

Appendix 1: AP Human Geography Topic V.A.2. Second Agricultural Revolution

Beginning primarily in the eighteenth and continuing into the nineteenth century, technological advancements rapidly changed agriculture in industrialized regions of the world, particularly Great Britain, Europe, and the United States. In short, agricultural yields increased dramatically because of technological innovations. Some changes were mechanical. For example, the invention of modern reapers in the 1830s allowed some crops to be mechanically harvested. This meant that a single farmer could harvest a larger farm. Better seed drills and stronger plows, such as the steel model introduced by blacksmith John Deere in 1837, further contributed to larger farms. Later, in the early twentieth century, the internal-combustion engine brought tractors and other farming machines.

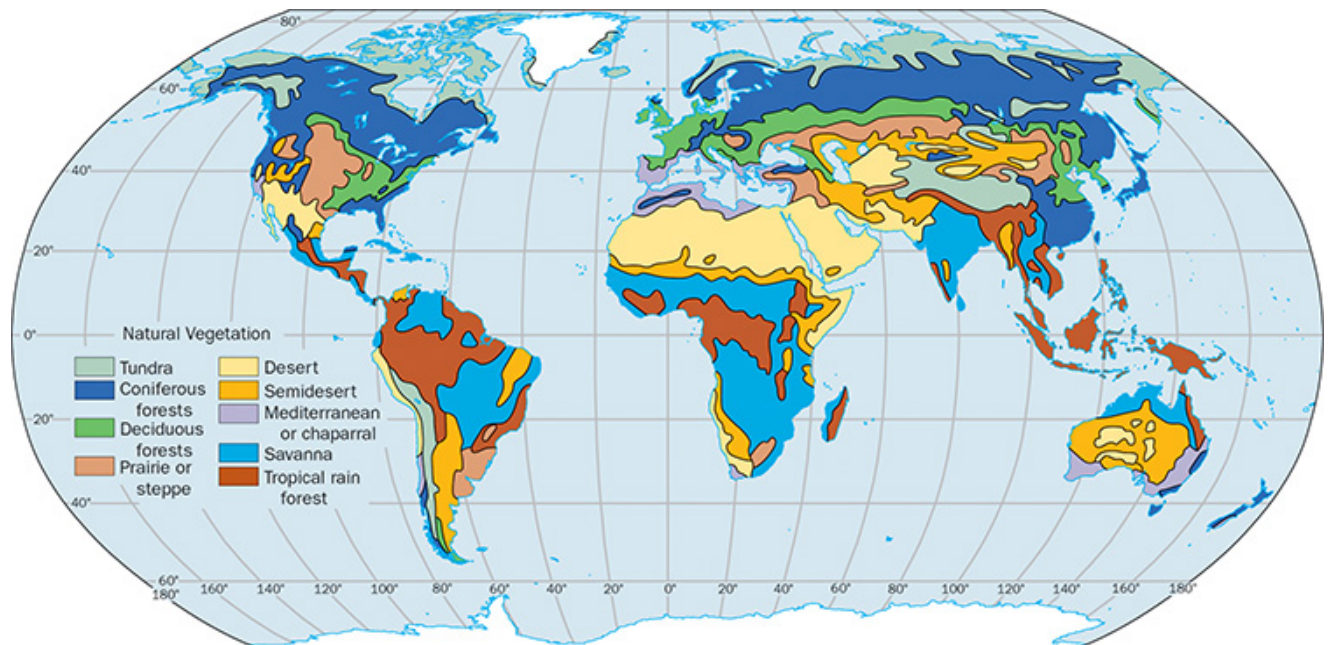
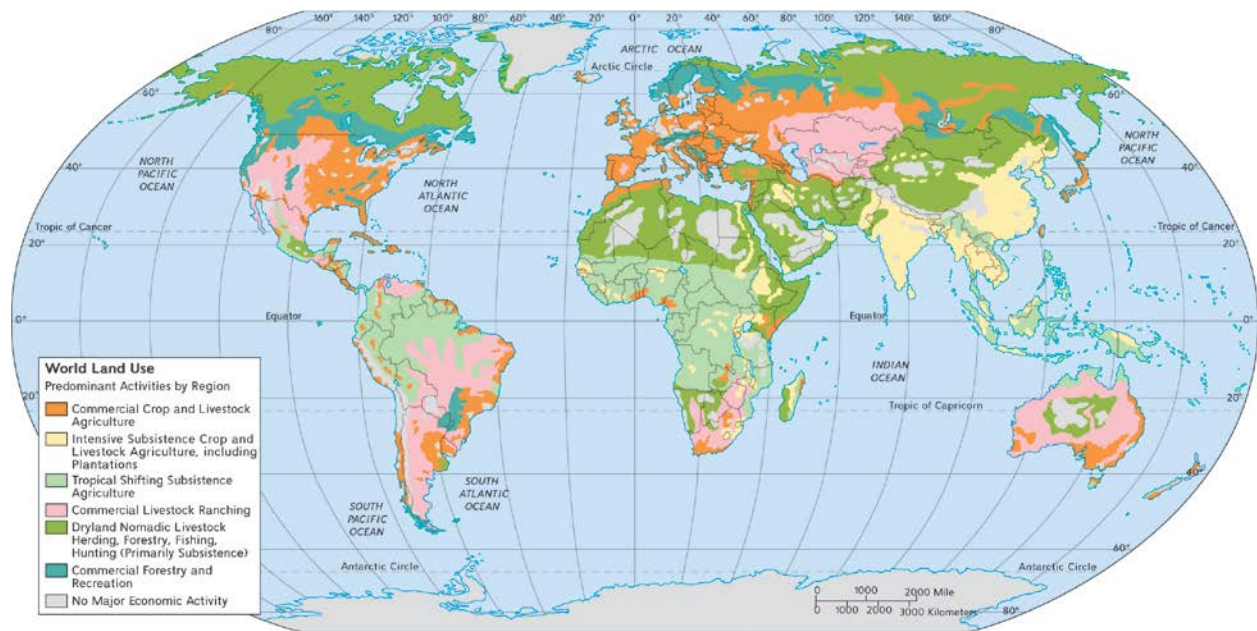
Other advancements came in the areas of hybrid crops, pesticides, and fertilizer. The development of hybrids has completely transformed agricultural outputs for some crops, including corn (maize), wheat, and rice. In the United States, for example, the number of bushels of corn per acre doubled between 1930 and 1940 due in large part to newly introduced hybrid varieties. The use of hybrids was a key factor in the Green Revolution that began later in the 1950s.

