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# Unit 5

# Agriculture &

# Rural Land Use

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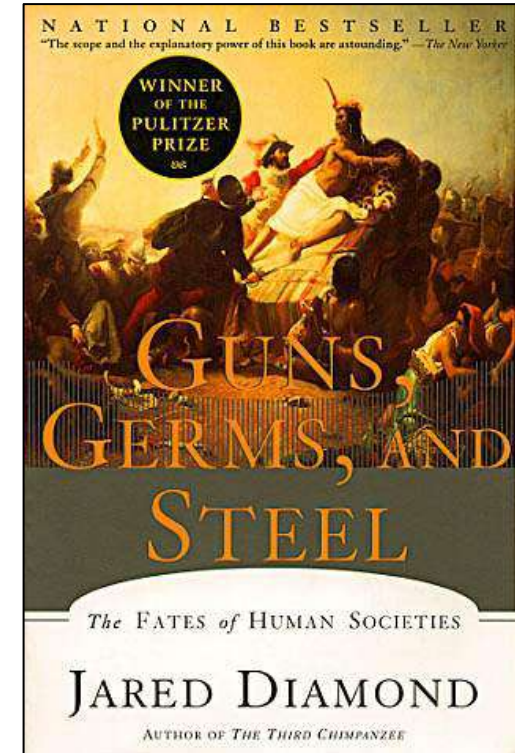
This PPT has been created using the information from the *AMSCO Human Geography: Preparing for the Advanced Placement Examination* book.  
Palmer, David. *AMSCO Advanced Placement Human Geography*. Perfection Learning, 2019.



**UNIT 5 – AGRICULTURE, FOOD, & RURAL LAND USE**  
**CH 12: THE DEVELOPMENT OF AGRICULTURE**

*Twelve thousand years ago, everybody on earth was a hunter-gatherer; now almost all of us are farmers or else are fed by farmers...Farming spread mainly through farmers' outbreeding hunters, developing more potent technology, and then killing the hunters or driving them off of all lands suitable for agriculture.*

*-Jared Diamond, *Guns, Germs and Steel: The Fates of Human Societies**



# UNIT OVERVIEW

- About 12,000 years ago, people living in **Southwest Asia** began to grow crops and raise animals *intentionally*. From there, agriculture diffused throughout the world.
- Since 1750, mechanization, the use of chemicals, and research have increased agricultural productivity, allowing more people to work off the farm. However, this change has also resulted in an increased stress on the environment.

# UNIT OVERVIEW

- **Physical Geography, Economics, and Settlement Patterns**
  - What people have grown and raised has always been shaped by the climate, soils, and landforms.
  - The types of agriculture produced (dairy, vegetables, grain) is heavily influenced by nearness of the market.
  - Farmers have shaped the landscape by cutting down trees and draining wetlands.
  - Improvement in technology have shifted the industry towards larger enterprises and greater interdependence.

# UNIT OVERVIEW

- **Changes and Opportunities**
  - Changes in technology and society influenced how people produce and consume food.
  - Since women were often in charge of cooking, and food is increasingly prepared outside the home, women now have more flexibility.

# ENDURING UNDERSTANDING (5.A)

By the end of this section, you will *understand* that **the development of agriculture led to widespread alteration of the natural environment.**



## LEARNING OBJECTIVE (5.A.1)

By the end of this section, you will *be able to* **identify major centers of domestication of plants and animals and patterns of diffusion in the first (Neolithic) agriculture revolution.**

- a. Students will know that **early hearths of domestication** of plants and animals include Southwest Asia (e.g., the Fertile Crescent), Southeast Asia, and the Americas.
- b. Students will know that **patterns of diffusion** (e.g., Columbian Exchange) resulted in the globalization of various plants and animals.



# THE REVOLUTIONS

**Agriculture** – the process by which humans alter the landscape in order to raise crops and livestock for consumption and trade.

