia, PA: Da Capo Press.

This well-written book explores the relationship of chemicals (agricultural and others) in our environment to cancer, through both the science and the author's own story as a biologist and cancer survivor. An important and engaging effort.

Schoonover, Heather, and Mark Muller 2006. *Food without Thought: How U.S. Farm Policy Contributes to Obesity.* Instituted for Agriculture and Trade Policy. March 2006. *www.iatp.org/files/421_2_80627.pdf*

Troy, Lisa, Emily Ann Miller, and Steve Olson. 2011. *Hunger and Obesity: Understanding a Food Insecurity Paradigm* (workshop summary). Institute of Medicine of the National Academies. The National Academies Press. Washington D.C.

World Health Organization. No Date. *Trade, Foreign Policy, Diplomacy and Health: Food Security. www.who.int/trade/glossary/story028/en/*

OTHER RESOURCES

Alkon, Alison Hope, and Julian Agyeman, eds. 2011. *Cultivating Food Justice: Race, Class, and Sustainability.* Cambridge, MA: MIT Press.

This edited book offers a series of narratives exploring how race and class are intertwined in the food system. Its premise is that much of the food movement has come from white and middle-class people, who come from a shared perspective. This book intends to provide a broader critique of the industrialized food system, including injustice in the conversation.

Allen, Patricia. 2004. *Together at the Table: Sustainability and Sustenance in the American Agrifood System.* University Park, PA: Pennsylvania State Press.

Examines the growth and development of alternative food system initiatives in the U.S., including: The growth of organic farming and the development of the USDA National Organic Program; the growth in popularity of direct marketing relationships such as farmers' markets and community-supported agriculture (CSA); the growth of urban agriculture and community garden programs; the increase in natural and social science research programs focused on sustainable food and farming systems.

Cunningham, Brent. 2010. Food fighter: Grist's Tom Philpott on why class needs to be a part of the food debate. *Columbia Journalism Review,* 4 May. Online.

Friedland, William H. 1981. *Manufacturing Green Gold.* Cambridge, MA: Cambridge University Press.

A classic work describing how agricultural industry structure is related to the social relations of production and technological change.

Gottlieb, Robert, and Anupama Joshi. 2010. *Food Justice.* Cambridge, MA: MIT Press.

This book describes the myriad issues pertaining to food justice, such as farmworkers' and meat processing workers' conditions, food access issues, and over-processing of food. The book also describes the food justice movement that has arisen from these conditions. It tells the stories of groups and individuals working to make change, both in the U.S. and internationally.

Guthman, Julie. 2008. "If they only knew": Color blindness and universalism in California alternative food institutions. *The Professional Geographer* 60 (3):387-97.

Patel, Raj. 2007. *Stuffed and Starved*. Brooklyn, NY: Melville House Publishing.

Excellent book that provides an overview of the current food system and the results of the choices made by corporations, governments, farming communities, and others. Topics covered include farmer suicides, migration, trade agreements and development, agribusiness winnings, control of seed, and the example of soybeans—where all the factors described come together. Also includes a focus on the power of the supermarket industry and how people are constrained as consumers.

FILMS AND VIDEOS

A Place at the Table. 2012. Magnolia Pictures (84 minutes).

www.magpictures.com/aplaceatthetable/

This film explores the issue of hunger in the U.S. It follows three families as the grapple with food insecurity, and explores the reasons behind it. The film makes the point that we can do something to end it.

Food Stamped: Is It Possible to Eat Healthy on a Food Stamp Diet? 2011. By Shira and Yoav Potash. Summit Pictures (62 minutes).

www.foodstamped.com

This documentary chronicles a couple as they attempt to live in a healthy manner on a food stamp budget. During this experiment, they also consult with others in the food system: those on food stamps, congress members, nutrition experts, etc.

Forgotten Voices: The Story of the Bracero Program. No Date.

www.youtube.com/watch?v=AL5d9CWV0Xg

This 7-minute video provides an excellent overview of one group of immigrants' experience, under one policy program. It provides a very descriptive look at the lives of these workers, including the abuses and reasons for those participating, in the program.

The Harvest / La Cosecha: The Story of Children Who Feed America. 2011. (80 minutes).

theharvestfilm.com

This film documents child labor in U.S. agriculture.

Slavery and the Making of America. 2004. Thirteen/ WNET New York.

www.pbs.org/wnet/slavery/index.html

This multipart series includes the history of slavery and agriculture. This website contains interactive features. Check Youtube *for video episodes.*

Soul Food Junkies. 2012.

www.pbs.org/independentlens/soul-food-junkies

In a quest to understand why his father is unwilling to change his traditional soul food diet while dealing with a serious health issue, the filmmaker ". . . sets out to learn more about this rich culinary tradition and its relevance to black cultural identity." He explores the issues through conversations with a variety of people in the food system, and identifies socio-economic issues that play a large role. He also explores solutions by speaking with those in the food justice movement making those changes happen, including making healthier versions of soul food.

CURRICULUM RESOURCES: SEE UNIT 3.1, RESOURCES

3.3

Environmental Issues in Modern Agriculture

Introduction: Environmental Issues in Modern Agriculture

OVERVIEW

This unit introduces students to the most common agricultural practices employed in conventional production, and the major agricultural, environmental, and human health concerns that have arisen as a result of their use over the last century.

Two lectures cover the socioeconomic factors that shape conventional modern agricultural production; key elements of modern agriculture and their environmental and human health impacts; and critical interactions between natural and agroecosystems. The lectures also present the set of alternative farming practices that have been used to avoid risks to environmental quality and human health. The lectures conclude with a discussion of the policy, regulatory, and economic factors that reinforce the conventional agriculture model and the policy and economic changes that need to take place in order to develop more sustainable productions systems.

Note: It is important to convey to students that many "conventional" farming operations, though not operating under National Organic Program organic certification, often integrate many of the "sustainable agriculture" practices outlined in this manual. Further, it is important to discuss that mere adherence to the minimum requirements of organic certification does not necessarily constitute sound agricultural practices. Students should understand that agriculture itself (whether "certified organic" or "conventional") is one of the most extensive and environmentally disruptive land use practices that human beings currently employ. Additionally, it is important to stress that it is often market pressures and the need to maintain a competitive advantage/economic viability that have encouraged individual farmers to adopt agricultural technologies that have later proven to have negative environmental or human health consequences. Lastly, though environmental degradation often results from the simple misuse or over-application of agricultural technologies (e.g., synthetic N-P-K fertilizers), certain agricultural technologies (e.g., GMOs and pesticides) currently pose either an unknown or well-substantiated environmental quality and/or human health risk.

MODES OF INSTRUCTION

> LECTURES (2 LECTURES, 50 MINUTES EACH)

Lecture 1 reviews a framework of analysis to understand the factors driving change in modern agricultural systems—technology and capital—and an explanation of how changes in production have impacted environmental and human health.

Lecture 2 includes an overview of alternative agricultural practices and concludes with an examination of the necessary policy and economic changes needed for their widespread adoption.

References given in the outlines are described in the References and Resources section.

LEARNING OBJECTIVES

CONCEPTS

- The environmental impacts of modern agriculture are the consequence of the paths of technological development taken in this country
- The "technology treadmill": The technological package of modern agriculture as a system with its own internal logic, fueled and maintained by the techno-scientific and socioeconomic systems in which it is situated
- The development of agricultural mechanization, agricultural chemicals, and agricultural biotechnology and their impact
- The major environmental impacts and human health risks of modern agriculture: Water, soil, and air, biological diversity, and human health
- The barriers to adoption of conservation measures that would reduce these risks
- The set of organic/sustainable farming practices that are used to avoid risks to environmental quality and human health
- The policy and economic changes that need to take place in order to develop more sustainable productions systems

Lecture 1: Technological Innovations

A. The Shaping of Conventional Agriculture: Technological Innovations, Investment Capital, and the Technology Treadmill (see Cochrane 1993; FitzSimmons 1986; Heffernan et al. 1999)

1. The initial resistance of agriculture to the forces of capitalism
   a) Crop production as high-risk investment: Capital investors initially reluctant to invest in agriculture with productivity and profit being tied to biological processes and variables of natural environment
2. New agricultural technologies and capitalist investment
   a) As new agricultural technologies were developed and introduced into agriculture, capitalist investors found it more profitable to invest in the technologies rather than crop production itself
   b) Consequences
      i. Farmers become dependent upon constantly evolving inputs of agricultural technology
      ii. Agricultural technologies require substantial financial investment, thus requiring many farmers to obtain loans to reinvest in technology
      iii. Capital investors and technology manufacturers control agricultural technology
      iv. The restructuring of farm economics: New technology requires access to capital (loans, credit) for investment. This favors larger, well-capitalized farmers or farming corporations and puts smaller farmers at a competitive disadvantage, who often have to sell out, contributing to the growth in farm size and the loss of more small farms.
3. "The technology treadmill"
   a) The technology treadmill defined: The self-reinforcing cycle of technological dependency, driven by the application of technology and investment capital to agriculture
      i. Competition in the marketplace encourages the adoption of new agricultural technologies that allow for increases in efficiency or increases in the scale of production
      ii. Increased efficiency, increases in the scale of production convey a competitive advantage through the economies of scale
      iii. Crop prices are driven down because of efficiencies in production and the reduced costs per unit produced
      iv. This drives some small producers out of business because they cannot access the credit needed to invest in the latest technology that is now essential in competing in the market place
      v. Concurrently, this encourages producers to further increase the scale of production to have the size of operations necessary to cover their debts incurred through purchases of technology inputs
      vi. The agricultural technologies used in expanding the scale of production have had significant social and environmental consequences

B. Technological Innovations and Practices Used in Conventional Agriculture

1. Fossil fuel use in conventional agriculture
   a) Fossil fuel was first used on the farm to replace human labor and animal power. It was a great labor-saving device. It laid the foundation for monocultural production (through tractors) and long distance shipping of agricultural products.
   b) The influence of fossil fuel
      i. Economically subsidized in many ways: Highways; lower prices for larger volumes of fuel used; externalized environmental costs (e.g., CO_2, oil spills, etc.)
      ii. Inexpensive fossil fuel power makes long-distance, cross-country, and international transportation of food and fiber cost effective. Cost effectiveness of international import agriculture is further assured by lower costs of production in developing nations due to lower environmental and social justice standards.
      iii. Local and sustainable food systems cannot compete against large-scale agriculture with economically efficient long-distance food transport and the suite of externalized costs
2. Monoculture cropping systems (see Kimbrell 2002)
   a) Monoculture defined: The planting of genetically similar or uniform crop varieties over large tracts of land, sometimes without rotation to other crops in space or time
   b) Scale of monocultures: Monocultures can occupy hundreds to thousands of acres of land
   c) Known and potential agroecological risks:
      i. Agriculture as environmental degradation: With 600 million hectares worldwide, and 943,000 acres of arable land under cultivation in the U.S., it is the most extensive terrestrial-based activity
      ii. Agriculture has resulted in the conversion and degradation of grassland, woodland, and wetland ecosystems in the U.S. and around the world
      iii. Highly simplified agricultural ecosystems maintain large carrying capacity for "pest" organisms and low carrying capacity for natural predators of agricultural pests
      iv. Narrow and therefore vulnerable crop gene-pool
      v. Dependency on biocides to control pests
      vi. Soil loss and siltation of waterways through wind and water erosion in the absence of cover crops
      vii. Uninterrupted pest/host relationship resulting in buildup of pest and pathogen populations
3. Hybrid seed (see Kloppenburg 2004)
   a) History of seed production: Historically, farmers selected seed from the crop plants that produced well in a given area. This assured a locally adapted crop gene pool.
   b) Though rapidly changing, this is still the practice in most of the world today
   c) The development of off-farm selective breeding programs
      i. Geneticists began controlled breeding of corn varieties in the first half of the 20th century to improve yields
      ii. Hybrid seed varieties—a product of a forced cross between homogeneous inbred lines—have superior traits, such as uniformity in growth and yield, uniform ripening, better taste, consistent germination, and processing and shipping qualities
      iii. Traits in hybrid seeds can only be assured during the first generation, requiring farmers to buy hybrid seeds annually
      iv. This created a huge economic opportunity for seed companies by generating input dependence by farmers on these high-yielding seeds

v. It also meant that entire counties or states could have near-uniform and therefore vulnerable crop genetics

d) The adoption of hybrid seed
   i. Government agencies and seed companies conducted extensive campaigns to "modernize" farmers by persuading them to buy "improved" seeds
   ii. Farmers who were resistant, either because they suspected efforts to make them buy off-farm inputs, or because they simply saw no reason to change, were ridiculed
   iii. As early adopters began to profit from improved seeds, they were able to outcompete their neighbors
   iv. Early adopters of agricultural technologies began to buy their neighbors out, encouraging the concentration of ownership

e) Known and potential agroecological risks
   i. The loss of genetic diversity of crop plants
   ii. They may lack traits that have other ecological functions, such as disease resistance
   iii. Narrow genetic base and therefore vulnerable to pests and pathogens
   iv. Dependency on pesticide use
   v. Loss of biodiversity of sexually reproduced crop plants
   vi. Input dependence by farmers

4. GE: Genetically Engineered organisms (see Gurian-Sherman 2009; *www.centerforfoodsafety.org*; Kimbrell 2002)
   a) What are genetically engineered (GE) organisms?