Chemical advancements were crucial to the expanded use of fertilizer and pesticides during the Second Agricultural Revolution. Fertilizer use also greatly expanded in the nineteenth and twentieth centuries. After the 1850s, superphosphate fertilizers were shipped from Britain all over the world. After World War I, chemical companies introduced ammonium sulfate, ammonium phosphate, and other manufactured fertilizers that continued to increase yields, although sometimes with serious negative consequences for groundwater. Pesticides before the 1940s were limited to natural compounds, but synthetic compounds became common after World War II. The now infamous DDT (dichlorodiphenyltrichloroethane) was one of the first widely used synthetic pesticides. It was very successful in eradicating malarial mosquitos and was used by farmers as an insecticide, but by the 1950s its dangers, including as a carcinogen, were becoming known. Rachel Carson's book *The Silent Spring* focused attention on DDT and its connection to the decline of species such as the bald eagle. But while some pesticides have been controversial, they have contributed to greatly increased yields worldwide.

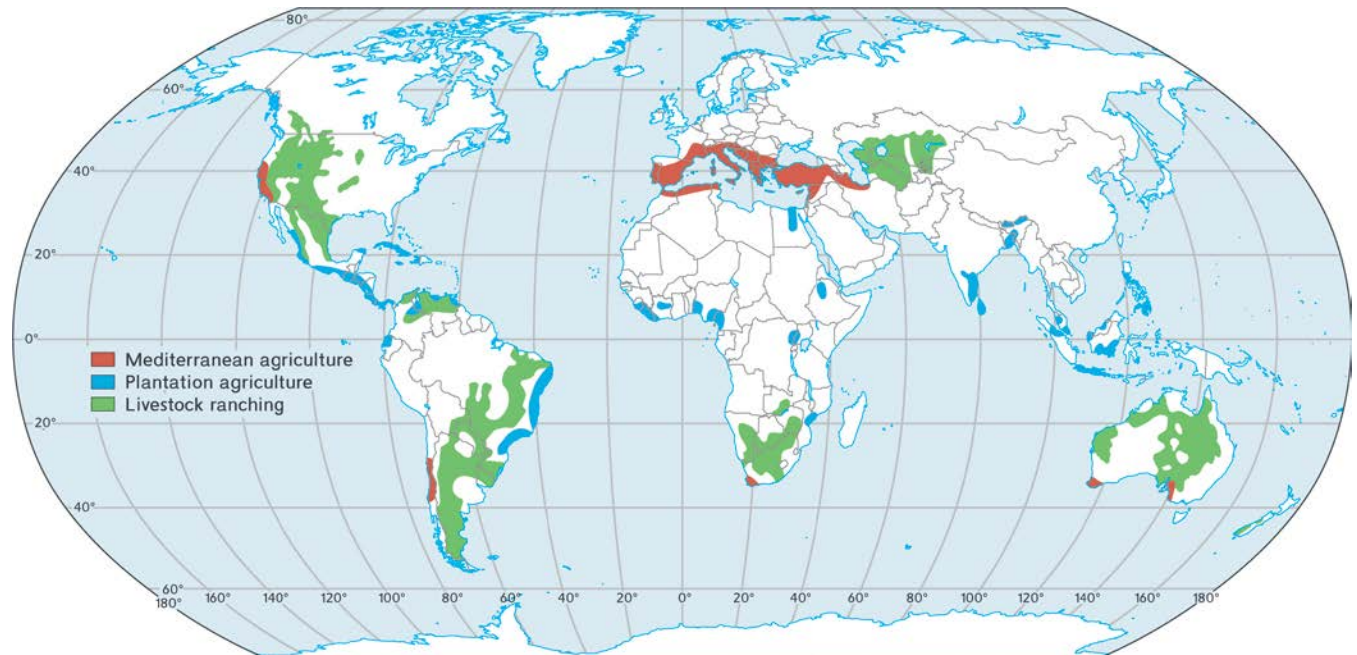
Appendix 2: AP Human Geography Topic V.B.1. Agricultural Systems Associated with Major Bioclimatic Zones

See also Module 15E

Look closely at Figure 15E.4 and the figure below showing natural vegetation and compare it with a map of world climate zones. The similarities are striking. Climate is the primary determinant of agriculture and therefore, similar types of agriculture are found in similar bioclimatic zones. In this section, the primary types of agriculture in the world's major climate zone are outlined.



In tropical regions, *shifting cultivation* is a primary form of subsistence farming. This form of agriculture is also known as *slash-and-burn* or *swidden* agriculture. The alternate names are used because slashing and burning is a common way for shifting cultivators to clear land, which is known as *swidden*. Farmers work a plot of land for a few years and then leave it fallow for an extended period to allow the soils to recover. The health of shifting cultivation systems is negatively affected by population growth because land cannot be left fallow for as long because competition for land forces farmers to return to previously worked plots sooner than desired.



