

Agriculture

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How is Agriculture Currently Organized Geographically, and How has Agribusiness Influenced the Contemporary Geography of Agriculture?

Understanding global agricultural patterns requires looking at more than market location, land use, and transportation costs—the factors analyzed by von Thünen. We must also consider the effects of different climate and soil conditions, variations in farming methods and technology, the role of governments and social norms, and the lasting impacts of history. Decisions made by colonial powers in Europe led to the establishment of plantations from Middle America to Malaysia. The plantations grew crops not for local markets but for consumers in Europe; similarly, U.S. companies founded huge plantations in the Americas. Over the past few centuries, the impact of this plantation system transformed the map of world agriculture. The end of colonial rule did not signal the end of the agricultural practices and systems that had been imposed on the former colonial areas. Even food-poor countries must continue to grow commercial crops for export on some of their best soils where their own food could instead be harvested. Long-entrenched agricultural systems and patterns are not quickly or easily transformed.

Commercial farming has come to dominate in the world's economic core, as well as some of the places in the semi-periphery and periphery. Commercial farming is the agriculture of large-scale grain producers and cattle ranches, mechanized equipment and factory-type labor forces, of plantations and profit. It is a world apart from the traditional farms of Asia and Africa.

Field Note

“The technology of refrigeration has kept pace with the containerization of seaborne freight traffic. When we sailed into the port of Dunedin, New Zealand, I was unsure of just what those red boxes were. Closer inspection revealed that they are refrigeration units, to which incoming containers are attached. Meats and other perishables can thus be kept frozen until they are transferred to a refrigerator ship.”



Figure 11.16 Dunedin, New Zealand.

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The spatial expansion of modern **commercial agriculture** began in the eighteenth and nineteenth centuries when Europe became a market for agricultural products from around the world: Moreover, European countries manufactured and sold in their colonies the finished products made from imported raw materials. Thus, cotton grown in Egypt, Sudan, India, and other countries colonized by Europe was bought cheaply, imported to European factories, and made into clothes—many of which were then exported and sold, often in the very

colonies where the cotton had been grown in the first place.

Major changes in transportation and food storage, especially refrigeration, further intertwined agricultural production and food processing regions around the world during the twentieth century (Fig. 11.16). The beef industry of Argentina, for example, secured a world market when the invention of refrigerated ships made it possible to transport a highly perishable commodity over long distances. European colonial powers required farmers in their colonies to cultivate specific crops. One major impact of colonial agriculture was the establishment of **monoculture** (dependence on a single agricultural commodity) throughout much of the colonial world. Colonies became known for certain crops, and colonizers came to rely on those crops. Ghanaians still raise cacao; Moçambiquans still grow cotton; and Sri Lankans still produce tea. The production of cash crops in poorer countries is still perpetuated by loan and aid requirements from lending countries, the World Trade Organization, the International Monetary Fund, and the World Bank (see Chapter 10).

The World Map of Climates

Before we can study the distribution of agriculture in the world today, we need to examine Figure 11.17, the distribution of climate zones. All of the elements of weather, absorption of the sun's energy, rotation of the Earth, circulation of the oceans, movement of weather systems, and the jet stream, produce a pattern of climates represented in the map—and those climate patterns have a profound impact on what can be grown where. We owe this remarkable map to Wladimir Köppen (1846–1940), who devised a scheme called the **Köppen climate classification system** for classifying the world's climates on the basis of temperature and precipitation.

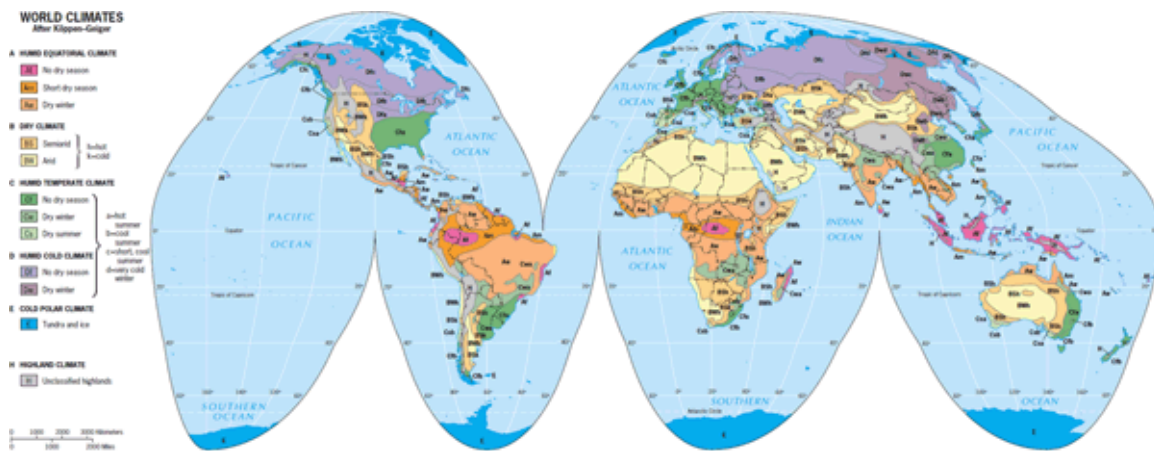


Figure 11.17

World Climates.

The Köppen map of world climates, as modified by R. Geiger. These are macroclimatic regions; microclimates are set within these but cannot be shown at this scale.

Köppen's map provides one means of understanding the distribution of **climatic regions** (areas with similar climatic characteristics) across the planet. The legend looks complicated, but it really is not; here is one of those maps worth spending some time on. For present purposes, it is enough to get a sense of the distribution of the major types of climate. The letter categories in the legend give a clear indication of the conditions they represent.

The (A) climates are hot or very warm and generally humid. The “no dry season” (Af) regions are *equatorial rainforest* regions. The “short dry season” (Am) climate is known as the *monsoon climate*. And if you can envisage an African savanna, you know what the (Aw, *savanna*) designation means.

Once you realize that the yellow and light brown colors on the map represent dry climates (BW, *desert* and BS, *steppe*), it becomes clear how much of the world has limited water availability. Nonetheless, some very large population clusters have developed in these water-deficient regions, especially at lower (and warmer) latitudes. The world faces a long-term water crisis, and the Köppen map helps show why.