      Genetic engineering (GE) is the transfer of genes from one organism to another through means that do not occur without human intervention. This involves isolating and then moving genes within and without different species by recombinant DNA techniques and other manipulation of the genetic construct outside the traditional practices such as sexual and asexual breeding, hybridization, fermentation, in-vitro fertilization and tissue culture.

   b) Examples of GE technologies
      i. Bt-producing crops, herbicide-resistant crops, vitamin-producing crops, pharmaceutical crops, GE animals (e.g., salmon)
      ii. Terminator seeds: Despite the moratorium since 2001, there is increasing pressure to use them. (Watts and Vidal 2013).

   c) Claims about benefits of GE crops
      i. Feeding the world: However, malnutrition and hunger are largely problems of maldistribution of food and poverty, not of underproduction
      ii. Reducing pesticide use: Bt crops appear to be reducing the use of pesticides. However, increasing insect resistant to Bt is a concern. In contrast, herbicide use has increased as GE crop plants have higher tolerances for herbicides (Benbrook 2012).
      iii. Increasing yield: A recent Union of Concerned Scientists report states that looking at studies for the past 20 years, there has been little increase in yield from GE crops. They suggest overall yield increases in corn are based on non-genetic engineering approaches (Gurian-Sherman 2009).
      iv. Other claims: Herbicide-resistant crops require less work, allowing farmers more time. However it puts farmers on the technological treadmill, having to pay more for input solutions to problems instead of managing problems by working within natural systems.

   d) Worldwide increase in the use of GE technology
      i. Herbicide-resistant crops (HRCs) and insect-resistant crops (Bt crops) accounted for 59 and 15 percent respectively of the total global area of all transgenic crops in 2000

ii. Worldwide, transgenic crops increased at a rate of 6% per year, for the past 17 years. As of 2012, there were 170.3 milling hectares in biotech crops (International Service for the Acquisition of Agri-Biotech Applications 2012).
iii. The U.S., Brazil, Argentina, and Canada, had the most acreage in GE crops in 2012. The most commonly grown crops worldwide are herbicide-tolerant soybeans (47% of biotech), stacked traits maize (23%) and Bt cotton (11%) (International Service for the Acquisition of Agri-Biotech Applications 2012).

e) Known and potential agroecological and human health risks
i. Potential human allergens: Viral vectors and antibiotic markers are used to verify successful trans-genetic engineering
ii. Potentially unknown viruses, toxins, and pathogens could be created by vector-mediated horizontal gene transfer and recombination
iii. The "escape" of trans-genetic genes via wind and insect pollination to wild plant weeds of the same species resulting in irreversible genetic pollution
iv. Additional farmer dependency on technological inputs
v. Ethical questions around intellectual property rights of germplasm
vi. Loss of genetic diversity of crop plants through the abandonment of regional selection of sexually reproduced seed
vii. Loss of effectiveness through rapid evolution of resistance of biocontrol pesticides for organic systems: Example, Bt corn
viii. Transfer of genes/contamination of non-GMO and certified organic crops
ix. Reduction of the fitness of non-target organisms through the acquisition of transgenic traits via hybridization
x. The rapid evolution of resistance of insect pests such as to Bt
xi. Soil accumulation of the insecticidal Bt toxin
xii. Disruption of natural control of insect pests through intertrophic-level effects of the Bt toxin on natural enemies of agricultural pests
xiii. Unanticipated effects on non-target herbivorous insects (e.g., monarch butterflies) through deposition of transgenic pollen on foliage of surrounding wild vegetation

f) GMOs as a crisis of democracy
i. FDA has made the regulatory determination that they are "substantially equivalent" to non-GMO foods and that minimal testing needs to be done, and they need not be labeled. Simultaneously, industry has pursued patent rights for GMOs, which require novelty.
ii. GMOs sold and in widespread use before long-term studies on ecological and human health risks were conducted
iii. Question: Do individuals have the right to be informed of the potential environmental quality and human health risks associated with GMO as with other products (e.g., tobacco, alcohol, gasoline)?

5. Synthetic pesticides: herbicides, insecticides, rodenticides, and fungicides (see Benbrook 1996; Kegley 1999, 2000; Reeves 1999; Kimbrell 2002)
a) Pesticides as "biocides": A pesticide is any substance or mixture of substances used to destroy, suppress, or alter the life cycle of any target organism. A pesticide can be a naturally derived or synthetically produced substance. Pesticides are not able to discriminate between target and non-target organisms with similar physiology.
b) Origins of synthetic biocides: Developed in WWI and WWII as warfare agents and later applied to agriculture
c) How pesticides work: The physiology of biocides (see *www.epa.nsw.gov.au/)*

i. Physical toxicity pesticides: Block the cellular processes of target organisms in a purely mechanical way. Examples include spray oils that clog the respiratory mechanism of insects.

ii Metabolic system inhibitors: There are many inhibitory pesticides in this category, such as rotenone and cyanide, that disrupt respiratory functions in animals; herbicides that inhibit seed germination or plant growth (especially at the root and shoot tips); and fungicides that inhibit germination of spores

iii. Protein synthesis and enzyme disruption: Proteins such as enzymes control many important cell functions. Many pesticides aim to disrupt enzyme processes or denature proteins. Examples include inorganic copper compounds, dithiocarbamate fungicides, phosphono amino acid herbicides such as glyphosate, and organophosphate insecticides.

iv. Hormonal system interference: Several pesticides simulate or otherwise interfere with hormones to disrupt hormone cycles. Examples are the phenoxy herbicides that interfere with plant growth hormones and insect growth regulators that interfere with cuticle formation in insects during molting.

v. Nervous system disruptors: These pesticides affect mainly animal groups such as insects, nematodes, and rodents. Some are narcotics such as some fumigant pesticides. Others disrupt the movement of nerve impulses, such as the organophosphate, carbamate, and pyrethroid pesticides.

vi. Photosynthetic inhibitors: Pesticides that disrupt photosynthesis prevent the plant from producing or storing energy and ultimately kill the plant. Examples include the triazine, substituted urea, and uracil herbicides.

vii. Some pesticides work in more than one way and fall into more than one of these categories. The modes of action of many pesticides are not fully understood.

d) Current trends in sales and use of biocides in agriculture (see Kegley 2000)

i. California: ~160 million pounds of active ingredients/year [1]

ii. U.S.: 1,133 million pounds active ingredients were estimated to have been used in 2006 and 2007 [2]

iii. Misleading terms: Active ingredients and "inert" ingredients. Pesticide formulation may contain 99% inert ingredients. Many inert ingredients have adverse health effects and may be active ingredients in other pesticide formulations.

e) Known and potential environmental and human health risks (see Kegley 1999, 2000; Reeves 1999; Moyers 1993)

i. Toxicity to non-target organisms, including natural enemies of agricultural pests

ii. Surface and groundwater pollution: Toxicity to aquatic wildlife and humans through drinking water

iii. Bio-accumulation in wildlife populations

iv. Effects on the physical environment (e.g., methyl bromide and ozone depletion)

v. Acute poisoning and occupational exposure of farmers and agricultural workers with known endocrine-disrupting compounds, known and suspected carcinogens, and nerve toxins. (3 million human pesticide poisonings, and 220,000 deaths attributed to pesticides worldwide/year.)

---

1 Californians for Pesticide Reform. 2010. Healthy children and green jobs: A platform for pesticide reform. San Francisco, CA. *pesticidereform.org/downloads/CPR-Platform-Nov-2010.pdf*

2 Grube, A, D. Donaldson, T. Kiely and L. Wu. 2011. Pesticides industry sales and usage: 2006 and 2007 market estimates. U.S. Environmental Protection Agency. *www.epa.gov/opp00001/pestsales/07pestsales/market_estimates2007.pdf*

vi. Dietary exposure to endocrine-disrupting compounds, known and suspected carcinogens and nerve toxins
vii. Potential synergistic effects of exposure to environmental toxins with similar mechanisms of toxicity
viii. Soil degradation: Reduce biological activity and diversity
ix. Developed resistance and resilience in pest populations
x. Dietary exposure and the safety of existing tolerance levels
xi. Pesticides disproportionately affect predaceous "beneficial organisms" over pests, creating resurgence in populations of pest organisms

f) The "logic" of pesticide use and the externalization of costs
   i. For every $1 spent on pesticides there are $3 to $5 in return[3]

g) Estimates on financial costs to mitigate environmental damage
   i. In the U.S., environmental costs are estimated to be around $10 billion, depending on assumptions (Pimentel 2005). These costs of production are not compensated for by the farmer or agrochemical company.

h) Legislation restricting the use of biocides (see Benbrook 1996)
   i. The Food Quality Protection Act of 1996 (see *www.epa.gov/opppsps1/fqpa/*)
   ii. Shortcomings of the FQPA (see *www.ecologic-ipm.com*)

6. Synthetically compounded N-P-K fertilizers (see also Supplement 4, Nitrate Contamination of Groundwater, in Unit 1.5, Irrigation—Principles and Practices)

a) What is synthetically compounded fertilizer? Synthesizing ammonia from nitrogen and hydrogen gas involves submitting nitrogen and hydrogen to at least 3,000 pounds per square inch of pressure, in the presence of osmium as a catalyst. Industrially produced synthetic ammonia is the principal source of the commercially available, industrially produced nitrogen and is the principal starting point from which all of the different kinds of industrially produced, so-called nitrogen "fertilizers" are made.

b) Known and potential agroecological and human health risks (see; U.S. Geological Survey 2010 , and Gliessman 2007)
   i. The overapplication of synthetic N, P, and K nutrients are the most extensive form of "nonpoint source" (runoff) water pollution in the U.S.
   ii Trends in nitrogen concentrations have changed little between 1993 and 2003. In places where there are changes, they tend to show increases rather than decreases (U.S. Geological Survey 2010).
   iii. The overapplication of N-P-K fertilizers has greatly altered the global N and P cycles with unknown consequences (Gliessman 2007)
   iv. Surface water contamination: N-P-K contamination leads to growth of algae and other plants (this process is called eutrophication). The plants utilize available oxygen and block sunlight penetration, harming fish and other marine organisms. This leads to "dead zones," e.g., in the Northern Gulf of Mexico (see Carpenter et al. 1998; Miller 2008; U.S. Geological Survey 2010).
   v. Energy-intensive production: Nitrogen fertilizer requires large amounts of natural gas, both to contribute hydrogen to the nitrogen, but also adding heat manufacture it. Fertilizer prices tend to be in line with those of natural gas (see Miller 2008; Sawyer et al 2010).

3 United States Environmental Protection Agency. 2012. Agricultural Pesticides.*www.epa.gov/oecaagct/ag101/croppesticideuse.html*

vi. Drinking water contamination: Nitrate poisoning. Elevated nitrate levels in drinking water wells are common in agricultural areas and have resulted in a rare infant disease called methemoglobinemia ("blue-baby syndrome"; see *www.cdfa.ca.gov*).
    - In rural agricultural areas, 20% of shallow wells have nitrate levels above the federal drinking water standard (U.S. Geological Survey 2010)
vii. Excess nitrogen in crops can lead to increased susceptibility to pests and pathogens and poor post-harvest handling (Young, 1999)
viii. Soil degradation: Increased loss of soil organic matter; decreased soil biological activity and diversity; reduced aggregation and aggregate stability and the decline in desirable physical properties; increased soil erosion by wind and water; reduced nutrient availability through biological activity; increase susceptibility to pests and pathogens; increased dependence on synthetic chemical fertilizers and pest control agents to maintain productivity (Magdoff 2000)

7. Concentrated Animal Feeding Operations (Gurian-Sherman 2008 and Pew Commission on Industrial Farm Animal Production 2009)
    a) The number and size of Confined Animal Feeding Operations (CAFOs) have increased
        i. Hog operations went from over 500,000 in 1982 to 60,000 in 2006, with no decrease in production overall
        ii. The average size of a CAFO in 2004 was 12,000 animals in the Southern U.S.
    b) Large amounts of manure create concentration of nutrients, resulting in significant nutrient pollution of air, water, and groundwater (e.g., nitrate contamination and eutrophication of surface waters)
8. Agricultural water use (Reisner 1993)
    a) In the Western U.S., roughly 90% of water diversion and supply goes to agriculture (U.S. Department of Agriculture 2013)
    b) There are about 75,000 dams nationwide, and about 1500 in California
    c) Environmental consequences of dams and water diversion
        i. Dams degrade aquatic and riparian ecosystems by altering natural river flows, preventing flood flows necessary for the maintenance of habitat and wetlands, disrupting natural water temperatures, and reducing water quality
        ii. In California, dams block 90% of the anadromous fish habitat for Chinook salmon and steelhead trout (Patrick 2005)
    d) Groundwater depletion (see *water.usgs.gov/ogw/gwrp/stratdir/future.html*)
        i. The overdraft of groundwater is resulting in the depletion of underground aquifers, resulting in increased costs of harvest and eventual loss of the resource
        ii. Groundwater depletion in coastal areas may result in saltwater intrusion and salt contamination of ground water
        iii. Land subsidence: Land compaction and sinking due to water extraction can damage buildings and infrastructure, as well as permanently decreasing the storage capacity available
    e) Salinity problems
        i. Salinity results from the accumulation of salt in the soil, resulting from the use of irrigation in poorly drained soils
        ii. High soil salinity may result in the interference of water uptake and circulation leading to moisture stress in crop plants
        iii. More than half of irrigated agricultural lands in California are affected by elevated salinity (University of California Agricultural Issues Center 2009)

9. The environmental consequences of international trade liberalization policies (see Korten 2001)

   International trade liberalization policies (e.g., NAFTA and GATT) allow capital investors and U.S. and European food corporations to secure profits through the production of agricultural products in less developed nations (LDN). Costs of production in LDNs are much lower due to LDNs having lower environmental quality and social justice standards. These inexpensive products with many associated externalized costs are imported to the U.S. and Europe and sold at very low prices at large retail outlets.

