

# AP Human Geography: Agriculture

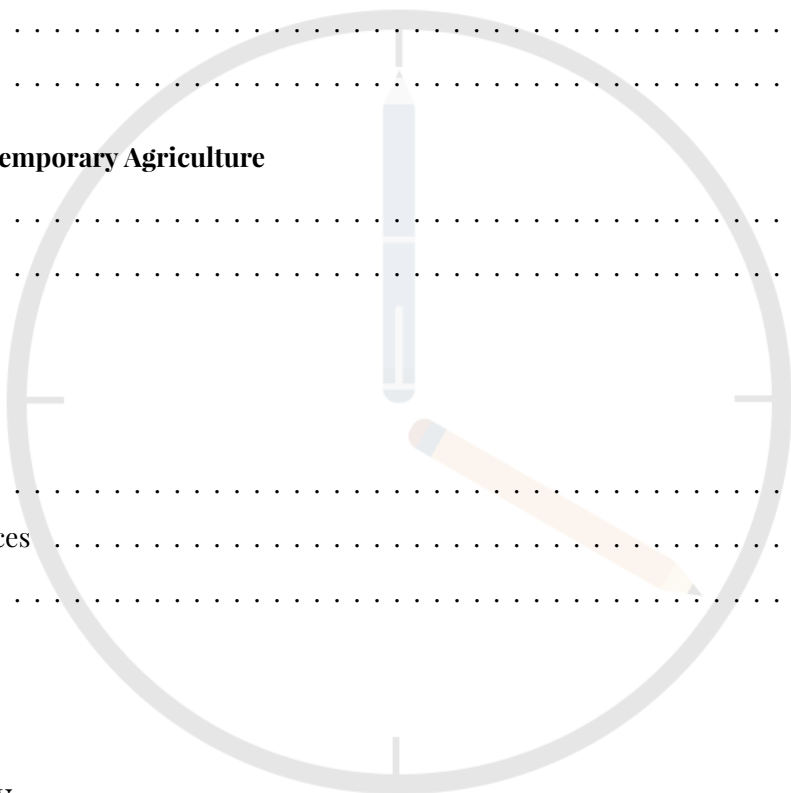
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# 1 Commentary

Agriculture is essential to the study of human geography because it directly impacts the way that humans live and how quickly the population can grow. The transition from the age of hunting and gathering to the age of agriculture allowed for huge population booms as well as important staples of civilization like job specialization and trade. Without our work in agriculture, our society would not be advanced as it is now, which is why learning about agriculture is so relevant to human geography!

## 2 Introduction to Agriculture

### 2.1 Overview

#### Terms to Know

- **agriculture:** the raising of animals or the growing of crops on tilled land to obtain food for primary consumption by a farmer's family or for sale off the farm
- **subsistence farming:** a form of farming in which nearly all the crops or livestock raised are used to feed/maintain the farmer and farmer's family; crops barely used for trade
- **commercial farming:** a form of farming in which nearly all of the crops or livestock raised are used for trade and the production of products to be sold
- **intensive agriculture:** subsistence farming in which farmers expend a large amount of effort and capital in order to maximize their agricultural output on a chunk of land; large input relative to land area; usually done near population centers
- **extensive agriculture:** farming that uses relatively small inputs on a large plot of farmland and yields a large amount of output per acre; usually takes place in more remote locations and involves work done by hand
- **domestication:** the modification of plants or animals for select traits that are beneficial to humans; ex. larger fruits