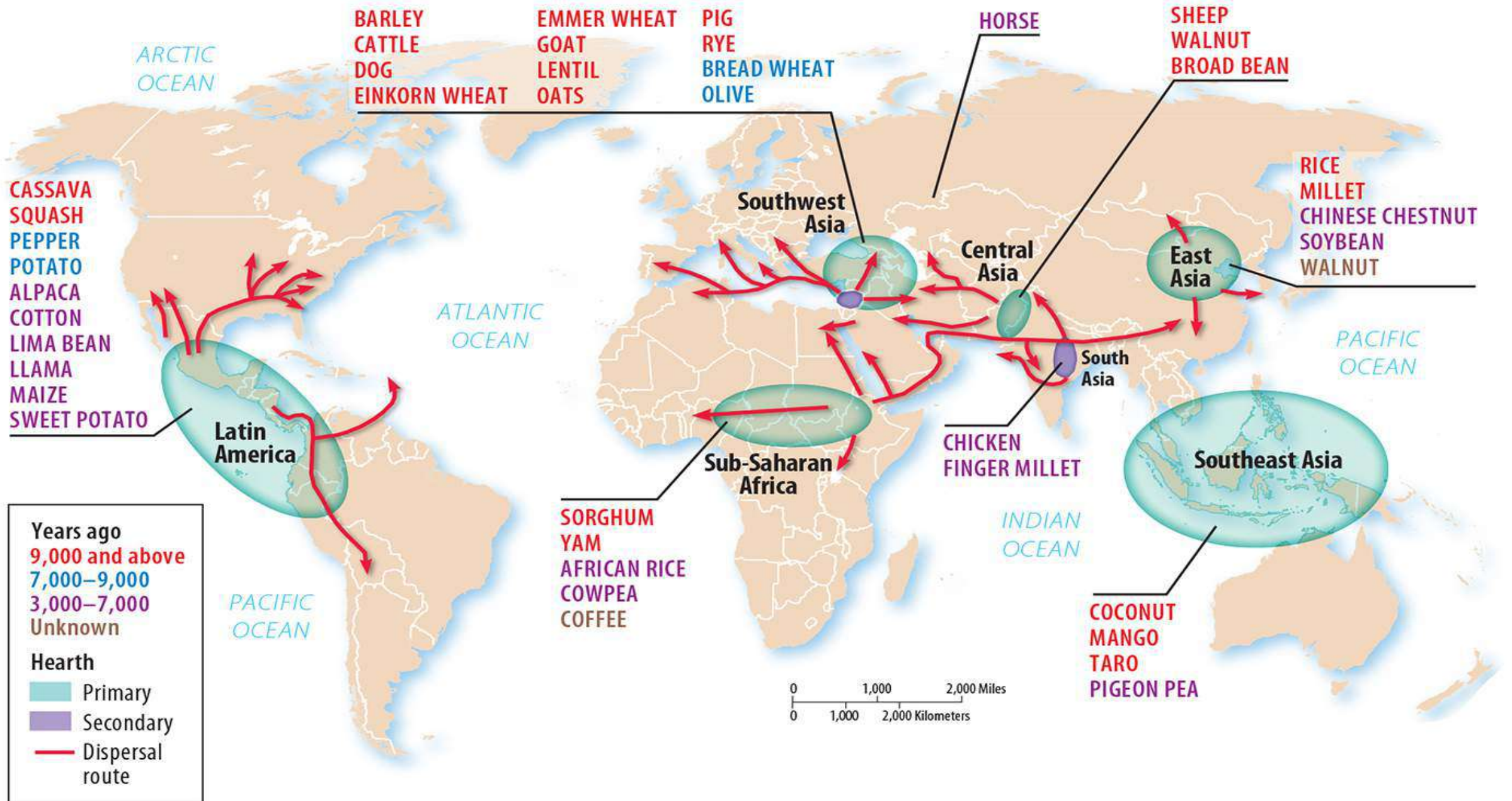
- **First (Neolithic) Agricultural Revolution**
  - Origin of farming
  - Marked by the *domestication* of plants and animals
  - Mostly **subsistence** farming (consumption, simple tools, and manual labor)
- **Second Agricultural Revolution**
  - 1700s, Industrial Revolution increased food supplies
  - Improved mechanization, fertilizers, soils, and selective breeding
- **Third Agricultural Revolution**
  - 1960s – The Green Revolution
  - Agribusiness – companies control the development, planting, processing, and selling of food to the consumer.





# PLANT AND ANIMAL DOMESTICATION

- You need to be familiar with the five **centers**, or hearths, of the First Agricultural Revolution.
  - Southwest Asia
  - East Asia
  - South Asia
  - Africa
  - The Americas



# PLANT AND ANIMAL DOMESTICATION

- Carl Sauer – mid 20<sup>th</sup> century
  - Animal domestication, the raising and caring for animals by humans for protection or food, probably began in Central Asia (dogs) and then in Southwest Asia (goats and sheep).
  - Plant domestication, the growing of crops that people planted, raised, and harvested, probably began *after* animal domestication.

## MAJOR HEARTHES OF CROP AGRICULTURE

Time Period	Location	Crops	Early Diffusion Pattern
10,000 to 12,000 Years Ago	Southwest Asia (Fertile Crescent)	<ul style="list-style-type: none"> <li>• Barley</li> <li>• Wheat</li> <li>• Lentils</li> <li>• Olives</li> <li>• Oats</li> <li>• Rye</li> </ul>	<ul style="list-style-type: none"> <li>• North Africa</li> <li>• Southern Europe</li> <li>• Central Asia</li> </ul>
10,000 Years Ago	Southeast Asia	<ul style="list-style-type: none"> <li>• Mango</li> <li>• Taro</li> <li>• Coconut</li> </ul>	<ul style="list-style-type: none"> <li>• Southeastern Asia</li> </ul>
9,500 Years Ago	East Asia	<ul style="list-style-type: none"> <li>• Rice</li> <li>• Soybean</li> <li>• Walnut</li> </ul>	<ul style="list-style-type: none"> <li>• North Central Asia</li> <li>• Korean peninsula</li> </ul>
7,000 Years Ago	Sub-Saharan Africa	<ul style="list-style-type: none"> <li>• Yams</li> <li>• Sorghum</li> <li>• Cowpeas</li> <li>• Coffee</li> <li>• African rice</li> </ul>	<ul style="list-style-type: none"> <li>• Western Africa</li> <li>• North Africa</li> </ul>
5,500 Years Ago	Mesoamerica	<ul style="list-style-type: none"> <li>• Squash</li> <li>• Peppers</li> <li>• Maize (corn)</li> <li>• Potato</li> <li>• Sweet potato</li> <li>• Cassava</li> </ul>	<ul style="list-style-type: none"> <li>• North America</li> <li>• South America</li> </ul>