10. Summary: Conventional agriculture, soil degradation, and the technology treadmill (see Magdoff 2000)

    Market competition and the absence of laws restricting the use of agrochemicals encourage the adoption of new agricultural technologies that allow for increases in the efficiency and scale of production (e.g., monocultures, pesticides, synthetic N-P-K fertilizers, hybrid and GMO seeds). Large-scale monocultures create a large carrying capacity for "pest" organisms and low carrying capacity for natural predators of agricultural pests by simplifying the agroecosystem and surrounding plant communities. This results in the population growth of pest organisms and the inability of natural predators of insect pests to effectively prevent pest outbreaks. Pesticides are therefore applied in an attempt to control pest populations.

    Pesticides disproportionately affect predaceous natural enemies of insect pests, resulting in the resurgence of insect pest populations and the development of genetic resistance of pests to pesticides. Pesticides become less effective and the intensity of pesticide use increases. The overuse of synthetic nitrate fertilizer may result in excessive vegetative growth and poor post-harvest quality, both of which are highly susceptible to pests. Pesticides are therefore applied in an attempt to control pest organisms.

    Synthetic N-P-K fertilizers do not replace the organic matter necessary to maintain the soil biological diversity and activity needed to maintain disease suppression and desirable physical properties of agricultural soils. The use of synthetic fertilizers and the absence of sound crop rotation and cover cropping may encourage soil erosion and compaction, reduce the water- and nutrient-holding capacities of soil, and result in poor growing conditions for crops, leading to an increased susceptibility to both pests and pathogens. Intensive use of fertilizers, new pesticides, and tillage are then required to maintain productivity of such systems. This often results in further soil degradation and the unintentional exposure of agriculture workers, wildlife, and the general public to elevated levels of pesticides and nitrates in food and groundwater.

    Agriculture itself (whether "certified organic" or "conventional") is one of the most extensive and environmentally disruptive land-use practices, where terrestrial plant and animal communities are converted to row crops and enormous amounts of water are diverted to supply needed irrigation water. Irrigation water has led to elevated salt levels, which may result in the interference of crop plants to access and regulate moisture. Water diverted from rivers has resulted in the degradation of these aquatic ecosystems through the erection of dams. Overdraft of underground aquifers for agricultural use has led to the depletion of this resource, and in coastal areas, to the intrusion of saltwater into agricultural wells.

    GMO crops pose an unknown environmental and human health risk, reduce the diversity of crop genetics and, where adopted, create further input dependence for farmers. Hybrid seed reduces the diversity of crop genetics and creates further input dependence for farmers.

Lecture 2: Alternatives to Conventional Agriculture

A. Viable Alternatives to Conventional Agriculture: Sustainable and "Organic" Agriculture Practices (see Pesticide Action Network of North America 2009; National Research Council 1989; Magdoff 2000; see also Part 1, Organic Farming and Gardening Skills and Practices)

1. Soil health management: Maintaining optimal soil chemical properties
   a) Nutrient budgeting based on balancing nutrient inputs with outputs: Matching crop demand with nutrient contribution of inputs. This approach attempts to assure that nutrient needs are met without creating nutrient excesses and their associated problems (e.g., nutrient runoff, leaching/nonpoint source pollution, pest susceptibility, and poor post-harvest quality).
   b) Practices
      i. Cover crops: Non-market crops, some of which are used to fix atmospheric nitrogen and carbon; cycle nutrient inputs and sub-soil nutrients (e.g., N and P respectively); stimulate soil biological activity; prevent nutrient leaching
      ii. Compost: Depending on compost feedstock, can be a source of N-P-K and micronutrients; stimulates soil biological activity necessary for nutrient release
      iii. Naturally occurring soil amendments and fertilizers: Supplies nutrients
      iv. Proper irrigation: Prevents leaching of mobile nutrients
2. Soil fertility management: Soil physical properties
   a) Perennial cover crop rotation: Allows soil to remain undisturbed and aggregate formation to proceed
   b) Properly timed and quantity of tillage: Prevents compaction of soil and unnecessary oxidation of soil organic matter (SOM)
   c) Cover crops: Prevent soil erosion; stimulate soil biological activity; allow soil to rest and aggregate formation to proceed
   d) Compost: Stimulates soil biological activity, diversity, and aggregate formation
   e) Proper irrigation: Prevents soil erosion
3. Non-toxic pest management
   a) Sound soil fertility management (see above)
   b) Polycultures: Diversity of crop plants maintains more even carrying capacity for pests and beneficial insects
   c) Biocontrol of pest organisms, e.g., using releases of predaceous, parasitic, and parasitoid insects to reduce pest populations
   d) Farmscaping: Non-crop vegetation used to encourage habitat for beneficial organisms and/or encourage pests away from market crop (trap crop)
   e) Cover crops: Rotating crops interrupts pest-host cycle and attracts natural enemies of agricultural pests; stimulates soil biological activity; allopathic control of pests
   f) Compost: Stimulates soil biological activity and diversity that encourage disease-suppressive qualities of soils
   g) Mating disruption: Pheromone releases timed with mating periods
4. Open-pollinated seed varieties: Maintain viability of regionally adapted (i.e., disease resistant) crop cultivars

B. Making Agriculture Practices in the U.S. More Environmentally Sound

(see Youngberg et al. 1993; Lockeretz 1997; Hassanein 1999)

1. Recognize what has driven change in agriculture over the past century: A complex interaction of social forces that have different impacts under different ecological conditions
2. Second step: Recognize that the primary instruments of change have been investment capital and technological developments
   a) Behind these instruments are a host of social structures that have influenced our relationship to food and food production: capitalist economics, national policies, changes in the agricultural workforce, reduction in food costs and increased availability of foods, changes in diet preferences, and attitudes toward the role of food in culture
3. To effect change, advocates will have to work intensively in particular areas but link up with others working on a broad range of reforms
4. Economics
   a) Support of policy initiatives that encourage local economic development that allows social and environmental values to be incorporated into the price structure of foods
5. Policy, science, technology, and education
   a) Continued educational efforts in informing consumers of the relationship between personal food choices, the food systems these choices support, and the associated social and environmental consequences
   b) Citizen participation in U.S. agricultural public policy (e.g., Farm Bill) in support of funding federal programs that financially support the adoption of conservation farming practices
   c) Citizen encouragement of agricultural public policies to fund federal programs for alternative agriculture, environmental, and food system research in U.S. agricultural colleges
   d) Consistent and sustained pressure on the public institutions that direct research trajectories (e.g., Land Grant institutions)
   e) Integration of conservation farming education into Cooperative Extension services
6. Policy: See Policy Initiatives in Unit 3.4, Sustainable Agriculture and Sustainable Food Systems
7. The importance of human values in shaping agriculture
   a) Recognize that attitudes toward food are shaped by broad social circumstances such as the cost of living, changes in the roles of women in society, food products advertising, the number of persons directly involved in food production, knowledge of food and agricultural systems and their social, environmental, and health consequences
   b) With knowledge of food and agricultural systems and the associated social, environmental, and health consequences, individuals may be compelled to emphasize locally produced seasonal and organic foods
   c) Education on food costs and fast foods may encourage more Americans to spend less money on food outside the home
   d) Re-emphasizing eating as a social act that builds family and community can assist the necessary changes in diet, the local agricultural economy, and the broader food system

Discussion Questions

ENVIRONMENTAL ISSUES IN MODERN AGRICULTURE, LECTURES 1 & 2

1. Why do you think it is important to understand the environmental impacts of the agriculture and food system?
2. What did you learn from these two lectures that was surprising to you? Why was it surprising? What did you previously assume to be true?
3. What are some of the most concerning issues raised? Why?
4. Are there any topics from these lectures that you are interested in learning more about? Why? How will you go about learning it?
5. How does learning about this material impact the way you intend to participate in the food system (as a farmer, activist, consumer, etc.)?

References & Resources

SUGGESTED READINGS FOR STUDENTS (DESCRIBED BELOW)

- Carpenter et al., 1998
- Teaching the Food System, 2010
- Gliessman, Stephen R., 2014. Chapters 1-2

PRINT REFERENCES & RESOURCES

Altieri, Miguel A. (ed.). 1995. *Agroecology: The Science of Sustainable Agriculture*. Boulder, CO: Westview Press.

Miguel Altieri is one of the pioneers in developing the discipline of agroecology, and this was the first text to lay out its major premises. Rather than present techniques for production, this text proposes an agricultural paradigm based on the science of ecology. The (second) edition contains updated essays, and still provides a thoughtful overview.

Benbrook, Charles M. 1996. *Pest Management at the Crossroads*. Yonkers, NY: Consumers Union.

The clearest summary of environmental, health, policy and economic issues surrounding pest management in the U.S. Its chapters introduce IPM—with an emphasis on biointensive IPM, review of pesticide use and risk, and discussion of economic and policy obstacles to the adoption of IPM.

Benbrook, Charles. M. 2012. Impacts of genetically engineered crops on pesticide use in the U.S.—the first sixteen years. *Environmental Sciences Europe,* 24(1), 1-13.

Carpenter, Stephen, Nina F. Caraco, David L. Correll, Robert W. Howarth, Andrew N. Sharpley, and Val H. Smith. 1998. *Nonpoint Pollution of Surface Waters with Phosphorus and Nitrogen*. Issues in Ecology 3.

Provides an introduction to the ecological impacts of nutrient run-off. Although the article's scope is much broader than agriculture, it explains the biochemical processes that occur when excess nutrients enter waterways; appropriate for non-science majors. Available from www.esa.org/issues.htm

Cooper, Ann. 1999. *Bitter Harvest: A Chef's Perspective on the Hidden Dangers in the Foods We Eat and What You Can Do About It*. New York: Routledge.

Describes the health risks of modern industrial food and lax government oversight of food safety.

Conway, Gordon, and Jules N. Pretty. 2009. *Unwelcome Harvest: Agriculture and Pollution*. Sterling, VA: Earthscan.

An exhaustive overview of the relationship amongst agrochemicals, environmental impacts, and social consequences from a global perspective.

DANR (Division of Agriculture and Natural Resources). 1992. *Beyond Pesticides: Biological Approaches to Pest Management in California*. Oakland: University of California Division of Agriculture and Natural Resources.

A thorough analysis of the production-related problems of pesticide reliance in California; proposes in-creased funding for research and extension of biological methods of pest management in the state.

FitzSimmons, Margaret. 1986. The new industrial agriculture: The regional integration of specialty crop production. *Economic Geography* 62 (4):334-353.

Gliessman, Stephen R. 2014. *Agroecology: The Ecology of Sustainable Food Systems, 3rd edition*. Boca Raton, FL: CRC.

This new edition of the bestselling textbook for courses in agroecology or sustainable agriculture updates the issues facing the sustainability of food systems, especially the strong movement from the "second green revolution" of biotechnology, the continued consolidation of the agricultural and food industries, the conflict with biofuels, and today's historical record of hungry and undernourished people worldwide. Presents recent research and provides new examples throughout, including innovative ways farms and other parts of the food system have introduced new alternative technologies to improve sustainability.

Gurian-Sherman, Doug. 2008. *CAFOs Uncovered: The Untold Costs of Confined Animal Feeding Operations*. Cambridge, MA: Union of Concerned Scientists. *www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf*

Gurian-Sherman, Doug. 2009. *Failure to Yield: Evaluating the Performance of Genetically Engineered Crops*. Cambridge, MA: Union of Concerned Scientists. *www.ucsusa.org/assets/documents/food_and_agriculture/failure-to-yield.pdf*

Hassanein, Neva. 1999. *Changing the Way America Farms: Knowledge and Community in the Sustainable Agriculture Movement*. Lincoln, Nebraska: University of Nebraska Press

Heffernan, William D., Mary Hendrickson, and Robert Gronski. 1999. *Consolidation in the Food and Agriculture System*. National Farmers Union. *www.foodcircles.missouri.edu/whstudy.pdf*

Provides the clearest and most compelling evidence of the concentrated economic control that a small number of transnational corporations have over the processing and distribution of foodstuffs.