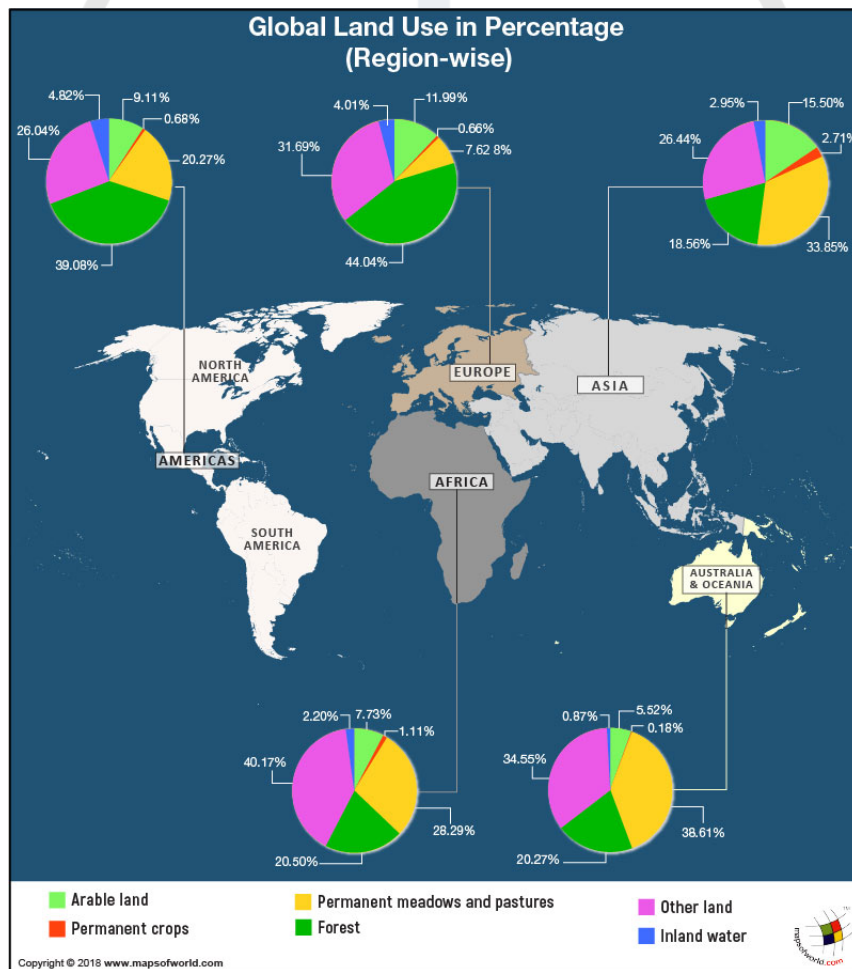
### 2.2 Notes

- **Agricultural concepts are influenced by the physical environment**
  - The climate and physical features in a region (ex. lakes, rivers, mountains) will either prevent or allow farmers to grow certain crops
  - Consider how the amount of available farmland, sunlight, and water, as well as the temperature of a region impact what crops can be grown there
- Below is a table that lists the types of climates worldwide, where those climates can be found, and what products are produced there!

Types of Climates

Climate Type	Example Locations	Agricultural Products
Cold Mid-Latitude	Northern US, Central US, Southern Canada, Eastern Europe	Wheat, barley, livestock, dairy
Warm Mid-Latitude	Southern China, Southern US	Vegetables, fruits, rice
Grasslands/Continental Steppe	North Africa, Western US, Mongolia	Cattle, sheep, goats, horses, camels
Subtropical	Indonesia, West Indies	Rice, cotton, tobacco
Tropical	Equatorial Africa, Indonesia	Coffee, sugar, tea, cacao, pineapple

Here is a map of the agricultural regions of the world:



- Although agriculture is influenced by the environment, humans can still make modifications to meet their agricultural needs. Here are some examples!
  - Clearing land away to grow crops (ex. slash-and-burn agriculture)
  - Using irrigation strategies to water plants in areas that may not have a water source close by
  - Using artificial lights to make up for a lack of natural sunlight
  - Keeping plants in an environment with a regulated temperature to speed up the growing process
  - Using fertilizers and pesticides to speed up the growing process and keep insects from destroying crops
- This ties back to previous units because it is an example of **environmental possibilism!**
- However, sometimes although replicating the conditions required to grow a certain crop is possible, it is too cost-inefficient to make a real profit. (ex. bananas are primarily grown in India and South America, but not in the United States because it would cost too much to replicate banana-growing conditions in the US and wouldn't result in any financial gain.)
- Agriculture can either be **intensive** or **extensive**
  - **Intensive agriculture** uses large amounts of labor and capital relative to land area with the aim of maximizing crop yields
    - \* In order to get the maximum yield out of a plot of land, farmers start using fertilizers, pesticides, herbicides, high-efficiency machinery, and irrigation
    - \* Examples include **market gardening (truck farming), plantation farming, and mixed crop & livestock**
    - \* **Plantation farming** is usually found in LDCs (less-developed countries) because it allows for cheap labor; usually cash crops like coffee, sugar, tobacco, and tea are grown and sold to MDCs (more-developed countries)
    - \* **Mixed crop & livestock agriculture** is usually found in MDCs; crops like soybeans and corn are grown to fatten up livestock so that the farmers can send the livestock to slaughterhouses and make money
    - \* **Market gardening** is usually found in regions with long growing seasons (ex. the southeastern United States); vegetables and fruits like grapes, lettuce, and potatoes are grown and harvested using migrant labor (cheapest option). The produce is then canned, frozen, or processed and sent across the country; produce is usually sold directly to individuals or restaurants. Market gardening is **small-scale**
  - **Extensive agriculture** uses larger plots of land and has lower crop yields per acre.
    - \* Usually done far away from population centers
    - \* Has less capital and lower labor inputs than **intensive agriculture**

- \* Crop yields depend on the environment (soil, terrain, water availability, weather)
- \* Examples include **shifting cultivation, nomadic herding, wheat farming, and ranching**
- \* **Shifting cultivation** is found in tropic climates like Latin America, Sub-Saharan Africa, and south-east Asia. Crops are planted in a plot of land until it loses its nutrients, then farmers find a new plot of land and start the process over again, leaving the old plot of land to **fallow** (regrow plants and regenerate nutrients in the soil). This can also be done using **slash-and-burn agriculture!**
- \* **Nomadic herding** is located in North Africa, central Asia, and southeast Asia, where the climate does not allow for sedentary agriculture (arid and semi-arid climates). Herders endlessly roam the land with their livestock, keeping them from having a population boom or establishing complex economic practices.
- \* **Ranching** is located away from population centers because it requires a lot of land, and land becomes cheaper the further away it is from the population center, making the ranch more profitable (ranch land is also much cheaper than farmland because it is unsuitable for farming). Ranching is a type of **commercial farming** and involves allowing livestock like cattle and sheep to graze on a large plot of land. Farmers make a profit by selling their livestock to other farmers.
- Agricultural economics are influenced by things like the supply and demand of a product, the price of land, regulations that have to be followed (ex. regulations regarding organic products), price of labor, and the price of machinery