### Fertile Crescent



### Coffee



### Sorghum



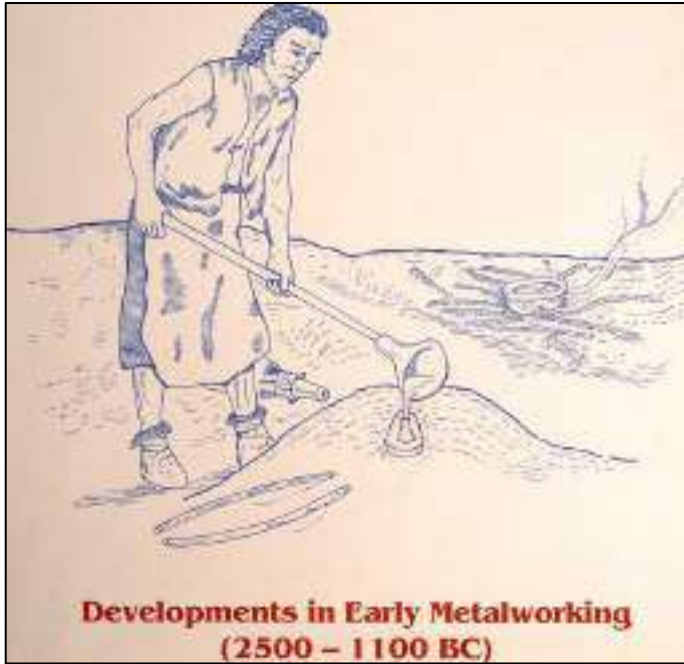
### Soybeans



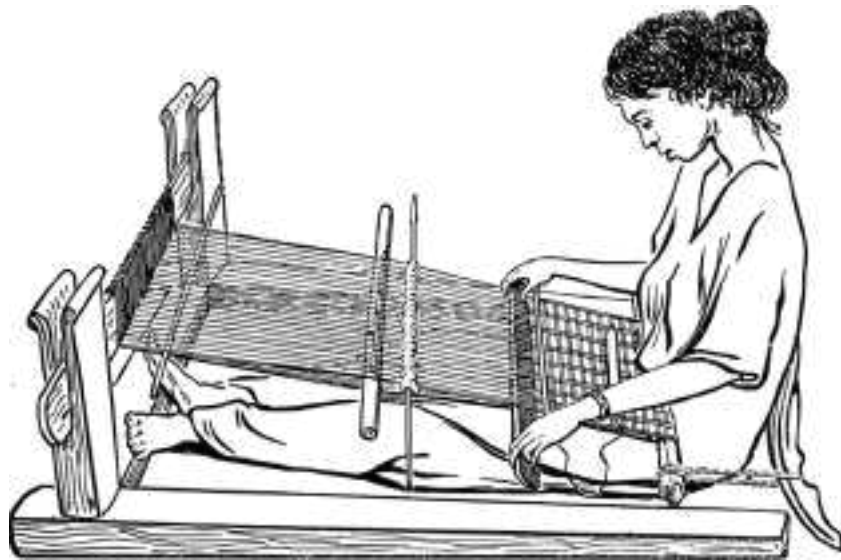
# PLANT AND ANIMAL DOMESTICATION

- **Diffusion of the First Agricultural Revolution**
  - The major hearths led to the first civilizations, large societies with cities and powerful states.
  - Civilization brought increased trade, larger empires, and conquest.
  - People had time to specialize in work and developed new occupations and technologies (metalwork, artists, soldiers, weavers, etc.)





**Developments in Early Metalworking  
(2500 – 1100 BC)**



1: North Italian infantryman, mid-14th C.  
2: North Italian crossbowman, mid-14th C.  
3: Venetian infantryman, first half 14th C.

# PLANT AND ANIMAL DOMESTICATION

- **Diffusion of the First Agricultural Revolution**
  - Increased trade between cultures
  - Somewhat expansive considering the transportation of that time
  - Example: Roman Empire traded from present-day England to Africa and Southwest Asia
  - Example: Silk Roads, the routes connecting Rome with China, people traded silk, rice, and other goods.