The (C) climates also have familiar names. The (Cf) climate, represented by dark green, prevails over the southeastern United States. If you know the local climate in Atlanta or Nashville or Jacksonville, you understand why this climate is often called “humid temperate.” It is moist, and it does not get as cold as it does in Canada or as warm (continuously, anyway) as in the Amazon Basin. If you have experienced this kind of climate, the map gives you a good idea of what it's like in much of eastern China, southeastern Australia, and a large part of southeastern South America.

The “dry summer” (C) climates are known as *Mediterranean* climates (the small s in Cs means that summers

are dry). This mild climate occurs not only around the Mediterranean Sea, and thus in the famous wine countries of France, Italy, and Spain, but also in California, Chile, South Africa's Cape, and southern parts of Australia. So you know what kind of climate to expect in Rome, San Francisco, Santiago, Cape Town, and Adelaide.

Farther toward the poles, the planet gets rather cold. Note that the (D) climates dominate in the United States' upper Midwest and Canada, but it gets even colder in Siberia. The “milder” (Da) climates (here the key is the small a, which denotes a warm summer) are found only in limited parts of Eurasia. Winters are very cold in all the (D) climates and downright frigid (and long) in the (Dfb) and (Dfc) regions. (D) climates are generally continental, on the interior of continents, instead of on coasts. Continental locations make (D) climates generally drier than (C) climates. The continentality of (D) climates also contributes to the large range of temperatures found across the year because land heats and cools much faster than water.

Polar climates, where tundra and ice prevail, are found poleward of (D) climates. The polar location of (E) climates means temperatures are cold throughout the year. As a result, plant life does not break down and nourish the soil during the year, and also a layer of permafrost (frozen ground) exists year round.

The World Map of Agriculture

When comparing the world map of agriculture (Fig. 11.18) with the distribution of climate types across the world (Fig. 11.17), we can see the correlation between climate and agriculture. For example, drier lands rely on livestock ranching, whereas moister climates are marked with grain production. Understanding the major agricultural zones shown in Figure 11.18 requires looking at both environmental and social variables.

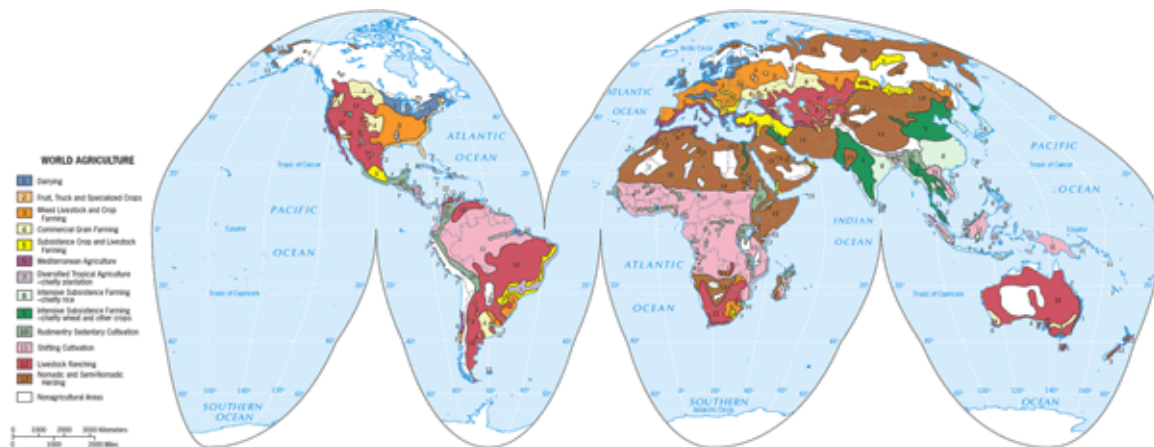


Figure 11.18

World
Agriculture.

Different kinds of agricultural areas are shown throughout the world. *Adapted with permission from: Hammond, Inc., 1977.*

Cash Crops and Plantation Agriculture

Colonialism profoundly shaped nonsubsistence farming in many poorer countries. Colonial powers implemented agriculture systems to benefit their needs, a practice that has tended to lock poorer countries into production of one or two “cash” crops. Cash farming continues to provide badly needed money, even if the conditions of sale to the urban-industrial world are unfavorable. In the Caribbean region, for example, whole national economies depend on sugar exports (sugar having been introduced by the European colonists in the 1600s). These island countries wish to sell the sugar at the highest possible price, but they are not in a position to dictate prices. Sugar is produced by many countries in various parts of the world, as well as by farmers in the global economic core (Fig. 11.18). Governments in the core place quotas on imports of agricultural products and subsidize domestic production of the same commodities.

Occasionally, producing countries consider forming a cartel in order to present a united front to the importing countries and to gain a better price, as oil-producing states did during the 1970s. Such collective action is difficult, as the wealthy importing countries can buy products from countries that are not members of the cartel. Also, the withholding of produce by exporting countries may stimulate domestic production among importers. For example, although cane sugar accounts for more than 70 percent of the commercial world sugar crop each year, farmers in the United States, Europe, and Russia produce sugar from sugar beets. In Europe and Russia, these beets already yield 25 percent of the annual world sugar harvest. Collective action by countries producing sugarcane could easily cause that percentage to increase.

When cash crops are grown on large estates, we use the term **plantation agriculture** to describe the production system. Plantations are colonial legacies that persist in poorer, primarily tropical, countries along with subsistence farming. Figure 11.18 shows that plantation agriculture (7 in the legend) continues in Middle and South America, Africa, and South Asia. Laid out to produce bananas, sugar, coffee, and cocoa in Middle and South America, rubber, cocoa, and tea in West and East Africa, tea in South Asia, and rubber in Southeast Asia, these plantations have outlasted the period of decolonization and continue to provide specialized crops to wealthier markets. Many of the most productive plantations are owned by European or American individuals or corporations.

