## Chapter Eleven: Agriculture

**Organic agriculture,** the raising of pesticide and fertilizer free crops, is on the rise in the US, Canada, and Europe. More and more supermarkets are carrying the organics, and all the countries in the world have at least some organic crops being grown, although those nations on the periphery generally grow the crops for export to the core countries.

**What is Agriculture, and Where Did Agriculture Begin?**
**Agriculture** is the deliberate tending of crops and livestock to produce food, feed, and fiber. Half of the food grown in the US is used to feed livestock. Agriculture is economic activity, and a common way of classifying economic activities is to focus on what is being produced:
-Agriculture is classified as a **primary economic activity,** which are activities involving those products closest to the ground, such as agriculture, ranching, hunting, fishing, forestry, mining.
-**Secondary economic activities** are those activities that take a primary product and manufacture it—that is, change it into something else such as toys, ships, processed foods, chemicals and buildings.
-**Tertiary economic activities** are part of the service industry, connecting producers to consumers and facilitating commerce and trade. These include bankers, lawyers, doctors, teachers, nurses, salespeople, and clerks.
**-Quaternary and quinary economic activities**: Quaternary are those associated with information or the exchange of money or goods; quinary are those associated with research or higher education.

The generation of wealth across the globe *is better illuminated by focusing on how goods are produced (the kinds of technology, research, wages, and education that go into production) and not simply on what is produced.* Examining the proportion of people employed in a given sector in an economy gives us a basic idea of how the good is produced. For example, in Guatemala the agriculture sector accounts for 22.7% of the country's gross domestic product (GDP), yet 50% of the labor force is employed in agriculture. Contrast that with Canada, where the agricultural sector accounts for 2.3% of GDP and only 3% of the labor force is employed in agriculture. These statistics show us that agriculture in Guatemala is still a labor intensive endeavor considering the percentage of population engaged in it compared to the percentage of Canadians engaged in agriculture. In the US, less than 2% of the population is engaged in agricultural production, despite the fact that agricultural production is at an all time high. Thus, mechanizations and efficiencies are what allow this; examples would be new technologies such as hybrid seeds, genetically modified crops, fertilizers, pesticides and machinery. The average farm size has grown quite a bit in the last few decades; the American small farmer is rare, replaced by large farms owned by large agricultural businesses. This is a far cry from human agricultural beginnings.

Before agriculture, hunting, gathering, and fishing occurred anywhere people lived. In modern-day America, food production ranged from salmon fishing in the Northwest, to bison hunting in the great plains, to subsistence agriculture in the Southeast. Tools with which to provide food were handmade from stone and bone. The mastery of fire, trappings, and migration to follow animals also were important.

However, around 14,000 years ago it seems that **plant domestication**, or mastering the breeding of plants for food production, began with **root crops** such as yams, and then moved on to the growing of **seed crops,** which are more complex due to the need for proper seasons, seed selection, and sowing techniques. The domestication of seed plants marked the beginning of the **First Agricultural Revolution**, and it occurred in the area known as the **Fertile Crescent**, which is an area centered in the Tigris and Euphrates River valleys of modern day Iraq. Around 8000 years ago **animal domestication** allowed goats, pigs, sheep, horses, and cattle to be raised for both food and labor. Interestingly, most animals are still not domesticated, and those that have been domesticated have been so for thousands of years; there have been very few if any modern animal domestications.

Hundreds of millions of farmers around the world are involved in **subsistence farming,** which is growing only enough food to sustain themselves and their families and who do not enter into the cash economy at all. Subsistence farmers are especially present in remote areas of South and Central America, Africa, and South and Southeast Asia. Because land is often held in a communal fashion because there is no individual wealthy enough to own all the land, individual wealth building is rare. Because there is no insurance against calamity, the people of a subsistence area tend to be dependent upon each other; while they are poor, they are free. While some subsistence are sedentary, living in one place throughout the year, many others move from place to place in search of better land; this is known as **shifting cultivation,** and is more commonly found in tropical rainforest and subtropical zones. The subsistence agriculture found here is sometimes known as **slash and burn agriculture,** because the farmers cut the forest and

burn it to release nutrients into the soil. After planting a couple of years' crops, the soil becomes infertile and washes away, requiring the farmers to move on to a new area and repeat the cycle. This method of farming necessitates occurring in isolated areas, as it cannot support large populations. It has been a form of farming for thousands of years. During colonialism (1500 to 1950), European sought to modernize the economies of the colonies by ending subsistence farming and integrating the farmers into colonial systems of production and exchange. They taxed the farmers, forcing the farmers to raise cash crops (such as cotton and coffee) to pay the bill. As sometimes the land devoted to cash crops limited the land available for food production, famines sometimes resulted. Subsistence farming faces an uncertain future as wealthy interests gain ownership of the land, causing the equality of the system to become stratified into wealthy owners and poor tenants working the land.