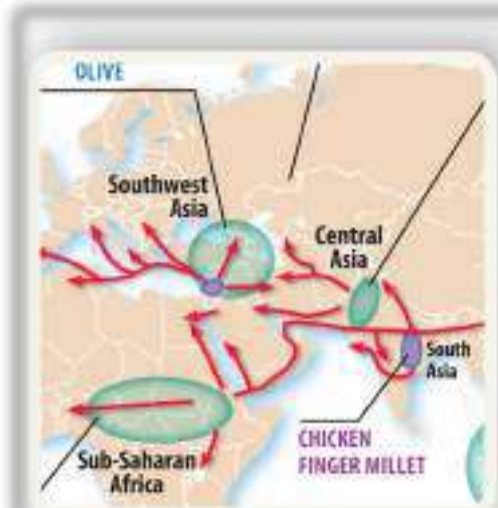


# PLANT AND ANIMAL DOMESTICATION

- **Diffusion of the First Agricultural Revolution**
  - The Columbian Exchange was the global movement of plants and animals between Afro-Eurasia and the Americas.
  - Examples
    - Coffee (from eastern Africa) and bananas (from New Guinea) continue to be grown in the Americas
    - Potatoes (from northwest South America) and maize (from southern Mexico) thrive in Europe, Asia, and Africa.

# ENDURING UNDERSTANDING (5.A)

By the end of this section, you will *understand* that **the development of agriculture led to widespread alteration of the natural environment.**



## LEARNING OBJECTIVE (5.A.2)

By the end of this section, you will *be able to* **explain the connection between physical geography and agricultural practices.**

- a. Students will know that agricultural regions are influenced by the natural environment (e.g., climate, soils, landforms).
- b. Students will know that populations alter the landscape (e.g., terraces, irrigation, deforestation, draining wetlands) to increase food production.

# PHYSICAL GEOGRAPHY AND AGRICULTURE

- Physical geography features (access to water, climate, soil types, landforms) influence how people farm in a region.
- Irrigation, terrace farming, deforestation, desertification, and the drainage of wetlands have occurred as farmers try to increase production to feed an ever-growing human population.

# PHYSICAL GEOGRAPHY AND AGRICULTURE

- Access to Water
  - All crops and animals need water – even the cattle herders in the Sahel, a dry region on the southern edge of the Sahara.
- Soil
  - Nutrient levels in soils influence agriculture. For examples, cotton needs nutrient-rich soil while sorghum can grow in nutrient-poor soils, like tropical rainforests.





Bringing Clean Water to the Sahel Belt



# PHYSICAL GEOGRAPHY AND AGRICULTURE

- Climate Differences
  - Influenced by the latitude and physical geography can impact what crops can be grown.
- Landforms
  - Flat land found in large, expansive valleys provides excellent landscapes for agriculture.
  - Mountains, ridges, and hills limit agricultural activity and often require more human inputs in order to make the land more useful for agricultural production.

# HUMANS ALTERING THE LANDSCAPE

- **Terracing**
  - Early form of land alteration in East Asia (rice), northern Africa (fruit and olive trees), and South America (potatoes and corn).
  - Farmers build a series of steps into the side of a hill creating a flat surface with several benefits:
    - Planting, tending, and harvesting crops is physically easier for farmers
    - The land collects rainfall rather than allowing it to run down a sloped hillside, helping to sustain crops
    - The reduction in water running down the hillside reduces soil erosion.
  - Can cause mudslides



[Nine Examples of Terrace Farming Around the World](#)

# HUMANS ALTERING THE LANDSCAPE

- **Managing Water – Irrigation**

- Irrigation is the diversion of water from its natural course or location to aid in the production of crops.
- Early example: carrying containers of water from a river or lake to pour on plants.
- 6,000 BCE: early civilizations used organized strategies like digging canals to manage their water resources.
- 19<sup>th</sup> and 20<sup>th</sup> centuries: large-scale irrigation contributed greatly to feeding the rapidly growing population of the world.