Multinational corporations have tenaciously protected their economic interests in plantations. In the 1940s and 1950s, the Guatemalan government began an agrarian reform program. The plan entailed renting unused land from foreign corporations to landless citizens at a low appraised value. The United Fruit Company, an American firm with extensive holdings in the country, was greatly concerned by this turn of events. The company had close ties to powerful individuals in the American government, including Secretary of State John Foster Dulles, CIA director Allen Dulles (the two were brothers), and Assistant Secretary of State for Inter-American Affairs John Moors Cabot. In 1954, the United States supported the overthrow of the government of Guatemala because of stated concerns about the spread of communism. This ended all land reform initiatives, however, leading many commentators to question the degree to which the United Fruit Company was behind the coup. Indeed, with the exception of President Dwight Eisenhower, every individual involved in the decision to help topple Guatemala's government had ties to the company. This example illustrates the inextricable links between economics and political motivations—and it raises questions about the degree to which multinational corporations based in wealthy countries influence decisions about politics, agriculture, and land reform in other parts of the world.

Commercial Livestock, Fruit, and Grain Agriculture

As Figure 11.18 shows, by far the largest areas of commercial agriculture (1 through 4 in the legend) lie outside the tropics. Dairying (1) is widespread at the northern margins of the midlatitudes—particularly in the northeastern United States and in northwestern Europe. Fruit, truck, and specialized crops (2), including the market gardens von Thünen observed around Rostock, are found in the eastern and southeastern United States and in widely dispersed small areas where environments are favorable. In Central Asia and the Sahara, major oases stand out as commercial agriculture on the map.

Mixed livestock and crop farming (3) is widespread in the more humid parts of the midlatitudes, including much of the eastern United States, western Europe, and western Russia, but it is also found in smaller areas in Uruguay, Brazil, and South Africa. Commercial grain farming (4) prevails in the drier parts of the midlatitudes, including the southern Prairie Provinces of Canada, in the Dakotas and Montana in the United States, as well as in Nebraska, Kansas, and adjacent areas. Spring wheat (planted in the spring and harvested in the summer) grows in the northern zone, and winter wheat (planted in the autumn and harvested in the spring of the following year) is used in the southern area. An even larger belt of wheat farming extends from Ukraine through Russia into Kazakhstan. The Argentinean and Australian wheat zones are smaller in area, but their exports are an important component of world trade.

Even a cursory glance at Figure 11.18 reveals the wide distribution of **livestock ranching** (12), the raising of domesticated animals for the production of meat and by-products, such as leather and wool. In addition to the large cattle-ranching areas in the United States, Canada, and Mexico, much of eastern Brazil and Argentina are devoted to ranching, along with large tracts of Australia and New Zealand, as well as South Africa. You may see a Thünian pattern here: livestock ranching on the periphery and consumers in the cities. Refrigeration has overcome the problem of perishability, and high volume has lowered the unit cost of transporting beef, lamb, and other animal products.

Subsistence Agriculture

The map of world agriculture labels three types of subsistence agriculture: subsistence crop and livestock farming; intensively subsistence farming (chiefly rice); and intensively subsistence farming (chiefly wheat and other crops). In some regions that are labeled as subsistence, that label does not tell the whole story. For example, in Southeast Asia, rice is grown on small plots and is labor-intensive, so that subsistence and export production occur side by side. Despite the region's significant rice exports, most Southeast Asian farmers are subsistence farmers. Thus, Southeast Asia appears on the map as primarily a subsistence grain-growing area.

Mediterranean Agriculture

Only one form of agriculture mentioned in the legend of Figure 11.18 refers to a particular climatic zone: **Mediterranean agriculture** (6). As the map shows, this kind of specialized farming occurs only in areas where the dry summer Mediterranean climate prevails (Fig. 11.17): along the shores of the Mediterranean Sea,

in parts of California and Oregon, in central Chile, at South Africa's Cape, and in parts of southwestern and southern Australia. Farmers here grow a special combination of crops: grapes, olives, citrus fruits, figs, certain vegetables, dates, and others. From these areas come many wines; these and other commodities are exported to distant markets because Mediterranean products tend to be popular and command high prices.

Drug Agriculture

There are important agricultural activities that cannot easily be mapped at the global scale and therefore do not appear in Figure 11.18. One of those is the cultivation of crops that are turned into illegal drugs. Because of the high demand for drugs—particularly in the global economic core—farmers in the periphery often find it more profitable to cultivate poppy, coca, or marijuana plants than to grow standard food crops. Cultivation of these plants has increased steadily over the past several decades, and they now constitute an important source of revenue for parts of the global economic periphery. Coca, the source plant of cocaine, is grown widely in Colombia, Peru, and Bolivia. Over half of the world's cultivation of coca occurs in Colombia alone.

Heroin and opium are derived from opium poppy plants, grown predominantly in Southeast and South Asia, especially in Afghanistan and Myanmar. In the 2008 World Drug Report, the United Nations reported that 92 percent of the world's opium production took place in Afghanistan. The United States-led overthrow of the Taliban in Afghanistan in 2001 created a power vacuum in the country and an opportunity for illegal drug production to quickly rebound (the austere Taliban government had virtually eradicated opium production in Afghanistan by 2001). Most opium production in Afghanistan today occurs in five unstable southern provinces.

United States government policies have affected production of illegal drugs in Latin America. During the 1980s and 1990s, the U.S. government worked with local authorities to crack down on coca production in Colombia. With this crackdown, much of the drug production and trafficking moved north to northern Mexico. In June 2005, the *Economist* quoted one American official as reporting that “Mexican criminal gangs ‘exert more influence over drug trafficking in the U.S. than any other group.’” Mexicans now control 11 of the 13 largest drug markets in the United States.” Marijuana and opium production in Mexico is on the rise, and the United States Drug Enforcement Agency (DEA) is concerned about the high potency of marijuana coming out of Mexico and Canada. Although more than 90 percent of the world's opium production is in Afghanistan, most heroin (which is derived from opium) coming into the United States comes from Mexico or Colombia. The heroin consumed in the western United States comes from opium grown in Mexico, whereas the heroin consumed in eastern United States comes from opium grown in Colombia.

Drug cartels that oversee the drug trade have brought crime and violence to the places where they hold sway (Fig. 11.19). There are areas in Rio de Janeiro where the official police have little control, and drug lords have imposed reigns of terror over swaths of the countryside in parts of Central and South America, Southwest Asia, Southeast Asia, and elsewhere. The drug trade depends on the voracious appetite for mind-altering substances in North America and Europe in particular.



Figure 11.19

Mexican Drug Cartel Regions of Influence in Mexico.