### 3 Settlement Patterns and Survey Methods

#### Terms to Know

- **clustered rural settlement:** settlement where houses and farm buildings are located in a dense cluster surrounded by farmland
- **dispersed rural settlement:** settlement where houses are spread far apart from each other over a large area of land
- **linear rural settlement:** settlement where buildings and houses are arranged in a chain along a land feature (usually a natural land feature like a river)
- **Metes and bounds:** survey system developed in Britain in the 17th century that spread to North America; involves drawing boundary lines by using natural features like trees and mountain ranges as reference points
- **Township and range:** survey system that divides land into rectangular 6x6 plots of land known as survey townships
- **Long-lots:** survey system that divides land into long strips that extend from a river, lake, or road

### 3.1 Notes

- First we will look at types of rural settlement patterns! Here are the most common ones:
  - **Clustered settlements** are a type of rural settlement where buildings are closely packed together, creating a high population density and allowing for more interactions among citizens
  - **Dispersed settlements** are a type of rural settlement where buildings are far apart, creating a low population density and reducing interactions with other citizens. However, this allows for **more interactions with the environment**
  - **Linear settlements** are another type of rural settlement and are developed along a line of transportation (river, road, etc.)
- Now we will take a look at the most common survey methods:
  - **Metes and bounds** is a survey system that uses geographic features as a reference point for drawing boundary lines. This method is most commonly used for **short distances**. **Metes** are the straight lines that connect different points of a region, while **bounds** are the geographic features in the region
  - **Long-lots** divides land into long strips of land along a transportation system, allowing each plot owner equal access to the resource.
  - **Township and range** divides land into rectangular plots of land known as survey townships by using longitude, latitude, and a base line. Townships go north to south, while ranges go west to east, creating a grid pattern across the region.

## 4 Agricultural Origins and Diffusions

### 4.1 Overview

#### Terms to Know

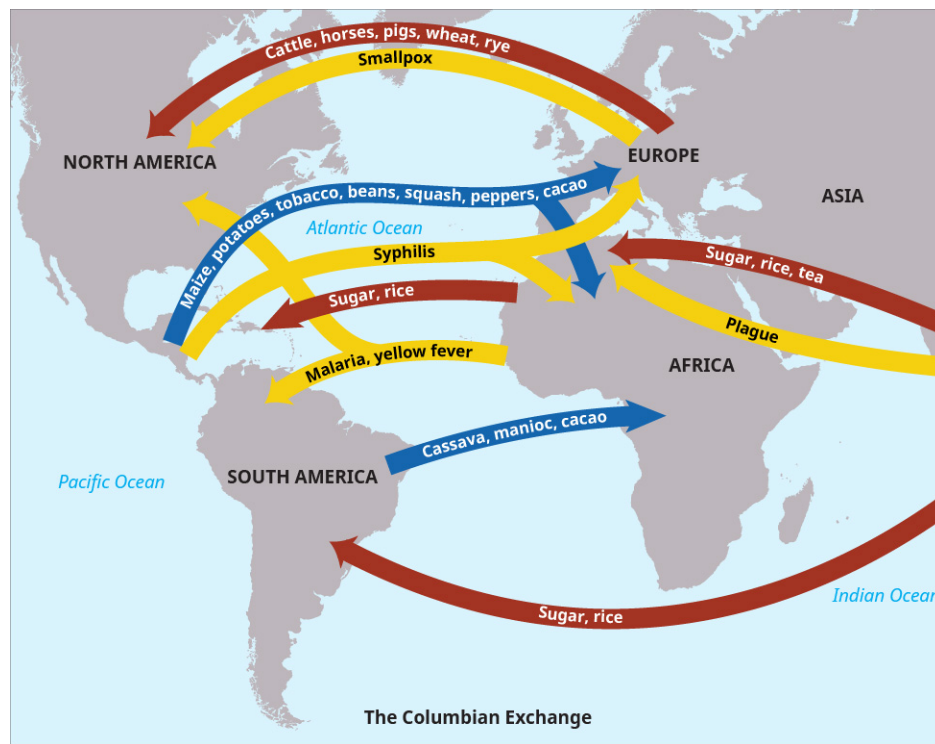
- **Fertile Crescent:** boomerang-shaped region with fertile soil where new innovations like writing, agriculture, wheels, and irrigation were created
- **Stone Age:** period of time when humans started using stone to make tools; lasted about 2.5 million years
- **hunter-gatherer:** nomads who hunt and fish for their food instead of growing it
- **nomadic:** roaming from place to place without a fixed pattern of movement; the movement usually depends on where the next food or water source is
- **Neolithic Revolution:** the transition in human history from small, nomadic bands of hunter-gatherers to larger, agricultural settlements and early civilization
- **plant domestication:** the process by which farmers select for desirable traits by breeding successive generations of a plant so that a whole different domestic species of the plant emerges with traits that are useful to humans (this was the ability to be harvested easily)
- **animal domestication:** selecting for desirable traits by breeding successive generations of an animal so that the new species has traits that are useful to humans
- **agricultural hearth:** the "birthplace" of a crop; where a crop originated before it diffused across the world
- **diffusion:** the spread of a cultural element/phenomenon
- **The Columbian Exchange:** the exchange of plants, animals, ideas, technology, and diseases between the Americas, Europe, and Africa following Christopher Columbus's voyages to the new world

### 4.2 Notes

- **The Neolithic Revolution** started in 10,000 BC in the Fertile Crescent and involves the transition from hunter-gatherers to sedentary agricultural settlements
  - The Neolithic Revolution quickly spread to other parts of the world and resulted in the growth of new civilizations, cities, and innovations.
- During the Neolithic Age, humans still used stone tools like their ancestors, but started using those tools to grow and harvest plants and build permanent settlements.