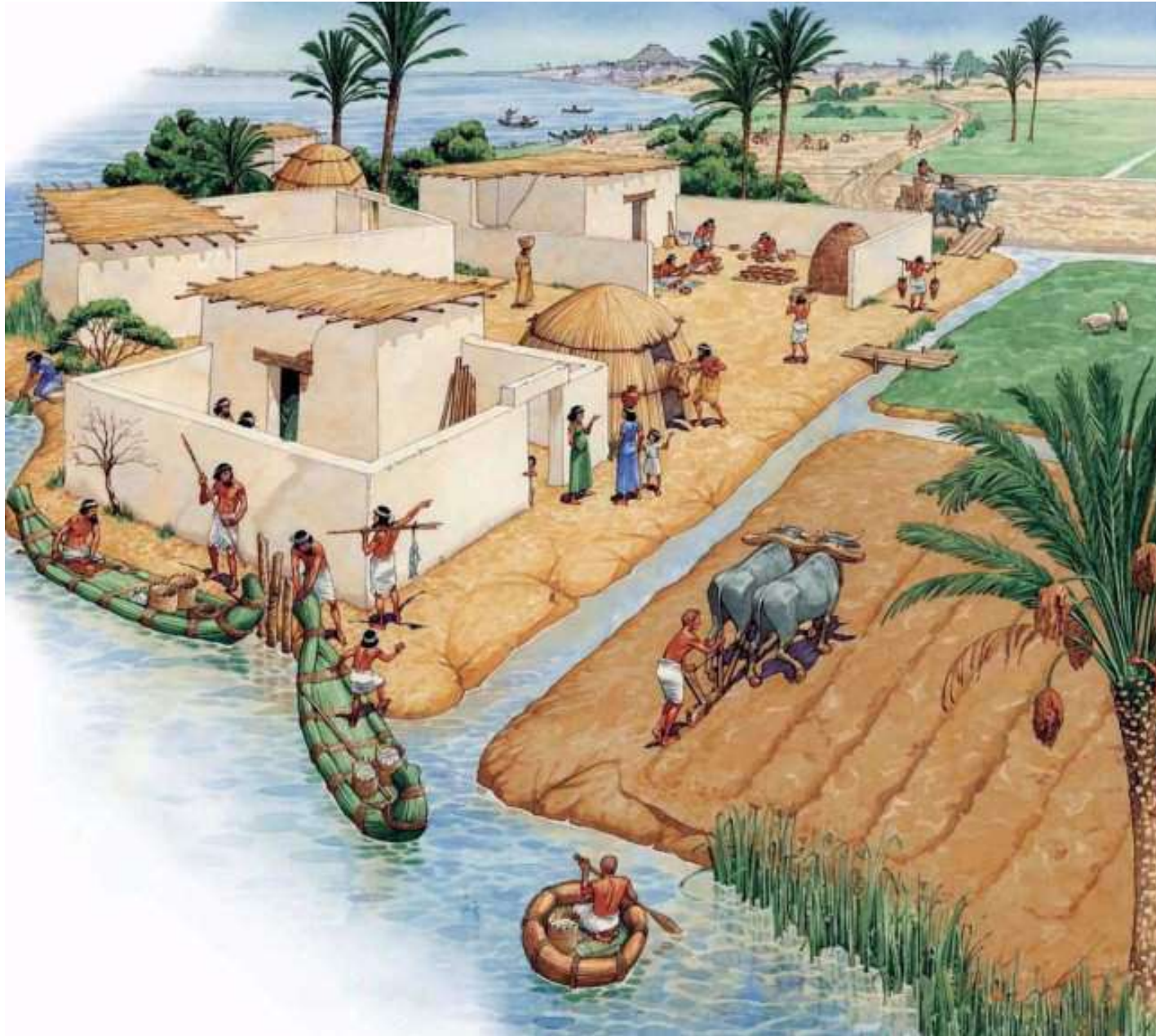
# HUMANS ALTERING THE LANDSCAPE

- **Managing Water – Irrigation**
  - Irrigation systems can damage the local environment and when misused can cause several problems.
    - Disrupt natural drainage and reduce the normal regeneration of soils caused by natural flooding.
    - Salinization, increasing the salt content, of soil resulting in decreased crop yield and soil fertility.
    - Land subsidence – the collapse of land resulting from the removal of underground water that supports the surface land.

# HUMANS ALTERING THE LANDSCAPE

- **Managing Water – Irrigation**
  - Irrigation in the United States
    - California – specifically the Central and Imperial Valleys
    - Nebraska to northern Texas uses an underground water supply called the Ogallala Aquifer.
  - Draining the wetlands
    - Provides more farmable land, which is generally nutrient rich, and increases carrying capacity
    - Major drawback – reduction of biodiversity in both plants and animals and eliminates the natural filter that protects and promotes surface and groundwater quality.