International Service for the Acquisition of Agri-Biotech Applications. 2012. *Pocket K No. 16: Global Status of Commercialized Biotech/GM Crops in 2012*. *www.isaaa.org/resources/publications/pocketk/16/*

Kegley, Susan, Lars Neumister, and Timothy Martin. 1999. *Disrupting the Balance: Ecological Impacts of Pesticides in California*. San Francisco, CA: Californians for Pesticide Reform. *www.igc.org/cpr/publications/publications.html*

Reports in considerable detail the continuing impacts of agrochemicals on California's ecosystems.

Kegley, Susan, Stephan Orme, and Lars Neumister. 2000. *Hooked on Poison: Pesticide Use in California 1991–1998*. San Francisco, CA: Californians for Pesticide Reform. *www.igc.org/cpr/publications/publications.html*

Drawing from California's pesticide database, reports patterns of pesticide use in the state by chemical, crop, and county.

Kimbrell, Andrew, ed. 2002. *Fatal Harvest: The Tragedy of Industrial Agriculture*. Washington DC: Island Press.

A coffee table-sized book with many short essays and large photos describing the environmental and social consequences of our modern agricultural system. Provides a thorough identification of the range of consequences from this system. A lower-cost version without photos has all the essays, and would be an appropriate reader for undergraduates.

Kloppenburg, Jack Ralph. 2004. *First the Seed: The Political Economy of Plant Biotechnology, 2nd edition*. Madison, WI: University of Wisconsin.

A brilliant historical analysis of seeds, plant breeding, genetic diversity, and the appeal of biotechnology to capitalism.

Korten, David C. 2001. *When Corporations Rule the World*. Bloomfield, CT: Kumarian Press, Inc.

A central text in the emerging global Living Democracy Movements. Addresses the social and environmental consequences of economic globalization.

Lockeretz, William, ed. 1997. *Visions of American Agriculture*. Ames. IA: Iowa State University Press.

A selection of writings by experts on social and economic evolution in the agricultural sector.

Miller, G. T., and Scott E. Spoolman. 2012. *Living in the Environment, 17th edition*. Belmont, CA: Brooks/Cole Cengage Learning.

Undergraduate-level textbook in environmental science. Addresses prevalent environmental issues including problems in modern conventional agriculture and alternatives.

National Research Council. 1989. *Alternative Agriculture*. Washington, D.C.: National Academy Press.

This book was significant because of the scientific legitimacy it accorded to the emerging sustainable agriculture movement. Its methodology was criticized by both conventional and alternative agriculture advocates. Although its findings and recommendations are not particularly provocative by today's standards, it marked an important milestone in efforts to promote alternative approaches to production.

National Research Council. 1993. *Soil and Water Quality: An Agenda for Agriculture*. Washington DC: National Academy Press.

Provides the most scientifically thorough discussion of the soil and water conservation challenges facing agriculture in the U.S. Although written by scientists, its target audience is policymakers. Clear and well-organized.

Pesticide Action Network of North America. 2009. *Agroecology and Sustainable Development: Findings from the UN-led International Assessment of Agricultural Knowledge, Science and Technology for Development*. San Francisco, CA. *www.agassessment-watch.org/docs/PANNA_agroecology_Brief_20090505.pdf*

Pimentel, David 2005. Environmental and economic impacts of the application of pesticides primarily in the U.S. *Environment, Development and Sustainability.* 7, 229-252.

Patrick, Wesley S. 2005. *Evaluation and Mapping of Atlantic, Pacific and Gulf Coast Terminal Dams: A Tool to Assist Recovery and Rebuilding of Diadromous Fish Populations*. Department of Biology, East Carolina University. Proceedings of the 14th Biennial Coastal Zone Conference, New Orleans, Louisiana, July 17 to 21, 2005. *www.csc.noaa.gov/cz/CZ05_Proceedings/pdf%20files/Patrick.pdf*

Pew Commission on Industrial Farm Animal Production. 2009. *Putting Meat on the Table: Industrial Farm Animal Production in America.* A Project of The Pew Charitable Trusts and Johns Hopkins Bloomberg School of Public Health. *www.ncifap.org/_images/PCIFAPFin.pdf*

Pollan, Michael. 2002. Power Steer. *New York Times Magazine*, March 31.

Describes the modern beef production system, and its human health and environmental impacts.

Pretty, Jules N. 1995. *Regenerating Agriculture*. London: Earthscan.

Would serve well as a textbook for a sustainable agriculture class with a global perspective. Pretty does a good job integrating technical, social, and political changes that need to be put in place to make a transition to more environmentally friendly agriculture.

Reeves, Margaret, Kristin Schafer, Kate Hallward, and Anne Katten. 1999. *Fields of Poison: California Farmworkers and Pesticides*. San Francisco: Californians for Pesticide Reform.

The most complete discussion of California farmworker poisonings. Critiques the weak reporting and even weaker enforcement of farmworker protection laws.

Reisner, Mark. 1993. *Cadillac Desert: The American West and its Disappearing Water.* New York, NY: Penguin Group.

Robbins, John. 1987. Diet for A New America. Walpole NW: Stillpoint.

Discusses the human and environmental health impacts of modern agriculture and diet.

Röling, N.G., and M.A.E. Wagemakers, eds. 1998. *Facilitating Sustainable Agriculture: Participatory Learning and Adaptive Management in Times of Environmental Uncertainty.* Cambridge: Cambridge University Press.

Essays explore in detail the social changes necessary to make the technical changes possible for sustainable agriculture. The emphasis and case studies are focused on Europe and the developing world, but the principles are relevant to all.

Sawyer, John, Mark Hanna, and Dana Petersen. 2010. *Energy Conservation in Corn Nitrogen Fertilization – Farm Energy.* Iowa State University – University Extension. *store.extension.iastate.edu/Product/Energy-Conservation-in-Corn-Nitrogen-Fertilization-Farm-Energy*

Schahczenski, Jeff, and Holly Hill. 2009. *Agriculture, Climate Change and Carbon Sequestration.* ATTRA–National Sustainable Agriculture Information Service. IP 338. *attra.ncat.org/publication.html*

Provides an overview of the relationship between agriculture, climate change and carbon sequestration. Investigates possible options for farmers and ranchers to have a positive impact on the changing climate and presents opportunities for becoming involved in the emerging carbon market.

Schlosser, Eric. 2001. *Fast Food Nation: The Dark Side of the All-American Meal.* Boston: Houghton Mifflin.

Contains great chapters on food safety, meat packing, and the implications of a fast food diet.

U.S. Department of Agriculture. 2013. *Irrigation & Water Use*. Economic Research Service. Updated June 7, 2013. *www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use.aspx#.U2WGuS8oyCQ*

U.S. Geological Survey. 2010. Nutrients in the Nation's Streams and Groundwater, 1992-2004. Reston, Virginia: USGS Circular 1350.

University of California Agricultural Issues Center. 2009. *Soil Salinization*. AIC White Papers on California Agricul-tural Issues. *aic.ucdavis.edu/publications/whitepapers/Soil%20Salinization.pdf*

USGS. 2000. *Water Quality in the Sacramento River Basin, California, 1994-1998*. Reston, Virginia.

Reports describe a thorough investigation into the water quality in U.S. and California rivers and streams.

Youngberg, Garth, Neill Schaller, and Kathleen Merrigan. 1993. The sustainable agriculture policy agenda in the United States: Politics and prospects. In *Food for the Future,* Patricia Allen, ed. New York: John Wiley.

Wright, Julia. 2009. *Sustainable Agriculture and Food Security in an Era of Oil Scarcity: Lessons from Cuba*. Sterling, VA: Earthscan.

Watts, Jonathon, and John Vidal. 2013. Unease among Brazil's farmers as Congress votes on GM terminator seeds. *The Guardian*. Thursday 12 December 2013. *www.theguardian.com/global-development/2013/dec/12/brazil-gm-terminator-seed-technology-farmers*

WEB-BASED RESOURCES

Action Group on Erosion, Technology and Concentration (formerly RAFI)

www.etcgroup.org

Dedicated to the conservation and sustainable advancement of cultural and ecological diversity and human rights. Supports socially responsible developments of technologies useful to the poor and marginalized and addresses international governance issues and corporate power.

The Organic Center

organic-center.org

Viewpoints on organic, conventional and genetically engineered farming systems.

Bullfrog Films

www.bullfrogfilms.com

Source of films on environmental issues.

Californians for Pesticide Reform

www.pesticidereform.org

A coalition of over 170 public interest groups dedicated to protecting human health and the environment from the dangers of pesticide use.

Center for Food Safety

www.centerforfoodsafety.org/

Analyzes biotechnology issues.

Extension Toxicology Network

ace.orst.edu/info/extoxnet/

A source of objective, science-based information about pesticides developed by toxicologists and chemists within the Extension Service of the land-grant universities; written for the non-expert. Information fully search-able and selectively retrievable.

Food Quality Protection Act (FQPA)

www.epa.gov/pesticides/regulating/laws/fqpa/

Viewpoints on the FQPA.

Heinz Center

triblive.com/news/allegheny/4957496-74/heinz-center-endowments#axzz2vhMuCVml

The Heinz Center is a non-profit institution dedicated to improving the scientific and economic foundation for environmental policy through multisectoral collaboration among industry, government, academia, and environmental organizations.

Pesticide Action Network

www.panna.org

An excellent website containing the most recent compilations of studies on pesticide use in California and the U.S.

Sustainable Agriculture Education Association (SAEA)

sustainableaged.org/
(see "Curriculum Library")

Starting in 2014, SAEA will roll out a place where educators can share syllabi, class

exercises, assignments, and information about their degree programs.

Teaching the Food System. 2010. Agriculture and ecosystems: Background reading. A Project of the Johns Hopkins Center for a Livable Future.

www.jhsph.edu/research/centers-and-institutes/teaching-the-food-system/curriculum/_pdf/Agriculture_and_Ecosystems-Background.pdf

UC Sustainable Agriculture Research and Education Program—Agriculture Sustainability Initiative, UC Davis

www.sarep.ucdavis.edu

An excellent website for the discussion of the social, political, ecological, and agronomic aspects of "sustainable agriculture."

U.S. Geological Survey

water.usgs.gov/nawqa/

Accessible reports and maps on the water quality impacts of non-point source pollution from agriculture. These are appropriate for undergraduate students, and their maps make nice overheads for lectures.

U.S. Geological Survey

water.usgs.gov/ogw/gwrp/stratdir/future.html

The USGS Ground-Water Resources Program's efforts to examine and report on critical issues affecting the sustainability of the nation's groundwater resources.

Union of Concerned Scientists

www.ucsusa.org/food_and_agriculture/

Offers a large section on food and agriculture issues. The website includes a particularly useful section on genetic engineering, providing brief overviews as well as several reference documents.

VIDEOS

In Our Children's Food. 1993. PBS FRONTLINE special. Hosted by Bill Moyers (56 minutes).

Covers human health and environmental risks associated with pesticide exposure. Follows the politics of the development of the National Academy of Sciences' children's study: Pesticide residues in the diets of infants and children.

Oliver de Schutter: What is Agroecological Farming? 2012.

www.youtube.com/watch?v=938PECAJ920

Race to Save the Planet: Saving the Environment and Feeding the World. 1990. WGBH/PBS video.

Explores the human side of international environmental issues in agriculture and the delicate balance between progress and the preservation of the environment.

Diet for a New America. 1991. KCET /PBS video. Hosted by John Robbins (60 minutes).

From the John Robbins book of the same name. Discusses the human and environmental health impacts of modern agriculture and diet.

Playing with Poison. 2001. CBC's The Nature of Things. Force Four Entertainment (64 minutes).

American anthropologist investigates the side effects on children of pesticide use in Mexico's Yaqui Valley, one of Mexico's largest agricultural areas. Available from: www.bullfrogfilms.com

Queen of the Sun: What Are the Bees Telling Us? 2011. By Taggart Siegel and John Bets (83 minutes).

www.queenofthesun.com

An alternative look at the global bee crisis; includes interviews with beekeepers, scientists and philosophers from around the world, who reveal both the problems and the solutions in renewing a culture in balance with nature.

Symphony of the Soil. 2012. Directed by Deborah Koons Garcia (103 minutes)/

www.symphonyofthesoil.com

An artistic and scientific exploration of soil, examining its complex dynamics as well as the human relationship with soil, the use and misuse of soil in agriculture, deforestation and development, and the latest scientific research on soil's key role in ameliorating the most challenging environmental issues of our time. Filmed on four continents, featuring esteemed scientists and working farmers and ranchers.

3.4

Sustainable Agriculture and Sustainable Food Systems

Introduction: Sustainable Agriculture & Sustainable Food Systems

UNIT OVERVIEW

This unit draws on information presented in Units 3.1–3.3 to help students understand efforts to promote greater sustainability and justice in U.S. food and agriculture systems.