**How did Agriculture Change with Industrialization?**

By the 18th and 19th century, crops such as corn and potatoes that originated in the New World were in greater production in Europe, thus allowing greater supply and nutrition of foodstuffs in Europe. New technologies such as the seed drill, improved fertilizers, as well as hardier breeds of livestock also allowed for more food production. This resulted in what is known as the **Second Agricultural Revolution.** This second revolution allowed enough food to be available, enabling more workers to devote their labor to industrial endeavors, which thus enabled even more advances in agricultural technology.

The new commercial agriculture was geared to producing food for people who live in a nearby town or city, a clear geography *based on perishability of products and cost of transportation.* In the 1800's, a German farmer named **Johann Heinrich von Thunen** studied the spatial patterns associated with farming around towns. (see map on page 340) Von Thunen noted that each town was surrounded by a set of more-or-less concentric rings within which particular commodities dominated. Near the town, commodities that were perishable were produced, such as dairy products and strawberries. The next ring would be forest to allow for firewood, etc. The next belt would be less perishable and bulkier, such as wheat and grains. Further still would be livestock. Von Thunen also factored in the cost of transportation; the greater the distance to market, the greater the transport costs; therefore, it would be impractical to produce crops that were perishable further out, since more expense would be needed to insure the produce got to market quickly. In a similar theory done by Lee Liu in China, he found that the soil nearest the town was organically richer due to greater care by those who live nearer the fields are able to give; further out, the soil was more degraded due to greater fertilizer and pesticide use, as the farmers did not have as much time to devote to lands further away from their home.

**The Third Agricultural Revolution, aka the Green Revolution,** dates as far back as the 1930's, when agricultural scientists in the American Midwest began experimenting with technologically manipulated seed varieties to increase crop yields. In the 1940's, American scientists funded research on maize (corn) production that was so successful that Mexico was able to cease the importation of corn due to new hybrid seeds that produced more. New strains of rice were also created that greatly increased the yield due to greater resistance against pests and a shorter growing cycle which permitted more harvests in one year. Now, **genetically modified organisms (GMOs)** have taken crop production to the next level by genetically engineering crops that can survive where they could not have before. Today, thanks to improved seeds and methods, most famines are due to government instability rather than crop failure. However, some are concerned about negative impacts of new hybrids; they fear new super-plants could lead to the evolution of new super-pests. Most GMOs are grown in the US, and most European nations have declared them to be safe; however, there is some fear that the new genetically modified foods could have health risks that are unknown and also lack the flavor of traditional crops. Another problem, ironically, is that the greater supply of food thanks to the agricultural advances cause more supply, and thus lower prices, for the crops. Thus, smaller farmers who farm only a few acres are having a harder time earning enough from the crops to survive. Their land is then taken over by larger agribusinesses. Finally, unlike standard plants in which a farmer can take the seeds and plant them for next year's crop, GMO seeds have to be purchased each year to be legally used; this is a difficult expense for smaller farmers.

Recent shifts from subsistence to commercial agriculture have had dramatic impacts on rural life. Increased crop production of export crops such as coffee and fruits has limited the amount of food grown for local consumption. Also, women have been affected more than men, in that they are the primary agricultural workers in Africa and Asia, and the rise of year-round commercial farming has altered their ability to work and care for their families.

**What Imprint does Agriculture Make on the Cultural Landscape?**
The pattern of landownership in the US is based on various types of surveying, known as the Cadastral system, was intended to help regulate settlement. The prevailing survey system in the US, the one that appears as checkerboards across agricultural fields, is the **rectangular survey system,** which was part of cadastral system known as the **township and range system;** this system was designed to facilitate the movement of non-Indians across the frontier. Another major surveying system used in the US, particularly in the Eastern US was the **metes and bounds survey,** which uses natural features to demarcate irregular parcels of land; this is why counties in Tennessee, for example, are irregularly shaped. The **longlot survey system** was implemented in Texas and Louisiana; it is based on rivers, roads, or canals, and thus are oblong. Another influence on land division was the old European concept of **primogeniture,** which is the passing of land inheritances to the eldest son.