- Historians believe that the causes of the Neolithic Revolution varied worldwide; some theories are that the warming of the Earth or advancements in the human brain are responsible for this sudden change in lifestyle
- The five major agricultural hearths are the Fertile Crescent, Sub-Saharan Africa, Southeast Asia, East Asia, and Central America
- **The Fertile Crescent** is where sedentary agriculture originated; wheat, barley, oats, lentils, chickpeas, and flax originated here and diffused across the Middle East and into Europe and Africa
- When domesticating plants, farmers tried to breed plants that would harvest easily
- In Sub-Saharan Africa, sorghum, yams, and coffee were grown and diffused through southern Africa
- In Southeast Asia, coconuts and mangoes were grown and diffused through east India
- In East Asia, rice and soybeans were grown and diffused through Korea and Japan around 7,700 years ago
- In Central America, potatoes, maize (corn), squash, and peppers were grown and diffused through North and South Americas around 10,000 years ago
- **Animal domestication** first occurred in Mesopotamia around 12,000 years ago when sheep and cattle were domesticated as farm animals
  - Later, water buffalo and yak were domesticated in India, Tibet, and China
  - Animals used for transporting trade goods like oxen, donkeys, and camels, were domesticated around 4,000 BC
  - **The domestication of animals allowed humans to consume animal products like dairy and meat as well as reduced the amount of labor done by humans. However, domesticated animals also spread diseases like smallpox, the measles, and the flu to humans.**
- This first agricultural revolution allowed for job specialization and a population boom, as people now had time to improve other aspects of civilization like economics and politics; without the Neolithic Revolution, the Bronze and Iron Age would not have occurred later on
- **Agriculture diffused primarily through trade;** trade routes made diffusion quicker and trade companies (East India Trading Company) allowed for agricultural products to spread to Africa, Europe, the Middle East, and south Asia
- **The Columbian Exchange** played a huge role in the diffusion of agriculture. The diagram above shows what was exchanged between the three countries!
- The Columbian Exchange led to a huge demand for products like sugar, tobacco, and chocolate
  - Tobacco, squash, corn, vanilla, and turkey were native to the Americas and are now common items in Afro-Eurasia due to the exchange.



- Similarly, coffee, bananas, sugar, cattle, and wheat were native to Afro-Eurasia and are now common items in the Americas.
- **Agriculture also diffused due to migration (both forced and voluntary)**
- The Green Revolution led to an even greater amount of diffusion; trade, migration, government programs, and businesses allowed new plant variants to spread across the world

## 5 The Second Agricultural Revolution

### 5.1 Overview

#### Terms to Know

- **The Second Agricultural Revolution:** the increase in agricultural production in Britain due to new agricultural innovations that increased land productivity between the mid-17th and late 19th centuries
- **crop rotation:** the cultivation of different crops in a specific order on the same fields so that the soil stays fertile
- **Norfolk Four-Course System:** crop rotation system established in England that rotated wheat, turnips, barley, and clover/undergrass every year in a four-year cycle so that certain nutrients would be taken from the soil as the plants grew
- **breeding:** selecting animals to breed based on genetic traits in order to breed animals with the most desirable traits
- **Jethro Tull:** British agriculturist who revolutionized agriculture by inventing the seed drill, improving the plough, and developing a horse-drawn hoe
- **Industrial Revolution:** the period of time when people switched from an economy based on agriculture to an economy based on manufacturing and industry
- **Thomas Malthus:** British philosopher who came up with the Malthusian growth model, which stated that food production wouldn't be able to keep up with population growth
- **Agriculture:** the deliberate modification of the Earth's surface through cultivation of plants and domestication of animals to produce substance or economic gains
- **Enclosure Movement:** the transition from many small farms to a small number of large farms in England during the eighteenth century

### 5.2 Notes

- The Second Agricultural Revolution started in **Great Britain** because of the **Industrial Revolution**
- During this time, inventions like the seed drill, steel elevator, cotton gin, grain elevator, and McCormick Reaper revolutionized agriculture and dramatically increased agricultural production
- During this time, the **Enclosure Movement** took place
  - **The Enclosure Movement** occurred when farmers on small farms were kicked off of their land so that small farms could be consolidated into larger farms

- **Land now became owned privately instead of communally, which boosted agricultural productivity because farmers saw direct results from their efforts to take care of their land**
- During this time, there was a great increase in urbanization; people moved to cities in search of economic opportunities because farms were producing such a surplus that many workers weren't needed there anymore
- Consequentially, job specialization increased, the population boomed, and people saw an improvement in their diets due to the increase in available food
  - In fact, **Thomas Malthus** came up with his theory that the population would exceed our food resources when he saw the level of population growth occurring
- In addition, new innovations improved transportation and technology, increasing time-space compression, growing the economy, and improving trade efficiency
- This topic connects to previous AP Human Geography units because it affected the population and allowed many countries to advance to Stage 2 of the Demographic Transition Model

## 6 The Green Revolution

### 6.1 Overview

#### Terms to Know

- **The Third Agricultural Revolution:** involved the development of more efficient farming equipment and practices, especially in the area of improved varieties of grain; caused by advancements in research and technology
- **The Green Revolution:** the advances in plant biology and the development of disease-resistant, higher-yielding, and faster-growing varieties of grain in the mid-20th century
- **GMOs:** Genetically Modified Organisms; crops whose genetic structure has been altered to give them traits that are desirable to humans
- **Plant hybridization:** crossing two genetically different plants to create a hybrid plant with desired characteristics