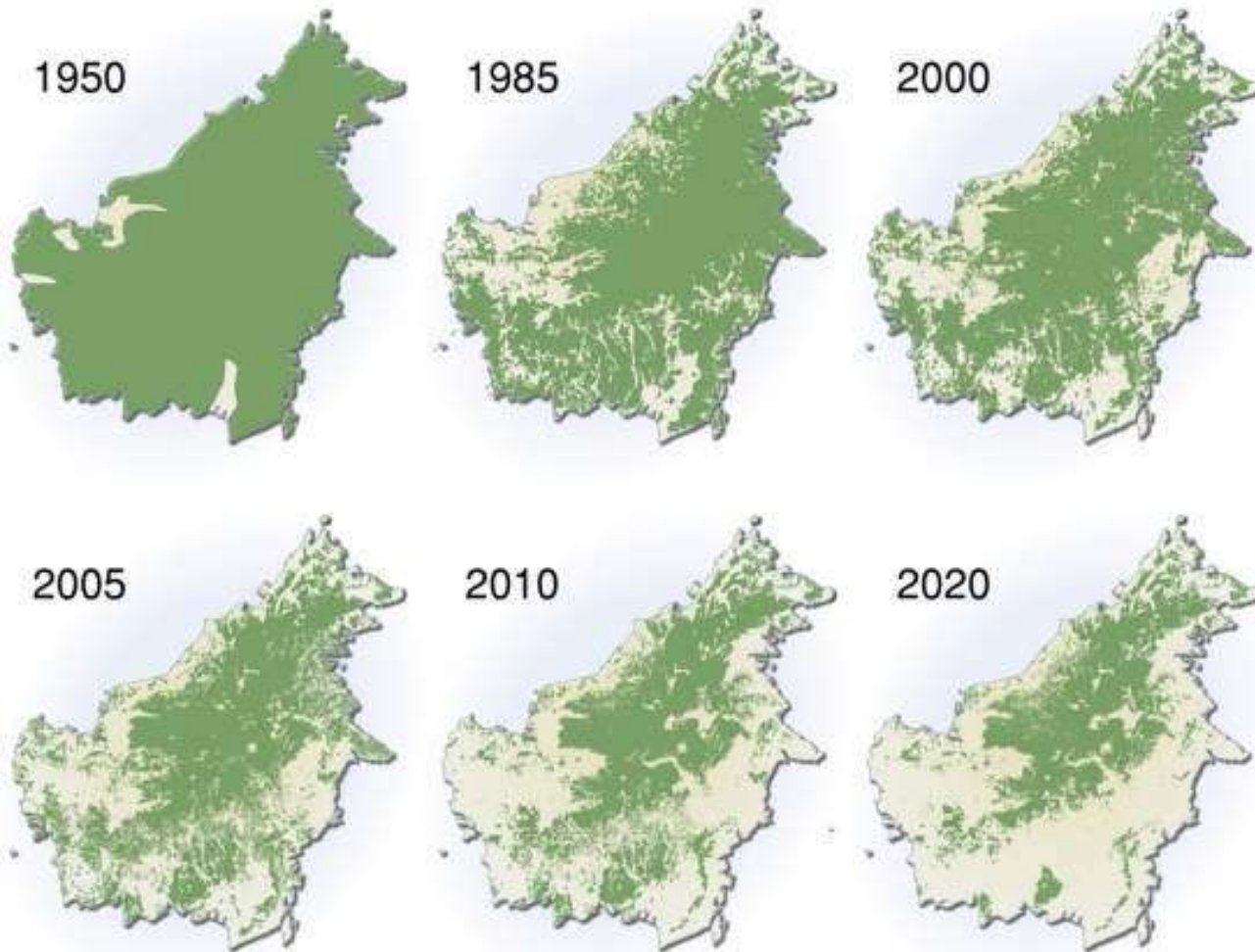




# HUMANS ALTERING THE LANDSCAPE

- **Clearing Trees and Other Vegetation – Deforestation**
  - **Deforestation** is the removal of large tracts of forest.
  - Examples: Northern and central Europe were once heavily forested but are now mostly farmland and urban areas.
  - Today occurs mostly in Southeast Asia, parts of Africa, and the rainforests of South America.
  - Global damage – the rainforests absorb so much carbon dioxide that shrinking them leads to an increase in atmospheric carbon dioxide, contributing to climate change.





Deforestation of the Amazon Rainforest

# HUMANS ALTERING THE LANDSCAPE

- **Clearing Trees and Other Vegetation – Desertification**
  - Cutting down trees can result in local problems, such as soil erosion, decrease in rainfall, and desertification (the transition of land from fertile to desert).

The image is a composite landscape. The left side shows a brown, cracked, and parched desert floor under a heavy, orange-brown sky. The right side shows a vibrant green field of crops under a bright blue sky with white clouds. The word "Desertification" is written in a black, cursive font across the center, bridging the two contrasting environments.

# *Desertification*

# HUMANS ALTERING THE LANDSCAPE

- Clearing Trees and Other Vegetation - Slash and Burn Agriculture
  - All vegetation in an area of forest is cut down and burned in place. The ash provides some soil nutrients, and the land can be farmed for a few years before the soil becomes depleted and the plot is abandoned. The plot then returns to a natural, somewhat altered state, while farmers move on.
  - Requires people to move regularly - called **shifting cultivation**.





# HUMANS ALTERING THE LANDSCAPE

- Clearing Trees and Other Vegetation - Slash and Burn Agriculture
  - Advantages are on a small scale - beneficial to humans and the environment recovers quickly.
  - Disadvantages are on a large scale - may seriously damage the environment.

# HUMANS ALTERING THE LANDSCAPE

- Clearing Trees and Other Vegetation - Slash and Burn Agriculture
  - Example of Disadvantage
    - Rather than use fire, farmers usually remove vegetation by cutting it down, pulling it out, or killing it with herbicides.
    - On the Great Plains, farmers removed the tall prairie grasses in order to plant wheat and other grains. These new crops lacked the extensive root systems of prairie grass. Without the strong roots, and with a lack of rain and some wind, the valuable topsoil can simply blow away.

# HUMANS ALTERING THE LANDSCAPE

- Clearing Trees and Other Vegetation - Slash and Burn Agriculture
  - Example of Disadvantage
    - The worst period of this occurred in the 1930s and is known as the Dust Bowl. This era of massive soil erosion was one of the worst ecological disasters in U.S. history.





# HUMANS ALTERING THE LANDSCAPE

- Recent Trends
  - In the modern era, commercial agriculture, in which farmers focus on raising one specific crop to sell for profit, has increasingly replaced subsistence farming, in which farmers focus on raising food they need to live.
  - Increasing numbers of farming operations evolved from small enterprises owned by a single family into large-scale, capital-intensive businesses, putting more stress on the environment than ever before.

# ENDURING UNDERSTANDING (5.A)

By the end of this section, you will *understand* that **the development of agriculture led to widespread alteration of the natural environment.**



## LEARNING OBJECTIVE (5.A.3)

By the end of this section, you will *be able to* **explain the advances and impacts of the second agricultural revolution.**

- a. Students will know that new technology and increased food production led to better diet, longer life, and more people available for work in factories.