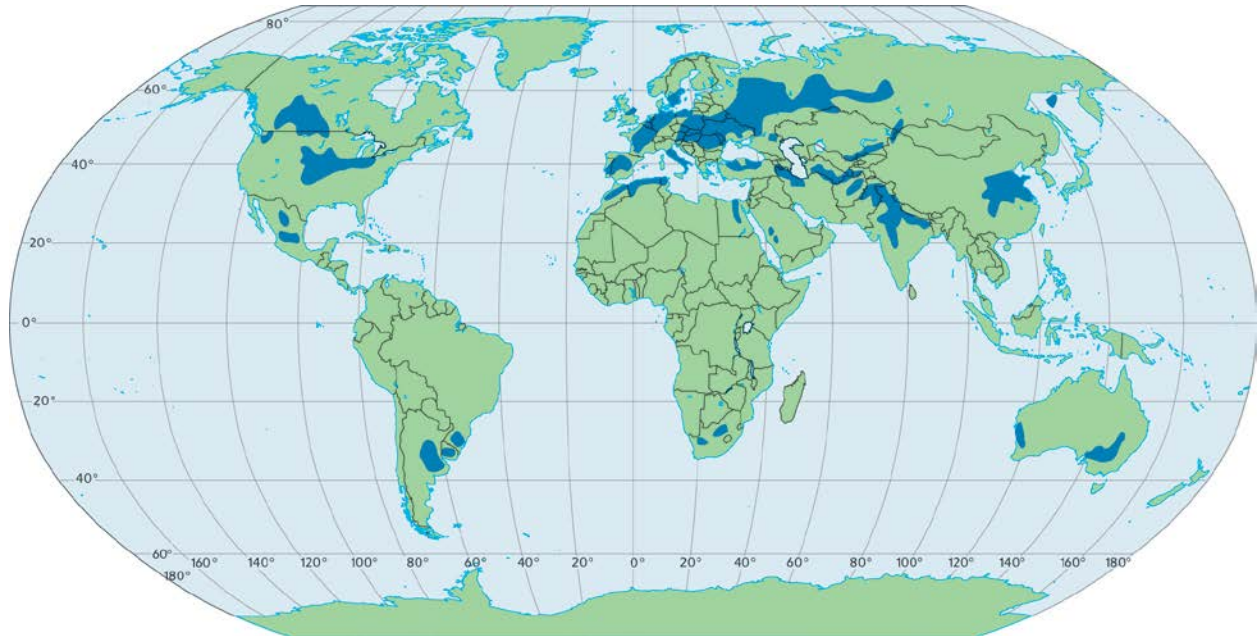
Many types of commercial *plantations* are also common in tropical areas (A climates), including bananas, coffee, tea, cocoa (chocolate), rubber, and palm oil. Plantations are a form of intensive agriculture that almost always focus on raising a single cash crop for export to global markets. Plantations are controversial because their profits are exported and if a country's income is largely dependent on a single crop, its economy can be devastated by price swings.

In tropical areas of South, Southeast, and East Asia, intensive subsistence farming, nearly all wet rice farming, is the primary form of agriculture. Rice is the most consumed staple grain and the third most cultivated crop after sugarcane and corn. The warm weather of the tropics allows two or even three crops of rice to be cultivated in a single year in some regions.

Moving north and south from the tropics, arid areas are encountered (B climates). Here, crop farming is limited to those areas where water is readily available, such as along rivers like the Nile, or in oases. Outside of well-watered areas, pastoralism, livestock herding, is common. Experts in *animal husbandry* (the breeding, care, and management of animals), pastoralists in dry areas typically herd goats, sheep, horses, camels, cattle, or yak. Larger animals are only found in areas with abundant grasses or other food. In the most arid areas, goats and sheep predominate. The seasonal movement of some pastoralists to find food for their animals is known as *transhumance*.

The temperate areas of the world (C & D climates) have a wide range of agriculture. In midlatitude areas with adequate water, such as the East Coast of the United States, Europe, and

Western Russia, *commercial crop and livestock* is common. Most U.S. agriculture falls into this category. Common crops include corn, wheat, soybeans, sorghum, vegetables, and fruit. While climate determines, in part, what crops can be grown, proximity to urban areas can also have an influence. For example, fruits and vegetables are more commonly grown near cities where the crops are readily available for consumers' tables. Farms that grow fresh vegetables for nearby cities are known as *truck farms*. Grains may be grown for either human or animal consumption. Dairy cows, cattle for human consumption, and pigs are commonly raised in temperate climates.



In midlatitude areas that are drier, such as the western United States or Argentina, crops can usually only be raised with adequate irrigation systems. Because of this, commercial livestock ranching is more common. Large herds of cattle or other animals can thrive on the grasses that grow in these semi-arid regions.

One specialized agricultural system found in mid-latitude areas (Köppen climates Csa and Csb), is known as Mediterranean agriculture. Because the Mediterranean climate is characterized by hot, dry summers and cool, wet winters, agriculture is difficult. Farmers in this region have learned to cultivate crops that can withstand the conditions, such as citrus fruit, olives, grapes, figs, and dates. Because grass for grazing is limited, goats and sheep are raised. Fishing is also common.

In cold, northern areas of world, agriculture is limited. Indigenous peoples in these areas survived by a combination of subsistence activities, including hunting, fishing, and sometimes herding, as in the case of reindeer herders in northern Europe, Russia, Central Asia, and Mongolia. Because cold areas such as Canada and Russia have vast expanses of woodlands, forestry is also a primary economic activity.