### 6.2 Notes

- **The Green Revolution** transformed agriculture through the use of **GMOs**, fertilizers, herbicides, and pesticides

- Fertilizers started using nitrogen and phosphite to speed up the growth of crops as well as fight off fungal diseases in crops
- Pesticide advancements kept insects from destroying crops, and herbicides got rid of invasive species, preventing them from taking nutrients from crops
- Scientists started using **plant hybridization** to create plants that were more visually appealing, resistant to diseases, and took less time to grow
- Scientists also started altering plants by modifying the plants' genes; these modified plants are known as **GMOs**
  - Modified plants could achieve characteristics that hybrid plants couldn't, making them very appealing
- **Globalization** kept increasing during this time period, allowing for easier transportation of goods
- There was also a large rise in the use of machinery during this time, increasing our reliance on machines and decreasing our reliance on human labor
- The Green Revolution resulted in an even greater agricultural surplus, reducing the cost of food as well as the cost of food production
- **However, the increase in machinery and industrialization led to a decrease in family farms and an increase in environmental issues like soil erosion, soil depletion, and eutrophication**
  - It is also important to remember that many LDCs did not reap the benefits of the Green Revolution, Africa especially, furthering the divide between LDCs and MDCs

## 7 Agricultural Production Regions

### 7.1 Overview

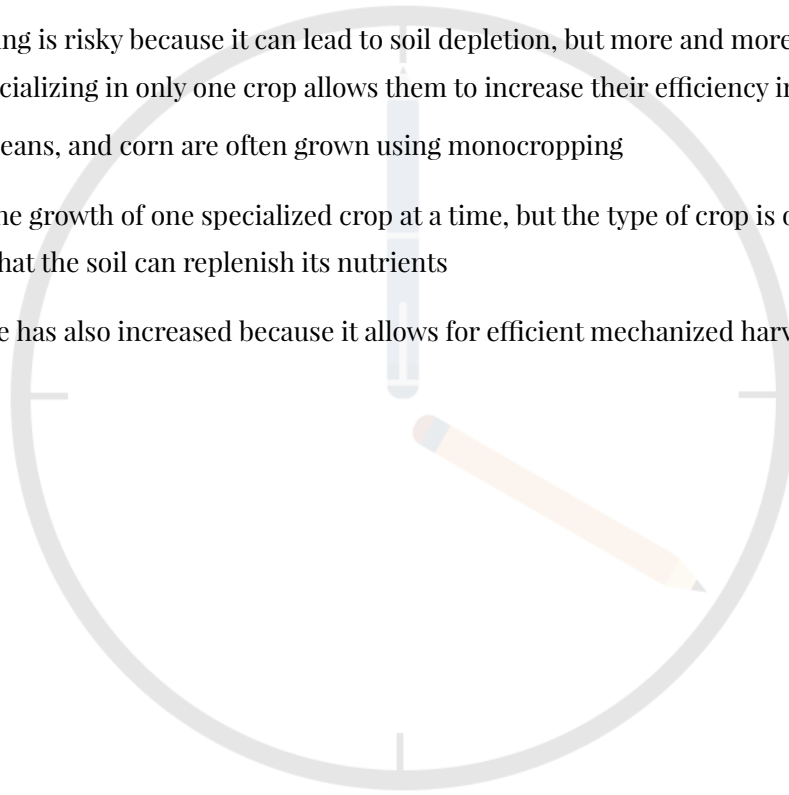
#### Terms to Know

- **The Bid Rent Theory:** economic geographical theory that predicts how the price and demand for land changes as the distance from the city center increases
- **subsistence agriculture:** farming done to provide food for family or the local community
- **commercial agriculture:** agriculture done with the goal of creating products to be sold for profit
- **intensive agriculture:** farming that uses more capital and labor in order to maximize the crop yield on a small plot of land; usually takes place near population centers
- **extensive agriculture:** farming that uses less capital and labor on a larger plot of land to yield a large amount of output per acre
- **monocropping:** the agricultural practice of growing the same crop on the same plot of land every year
- **monoculture:** the agricultural practice of growing only one crop at a time on a large plot of land; the type of crop grown is often switched after each harvest

### 7.2 Notes

- **Subsistence agriculture** takes place on a smaller plot of land and uses less machines and more human labor
- However, **commercial agriculture** takes place on a larger plot of land and uses advanced machines to produce large crop yields
- Core countries/MDCs have more commercial agriculture and use more machinery than periphery countries/LDCs, which have a high percentage of the population working in agriculture, use more human labor, and have more subsistence agriculture
- These two types of agriculture can be further classified as **intensive** or **extensive**
  - To determine the type of agriculture, think about the amount of land being used, if it relies more on human labor or machinery, and what the goal of the food production was
  - For example, cattle ranching is considered to be extensive commercial agriculture because it requires a lot of land, relies on human labor, and has the goal of selling cattle for profit
  - However, pastoral nomadism would be extensive subsistence agriculture. Although it also takes place on land and relies on human labor, the goal of food production is for consumption, not profit