Whereas traditional farm-village life is still common in India, Subsaharan Africa, China, and Southeast Asia, in the core areas of the world agriculture has taken on a very different form; thus, in places like the US, farm villages and other communities based on agriculture are vanishing. Whereas in Japan, farming villages are extremely concentrated to allow the most possible use of precious and scarce farmland, in the US Midwest, individual farmhouses lie quite far apart in what we call a **dispersed settlement pattern.** In contrast to dispersed settlement patterns, **nucleated settlement** is the most prevalent rural residential pattern in which houses are grouped together in tiny clusters or hamlets. Often, especially in Europe, villages are located on hillside; in both cases, the houses are closely gathered so that the flat land can be used for farming.

Different village patterns reflect different objectives of the people who settle them:
-The **round village**, found in East Africa and Europe, has homes surrounding a central cattle corral.
-The **walled village,** in which homes are clustered together surrounded by a protective wall, is found in Africa and Europe.
-The **grid village** is a European styled village that is common where European colonization occurred; roads play a large role in the grid-like layout.
Villages are still a major way of life in the semi-periphery and periphery countries; 800 million of China's 1.3 billion people live in villages. In Mexico, thanks to the North American Free Trade Agreement **(NAFTA),** more food is imported from the US; thus, fewer rural people work in agriculture, and instead work in petty commerce and construction work—they also emigrate to the US in search of work.

**What is the Global Pattern of Agriculture and Agribusiness?**
To understand patterns of agriculture at the global scale, one must look not only at market location and transportation costs as von Thunen did, but one musts also look at climate, soil conditions, farming methods and technology, involvement by governments, and lasting impacts of history. For example, during colonization the European powers established plantations from Central America to Malaysia. These plantations grew mostly cash crops for consumers in faraway Europe. This system not only created a lasting impact of slave labor, but also established cash crop farming on the best land, land that could have been used for food production. Once established, changing these crops is very difficult. **Commercial agriculture**, which is large scale grain producers and cattle ranches using mechanized equipment and factory-type labor, began with colonization and is a world apart from traditional agriculture. The coffee, tea, cocoa, sugar, and particularly cotton grown on plantations in abundant amounts (and thus at very low prices), helped spark the industrial revolution in Europe. Revolutions in transportation also allowed this global trade, with such advances as the refrigerated ship helping to transport beef over long distances for example. European colonizers required their colonies to cultivate specific cash crops; this led to the establishment of **monoculture,** or the dependence on a single agricultural commodity. The production of cash crops by poorer countries today is often perpetuated by loan and aid requirements from lending countries and financial entities such as the World Bank.

Climate plays a large role in what crops are grown where, and **Koppen's climate classification system** is the best way to classify the world's climates on the basis of termperature and precipitation. Koppen created **climatic regions** (areas with similar climatic characteristics) which are shown on the map on page 352-353).
-The areas along the equator generally have ample moisture; these are known as the **Humid Equatorial Climates,** such as *tropical rainforest* and *tropical savannah* climates. The Amazon, Congo, and Indonesia are examples of this.

-Many of the climates with more moisture while at the same time being *temperate (no extreme temperatures)* are also where large population centers *tend* to be. These are known as **Humid Temperate Climates,** which include the *Humid Subtropical and Mediterranean* climates. Examples of this include the US west coast, Southeastern US (including Nashville), Northwestern Europe, and eastern China.
**-Humid Cold Climates** are those such as the *Humid Continental* climate, where there is ample moisture but cooler average temperatures. Examples of this include New England, Canada, and Russia.
- The map does a great job showing how much of the world is in need of water! These climates range from arid *(desert)* to semi-arid *(steppe).* Collectively they are known as **Dry Climate** zones. Although living in these areas can be difficult, thanks to irrigation and wells, cities can and do exist here; Las Vegas, America's fastest growing city, is in the middle of a desert zone. Examples of this include the western half of the US (mostly steppe); Sahara, Middle East, and Australia.
-The arctic is of course an example of a **Cold Polar Climate.**

Drier lands tend to specialize in livestock ranching, while moister climates are associated with grain production. Sugar is common in the Caribbean region, where the hot, moist climate is favorable for sugar cane. While they would like to sell sugar for a lot, the relatively high supply of sugar keeps the price that the producer gets somewhat low. Sometimes producers have considered a **cartel,** or an organization of producer states that work together to keep prices high, such as OPEC, the oil producing cartel, did in the 1970's. These cartels are vulnerable to non-members underselling them, and thus are rare.