Courtesy of: Food and Agriculture Service.
<http://www.fas.org/sgp/crs/row/RL34215.pdf>

The supply of marijuana in the United States traditionally came from Mexico and Canada, as the DEA has reported. But an increasing amount of marijuana consumed in the United States is grown in the United States. Since 1996, a total of 16 states in the United States have legalized marijuana for medicinal purposes. In addition to Alaska, Hawaii, Michigan, Maine, Vermont, New Jersey and Rhode Island, most of the states with medicinal marijuana are in the western United States. Marijuana production for legal and illegal consumption in the United States is estimated to be “the largest cash crop in the United States.” An April 2011 article in the *New York Times* valued marijuana production at \$40 billion, “with California, Tennessee, Kentucky, Hawaii and Washington the top five production states,” despite the fact that medicinal marijuana is not legal in Tennessee or Kentucky.

Marijuana production has more than a monetary impact. Energy analyst Evan Mills distributed a study in April 2011 that estimates the energy consumed in producing marijuana in the United States costs about \$5 billion a year and accounts for 1 percent of all power consumed in the United States. Marijuana grown outdoors has much lower energy costs than marijuana grown indoors. Growers plant crops on public lands, especially in the west, because the remote location of public lands makes detection less likely for growers. Also, the land is public and therefore not owned by any one person to whom a crop could be traced. Marijuana grown indoors consumes massive amounts of electricity. The cost of indoor production includes grow lamps that are the kinds used in operating rooms, dehumidifiers, air conditioners, electric generators, water pumps, heaters, carbon dioxide generators, ventilation systems, and electrical control systems.

Informal Agriculture

Small-scale informal agricultural activities are also missing from maps of global agricultural patterns, yet these play an important role in the contemporary world. Millions of people cultivate small plots of land in and around their homes for domestic consumption or to trade informally with others. These activities are not captured by formal agricultural statistics, but the food that is grown in this fashion plays a vital role in the lives of literally billions of people. Even city dwellers in many parts of the world are involved in small-scale agricultural activities—cultivating or raising livestock in small plots of land around their dwellings, on rooftop gardens, or in community gardens. Such practices are encouraged in some places—notably China—but more often they are ignored, or even discouraged. Yet the contribution urban agriculture can make to the food security of city dwellers is attracting growing attention, and it is likely to grow in importance in the coming years.

Political Influences on Agriculture

As we noted above, the European colonial period provides a stunning example of the impact of political circumstances on agriculture. Consider, for example, one of the most significant contemporary **cash crops**: cotton. Colonialism encouraged the production of plantation-scale cotton in many regions of the world (e.g., India), and colonial powers established a trading network that led to the globalization of the cotton industry.

Cotton cultivation expanded greatly during the nineteenth century, when the Industrial Revolution produced machines for cotton ginning, spinning, and weaving that increased productive capacity, brought prices down, and put cotton goods within the reach of mass markets. As with sugar, the colonial powers laid out large-scale cotton plantations, sometimes under irrigation. Cotton cultivation was also promoted on a smaller scale in numerous other countries: in Egypt's Nile Delta, in the Punjab region shared by Pakistan and India, and in Sudan, Uganda, Mexico, and Brazil. The colonial producers received low prices for their cotton, and the European industries prospered as cheap raw materials were converted into large quantities of items for sale at home and abroad.

Wealthier countries continue to buy cotton, and cotton sales remain important for some former colonies. But they now compete with cotton being grown in the United States, Northeast China, and Central Asia. Moreover, cotton is in competition today with synthetic fibers such as nylon and rayon. As global supply and demand shifts in response to changing markets and new alternatives, economies that have been built around cotton production can go through wrenching adjustments.

Even as countries emerged from colonial control, they were left with a legacy of large landholdings owned or controlled by wealthy individuals or business entities. That legacy contributed to uprisings among the rural poor in places such as Mexico, Cuba, and Guatemala. Efforts on the part of governmental authorities in some ex-colonies to confront this situation provide a different example of the impact of politics on agriculture. In some cases governments enacted policies that perpetuated preexisting inequalities; in others land reforms were introduced that served to redistribute land to individuals or communities. The latter were common in parts of Central and South America, leading to a substantial reorganization of the rural landscape—sometimes spreading wealth more broadly. Pressure for land reform continues in many countries, and land issues are at the heart of many social movements in the global economic periphery and semi-periphery.

A more mundane, but common, way in which governments influence agriculture is through tax regulations and subsidies favoring certain land uses. The U.S. government currently spends more than \$10 billion subsidizing large-scale farmers. Pushed by a strong farm lobby, these subsidies guarantee floor prices for staple crops and protect farmers in bad years. They give large-scale agriculture an advantage over smaller scale alternatives. But in the past 60 years perhaps the most dramatic examples of politics affecting agriculture have come from the communist world. The governments of the former Soviet Union, eastern Europe, and Maoist China initiated far-reaching land reforms that led to the creation of large collective farms and agricultural communes. This giant experiment resulted in the massive displacement of rural peoples and irrevocably altered traditional rural social systems. Today farming privatization is under way in both Russia and China.

Socio-cultural Influences on Agriculture

Agriculture is also affected by social and cultural factors. As incomes rise, many people start consuming more meat and processed foods, seek out better quality fruits and vegetables, or demand fresh produce year round. Consider the case of coffee, one of the most important **luxury crops** in the modern world. Coffee was first domesticated in the region of present-day Ethiopia, but today it is grown primarily in Middle and South America, where approximately 70 percent of the world's annual production is harvested.

In the early eighteenth century, coffee was virtually unknown in most of the world. Yet, after petroleum, coffee is now the second most valuable legally traded commodity in the world. The United States buys more than half of all the coffee sold on world markets annually, and western Europe imports most of the rest. A well-known image of coffee production in North America is Juan Valdez, portrayed as a simple yet proud Colombian peasant who handpicks beans by day and enjoys a cup of his own coffee by night. This image is quite contrary to the reality of much coffee production in Latin America, however. In most cases coffee is produced on enormous, foreign-owned plantations, where it is picked by local laborers who are hired at very low wage rates. Most coffee is sent abroad; and if the coffee pickers drink coffee, it is probably of the imported and instant variety.