Appendix 3: AP Human Geography Topic V.B.2. Variations within Major Zones and Effects of Markets

You should be aware that the world's agricultural zones are generalizations. Market demands within regions can alter traditional patterns. For example, areas of the Amazon rainforest are cleared and used for raising cattle because of rising domestic Brazilian and global demand for beef. Indeed, demand for meat, especially beef, has altered agriculture in many places. Feedlots, pens where livestock are fattened for slaughter, emerged primarily in the 1950s and 1960s as hybrid seeds created large surpluses in grain and fast food restaurants and packaged food increased demand for beef. Feed lots can now be found all across the Great Plains, Texas, and the southwestern United States.

As globalization increases, consumers demand variety in their food products and farmers or commercial entities may adjust traditional systems to meet demands. Modern technologies such as hybrid plant varieties, fertilizer, and irrigation techniques make this easier. The Central Valley of California is a good case study. The region has a Mediterranean climate, but extensive irrigation schemes have allowed the farming of fruits and vegetables in the summer than would not usually be able to tolerate the dry conditions. One-sixth of all irrigated land in the United States is in the Central Valley.

Appendix 4: AP Human Geography Topic V.B.3. Interdependence among Regions of Food Production and Consumption

There is a significant level of interdependence among agricultural areas of the world. Soon after the domestication of agriculture, surpluses allowed for trade and, over time, crops were traded all over the world. Both chickens and pigs originated in Asia but have been raised in Europe for centuries. However, in the last few centuries transportation speeds have increased dramatically, allowing for more interdependence among regions. Shipping speeds in the fifteenth, sixteenth, and seventeenth centuries led to trade wars over Asian spices and resulted in Europeans enslaving millions of Africans to grow sugar in the Caribbean. When refrigerated shipping became commonplace in the late nineteenth century, regions of the world could more reliably share fresh agricultural products. Countries such as Argentina, far from population centers in Europe and the United States, were suddenly able to reliably ship meat to these markets. Before the late 1800s, few Americans, for example, would have even been able to eat a banana. It was only the rise of fast, reliable shipping that made it possible.

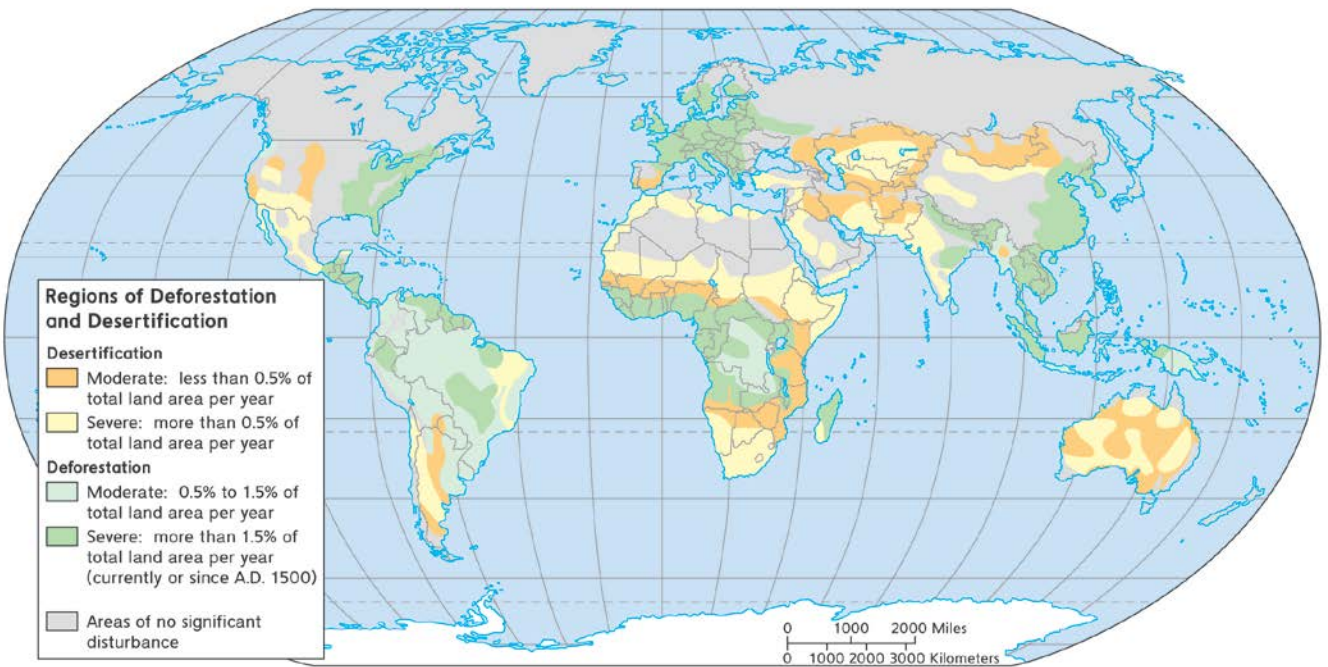
Today, the global food trade is a multi-billion dollar business and nearly every country imports food. The United States alone imports over \$130 billion in food every year. Fish, vegetables, and fruit top the list of products, and some products have become so common that we do not even think about their overseas origins. For example, there are almost no cocoa beans (chocolate) grown in the United States, so any chocolate you eat is an example of interdependence between growers in the tropics and chocolate manufacturers in temperate regions like Europe and the United States.