- **Intensive agriculture takes place near markets, while extensive agriculture takes place further away from city centers; this can be explained by the Bid Rent Theory**
- **The Bid Rent Theory** explains how land is used (either intensively or extensively) based on the value of the land
  - The theory states that land closer to a city center is more expensive, while land further away from the city is cheaper
  - When land is expensive, farmers buy less of it and use it intensively
  - When land is cheap, farmers buy more of it and use it extensively
- **Monocropping** refers to farmers growing the same crop in the same plot of land every year
  - Monocropping is risky because it can lead to soil depletion, but more and more farmers are using it because specializing in only one crop allows them to increase their efficiency in producing that crop
  - Wheat, soybeans, and corn are often grown using monocropping
- **Monoculture** is the growth of one specialized crop at a time, but the type of crop is often switched after each harvest so that the soil can replenish its nutrients
  - Monoculture has also increased because it allows for efficient mechanized harvesting and large-scale farming



## 8 Spatial Organization of Agriculture

### 8.1 Overview

#### Terms to Know

- **agribusiness:** the integration of various steps of production the food-processing industry; includes both large-scale commercial agriculture and the steps of processing and production, transportation, marketing, retail, research, and development
- **commodity chain:** a system of resources, producer transportation, communication, information, and consumers
- **transnational corporations:** companies that have facilities and sell products in many different countries
- **vertical integration:** when a company owns several smaller businesses involved in different steps in developing a product (ex. one company contracts with farmers to raise crops, a trucking firm transports the crops, a factory processes the crops, and a wholesaler sells the finished product to grocery stores)
- **suitcase farm:** a farm with no actual residents where all the work is done by migrant laborers or farmers who live nearby
- **cool chain:** transportation systems designed to keep refrigerated food cold while it is being transported across the country

### 8.2 Notes

- Positive changes like higher food yields and job specialization have come from our advancements in agriculture, but these changes have also brought negative ones, the most specific one being a rise in agribusinesses and a decrease in small-scale family farms
- **Agribusinesses** integrate all the steps of large-scale commercial agriculture and food production
  - Agribusinesses are often run by **transnational corporations** because they are such large-scale operations
  - These corporations make use of biotechnology, fertilizers, pesticides, herbicides, and machinery to maximize agricultural production
- Large-scale farms use **commodity chains** to gather resources, turn them into a finished product, and sell them to consumers
- Our food is now being produced worldwide and we rely less on actual people to make it



- Industrial farming has led to larger and larger farms because **agribusinesses** buy small farms and incorporate them into their business, giving them money that can be used to buy more machinery, fertilizers, and land
  - In addition, industrial farms take advantage of cheap migrant labor to reduce the cost of food production and harvesting
  - For example **suitcase farms**, which are farms that are completely run by migrant laborers or farmers nearby, are becoming more common in the Great Plains and Midwest
- Technological advancements have allowed farmers to raise crops and livestock far from their final market and consumers to purchase their products at low prices
  - Ex. Refrigeration advancements led to **cool chains**, which are transportation networks that keep food cool throughout a trip
    - \* Cool chains allow for fresh fruits and vegetables from the tropics to be delivered all the way to North America and Europe at a cheap price

## 9 Von Thünen Model

### 9.1 Overview

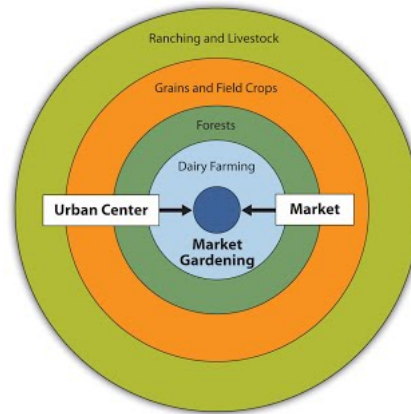
#### Terms to Know

- **Von Thünen Model:** model developed by Johann Heinrich von Thunen that predicts and attempts to differentiate between agricultural land use patterns based on the different scales of agricultural production
- **Time-space compression:** the reduction in the time it takes to spread products, ideas, or information to a distant place; time-space compression has been caused by advancements in transportation and technology

### 9.2 Notes

- Johann Heinrich von Thünen theorized the effects of geography and economics on agriculture using the **Von Thünen Model**
  - The model suggests that a farmer cultivates certain crops based on the distance between the farm and the market
  - The Von Thünen Model is based on the 1800s, when ox carts were the main form of transportation
  - The factors influencing the model are **the cost of land**, **the perishability of the product being sold**, and **the weight of the product**

- Here is a diagram illustrating this concept:



- The first ring on the diagram represents **dairy and market gardening, which is intensive agriculture**
  - Dairy and market gardening are intensive gardening because the products produced are extremely perishable ( fruits and vegetables rotting, milk spoiling) and fragile (fruits and vegetables bruising; eggs breaking)
- The second ring on the diagram represents **forests** because firewood/timber is used for building, heating, and cooking
  - Wood is also very heavy, making it expensive to transport
- The third ring on the diagram represents **grains and cereals, which are examples of extensive agriculture** because they are less perishable than dairy or market goods, relatively lightweight, and easy to transport
- The fourth ring on the diagram represents **livestock ranching, which is considered extensive agriculture** because it usually takes place on less desirable land, making it cheaper, and animals can transport themselves to slaughter
- **The Von Thünen Model was made during the 1800s; now that we have refrigeration, better transportation, and electricity (meaning that we don't need wood for heat), the model may not be as accurate anymore**
  - However, the Von Thünen Model was able to perfectly predict the distribution of Uruguay's agricultural regions
- **Time-space compression** has allowed for the ability to quickly exchange goods across distances and has led to **better transportation, a growing global demand for agricultural products, and specialty farming**