Recently, however, coffee production has undergone changes as more consumers demand fair trade coffee and more coffee producers seek fair trade certification. CNN reports that “Retailers who are certified Fair Traders return up to 40 percent of the retail price of an item to the producer.” Once a producer meets the requirements of organic coffee production and a few other criteria, that producer can be registered on the International Fair Trade Coffee Register. Coffee importers then purchase the fair trade coffee directly from the registered

producers. Being registered guarantees coffee producers a “fair trade price” of \$1.40 per pound of coffee (plus bonuses of \$0.30 per pound for organic). Over 1.2 million farmers and workers in 58 countries, mainly in the periphery and semi-periphery, are connected to the 827 fair trade certified producer organizations worldwide (Fig. 11.20). The fair trade campaign pressured Starbucks into selling fair trade coffee, and in 2010, Starbucks committed to doubling the amount of fair trade coffee it purchases, which accounts for 40 percent of the fair trade coffee imported into the United States. Other retailers have followed suit; for example, all espresso sold at Dunkin' Donuts in North America and Europe is fair trade certified. Fair trade coffee is available at large retail outlets and under corporate brands at Target, Wal-Mart, and Sam's Club.



Figure 11.20

**Mount Elgon,
Uganda.**

This fair trade coffee farmer in Uganda picks coffee berries at her farm, which is one of 6,000 small farms on Mount Elgon that sells directly to Cafedirect, a British Fair Trade company. © Karen Robinson Panos Pictures.

The push for fair trade production shows how social movements can influence agriculture. And fair trade goes beyond coffee. Dozens of commodities and products, ranging from tea, bananas, fresh cut flowers, and chocolate to soccer balls, can be certified fair trade. According to Fair Trade Labeling Organizations International, consumers spent more than \$4.84 billion on fair trade certified products in 2008.

People's changing tastes also shape the geography of agriculture. Tea is a rather recent addition to the Western diet. It was grown in China perhaps 2000 years ago, but it became popular in Europe only during the nineteenth century. The colonial powers (mainly the British) established enormous tea plantations in Asia and thus began the full-scale flow of tea into European markets. Tea production, both the fair trade and the traditionally traded varieties, is on the rise globally to meet the increasing demand.

Even as social preferences shape agricultural production, the consumption of particular products can have social consequences. Just a few decades ago, city dwellers in West Africa primarily consumed grains grown from nearby fields. Over the past three decades, relatively cheap imported rice from Malaysia and Thailand has become an important food source, and many locals came to prefer the taste of the imported rice. This set of circumstances left West Africa vulnerable when the price of imported grains skyrocketed in 2008. Local riots broke out and a food crisis ensued.

Agribusiness and the Changing Geography of Agriculture

The commercialization of crop production and the associated development of new agricultural technologies have changed how agricultural goods are grown and have sparked the rapid growth of agribusiness.

Agribusiness is an encompassing term for the businesses that provide a vast array of goods and services to support the agricultural industry. Agribusiness serves to connect local farms to a spatially extensive web of production and exchange. At the same time, it fosters the spatial concentration of agricultural activities. Both of these trends are revealed in the development of the poultry industry in the United States.

Early in the twentieth century, poultry production in the United States was highly disaggregated, with many farmers raising a few chickens as part of a multifaceted farming operation. Over the past 50 years, however, poultry production has fundamentally changed. Today, the farmers on the Delmarva Peninsula account for 8 percent of poultry production in the United States, and they do so by contracting and working directly with four major poultry companies. In an article on modern agriculture, David Lanegran summarized the impact of this transformation as follows:

Today, chickens are produced by large agribusiness companies operating hatcheries, feed mills, and processing plants. They supply chicks and feed to the farmers. The farmers are responsible for building a

house and maintaining proper temperature and water supply. Once a week the companies fill the feed bins for the farmers, and guarantee them a price for the birds. The companies even collect market-ready birds and take them away for processing and marketing. Most of the nation's poultry supply is handled by a half dozen very large corporations that control the process from chicks to chicken pieces in stores.

Lanegran goes on to show how selective breeding has produced faster growing, bigger chickens, which are housed in enormous broiler houses that are largely mechanized.

Broiler houses are concentrated in northwestern Arkansas, northern Georgia, the Delmarva Peninsula (Delaware, Maryland, and Virginia) east of Washington, D.C., the Piedmont areas of North Carolina, and the Shenandoah Valley of Virginia (Fig. 11.21). Lanegran shows that in many respects the “farmers” who manage these operations are involved in manufacturing as much or more than farming. They are as likely to spend their time talking to bank officers, overseeing the repair of equipment, and negotiating with vendors as they are tending their animals. As such, they symbolize the breakdown between the rural and the urban in wealthier parts of the world—as well as the interconnections between rural places and distant markets.