Cash crops are usually grown on **plantations**, or large estates devoted to the growing of a particular crop. These plantations, although located in periphery countries, are often owned by foreign corporations with strong government ties that can exert power to get their way. For example, in the 1950s, Guatemala attempted to reform its agricultural system. United Fruit, a US firm, used its connections in the CIA to overthrow the government of Guatemala under the guise of fighting communism.

Cotton and rubber are the major cash crops of the world, and are grown in many places, but particularly in areas where ample low cost labor is available. Cotton is grown in the US, China, and central Asia. Rubber is grown on trees (literally) in the tropical climates of Malaysia and Indonesia. The Vietnam War actually had roots in the growing of rubber by the French in their colony of Vietnam. Both of these commodities are in high demand despite the availability of synthetics.

**Luxury crops** such as tea, cacao, coffee and tobacco are also found in areas with warmer climates and ample labor. Coffee for example is grown largely in Central and South America; the US imports half of the world's coffee and most of the rest goes to Western Europe. Coffee is the second most valuable commodity traded on the world market besides oil. They even look the same. Most coffee is picked on large plantations that are owned by foreign entities and worked by low wage workers. More and more consumers are shopping for **fair trade** coffee, or coffee that returns up to 40% of the retail price to the producer. More than 500,000 farmers in 20 countries on the periphery and semi-periphery are registered to be involved in the fair-trade market. Tea is the drink of choice in Asia, where it is also grown.

If you look at the map on page 354-355, you will see that most areas of commercial agriculture lie outside of the tropics. Dairying is common in the northern US and Europe where it is somewhat cooler. Fruit, mixed crops, and livestock are found in the moister, warmer areas of the eastern and southeastern US, Western Europe, Western Russia, and Brazil. Grain production is found in the drier steppe areas of the US Great Plains, and Ukraine/Russia. **Livestock ranching** is widespread throughout the world; notice the livestock production lying away from cities; refrigeration has allowed meat to be transported from the periphery to the core easily. Notice how much of the world is still considered to be subsistence and shifting cultivation. Another notable zone is **Mediterranean Agriculture;** this zone has a wet and dry season, and is located in western South America and of course around the Mediterranean Sea. Grapes, olives, citrus fruits, vegetables, figs, and many other valuable crops are grown in this area. California's **Central Valley**, perhaps the most valuable agricultural area in the world, is of this type of climate, and is able to grow much more than any other area thanks in large part to irrigation.

Drugs are also a major cash crop, with cocaine coming from northern South America, and poppy, which is the source of heroin and opium, coming from Southeast Asia. Most of the illegal drug trade in the US come from and is controlled by Mexican gangs.

Commercial agriculture causes significant environmental change. Fish stocks are declining due to more efficient technologies leading to overfishing. From Newfoundland to Alaska to New Zealand, fisheries are reported depleted species. Forests have been cleared worldwide, and some fast-food chains in the US go out of their way to make sure their beef does not come from pastureland created out of dwindling rainforest in Central and South America. Chemical fertilizers, livestock waste, and pesticides run off from croplands and flow into bays, where algae feeds off the fertilizers and kill the fish. Virginia's Chesapeake Bay is an example of agricultural runoff being blamed for dramatic seafood loss. Livestock grazing in already dry areas has sped the development of **desertification** in some areas.

**Agribusiness,** or large agricultural corporations, has changed the face of agriculture worldwide, especially in the US. The day of the small independent farmer is largely gone. Today, poultry farmers get the chicks from the corporation such as Tyson; the farmers must build a house and maintain the chicks. Tyson feeds the birds and guarantees the farmer a price for the bird, then takes the birds and processes them. Most of today's chicken in the US comes from half a dozen large corporations that control the process from birth to processing. The trend is also to house chickens, hogs, and cattle in huge feed lots; in many cases, these animals spend their entire lives in a space about twice their size. In an effort to get bigger chickens faster in larger quantities, companies use hormones which some claim are passed on to the humans that eat them. In order to keep the animals from getting sick due to close proximity, they administer antibiotics that lead to new strains of antibiotic resistant bacteria. As agribusiness grows, the influence of the individual farmer over his own affairs gets to be less and less.

As cities expand outward, valuable farmland is lost. In the US, some of the farmland most at risk lies in California's central valley, but this is a problem that crosses all global boundaries. Also at risk in the US is South Florida and North Carolina's piedmont. As America's car culture has allowed Americans to 'get away from it all', suburbia continues to cover valuable farmland. Also, as people move to the suburbs, they complain about livestock and chicken production and the smells that sometime emanate from them. The map on page 359 shows the depletion of American farmland; not particularly the large red area in central California; that is the Central Valley, the most valuable farm area in the world.