## 10 The Global System of Agriculture

### 10.1 Overview

#### Terms to Know

- **infrastructure:** the basic features of a system or organization
- **luxury crops:** non-subsistence crops like coffee, tea, tobacco, and cacao
- **neocolonialism:** when a major power uses its influence to increase its control over a more under-developed area
- **subsidy:** a benefit given to a business or institution by the government

### 10.2 Notes

- The world is more connected than ever before thanks to technology; agricultural products can be traded globally now
- This has led to more interdependence between countries
  - Countries now rely on each other for certain goods and services
  - Different countries have different terrain and climate, allowing them to produce various agricultural products (this is an example of site and situation!)
  - Ex. countries in the southern hemisphere can produce products that countries in the northern hemisphere can't produce in the winter, allowing us to have a year-round supply of fruits and vegetables
- MDCs develop the most from the globalization of agriculture, while LDCs benefit the least
  - Food is produced and harvested by laborers in LDCs, who are not paid much, so that it can be processed and transported to MDCs, where transnational corporations and agribusinesses make most of the profits
  - This increases underdeveloped countries' dependence on developed countries
  - Underdeveloped countries are also more likely to grow **luxury crops** for MDCs, resulting in increased food shortages
- Because workers in LDCs usually can't afford machinery, they are more likely to exploit their environment to increase agricultural efficiency; this has led to deforestation, desalinization of soil (the build-up of salt in soil), soil erosion, and desertification
- Farmers in MDCs are often given **subsidies** from the government that assist their businesses and have access to better transportation systems, allowing them to trade their food across the world

# 11 Consequences of Agricultural Practices

## 11.1 Overview

### Terms to Know

- **soil salinization:** the process that occurs when soil in arid/semi-arid areas is brought under cultivation through irrigation
- **soil erosion:** the process that occurs when the topsoil in a field wears away due to natural forces like wind and water
- **deforestation:** human destruction of forests
- **biodiversity:** the variety of organisms in an ecosystem
- **shifting cultivation/slash-and-burn:** the process of farming in a certain region until the nutrients in the soil are depleted then moving onto another region to restart the process; slash-and-burn agriculture burns forests and starts the process on that cleared land
- **terracing:** the process of carving steps into hilly or mountainous terrain to create flat land used for farming
- **desertification:** the process of land becoming unusable for farming; usually caused by human agricultural practices
- **compost:** decayed organic matter used as plant fertilizer
- **water control land reclamation:** the process of draining the water out of a region of land so that it can be used for farming
- **polder:** low-lying land reclaimed from the sea surrounded by dikes and drained with pumps
- **algal blooms:** a rapid growth of algae and cyanobacteria in a body of water; usually due to fertilizer runoff
- **CAFO:** concentrated animal feeding operation
- **center-pivot irrigation systems:** a movable pipe structure that rotates around a central pivot point connected to a water supply that irrigates land
- **reservoir:** a natural or artificial place where water is collected and stored for use
- **aquifers:** permeable rocks that contain and transmit groundwater

## 11.2 Notes

- Farmers rely on fertilizers, pesticides, herbicides, feedlots, machinery, and irrigation to grow crops efficiently, but these cause great damage to our environment
- The production of meat is extremely harmful to the environment; livestock require huge amounts of land to graze (often resulting in deforestation) and release methane gas into the atmosphere, drastically increasing global warming
- Agriculture negatively impacts our water supplies too; **over 70 percent of our water is used for agriculture**
- **Desertification, which is when previously fertile land becomes unusable for farming, is increasing too**
  - It is often caused by human activities like allowing livestock to overgraze, overplanting crops in an area (depleting the nutrients from the soil), and using slash-and-burn agriculture
- **Deforestation** is increasing as well due to countries trying to make profits off of timber and make room for more farmland
- **Soil salinization**, which is the build-up of salt in soil, kills plants and causes water runoff, which in turn increases **soil erosion**
- **Terrace farming** is used to create flat land for farming on mountainous terrain in areas that need to maximize their farmland to feed their population, but often results in mudslides
- Irrigation helps us grow crops in areas without nearby water sources, but can take water from areas where it is needed and increases water pollution due to fertilizers running off into local bodies of water
- Humans have also started using **water control land reclamation** to drain water out of regions like swamps and wetlands so that the land can be used for farming
  - Water control land reclamation decreases biodiversity, ruins ecosystems, and allows more pollution to get into lakes and oceans
- **Our growing population is only intensifying these issues and we need to start coming up with solutions for these problems soon before it's too late!**

## 12 Challenges of Contemporary Agriculture

### 12.1 Overview

#### Terms to Know

- **GMOs:** genetically modified organisms
- **food deserts:** areas with little or no access to healthy and affordable food or limited or no access to fresh fruits and vegetables
- **urban farms:** farms that process, cultivate, and sell their foods near cities or towns
- **community support agriculture (CSA):** when communities pledge to buy agricultural products directly from a farm year-round

### 12.2 Notes

- Our use of fertilizers, GMOs, machinery, migrant labor, and other agricultural practices have sparked many debates on whether these activities should be stopped
- While **GMOs** allow us to grow more food at faster rates, many people that eating GMOs may pose risks to our health
- Another concern is that plant diversity is decreasing over time because farmers are using so many GMOs and hybrid plants instead of natural variants
- Livestock animals have to be the same size and weight to be processed in factories, so farmers are now feeding livestock food that isn't part of their natural diet and injecting them with growth hormones
- Water pollution and soil salinization have also increased in recent years due to the use of irrigation and fertilizers
- **Inefficiencies in the process of shipping food to consumers has led to a rise in food waste, which is bad for the environment because food releases methane gas when it decomposes**
  - Generally, the more miles a product has to travel from where it is produced to where it is consumed, the more opportunities there are for inefficiencies and food waste
- People in urban areas can sometimes be stuck in food deserts, meaning that they have no access to healthy food nearby. These areas struggle with obesity and diabetes because citizens have to get their food from restaurants or convenience stores
  - However, **urban farms** are being built to counter the food desert problem and **community support agriculture (CSA)**, which is when farmers sell their products directly to year-round clients, is resulting in less food waste