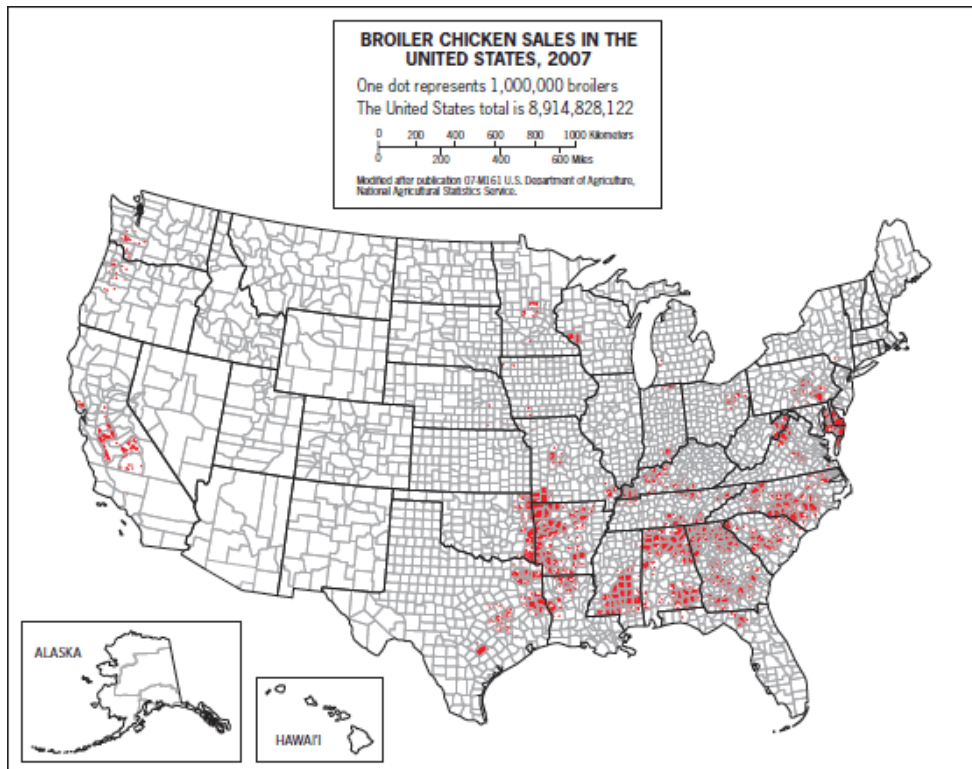


Figure 11.21

Broiler Chicken Sales in the United States, 2007.

Courtesy of: United States Census of Agriculture, National Agricultural Statistics Service.

The poultry example is not unusual. During the 1990s, hog production on the Oklahoma and Texas panhandles increased rapidly with the arrival of corporate hog farms. John Fraser Hart and Chris Mayda described the quick change with statistics. In 1992, the U.S. Census of Agriculture counted just over 31,000 hogs marketed in Texas County, Oklahoma, and just four years later “the panhandle was plastered with proliferating pork places, and Texas County alone produced 2 million hogs. It was the epicenter of an area that produced 4 million hogs, 4 percent of the national total and one-seventh as many finished hogs as the entire state of Iowa.” The availability of both inexpensive water and natural gas on the Oklahoma panhandle was enticing for corporate hog farms, which require both. Hart and Mayda explain that the “reasonable” price of land and the accessibility to “growing metropolitan markets of the South and the West” also made the region attractive for hog production. Similar to poultry production, a corporation built a processing plant, and production (both by farms owned by the corporation and those owned privately) increased to meet the demand (Fig. 11.22).

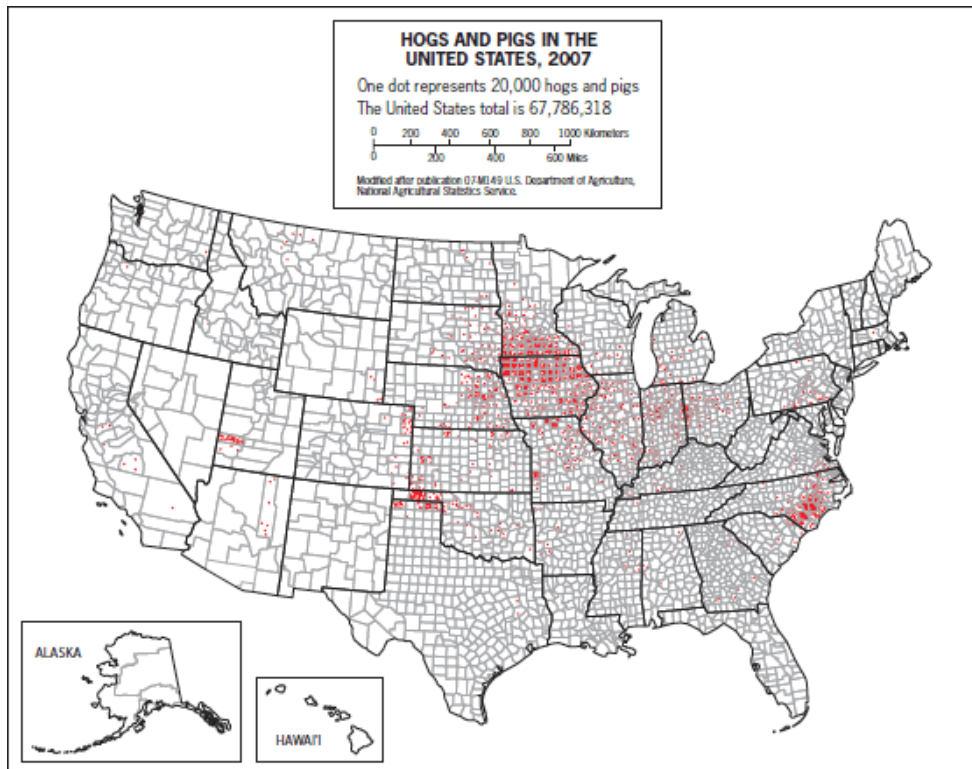


Figure 11.22

Hogs and Pigs in the United States, 2007.

Courtesy of: United States Census of Agriculture, National Agricultural Statistics Service.

Because of agribusiness, the range and variety of products on the shelves of urban supermarkets in the United States is a world apart from the constant quest for sufficient, nutritionally balanced food that exists in some places. A global network of farm production is oriented to the one-fifth of the world's population that is highly urbanized, wealthy, and powerful. Few farmers in distant lands have real control over land-use decisions, for the better off people in the global economic core continue to decide what will be bought at what price. The colonial era may have come to an end, but, as the map of agricultural regions reminds us, its imprint remains strong.

Environmental Impacts of Commercial Agriculture

Commercial agriculture creates significant environmental change. The growing demand for protein-rich foods and more efficient technologies are leading to overfishing in many regions of the world. In many places fish stocks are declining at an alarming rate. From mid-century to the late 1980s, the fish harvest from oceans and seas increased fivefold, and there seemed to be no limit to it. Countries quarreled over fishing rights, poorer countries leased fishing grounds to richer ones, and fleets of trawlers plied the oceans. International attempts to regulate fishing industries failed. Then in the 1970s and 1980s, overfishing began destroying fish stocks. The cod fisheries on Canada's Grand Banks off Newfoundland collapsed. In 1975 biologists estimated the Atlantic bluefin tuna population at 250,000; today the western stock is listed as critically endangered, and the stock in the Mediterranean is listed as endangered. From ocean perch and king crabs off Alaska to rock lobsters and roughies off New Zealand, fish and shellfish populations are depleted. The total annual catch is also declining and may already be beyond the point of recovery. Much of the damage has already been done, and fishing industries in many parts of the world have reported dwindling harvests and missing species.