The first lecture presents a short history of efforts to resist agriculture's modernization, a process that has been driven by increasingly capitalist relationships and the application of new technologies in agriculture. The lecture summarizes early U.S. agrarian populism and efforts to resist the "scientization" of agriculture through the authority of expert knowledge associated with the Land Grant University complex. It then presents the origins of the organic agriculture movement, and describes the impact that Rachel Carson's *Silent Spring* had on society and public policy. The resurgence of U.S. agrarian populism exemplified by Jim Hightower and Wendell Berry is then covered. The first lecture concludes with an introduction to the concept of "sustainability" in the literature and public discourse.

The second lecture reviews some of the initiatives to promote alternative visions of the U. S. food and agriculture system. It first explains various definitions and dimensions of "agricultural sustainability," and explores the problems associated with this term. Students will be exposed to the criticism of the way that proponents of "sustainable agriculture" have tended to limit discussions of this issue to farms and farmers, ignoring the broader social context of the food system of which the farm is one part. The lecture then introduces the concept of agroecology pioneered by Steve Gliessman and Miguel Altieri, and the application of ecological principles to the design and management of agroecosystems. The definition and requirements of certified organic food production and the growth and development of the "Organic" food industry over the last ten years are then discussed. This section further addresses concerns over the replication of social and environmental problems caused by the introduction of capitalist relations and federal standards to organic production. The concepts of localizing food systems and creating more integrated relationships between producers and consumers is then introduced. The lecture concludes with a discussion of the difficulties and necessity of policy change needed to move toward greater agricultural sustainability.

The third lecture, on food justice, illustrates how systemic inequities in the food system give rise to movements for social justice and provides an introduction to the complexity, diversity, challenges, and opportunities facing movements for social justice in the food system. It also intends to engage students in a critical reflection on the potential of social movements for systemic change in the food system. The lecture identifies the social justice efforts in the U.S. food system. It discusses briefly the roots and branches—where the movement has grown from and is growing to. The lecture concludes by categorizing different types of solutions to food system problems (food enterprise, food security, food justice, food sovereignty), defining them, and discussing how the overall system can best be transformed.

MODES OF INSTRUCTION

> LECTURES (3 LECTURES, 50 MINUTES EACH)

Three lectures cover the historical populist movements that have attempted to resist the industrialization of agriculture in the U.S., introduce the contemporary sustainable agriculture movements, and explore the social justice movement. References given in the outlines are described in the References and Resources section.

LEARNING OBJECTIVES

CONCEPTS

- The current food and agriculture system is not inevitable; many people and social movements have been working for decades to promote social justice and resource protection in this system. These efforts contest the direction the food system has taken.
- The outline of U.S. agrarian populism, its influence on U.S. culture, and its limited contemporary applicability
- The importance of knowledge questions in the search for sustainable alternatives
- The history of policy initiatives trying to promote more socially just and environmentally responsible forms of agriculture in the U.S., and the challenges facing any effort to promote sustainability at the national level
- The usefulness and limitations of applying the term "sustainability" to agrofood systems
- The value, complexity, and limitations of the agroecological paradigm
- The growth of organic food production and the role that U.S. government regulations have played in creating opportunities for organic agriculture that diverge from the original ideals of the organic farming movement
- The "third way" initiatives in promoting ecologically rational use of agrochemicals in conventional systems
- The different efforts to "localize" the food system and the role they play in promoting sustainability
- The reasons for the emergence of a food justice movement in the U.S.
- The relation and significance of food justice within the larger U.S. food movement
- Dialogue on the role of social movements in food system transformation

Lecture 1: A Brief History of Resistance to the "Modernization" of Agriculture

A. The Current Food System Is Not Inevitable and Reflects Dominant Social Values—Alternatives Will Need To Be Rooted in the Expression of Alternative Values
(see Thompson 1997)

1. The food system in the U.S. is an extreme example of industrialized agriculture (see Unit 3.1, Development of U.S. Agriculture)
   a) The scale of modern U.S. agriculture
   b) The concentration of ownership in modern U.S. agriculture
   c) The use of high technology and industrial processes in modern agriculture
2. For more than a century, critics have protested problematic trends in U.S. agriculture mentioned in previous lectures in Part 3, Social and Environmental Issues in Agriculture
   a) What kind of food system would we have today if their advice had been heeded?
   b) Imagination is necessary to create alternatives. You cannot create a food system that you cannot imagine.
   c) Values other than capitalism and profit will need to be injected into discussions and decisions about agriculture and food to achieve any viable alternatives

B. Early U.S. Agrarian Populism (see Danbom 1997; McConnell 1959; Goodwyn 1978; Mooney and Majka 1995)

1. Major periods of struggle: 1866–1890; 1920s–1930s
   a) Common theme of two periods: Efforts to protect small, independent farmers from predatory practices of capitalism
2. First period took place as capital from the Eastern seaboard began to dictate economic choices to homestead small holders in the Upper Midwest
   a) Issues included transportation, economic concentration
   b) Agrarian populist movements that grew out of this resistance
      i. Grange network: Served as local forums for farmers to meet and discuss cooperative action for the common good of local agriculture
      ii. Farmers Alliance: A political effort to promote farmer-owned cooperatives and policies that supported them
      iii. Populist Party: A political party that ran candidates; it had a vision of agriculture more in line with Jeffersonian democracy, and resisted the political power of railroads and powerful corporations
3. Second period: Agricultural depression foreshadowed national depression
   a) New Deal responses included: Alternative, communal farms; price supports; acreage reduction programs
   b) Soil Conservation Service (now Natural Resources Conservation Service, NRCS) grew out of this era also
4. Today: Is agrarian populism possible with the abolishment of subsistence and small-scale farming?
   a) Solutions must include cooperative action, but with <2% of the population on farms, it must include more than farmers

C. Resistance to the "Scientization" of U.S. Agriculture (see Chapter 2 in Hassanein 1999)

1. Historically, farmers have been the source and guardians of knowledge about agriculture, although this has recently changed
2. The development of the land grant system, experiment station, and agricultural cooperative extension system with a technological and production-centered research agenda removed farmers as the primary source of knowledge
   a) More scientific methods were brought to bear in agriculture, but with them specialized technologies and practices that marginalized farmers. Their "unscientific" knowledge and lack of financial resources left farmers in an inferior economic and political position.
   b) Supporters of the land grant system popularized the notion of farmers as stubborn, ignorant, and foolish, "unscientific." This notion took hold in the popular and political imagination.
   c) Most agricultural scientists during the middle part of the 20th century saw their work as unquestionably good, advancing the frontiers of modern society. They were by and large blind to the negative impacts of their work.
3. There were three responses by farmers to this development
   a) Following the program proposed by the land grant complex: Those who had access to land, capital, and technology were able to grow and outcompete their neighbors, often buying them out in the process
   b) A second group has rejected the entire land grant/cooperative extension project, creating an alternative knowledge base for agriculture. The organic farming movement is an example of this (see Vos 2000).
   c) A third approach is that of selectively adopting land grant/cooperative extension advice, and perhaps working to make this system more responsive to the contemporary needs of growers
4. Criticism of the land grant complex
   a) What are the worldview assumptions underlying modern agricultural science? Emphasis on technology where existing relationships of political and economic power are not questioned.
      i. Example: The issue of world hunger is often understood solely as a problem of underproduction and not maldistribution of an already overabundant food supply
   b) Whose interests has public agricultural science served?
      i. It has repeatedly served the financial well being of those with the most capital

D. Early Organic Movement (see Vos 2000; Sustainable Agriculture Research and Education 2012)

1. In England, Lady Eve Balfour and Sir Albert Howard were early leaders; in the U.S., J. I. Rodale along with Rodale Press. Howard's book, *An Agricultural Testament,* based on his time observing traditional systems in India as well as his own research, greatly influenced Rodale.
2. They were critics of the industrialization of agriculture, arguing that soil health, food quality, and human health were integrally related
3. Their ideas were fused with a more general critique of agriculture and society by the counterculture movement during the 1960s and 1970s to create the organic farming movement

E. *Silent Spring* by Rachel Carson, and Widespread Calls for Change

1. *Silent Spring's* thesis: Massive, ignorant, needless poisoning of the biosphere
2. Why was *Silent Spring* so powerful?
   a) It was an irrefutable critique of the chemical paradigm in agriculture
   b) It was an effective critique of the entire enterprise of modernization and better living through technology
3. Social and political impacts of *Silent Spring*
   a) People began to question the role of science and technology in agriculture and created a popular concern about the environmental and human health risks associated with many modern technologies
   b) The Environmental Protection Agency (EPA) was created, in part to provide a more objective agency for evaluating pesticide impacts
   c) Increased public funding and support for integrated pest management (IPM)
4. Fixed the problems of modern agriculture in the popular imagination. Created political space for alternatives.

F. Critics in the 1970s (see Berry 1977)

1. Jim Hightower and *Hard Tomatoes, Hard Times*: Calling for public accountability for public universities and institutions
2. Wendell Berry: A contemporary form of agrarian populism
3. On the margins, a few critics called for land reform in the U.S., especially associated with publicly funded irrigation works, but these arguments never really found much credence in Washington, D.C.
4. *A Time to Choose*: The Bergman (President Carter's Secretary of Agriculture) report on problems in American agriculture

G. Alternative Agriculture and the Development of the Concept of Sustainability

1. 1989: The National Research Council publishes *Alternative Agriculture*
   a) This was a surprising critique of the model agricultural paradigm
   b) The report was controversial for its message and method
2. The Brundtland Commission of the UN begins to popularize the notion of sustainability
   a) This UN commission laid the foundation for the 1992 Rio conference on sustainable development and brought this term into general use
   b) As a result, the term "sustainable agriculture" gains popularity
   c) "Sustainability" is a powerful, yet almost undefinable term

Lecture 2: Imagining Alternatives

A. Problematizing the Concept of Sustainable Agriculture: What Does Agricultural Sustainability Mean? What Does It Look Like? (see Allen and Sachs, 1991; *www.sarep.ucdavis.edu/concept.htm*)

1. Common conceptions of sustainable agriculture and their limitations
   a) Exclusively production oriented, agronomic in nature and farm-centric in focus
   b) The problems are inaccurately framed as only technical problems and thus requiring only technological solutions
   c) Fails to recognize the influence of social institutions on the soundness of farming practices and the food system
   d) Fails to equally recognize both the social and environmental problems resulting from the dominant agricultural model
2. Questioning objectives of sustainable agriculture: "What is it that we want to sustain, or change?"
   a) Whose needs should be emphasized?
   b) Which of their needs should be prioritized?
      i. Consumers and cheap food prices?
      ii. Environmental quality?
      iii. Fair prices to growers?
      iv. Low pesticide residues in foods?
      v. Workers: Wages, working conditions, or year-round employment?
3. Sustained over what time frame?
   a) Long-term versus short-term planning
4. What scale does this term get used at?
   a) Field? Farm? Watershed? Region? Nation? Globe?
   b) The unit of analysis largely determines what needs to be sustained
5. Comprehensive definitions of agricultural sustainability
   a) Many advocates for sustainable agriculture recognize the need to integrate at least the following indicators: ecological, economic, and social (see *asi.ucdavis.edu/sarep/about-sarep/def/*)
   b) How shall we define these other qualities? Questions for discussion:
      i. How do we define "environmental quality"?
      ii. How do we define social justice?
      iii. How do we define human health?
      iv. How do we define economic viability of small farmers?
      v. How do we define life quality of rural agricultural communities?
   c) What we define as goals in sustainable agriculture will influence the means and outcomes

B. Agroecology: Altieri and Gliessman (see agroeco.org, *www.agroecology.org*)

1. Agroecology defined: Applying the principles of ecology to the design and management of sustainable agricultural ecosystems
2. Altieri defines agroecology as: A scientific discipline that uses ecological theory to study, design, manage, and evaluate agricultural systems that are productive but also resource conserving

3. Strong emphasis on enhancing biological diversity of both the soil ecosystem and terrestrial plant associations in and around agricultural production systems
4. Advantages
   a) Looks at farms as agroecosystems that are subject to human disturbances
   b) Encourages returning more autonomy to the farmer through farmer as expert
   c) Emphasizes understanding, managing, and enhancing ecological processes for soil fertility and pest management in order to reduce reliance on costly and damaging external inputs
5. Agroecology also prioritizes food security, social equity, economic viability and resource conservation in its broad view (see also de Schutter 2012 under Resources, Lecture 3)
6. Problems
   a) How big is the system? How big an agroecosystem can be measured or managed?
   b) What happens if the farm is ecologically sustainable, but not commercially viable?