- However, consumers are starting to demand more sustainable agricultural practices and governments are putting in regulations to protect natural environments and resources as well as treat laborers more fairly
- Organic farms use sustainable practices and grow fertilizer-free food, reducing negative impacts on the environment
- Recently, the **Fair Trade Movement**, which is an effort to promote higher incomes for producers and more sustainable farming practices, has been picking up steam
  - This reduces the economic divide between producers in LDCs and consumers in MDCs

### 13 TL;DR

- Agriculture is influenced by the climate and physical geography
  - Some climates and soils are more conducive to growing certain crops
  - Humans can modify the environment by using artificial lighting, fertilizers, pesticides, and irrigation to grow crops in areas that do not have an optimal climate
- **Intensive farming** = small plots + high yields
- **Extensive farming** = large plots + low yields
- Economic decisions are influenced by plot size, labor costs, and machinery costs
- The most common rural settlement patterns are **clustered settlements** (building closely packed together), **dispersed settlements** (buildings far apart, more interactions with natural environment), and **linear settlements** (buildings placed along a line of transportation like a river or road)
- The most common survey methods are **metes and bounds** (uses geographic features as a reference point for drawing boundaries), **long-lots** (land is divided into long strips along a transportation system, allowing for equal access), and **township and range** (land divided into rectangular plots called survey townships, creating a grid pattern)
- **The First Neolithic Agricultural Revolution** marked the transition period between hunting and gathering and sedentary agriculture
  - During this time period, **plant domestication**, **animal domestication**, and job specialization emerged as well as a population boom due to the surplus in food
  - **The Columbian Exchange** led to the diffusion of plants, animals, ideas, and technology across the Atlantic Ocean from the New World to Old World
- **The Second Agricultural Revolution** and the **Industrial Revolution** occurred at about the same time and produced new innovations like the cotton gin, seed drill, and grain elevator that greatly agricultural yields

- This increase in production allowed for an increase in job specialization, time-space compression, population, improvements in diet, and urbanization
- The **Enclosure Movement** also occurred during this time, which was basically the transition from many small communal farms to a small number of large, private farms
- During the **The Green Revolution**, agricultural production increased again due to advancements in fertilizers, pesticides, and herbicides as well as the use of **plant hybridization** and genetic modification to create plants that grew faster, were more visually appealing, and could resist diseases and insects
  - However, the Green Revolution led to an increase in environmental damage and economic division between developed countries and less developed countries
- Types of agriculture can be defined as either **subsistence** (done to feed family or the local community) or **commercial** (done for profit), as well as either **intensive** (done on small plots of land with a large amount of labor and capital) or **extensive** (done on larger plots of land with a small amount of labor and capital; makes use of machinery)
  - To determine the type of agriculture, determine how much land is being used, what the goal of production is, and if there is a lot of labor or capital involved
- **The Bid Rent Theory** theorizes that land closer to a city is more expensive and used intensively by farmers, while land further away from a city is cheaper and used extensively by farmers
- A rise in agribusinesses and large-scale commercial farms that use machinery, biotechnology, and fertilizers had led to a drastic decrease in small, family-owned farms and an increase in the use of migrant labor
- Large-scale farms use **commodity chains** to gather resources, turn them into a finished product, and sell them to customers
- The globalization of agriculture has led to interdependence between countries; countries rely on each other for certain goods and services
- MDCs benefit the most from the globalization of agriculture because they get **luxury crops** for cheap prices from LDCs, **subsidies** from the government, and access to better transportation routes
- Our agricultural practices are causing loads of environmental problems like **desertification**, **soil salinization**, **soil erosion**, global warming, and water loss
- The use of **GMOs**, fertilizers, and migrant labor has caused a lot of controversy due to their negative impacts on the environment as well as the economies of LDCs
  - However, we are starting to promote **community support agriculture**, **urban farms**, sustainable agricultural practices, and fairer treatment of producers of agricultural products in LDCs as solutions to those problems



# Appendices

## A Credits

### A.1 Contributions

- Drafted by **Avigail Laing**

### A.2 External Sources

- [Kaptest](#)
- [The Mr. Sinn Youtube Channel](#)
- [Introduction to Agriculture Notes](#)
- [History](#)
- [Khan Academy: Columbian Exchange](#)
- [Britannica](#)

### A.3 Image Credits

- Clock: [Veronica Cruz](#)
- Global Land Use Map: [Maps of World](#)
- Columbian Exchange Map: [Bill of Rights Institute](#)
- Von Thünen Model diagram: [Google Sites](#)

## B Extra Resources

- All resources mentioned retain the same licensing as the original creators intended. The ProcrastiNote Team has checked every single one of these to make sure that our usage of their materials remains within the legal realm. If you are the owner of these materials and you believe there is a mistake in our citations, please contact us at [official.procrastinote@gmail.com](mailto:official.procrastinote@gmail.com). Thanks!