# IMPACT OF THE 2ND AGRICULTURAL REV.

- The **Second Agricultural Revolution** accompanied the Industrial Revolution that began in Great Britain in the 18<sup>th</sup> century.
- It involved the mechanization of agricultural production, advances in transportation, development of large-scale irrigation, and changes to consumption patterns of agricultural goods.
- Innovations such as the steel plow and mechanized harvesting greatly increased food production.



**Tradition holds that this plow, held in the Smithsonian collections, is one of the first three plows that John Deere personally forged. (National Museum of American History)**

Article:

[Did John Deere's Best Invention Spark a Revolution or an Environmental Disaster?](#)



The JH Limb Rake area canopy shake harvest system

If the video doesn't play, you can use this link: click [here](#)



# EFFECTS OF TECHNOLOGY

- Advances in food production led to better diets, longer life spans, and an increase in population. As population increased, so did the pool for workers in industry. Since most of these jobs existed in cities and new factory towns, mass migration to urban areas began to unfold.
- **Urbanization**, a process that is continuing today, changed the cultural landscape and population distributions throughout the world.



# LAND USE AND FARMING ADVANCES

- As technology changed, so did the laws.
- **Enclosure Acts** – a series of laws enacted by the British government that enabled landowners to purchase and enclose land for their own use that had previously been common land used by peasant farmers.
- Farms became larger, production became more efficient, producers raised crop to sell for profit rather than simply for their own consumption, and people were forced off the land, which created a workforce for the growing factories.

# LAND USE AND FARMING ADVANCES

EARLY ADVANCES IN MODERN AGRICULTURE		
Advancement	Date	Effect
Iron/Steel Plough	1819	<ul style="list-style-type: none"><li>• Reduced human labor</li><li>• Could break through harder soils</li><li>• Increased amount of crops grown per acre</li><li>• Increased size of farms</li></ul>
Mechanized Seed Drilling	18th century	<ul style="list-style-type: none"><li>• Planted and covered each seed quickly</li><li>• Resulted in increased yield per acre</li></ul>
McCormick Reaper/ Harvester	1831	<ul style="list-style-type: none"><li>• Increased harvest</li><li>• Reduced human labor</li><li>• Reduced amount of crops that perished in the field before harvest</li></ul>
Grain Elevator	1849	<ul style="list-style-type: none"><li>• Increased storage space and food supply</li><li>• Protected harvested food from animals and the elements</li></ul>
Barbed Wire	1870s	<ul style="list-style-type: none"><li>• Provided inexpensive fencing to keep livestock in grazing areas</li></ul>
Mixed Nitrogen and Nitric Acid Fertilizer	1903	<ul style="list-style-type: none"><li>• Increased crop yields per acre</li></ul>

The Enclosure Acts were not popular with everyone and people who lost their traditional way of life suffered greatly.

Several advancements in sowing (planting) and reaping (harvesting), storage, irrigation, and transportation were made in agriculture throughout the 19<sup>th</sup> century.



# AG. CHANGES AND SHIFTING DEMOGRAPHICS

- The Second Agricultural Revolution
  - Resulted in fewer, larger, and much more productive farms.
  - Caused a decrease in the number of farm owners and an even greater drop-off in the need for agricultural laborers.
  - Led to more people living in urban areas than rural areas for the first time in United States history.

# ENDURING UNDERSTANDING (5.A)

By the end of this section, you will *understand* that **the development of agriculture led to widespread alteration of the natural environment.**



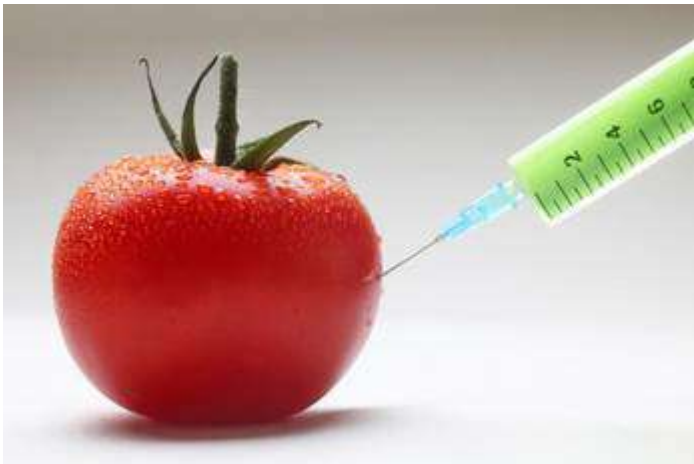
## LEARNING OBJECTIVE (5.A.4)

By the end of this section, you will *be able to analyze the consequences of the Green Revolution on food supply and the environment.*

- a. Students will know that the Green Revolution began with the development of high-yield seeds (e.g., rice, wheat, maize), resulting in the increased use of chemical and mechanical farming.
- b. Students will know that positive consequences of the Green Revolution include increased food production and a relative reduction in hunger at the global scale.
- c. Students will know that negative consequences of the Green Revolution include environmental damage resulting from irrigation and chemical use (e.g., pesticides, herbicides, fertilizers) and the cost of technology and seeds.