C. Organic Agriculture

1. Organic agriculture today (see *www.ams.usda.gov/nop/*)
   a) Defined: A system of agriculture that encourages healthy soil and crops through such practices as nutrient and organic matter recycling, crop rotations, proper tillage, and the strict avoidance of synthetic fertilizers and pesticides for at least three years prior to organic certification
2. Organic agriculture is currently the fastest-growing sector of the food market (Smith 2012; also see Organic Trade Association, *www.ota.com*)
   a) U.S. sales of organic in 2010 were 26.7 billion, up from 1 billion in 1990
   b) In 2010, 11% of all fruit and vegetable sales were organic
   c) Mainstream markets were responsible for 54% of organic product sales
3. The development of the organic movement and the National Organic Standards (see Vos 2000)
   a) The rationale behind organic certification: To assure consumers that food has been produced in accordance with a specific set of conservation farming practices
   b) The rationale behind the national organic standards: To make the certification standards for export/import agriculture more uniform
4. Shortcomings of organic production and criticisms of the national organic standards (see Pollan 2001, Philpott 2012)
   a) Production practices of most organic growers fall far short of both the agroecological and the organic ideal (see Guthman 2000)
      i. Off-farm inputs: Chilean nitrate, guanos, mined materials
      ii. Energy use: Organic agriculture does not necessarily use less energy, and may in fact use more
      iii. Weed control measures: Relies heavily on poorly paid hand labor. Which method is more sustainable?
   b) Who serves to benefit most from the National Organic Program (NOP): Food processors?
   c) NOP maintains less stringent standards than previous third-party certifying agencies
   d) NOP places small growers at an economic disadvantage by requiring practices that require expensive equipment
      i. Example: Compost production requirements (see Unit 1.7, Making and Using Compost, for information on NOP compost-making requirements)
   e) The effectiveness of the National Organic Standards Board as an advisory council for USDA remains questionable (Strom 2012; Jaffee and Howard 2010)

f) The "organic industrial complex": The replication of the industrial model of agriculture in organics (see Buck et al. 1997; Pollan 2001; Howard 2009)
   i. The organic commodity chain is identical to that of conventional agriculture

5. Despite shortcomings, organic offers important alternative to conventional agriculture (Philpott 2012)
   a) Food is produced without synthetic and persistent chemicals (keeping them out of people, particularly farm workers and farmers). Genetically modified seeds are excluded, meat is produced without constant (technically any) use of antibiotics, and soil-preserving practices are required.

D. Alternative Agriculture: A Third Way? (see Swezey and Broom 2000)

1. Integrated Pest Management (IPM) and "agricultural partnerships": Initiatives to develop management systems for industrial agriculture that do not prohibit the use of agrochemical inputs. Systems are based on agroecological principles and the gathering of appropriate local knowledge of a farming system.
2. Agricultural partnerships are based on a critique of the conventional extension system, which tends to treat growers as passive recipients of knowledge. Influenced by the "farmer-to-farmer" approach to knowledge generation practiced in the developing world.
3. In California these partnerships have reduced the environmental impact of agriculture, and show genuine promise of influencing a large number of growers in some cropping systems
4. Shortcomings of approach: Does not raise questions about the social problems resulting from the current organization of the food and agriculture system

E. Re-localizing a Food System (see Allen 2004; Clancy 1997; USDA 2014)

1. Strategic choices: Sustainability advocates balancing their interest in improving the environmental performance of agriculture with other problems in the food system
2. "Localizing" the food system: Connecting local growers with local eaters
   a) Promoted as a way to reduce hunger and enhance the economic viability of smaller farms that adopt conservation farming practices
3. Criticisms of the modern food system (see Clancy 1997)
   a) The modern food system as a "dis-integrated" food system
      i. Consumers have lost a relationship with the production of their foods
      ii. Growers have lost contact with the eaters that consume the food they grow
      iii. There are enormous hidden costs associated with the global food system and cheap food
4. Efforts to promote local food systems
   a) Local food initiatives (e.g., Buy Fresh Buy Local; see *www.caff.org*) to reduce barriers between producers and consumers
   b) Food policy councils, which help institutions and individuals recognize the advantages of buying local foods, and facilitate interactions with farmers
   c) Food hubs, places where food can be aggregated from smaller-scale farms to larger volume buyers
   d) Farm-to-school efforts, which allow local growers to sell to supportive institutions
   e) Farmers' markets and Community Supported Agriculture (CSA) are considered staple activities in re-localizing food systems
   f) Institutionalized in USDA—see *Know Your Farmer, Know Your Food initiative* (USDA 2014). Goal is to help " . . . communities scale up local and regional food systems and strengthen their economies."

5. The emergence of the community food security movement (see Lecture 3 of this unit for more information)
    a) Fundamental assumptions: That all people have a right to access local, nutritious, culturally appropriate, non-emergency food
    b) Links anti-hunger efforts with sustainable agriculture, economic development, and social justice advocacy

F. Policy Initiatives (see Youngberg et al. 1993; Marshall 2000)

1. Large-scale economic reforms that advocates have not been able to figure out how to implement in the U.S.
    a) Land reform: Making small-scale production possible for those without access to large amounts of capital
    b) Market reform: Preventing large growers, large manufacturers, and intermediaries from taking advantage of small-scale producers
2. Sustainability at a national scale: Making policies serve this vision
    a) Greater enforced restrictions on the domestic and international use of pesticides and synthetic fertilizers
    b) Ban on the use of GE organisms until long-term studies provide conclusive evidence on environmental quality and human health risks
    c) Legislation leading to the eventual elimination of all toxic pesticides
    d) Increased federal funding for research on organic and sustainable soil fertility and pest management practices
    e) Increased federal funding for research on the development of economically sustainable regional food systems
    f) Increased funding for regional and local food security initiatives
    g) Increased funding for extension work in training farmers in alternative production practices
    h) Increased access to low-interest credit for farmers to use in transitioning from conventional agriculture to certified organic production practices
    i) Anti-trust legislation discouraging the concentration of ownership in the food system
    j) Federal small farm subsidies to increase the adoption of conservation farming practices
    k) Initiate program to assess the true cost of socially just and environmentally sound production practices: "True cost accounting"
    l) Identify actors within the food system responsible for the externalized costs of production (e.g., pesticide manufactures, farmers)
    m) Internalize the true costs of production by readjusting price structure of agricultural products to better represent actual costs of production
3. Obstacles to these initiatives
    a) Political forces are deeply invested in the current agricultural model
    b) The cheap food dilemma
4. Current policies being advocated: See National Coalition for Sustainable Agriculture 2012
5. The U.S. Farm Bill (see National Coalition for Sustainable Agriculture *www.sustainableagriculture.net*)
    a) The influence of the U.S. Farm Bill
        i. It sets policy for what will be funded regarding agriculture, but it also greatly impacts food and conservation issues.

b) Recent outcomes in the 2014 Farm Bill

i. More money was allocated to programs for beginning farmers, local food systems, rural development, organics, and specialty crops. Crop insurance subsidies now have conservation requirements attached, and several riders were rejected that could have harmful impacts on competition, the environment, and commerce. However, other subsidy programs reforms, meant to more fairly distribute subsidies, were not enacted. Food stamps, a large portion of the Farm Bill, were cut significantly.

6. Local policies and initiatives: Sometimes local groups can effect small-scale change. Advocates still need to engage national policy, but there are some opportunities at the local level.
   a) Land use policy: Designating food belts
   b) Directing public institutions to buy from small or local sources

G. Summary and Conclusion: How Do We Promote Sustainability in the Agriculture and Food System?

1. To be effective, any effort has to understand the complexities of agriculture: It is framed by economic, social, and biological processes. All three need to be taken into account.
2. Effective social change generally includes oppositional and alternative efforts: Evolving reforms and promoting a revolutionary vision at the same time
3. Modern agriculture has been shaped directly by the advance of capitalist social relations and the application of science and technology to production practices. Behind these forces are a whole range of social forces. Policy reform is important, but ultimately, addressing these broader forces must be part of efforts to promote a more sustainable agriculture and food system.

Lecture 3: Food Justice—Current Activities to Address Social Justice Issues in the U.S. Food System

A. Food Justice—A Definition

1. There are several definitions in use—there is no one agreed-upon description
2. Definition for this discussion: Food justice sees the lack of healthy food in poor communities as a human rights issue and draws from grassroots struggles and U.S. organizing traditions such as the civil rights and environmental justice movements

B. Got Social Justice? A Quick Overview of the U.S. Food Movement (see Pollan 2010; Berry 1978; Gottlieb and Joshi 2010; Alkon and Agyeman 2011; Guthman 2004, 2011)

1. Back to the land/organics/Agrarian Populism: resistance and alternatives to industrial agriculture (see Lectures 1 and 2, Unit 3.4 for more details)
2. Rising food insecurity and diet-related diseases, food contamination, and environmental externalities of the U.S. food system provoke growing reaction by consumers and producers for alternatives
3. Global food crisis also affect consumers in the United States (Conner et al 2008, Holt-Giménez and Peabody 2008)
4. Farmer's markets, Community Supported Agriculture, food policy councils: The goals of many of these efforts are to democratize and localize the food system.
   a) Food policy councils generally work on both of these issues specifically (Harper et al 2009, Food First 2009)
   b) Community Supported Agriculture's (CSA's) initial aims focused on democracy by sharing the economic risk of farming beyond just the farmer
   c) All of these aim to localize the food system more broadly
   d) For underserved communities, the challenge is to keep the food dollar in the community where it can recycle 2–5 times, helping to grow the local economy (see Meter 2011)
5. Urban farming/gardening: Taking food and diet into our own hands
   a) Many organizations and local communities have started growing food to increase food security, provide a more healthy diet, and provide autonomy over the production of food. This follows a worldwide trend: 15–30% of the world's food is produced through urban farming by 800 million farmers.
   b) In Cuba, because of strong government support, Havana, Santiago, and other major cities receive 70% of their fresh fruits and vegetables from urban farmers. Havana produces 1kg of vegetables per capita per day on 70,000 peri/urban hectares (Murphy 1999, Chan and Roach 2012).
6. Foodies: Affluence, pleasure, and the passion for perfect food, questioning mass-food and re-establishing consumer-producer linkages—for those who can afford it. This is challenged by the more progressive wing of the Slow Food Movement, which takes a stand on food justice (Viertel 2012).
7. Community Food Security: From individual food insecurity to community-based solutions, the USDA, and the rise and fall of the Community Food Security Coalition (CFSC)

a) In 1994 the CFSC tries to unite anti-hunger, sustainable agriculture, environmentalists, farm labor advocates, and health and nutrition groups behind the "Community Food Security Empowerment Act," which is attacked by conservatives. The coalition fractures as each group negotiates for its own interests but gains relatively little in the 1996 "Freedom to Farm" Bill. The 2002 Farm Bill includes the Community Food Projects Program and the concept of "Community Food Security" is integrated into the USDA.

b) Despite internal divisions amongst CFSC's different groups' interests, the 2008 Farm Bill marked a high point in the Coalition's impact on the Farm Bill and its profile as the national organization representing the food movement. The CFSC's yearly gathering began with 30 people and grew to over 1000 at the last Conference held in Oakland in 2011. These served to network many organizations and build broad public interest and awareness in the Community Food Movement. This helped influence the Farm Bill to increase its funding for food stamps, funding for specialty crop farmers, farm to school, new farmers, etc. Internal struggles at the CFSC over issues of white privilege and the tension between food justice and food security approaches to social change led to many organizations made up of people of color leaving and forming the Growing Food and Justice for All Initiative.

c) The global food crisis, followed by the global recession and the turn towards fiscal conservatism, combined with internal difficulties, led to the CFSC's financial decline. The CFSC shut down in August 2012 after 16 years of food movement leadership, creating a political-institutional vacuum that has yet to be filled.