If you travel to Mediterranean Europe today you will see a landscape that reflects the clearing of forests in ancient times to facilitate agriculture and trade. Look carefully at many hillslopes and you will see evidence of terraces cut into the hills many centuries ago. The industrialization and commercialization of agriculture has accelerated the pace and extent of agriculture's impact on the environment in recent times. More land has been cleared, and the land that is under cultivation is ever more intensively used.

Significant agriculturally driven changes to the environment go far beyond the simple clearing of land. They range from soil erosion to changes in the organic content of soils to the presence of chemicals (herbicides, pesticides, even antibiotics and growth hormones from livestock feces) in soils and groundwater. In places where large commercial crop farms dominate, the greatest concerns often center on the introduction of

chemical fertilizers and pesticides into the environment—as well as soil erosion. And, as we have seen, the movement toward genetically modified crops carries with it another set of environmental concerns.

The growth of organic farming (discussed at the beginning of the chapter) and the move toward the use of local foods in some communities can benefit the environment. Yet such initiatives have had only modest impacts on the majority of the world's peoples and places. A telling sign is that the organic movement has had little effect on the production of the staple foods on which billions of people depend. Moreover, large corporate entities are playing an increasingly prominent role in the organic movement—raising controversies about standards and rendering illusory the ideal of an independent organic farmer engaged in “sustainable” agriculture. Nonetheless, better regulated organic farming and local food initiatives are clearly on the rise. Their proponents argue that they are priced out of the market by subsidies favoring large farms and by the failure of most agribusiness to incorporate the environmental and health costs of large-scale, intensive farming. And such arguments are gaining traction.

The environmental impacts of large-scale intensive agriculture can be particularly severe when agriculture moves into marginal environments, as has happened with the expansion of livestock herding into arid or semiarid areas (see the map of world climates, Fig. 11.17). The natural vegetation in these areas cannot always sustain the herds, especially during prolonged droughts. As a result, ecological degradation and, in some areas, desertification (see Chapter 10) are the result.

In recent decades, the popularity of fast-food chains that serve hamburgers has led to the deforestation of wooded areas in order to open up additional pastures for beef cattle, notably in Central and South America. Livestock ranching is an extremely land-, water-, and energy-intensive process. Significant land must be turned over to the cultivation of cattle feed, and the animals themselves need extensive grazing areas. By stripping away vegetation, the animals can promote the erosion of river banks, with implications for everything from water quality to wildlife habitat.

The Challenge of Feeding Everyone

Food riots that break out in low-income countries and stories of famine in countries including Somalia, Sudan, Malawi, and Zimbabwe remind us that food security remains a challenge for millions of people around the globe. Although food production has expanded in some parts of the world, food production per capita has actually declined in Africa over the past decade. Worldwide, nearly 1 billion people are malnourished. Currently, enough food is produced worldwide to feed Earth's population, but in the face of inadequate distribution systems and widespread poverty, food security looms as a significant issue for the twenty-first century.

As cities expand outward, some of the most fertile, productive farmlands are lost to housing and retail developments (Fig. 11.23). Many cities were established amid productive farmlands that could supply the needs of their inhabitants. Now the cities are absorbing the productive farmlands as they expand. Between 1987 and 1992, China lost more than one million hectares of farmland to urbanization. In the United States, the American Farmland Trust, identified 12 U.S. areas where farmland was giving way to urban uses at a rapid rate in the 1990s, including California's Central Valley, South Florida, California's coastal zone, North Carolina's Piedmont, and the Chicago–Milwaukee–Madison triangle in Illinois–Wisconsin. These 12 areas represent only 5 percent of U.S. farmland, but they produce 17 percent of total agricultural sales, 67 percent of all fruit, 55 percent of all vegetables, and one-quarter of all dairy products. Figures for other countries in the richer parts of the world (such as Japan) as well as for poorer countries (such as Egypt) prove that urban expansion into productive farmland is a global problem with serious implications for the future.

HIGH QUALITY FARMLAND IN THE PATH OF DEVELOPMENT

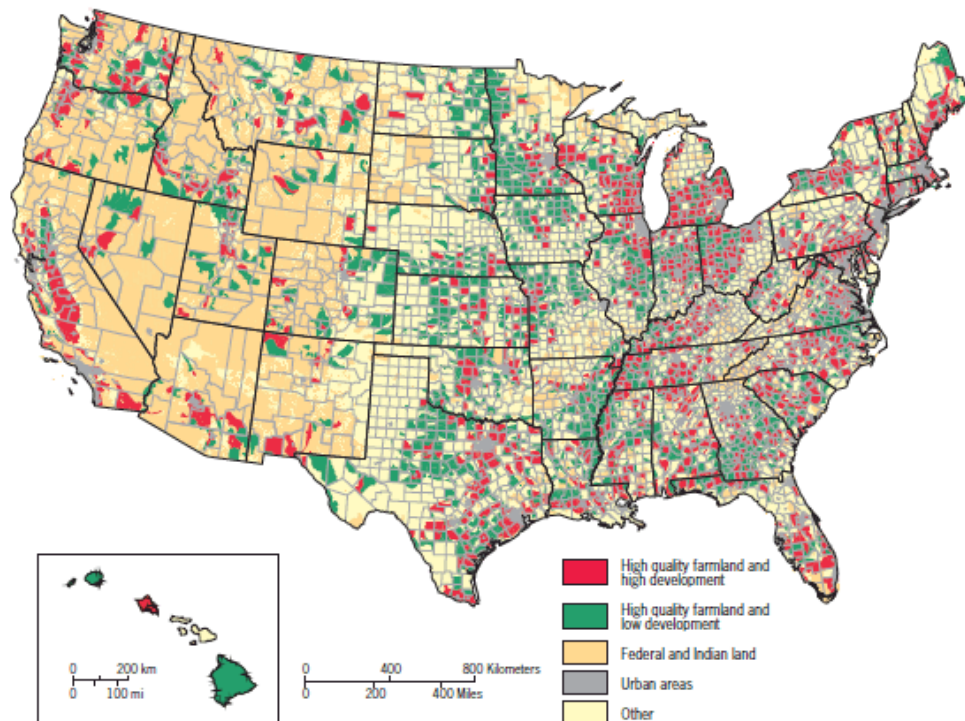


Figure 11.23

Farming on the Edge: High-Quality Farmland in the Path of Development, 2002.