Appendix 5: AP Human Geography Topic V.C.4., Roles of Women in Agricultural Production and Farming Communities

American stereotypes commonly connect farming with a male occupation, but worldwide, farming is often the work of women especially in developing areas. In Sub-Saharan Africa and parts of Asia, women make up 50% of the agricultural workforce. In India, female agricultural workers account for 30% while in Latin America, the number is closer to 20%. While women are indispensable to agriculture around the world, they face discrimination and inequality. Women tend to have smaller farms, do more work than their male counterparts, and have a harder time getting access to credit. Women are often responsible for gathering firewood or getting water, which can be time-consuming extra daily chores. They also are less likely to have equipment such as a tractor and are not as able to use fertilizer and hybrids.

Appendix 6: AP Human Geography Topic V.D.3. Environmental Issues

Agricultural systems around the world are under constant pressure from environmental issues and soil degradation is a major concern. As soils degrade, yields can decline and erosion can increase. As forests and other lands are converted to farmland to meet the needs of growing world demand for food, soil can be lost. Certain plants, such as soybeans, cotton, and wheat, can speed soil loss, as can the use of some fertilizers. Overgrazing can also cause soil degradation. In areas where livestock are raised, pasture lands must be carefully managed to avoid stressing the plants to the point where they cannot recover. Unchecked, overgrazing can lead to desertification. By some accounts, the world could lose all its topsoil by the end of the twenty-first century.¹ The figure below shows areas of the world where desertification and deforestation are significant concerns.



Adequate water for agriculture is also a major global concern. Rivers and aquifers in many regions have been overused, creating significant problems for agriculture. In the 1960s, the Soviet Union diverted two rivers that drained into Central Asia's Aral Sea. The diversion was primarily to support cotton production in Uzbekistan. Over time, the Aral Sea shrank and became polluted with chemical runoff, destroying the Aral Sea fishing economy. The cotton producing areas were also negatively affected because the soils became saline and polluted with pesticides and fertilizer. When fertilizers and chemicals are used on farm fields, they must be carefully and adequately managed or the fields or surrounding areas can become contaminated. Irrigated areas are prone to problems with contamination because if wet areas are not properly drained, water can rapidly evaporate, leaving behind any chemical that is in the water.

In the United States, the large Ogallala Aquifer that stretches from South Dakota to Texas is the source of 30% of all water used for irrigation in the country. In many areas, the Aquifer has been rapidly depleted in recent decades and estimates are that it may take thousands of years to

¹ <http://www.scientificamerican.com/article/only-60-years-of-farming-left-if-soil-degradation-continues/>

replenish the depleted water. While some conservation efforts are underway, depletion of the Aquifer is a major concern for the health of American agriculture. Recently, water issues have been a major concern in California, which relies heavily on irrigation and water from other states to support its world-leading agriculture. There is an increase worldwide in water shortages and as populations rise, it can be expected that farmers will continue to struggle to find adequate water.