8. Food Justice: Dismantling racism in the food system from farm to fork, Growing Food and Justice for All Initiative, Coalition of Immokalee Workers, Food Chain Worker's Alliance, Restaurant Opportunity Center, U.S. Food Sovereignty Alliance (USFSA)

a) The structural racism in the food system is reflected not only in the lack of access to fresh, healthy food in underserved communities, but by the poor wages and labor conditions of food workers, many of whom are immigrants, and discrimination in land, credit, and commodity markets, all of which disproportionately impact people of color. The Food Justice movement in the U.S. seeks equal access to healthy food, fair wages and good working conditions, and an end to discrimination against farmers of color.

b) Growing Food and Justice for All Initiative, a network hosted by Growing Power (*www.growingpower.org*) works to dismantle racism to bring about new, healthy, and sustainable food systems and support multicultural leadership in impoverished communities; see more at Supplement 3, The Good Food Revolution at Growing Power, in Unit 1.7, Making and Growing Compost

c) Food Chain Workers Alliance and members of the Restaurant Opportunity Center (ROC) work to improve wages and working conditions of food workers, most of whom are people of color

d) Coalition of Immokalee Workers (CIW) works to end slavery in Florida's tomato fields and provide workers with a decent wage. CIW has waged a highly successful Fair Food campaign/boycott with students and churches (see *www.foodchainsfilm.com*).

e) The U.S Food Sovereignty Alliance awards the yearly Food Sovereignty Prize (in opposition to the World Food Prize) to recognize organizations that are democratizing food systems and rebuilding local economies from the bottom up

C. The Political Economy behind Food Justice (see Holt-Giménez, Patel and Shattuck 2010)

1. The world food crisis and the construction of the corporate food regime
2. Overproduction, hunger, food insecurity, and diet-related diseases
3. Land grabs, concentration, and financialization, a rural and urban trend undermining food security (Wang, Holt-Giménez and Shattuck 2011)

D. Roots and Branches of the Food Justice Movement (see Holt-Giménez & Wang 2011; Holt-Giménez et.al. 2011; Holt-Giménez 2010; Jayaraman 2013; Holmes 2013)

1. Environmental justice: Analysis of disproportionate negative externalities systematically visited on underserved populations of color is tuned on the food system and diet-related diseases
2. Liberation struggles: The Black Panthers' 10-point platform for Black liberation includes demands for the right to food, land, and health. First national children's community breakfast program without philanthropic or government support (Patel 2012).
3. Civil rights/human rights: Right to food based on national struggles for civil rights and international human rights
4. Anti-hunger: How overproduction creates new consumer markets, aid institutions (food pantries, food banks) and ensures food insecurity
5. Farm/food labor: Farm and food workers are the most food insecure and physically/legally vulnerable workforce in the nation, however, labor rights, and wages are the organizing principles of this primarily immigrant workforce (UFW, CIW, ROC, Food Chain Workers Alliance—see above) (Brent 2010)
6. Youth and food justice: The emerging leadership for grassroots social change (Steele 2010)
7. Agroecology: The science of sustainable agriculture has applications in the U.S. and in urban settings (Schutter 2011)
8. Spreading resistance to the corporate food regime and deepening of food justice alternatives:
   a) From Fair Trade Coffee (Bacon et al 2012) to Domestic Fair Trade (Domestic Fair Trade Association, *www.thedfta.org*)
   b) Food bombs, Food hubs and Food Commons: the different forms of activism
   c) Are urban gardens gentrifying neighborhoods?
   d) Food celebrities: Who speaks for the Food Movement?

E. Food Security, Food Justice, or Food Sovereignty? (see Holt-Giménez and Shattuck 2011a, Holt-Giménez and Shattuck 2011b, Holt-Giménez and Wang 2011)

1. Food regimes and counter-movements; the corporate food regime, neoliberalization, and the food movement as an historic counter-movement
2. Food enterprise, food security, food justice, food sovereignty: The major trends and characteristics in the food regime and the food movement, their main institutions, orientation, model, approach to the food crisis and guiding documents
3. Cooptation, division, fragmentation, and stratification: The struggle for hegemony amongst neoliberal, reformist, progressive, and radical forces
4. The pivotal role of food justice: How the food justice movement determines the political direction of the food movement in the U.S.
5. Repolitization, convergence in diversity, strategic vs tactical alliances: The political challenges to transforming the U.S. food system

Discussion Questions

SUSTAINABLE AGRICULTURE & SUSTAINABLE FOOD SYSTEMS, LECTURES 1–3

1. What surprised you most about the activities resisting the conventional food and agriculture system?
2. What strategies are you most familiar with?
3. Which ones do you want to learn more about, and why?
4. Where do you think the food movement is going? How will it evolve next?
5. What does a socially just food system look like?
6. How does this socially just food system that you envision relate to what you hope to do in the future?

References & Resources

SUGGESTED READINGS FOR STUDENTS: LECTURES 1 & 2 (DESCRIBED BELOW)

- Allen, Patricia. 2004
- Danbom, David. 1997
- Pollan, Michael. 2001

SUGGESTED READINGS FOR STUDENTS: LECTURE 3

- Holt-Giménez, Eric and Yee Wang. 2011

LECTURES 1 & 2

PRINT RESOURCES

Allen, Patricia. 2004. *Together at the Table: Sustainability and Sustenance in the American System.* University Park: Pennsylvania State University Press.

Examines the growth and development of alternative food system initiatives in the U.S., including: The growth of organic farming and the development of the USDA National Organic Program; the growth in popularity of direct marketing relationships such as farmers' markets and community-supported agriculture (CSA); the growth of urban agriculture and community garden programs; the increase in natural and social science research programs focused on sustainable food and farming systems.

Allen, Patricia. 1993. *Food for the Future: Conditions and Contradictions of Sustainability.* New York: Wiley and Sons.

Challenged definitions of sustainable agriculture that did not incorporate social issues, such as justice, gender, ethnicity, or class. If advocates do not heighten their awareness of the social forces pressing on conventional agriculture, they run the risk of reproducing the same social problems in alternative agriculture. This book had a significant impact on academic thinking in the sustainable agriculture movement. The chapter by Allen and Sachs is particularly important and influential.

Allen, Patricia, and Carolyn Sachs. 1991. *What Do We Want to Sustain? Developing a Comprehensive Vision of Sustainable Agriculture.* Sustainability in the Balance, Issue Paper No. 2. Santa Cruz, CA: Center for Agroecology & Sustainable Food Systems, UC Santa Cruz. *casfs.ucsc.edu/about/publications*

A critique of definitions of sustainable agriculture that are limited only to what happens on the farm. Challenges its readers to reformulate definitions of sustainable agriculture to include gender, race, class, and is-sues in society at large. More appropriate for lower-division students than Allen 1993 (see above).

Allen, Patricia, and Martin Kovach. 2000. The capitalist composition of organic: The potential of markets in fulfilling the promise of organic agriculture. *Agriculture and Human Values* 17:221-232.

Explores the problems and possibilities associated with the increasing demand for organic agriculture.

Berry, Wendell. 1996. *The Unsettling of America: Culture and Agriculture.* San Francisco: Sierra Club.

A classic in contemporary agrarian philosophy written in an accessible style. Berry critiques the dominant industrial agriculture paradigm with his common sense prose, exposing the social, economic and ecological damage it caused. For this course, chapters 3, 4, and 9 are most appropriate. "The Ecological Crisis as a Crisis of Agriculture" describes the way conservationists and capitalists both objectify land and split it off from human culture. "The Agricultural Crisis as a Crisis of Culture" describes the social implications of a culture's alienation from the soil. "Margins" relates several stories of farmers who are intentionally creating alternatives.

Bosso, Christopher J. 1987. *Pesticides and Politics: The Life Cycle of a Public Issue.* Chapter 2, The Pesticides Paradigm, pages 21-45, and chapter 4, The Apotheosis of Pesticides, 61-79. Pittsburgh: University of Pittsburgh.

This book describes the enduring impact Silent Spring had on U.S. agriculture and pesticide policy.

Buck, Daniel, Christina Getz, and Julie Guthman. 1997. From farm to table: The organic vegetable commodity chain of northern California. *Sociologia Ruralis* 37 (1):3-20.

Describes the role that organic certification has had in shaping organic agricultural production

and how the distribution of this produce has begun to mimic that of the conventional food system. Places these developments in the broader framework of agrarian political economy.

Carson, Rachel. 2002. *Silent Spring*. Boston: Houghton Mifflin.

This book probably did more to instigate the environmental movement of the 1960s than any other. Unintentionally, it appears to have contributed to the alienation of the U.S. public from agricultural issues. Chapters 1 and 2 provide an overview of the chemical agriculture mindset, and chapters 3 and 4 introduce toxic agrochemicals and their environmental impacts. Chapter 17 describes alternative trajectories for human-environment relationships.

Clancy, Kate. 1997. Reconnecting farmers and citizens in the food system. In *Visions of American Agriculture,* W. Lockeretz (ed). Ames: Iowa State University Press.

Discusses the major factors that have weakened the links between farmers and the rest of the U.S. population. Clancy then provides criteria that must be met for a more integrated food system, including a more agriculturally literate society, local food security, and supportive institutions and policies. An ideal chapter for a beginning discussion of what needs to happen off the farm to promote social sustainability.

Danbom, David. 1997. Past visions of American agriculture. In *Visions of American Agriculture,* W. Lockeretz (ed.). Ames, Iowa: Iowa State University Press.

Introduces the history of conflicting views of U.S. agriculture: Agriculture as enterprise vs. agriculture as social enterprise. Provides a helpful introduction to the history of American agrarian populism.

Goodwyn, Lawrence. 1978. *The Populist Moment: A Short History of the Agrarian Revolt in America*. Oxford University Press.

Guthman, Julie. 2000. Raising organic: Grower practices in California. *Agriculture and Human Values* 17: 257-266.

This article is based on Julie Guthman's fieldwork investigating the actual practices of organic growers in California. She discovered that organic farms usually comply with organic regulations, but still fall short of the agroecological ideal, with larger farms and mixed organic/conventional farms least likely to fulfill this ideal. Describes the way in which organic certification has helped the organic farming sector grow and be-come more like conventional agriculture.

Hassanein, Neva. 1999. *Changing the Way America Farms: Knowledge and Community in the Sustainable Agriculture Movement*. Lincoln, Nebraska: University of Nebraska Press.

Describes the emergence of alternative networks of agricultural knowledge among dairy farmers in Wisconsin, with a special emphasis on issues of gender. Chapter 2, "Knowledge questions in the sustainable agriculture movement," provides an excellent overview of how farmers resisted the hegemony of Land Grant University scientists.

Howard, Sir Albert. 1947. *The Soil and Health*. New York: Schocken Books.

This is an early classic in the organic movement, presenting many of the underlying ecological and philosophical principles still relevant today.

Howard, Philip H. 2009. Consolidation in the North American organic food processing sector, 1997 to 2007. *International Journal of Sociology of Agriculture and Food* 16 (1): 13-30. *www.ijsaf.org/archive/16/1/howard.pdf*

Jaffee, Daniel & Philip H. Howard. 2010. Corporate cooptation of organic and fair trade standards. *Agriculture and Human Values* 27(4), 387-399.

Kloppenburg, Jack, John Hendrickson, and George W. Stevenson. 1996. Coming into the foodshed. *Agriculture and Human Values* 13 (3): 33-42.

Explores the conceptual and practical opportunities of organizing agricultural production around "food-sheds." Just as bioregionalists propose watersheds as an organizing framework for activism, so agricultural activists are working for local economies of food. Students often respond with enthusiasm to the imaginary this article proposes.

Marshall, Andrew. 2000. Sustaining sustainable agriculture: The rise and fall of the Fund for Rural America. *Agriculture and Human Values* 17: 267-277.

Marshall details the challenges facing any policy initiative in support of sustainable alternatives,

and the political and economic obstacles such an initiative must overcome. Helpful complement to Youngberg et al.

Mooney, Patrick H., and Theo J. Majka. 1995. *Farmers' and Farmworkers' Movements: Social Protest in American Agriculture.* Twayne Publishers.

National Coalition for Sustainable Agriculture. 2012. Farming for the future: A sustainable agriculture agenda for the 2012 food and farm bill. Washington DC. *sustainableagriculture.net/wp-content/uploads/2008/08/2012_3_21NSACFarmBillPlatform.pdf*

National Research Council. 1989. *Alternative Agriculture.* Washington, DC: National Academy Press.

The highest-ranking report up to that time to legitimize alternatives to the high-input, high-chemical-use model.

Philpott, Tom. 2012. How the NY Times went too far in slamming big organic. *Mother Jones.* July 11. *www.motherjones.com/tom-philpott/2012/07/has-corprate-influence-turned-organic-fraud*

Pollan, Michael. 2001. Behind the organic-industrial complex. *New York Times Magazine* May 13. *www.nytimes.com/2001/05/13/magazine/13ORGANIC.html*

This investigative journalism piece reached a wide audience, and brought the disturbing news that the organic ideal in the minds of many alternative consumers is very far from the reality of the contemporary organic food processing and distribution system. Useful to read side by side with the Kloppenburg et al. article.

Rosset, Peter A., and Miguel A. Altieri. 1997. Agroecology versus input substitution: A fundamental contradiction of sustainable agriculture. *Society and Natural Resources* 10 (3):283-295.

Critiques efforts to make conventional agriculture more sustainable, claiming that only a fully integrated agroecological farming system is truly sustainable.

Smith, Ned. 2012. Organic food sales growth outpaces rest of grocery industry. *BusinessNewsDaily.* April 23. *www.businessnewsdaily.com/2404-organic-industry-healthy-growth.html*

Strom, Stephanie. 2012. Has 'organic' been oversized? *New York Times.* July 7. *www.nytimes.com/2012/07/08/business/organic-food-purists-worry-about-big-companies-influence.html?pagewanted=3&_r=3&hp*

Sustainable Agriculture Research and Education. 2012. *History of Organic Farming in the United States. www.sare.org/Learning-Center/Bulletins/Transitioning-to-Organic-Production/Text-Version/History-of-Organic-Farming-in-the-United-States*

Swezey, Sean L., and Janet C. Broome. 2000. Growth predicted in biologically integrated and organic farming. *California Agriculture* 54 (4):26-36.

Describes the growing interest in promoting biologically integrated farming systems in California, a "third way" farming system that draws from knowledge gained by organic systems, reducing yet not fully abandoning agrochemical usage. A provocative companion to Rosset and Altieri.