This map from American Farmland Trust, whose charge is to preserve farmland, highlights farmland that is endangered of being suburbanized as cities expand into neighboring farmlands. *Courtesy of: American Farm Trust, <http://www.farmland.org/farmingontheedge/maps.htm>, last accessed November 2005.*

The conversion of farmlands into housing developments is not confined to areas close to major cities that could become suburbs. Expendable wealth and the desire to have a place to “get away from it all” have led highly productive commercial agricultural areas to be converted into regions for second homes. On the Delmarva Peninsula in the United States, where poultry production is concentrated, the price of land has risen as urbanites from Pennsylvania, Washington, D.C., Maryland, and New York bought land on the eastern shore to build second homes. Many of the new residents on the peninsula are demanding higher environmental standards. Rising land prices and stricter environmental standards are placing a squeeze on the cost of chicken production. Tyson Foods closed its production facility in spring 2004, and the *Washington Times* reported 650 lost jobs. As urban population continues to grow and expendable wealth increases for the wealthiest of the population, more agricultural lands will be converted to housing developments, especially lands in beautiful areas with recreational amenities such as the eastern shore of Maryland (the Delmarva Peninsula) and its Chesapeake Bay.

Population growth and the loss of agricultural land help to explain why global food prices have been on the rise for more than a decade. Putting further pressure on food prices are consumption increases in countries experiencing rapid developments (e.g. China) and a trend toward using food crops for biofuel production. These factors were behind an almost 50 percent surge in global food prices between April 2007 and March 2008. Food riots broke out in some cities, and the specter of large-scale famine grew. Another more recent spike in food prices was one factor in the outbreak of revolutions in North Africa and Southwest Asia in spring 2011. A convergence of changing land use, increasing use of grains for fuel, corrupt governments, and environmental impacts works against the provision of adequate food at reasonable prices for the world's poor.

Despite the severity of the situation, in today's world it is possible for many people to put farming largely out of their minds. As a result of industrialization of agriculture and improvements in transportation, consumers come in contact with farmers much less frequently than did previous generations. On a freezing cold winter day in Cincinnati, Ohio, consumers can purchase fresh strawberries grown in Chile. Consumers can also purchase highly processed foods with long shelf lives and forget where the item was purchased, much less think of the farm work that went into the ingredients, when they get around to consuming it.

As a result of the growing distance between farmers and consumers, geographers have sought to draw attention to **food deserts**, which are areas with limited access to fresh, nutritious foods (Fig. 11.24). Urban food deserts are typically found in low-income neighborhoods where consumers have little access to medium-size and large grocery stores and instead have access to small grocery stores filled mainly with processed, energy-dense but nutrient poor food. British geographer Hilary Shaw found (2006) that consumers in urban food deserts were more likely to purchase processed, energy-dense, nutrient-poor foods because of the lower expense of these foods relative to fresh fruits and vegetables and also to avoid wasting food.

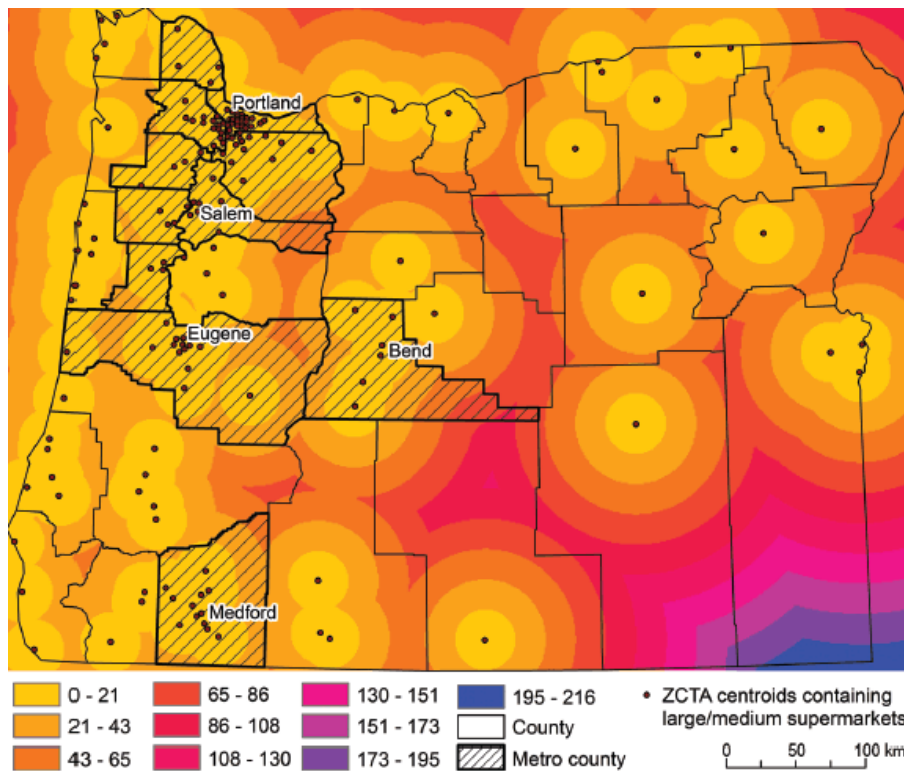


Figure 11.24

Food deserts in Oregon, 2010.

Mean distance (km) from population-weighted ZIP Code Tabulation Area (ZCTA) centroids containing large or medium supermarkets in Oregon. *Map courtesy of: Aki Michimi, 2011.*

Geographers Akihiko Michimi and Michael Wimberly found that rural food deserts lack not only access to larger grocery stores but also public transportation to reach larger grocery stores. In their study of food deserts and access to fruits and vegetables, the geographers found that since the 1980s in rural areas of the United States a “restructuring of food retail industries has occurred such that local grocery stores that once served small rural communities have been closed” and replaced with larger national chains in regional trade centers. Michimi and Wimberly also found a difference between food deserts in metropolitan and nonmetropolitan areas of the United States. In metropolitan areas, obesity rates increased and the rate of fruit and vegetable consumption decreased with increasing distance from grocery stores. They did not find the same correlation in nonmetropolitan areas, however.

Organic Farming

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