Thompson, Paul B. 1997. Agrarian values: Their future place in U.S. agriculture. In *Visions of American Agriculture,* W. Lockeretz (ed.). Ames, Iowa: Iowa State University Press.

Thompson develops the two main currents in U.S. agriculture proposed by Danbom (see above), describing the values and ethics inherent in each, and how activists might secure a future for more communitarian ethics in the future of U.S. agriculture.

United States Department of Agriculture. 2014. Know your farmer know your food. *www.usda.gov/wps/portal/usda/usdahome?navid=KNOWYOURFARMER)*

Vos, Timothy. 2000. Visions of the middle landscape: Organic farming and the politics of nature. *Agriculture and Human Values* 17:245-256.

Youngberg, Garth, Neill Schaller, and Kathleen Merrigan. 1993. The sustainable agriculture policy agenda in the United States: Politics and prospects. In *Food for the Future,* P. Allen, ed. New York: John Wiley.

Reviews the impact and implications of sustainability for agricultural policy making. Describes the difficulty of translating the values and visions of sustainable agriculture into concrete policy, and the tendency for political leaders to adopt the discourse of sustainability yet little more. A useful roadmap for charting a course towards improved policy efforts.

WEB-BASED RESOURCES

Agroecology in Action

www.agroeco.org/

Miguel Altieri's website has several useful summary essays about agroecology and agroecological principles. The section titled "Agroecology and Modern Agriculture" has the essays most relevant to this chapter.

National Campaign for Sustainable Agriculture

www.sustainableagriculture.net/index.htm

The National Campaign for Sustainable Agriculture is an umbrella organization for many local groups working for more sustainable agricultural policies in the U.S.

SAREP: What is Sustainable Agriculture?

www.sarep.ucdavis.edu/sarep/

Provides a nice overview of the key themes in sustainable agriculture, especially as they relate to California. Presents information on natural resources, production practices, and the social and economic context of sustainability issues.

Union of Concerned Scientists

www.ucsusa.org/food_and_agriculture/

The Union of Concerned Scientists runs a "Food and Agriculture" Campaign, whose goal is to create a more sustainable food system. They report on issues such as anti-biotic misuse, genetic engineering, industrial agriculture and the Farm Bill.

VIDEOS

Goodbye Mrs. Ant. 1992. A BBC-TV production in association with Lionheart Television International, Inc. Northbrook, IL: Coronet Film & Video (58 minutes).

An overview of the ecological impact of agricultural chemicals on the environment, and the Silent Spring-inspired efforts to regulate them. A good review of the popularity of DDT and the scientific enterprise that supported it.

My Father's Garden. 1995. Miranda Productions Inc.; producer, Abigail Wright; director, Miranda Smith; writer, Nathaniel Kahn (58 minutes).

Weaves together the personal stories of the loss of family farms, the role of chemical pesticides in changing the structure of American agriculture, and Fred Kirschmann's efforts to make his farm ecologically and economically sustainable. Available from: www.bullfrogfilms.com

The Living Land. 1998. Foundation for Global Community (27 minutes).

A thoughtful set of interviews with John Jeavons, Wes Jackson, Alice Waters, and Mas Masumoto on the values and practices of alternative agriculture. Available from: www.globalcommunity.org/cgvideo/land.htm

Miguel Altieri. 2012. Why is agroecology the solution to hunger and food security. *https://www.youtube.com/watch?v=2yFvD8wuLmU*

LECTURE 3

INSTRUCTOR'S NOTE: Many of the resources listed below are original sources. For concise 1,800–2,000 word syntheses of the issues in this lecture, please see *Food First Backgrounders* referenced in the outline. These are very accessible for undergraduates.

Alkon, Alison Hope, and Julian Agyeman (eds.). 2011. *Cultivating Food Justice: Race, Class, and Sustainability.* Cambridge, MA: MIT Press.

This edited book offers a series of narratives exploring how race and class are intertwined in the food system. Its premise is that much of the food movement has come from white and middle-class people, who come from a shared perspective. This book intends to provide a broader critique of the industrialized food system, including injustice in the conversation.

Bacon, Chris, et al. 2012. *The Struggle for Food Justice in Fair Trade*. CA: Food First Backgrounder, Winter 2012. *foodfirst.org/publication/the-struggle-for-food-justice-in-fair-trade/*

Berry, Wendell. 1986. *The Unsettling of America: Culture and Agriculture*. San Francisco, CA: Sierra Club.

Brent, Zoe. 2010. *Food Workers—Food Justice: Linking Food Labor and Immigrant Rights*. Oakland, CA: Food First Backgrounder, Summer 2010. *foodfirst.org/publication/food-workers-food-justice-linking-food-labor-and-immigrant-rights/*

Chan, May Ling Chan, and Eduardo Freyre Roach. 2012. *Unfinished Puzzle—Cuban Agriculture: The Challenges, Lessons, and Opportunities*. Oakland, CA: Food First Books. *foodfirst.org/shop/books-dvds/unfinished-puzzle-cuban-agriculture-the-challenges-lessons-and-opportunities/*

Food First. 2009. *Democracy in Action: Food Policy Councils,* CA: Food First Backgrounder, Fall 2009. *foodfirst.org/publication/democracy-in-action-food-policy-councils/*

de Schutter, Olivier. 2012. *Agroecology: A Path to Realizing the Right to Food.* Oakland, CA: Food First Backgrounder, Summer 2011. *foodfirst.org/publication/agroecology-a-path-to-realizing-the-right-to-food/*

Global Exchange. *Anti-Oppression Reader.* 2006. *www.seac.org/wp-content/uploads/2011/07/AO_Reader_2007.pdf*

An excellent resource for individuals and groups who are working to address social justice issues, both within the food system and outside of it. The purpose of the manual is to help create safe spaces for all to be valued and heard. The articles explore how oppression exists and manifests in its many forms, how we can see our role in it, and to ultimately to ". . . increase awareness about multi-paradigm experiences and increase understanding about responsibility and accountability of systems of power and privilege" p.2.

Gottlieb, Robert, and Anupama Joshi. 2010. *Food Justice,* Cambridge, MA: MIT Press.

This book describes the myriad issues pertaining to food justice, such as farmworkers' and meat processing workers' conditions, food access issues, and over-processing of food. The book also describes the food justice movement that has arisen from these conditions. It tells the stories of groups and individuals working to make change, both in the U.S. and internationally.

Guthman, Julie. 2011. *Weighing In: Obesity, Food Justice, and the Limits of Capitalism.* Berkeley, CA: University of California Press.

This book critiques the efforts and focus on addressing obesity. It also explores why the food system creates cheap and processed foods, why we consumer it and how the food movements solution of going lo-cal and fresh is reproduces inequalities.

Guthman, Julie. 2004. *Agrarian Dreams: The Paradox of Organic Farming in California.* Berkeley, CA: University of California Press.

This book summarizes the research of one of the first comprehensive studies of organics. It outlines how the ideas of organics are not necessarily manifesting as hoped, at least in California. The ideal of small-scale family growers is not as evident as the industrialization of organics.

Harper, Althea, Alison Alkon, Annie Shattuck, Eric Holt-Giménez, and Frances Lambrick. 2009. *Food Policy Councils: Lessons Learned.* Food First Development Report #21 Dec. 2009. *foodfirst.org/publication/food-policy-councils-lessons-learned/*

Holmes, Seth. 2013. *Fresh Fruit, Broken Bodies: Migrant Farmworkers in the United States.* Berkeley, CA: University of California Press.

Based on five years of embedded anthropological research, this book explores the lives of Mexican migrant farmworkers. The author documents their experiences, having traveled with the farmworkers from Oaxaca up to the west coast of California. It includes the experience of border crossing, working in the fields, attempting to get medical care, and of daily lives. The author also provides deepening ". . . understanding of the ways in which socially structured suffering comes to be perceived as normal and natural in society and in health care, especially through imputations of ethnic body difference."

Holt Giménez, Eric, and Annie Shattuck. 2011a. Food crises, food regimes and food movements: rumblings of re-form or tides of transformation? *The Journal of Peasant Studies* 38: 1, 109–144

Holt-Giménez, Eric, and Annie Shattuck. 2011b. *Occupy the Food System: Building a Vision of Transformation.* Oakland, CA: Food First Backgrounder, Nov 2011. *foodfirst.org/publication/occupy-the-food-system-building-a-vision-of-transformation/*

Holt-Giménez, Eric and Yee Wang. 2011. Reform or transformation? The pivotal role of food justice in the U.S. food movement. *Race/Ethnicity: Multidisciplinary Global Contexts* 5:1, Food Justice (Autumn 2011), pp. 83-102.

Holt-Giménez, Eric (Editor). 2011. *Food Movements Unite! Strategies to Transform Our Food System.* Oakland, CA: Food First Books.

This book highlights the many efforts worldwide to transform the food system. Twenty-one people working for change have contributed to the chapters, from famers to consumers, urban and rural, all bring us a glimpse of the "unprecedented 'movement of movements.'"

Holt-Giménez, Eric. 2010. *Food Security, Food Justice, or Food Sovereignty?* Oakland, CA: Food First Backgrounder, Winter 2010. *foodfirst.org/publication/food-security-food-justice-or-food-sovereignty/*

Holt-Giménez, Eric and Loren Peabody. 2008. *From Food Rebellions to Food Sovereignty: Urgent Call to Fix a Broken Food System*. Oakland, CA: Food First Backgrounder, Spring 2008. *foodfirst.org/publication/from-food-rebellions-to-food-sovereignty-urgent-call-to-fix-a-broken-food-system/*

Jayaraman, Saru. 2013. *Behind the Kitchen Door.* Cornell University Press.

The author unveils the extent to which food service workers live below the poverty line, endure illegal treatment (withholding of wages and overtime pay), and experience race and gender discrimination. She also points out how even restaurants focused on qualities of the food movement, such as promoting local and sustainable, don't necessarily treat their employees well or even fairly. She also points to the many reasons why it matters—human rights and dignity—to the simple correlation in research that restaurants that don't treat their workers well are more likely to have health-related food practice violations. Very en-gaging to read. Stories can be useful for class discussions. She also provides potential solutions, with her primary goal to improve the lives of those working in the food service industry.

Meter, Ken. 2011. Local foods are key to economic recovery. In *Food Movements Unite! Strategies to Transform Our Food Systems*. Oakland, CA: Food First Books.

Murphy, Catherine. 1999. *Cultivating Havana: Urban Agriculture and food Security in Years of Crisis*. Oakland, CA: Food First Development Report No.12, May 1999. *foodfirst.org/publication/cultivating-havana-urban-agriculture-and-food-security-in-the-years-of-crisis/*

Patel, Raj. 2012. *Survival Pending Revolutions: What the Black Panthers Can Teach the U.S. Food Movement*. Oakland, CA: Food First Backgrounder, Summer 2012. *foodfirst.org/publication/survival-pending-revolution-what-the-black-panthers-can-teach-the-us-food-movement/*

Pollan, Michael. 2010. Food Movement Rising. *New York Review of Books,* June 10, 2010.

This short article outlines the rising discontent with our current food system and describes aspects of the "movement," or multiple efforts working to address the problems from different vantage points. What is included in the movement in this article is drawn from the books he is reviewing, so it is not all inclusive.

Shattuck, Annie, Heidi Conner, Juliana Mandell, and Meera Velu, 2008. *The Food Crisis Comes Home: Empty Food Banks, Rising Costs—Symptoms of a Hungrier Nation*. Oakland, CA: Food First Backgrounder, Fall 2008. *foodfirst.org/publication/the-food-crisis-comes-home-empty-food-banks-rising-costs-hungrier-nation/*

Steele, Anim. 2010. *Youth and Food Justice: Lessons from the Civil Rights Movement*. Oakland, CA: Food First Backgrounder, Fall 2010. *foodfirst.org/publication/youth-and-food-justice-lessons-from-the-civil-rights-movement/*

Toi. 2013. *Frankly Not About Food Forests. www.blackgirldangerous.org/2013/09/frankly-not-about-food-forests/*

The author, a community activist and organizer, identifies several ways in which the work of white people on food system issues in communities of color can be problematic. Toi's narrative addresses historical and current structural racism and discrimination facing people of color in relation to the food system, and related feelings associated with this long history.

Viertel, Josh. 2012. *Beyond Voting with Your Fork: From Enlightened Eating to Movement Building*. Oakland, CA: Food First Backgrounder, Spring 2012. *foodfirst.org/publication/beyond-voting-with-your-fork-from-enlightened-eating-to-movement-building/*

Wang, Yi, Eric Holt-Giménez and Annie Shattuck. 2011. *Grabbing the Food Deserts*. Oakland, CA: Food First Backgrounder, Spring 2011. *foodfirst.org/publication/grabbing-the-food-deserts/*

VIDEO

Food Chains: The Revolution in America's Fields. 2014. Directed by Sanjay Rawal.

www.foodchainsfilm.com

The narrative of the film focuses on the efforts of the Coalition of Immokalee Workers or CIW, a group of tomato pickers from Southern Florida who are working to create more justice labor conditions.