# THE THIRD AGRICULTURAL REVOLUTION

- Starting in the mid-20<sup>th</sup> century, science, research, and technology generated a Third Agricultural Revolution.
- It involved the development and dissemination of better and more efficient farming equipment and practices, particularly in the area of vastly improved varieties of *grain*.

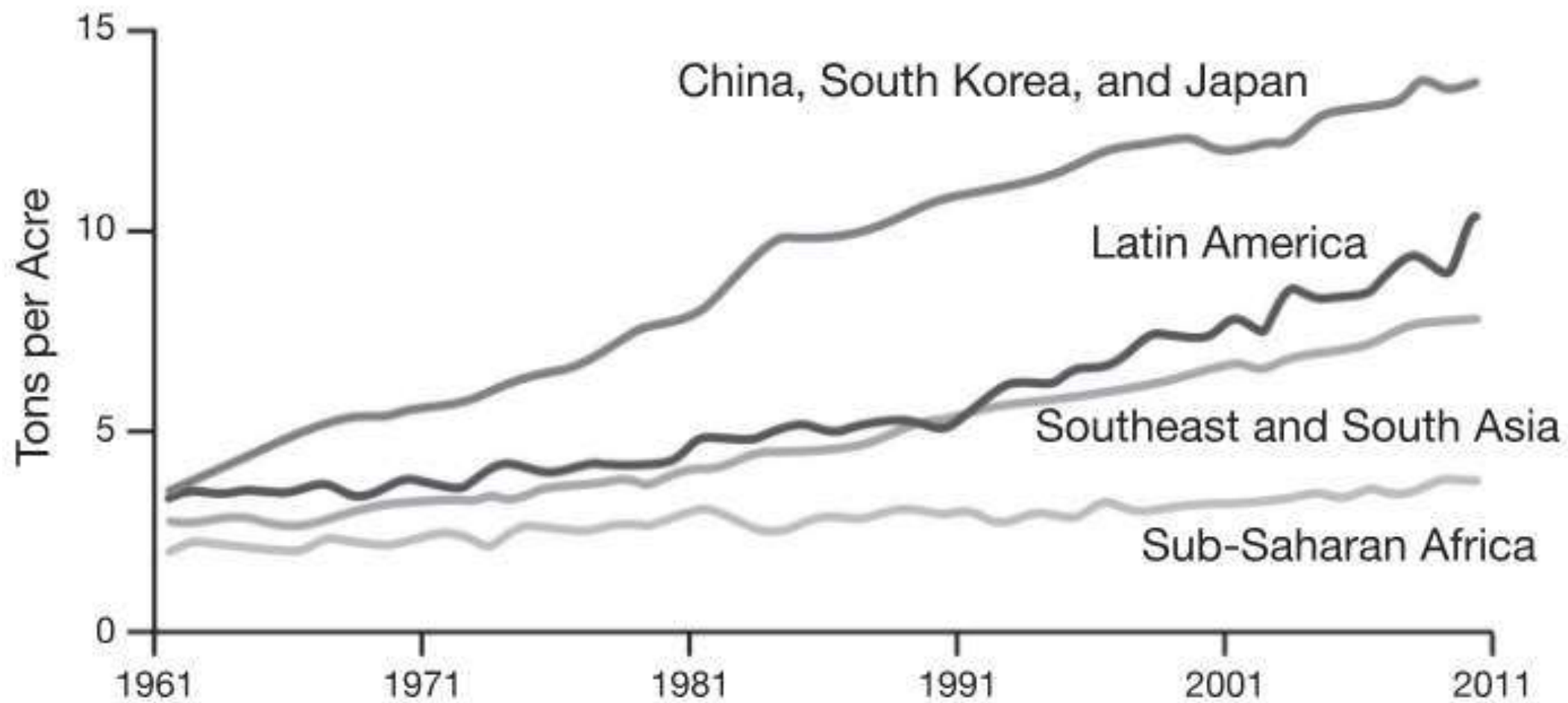


# THE THIRD AGRICULTURAL REVOLUTION

- **The Green Revolution**

- The advances in plant biology that began in the mid-20<sup>th</sup> century are known as the Green Revolution.
- The development of higher-yielding, disease-resistant, faster-growing varieties of grain.
- Rice, corn, and wheat
- Allowed for double-cropping (more than one crop per year)
- Increased use of pesticides and fertilizer in developing countries in Asia and the Americas.
- Some countries, like India, developed large-scale irrigation projects in order to make the most efficient use of water.

## INCREASE IN GRAIN PRODUCTION BY REGION



Source: "World Development Report 2013: Jobs," World Bank, 2013.

# THE THIRD AGRICULTURAL REVOLUTION

- **The Green Revolution - Hybrids**
  - Seed hybridization is the process of breeding together two plants that have desirable characteristics.
  - The Green Revolution scientists focused their attention on grains and globalization provided a much wider range of plants from which to crossbreed.
  - 1960s: new strain of rice (long-grain Indonesian rice and the denser-grain Taiwan dwarf rice).
  - Helped turn Mexico into a wheat-importing country into a self-sufficient country with surplus.

# THE THIRD AGRICULTURAL REVOLUTION

- **The Green Revolution - GMOs**

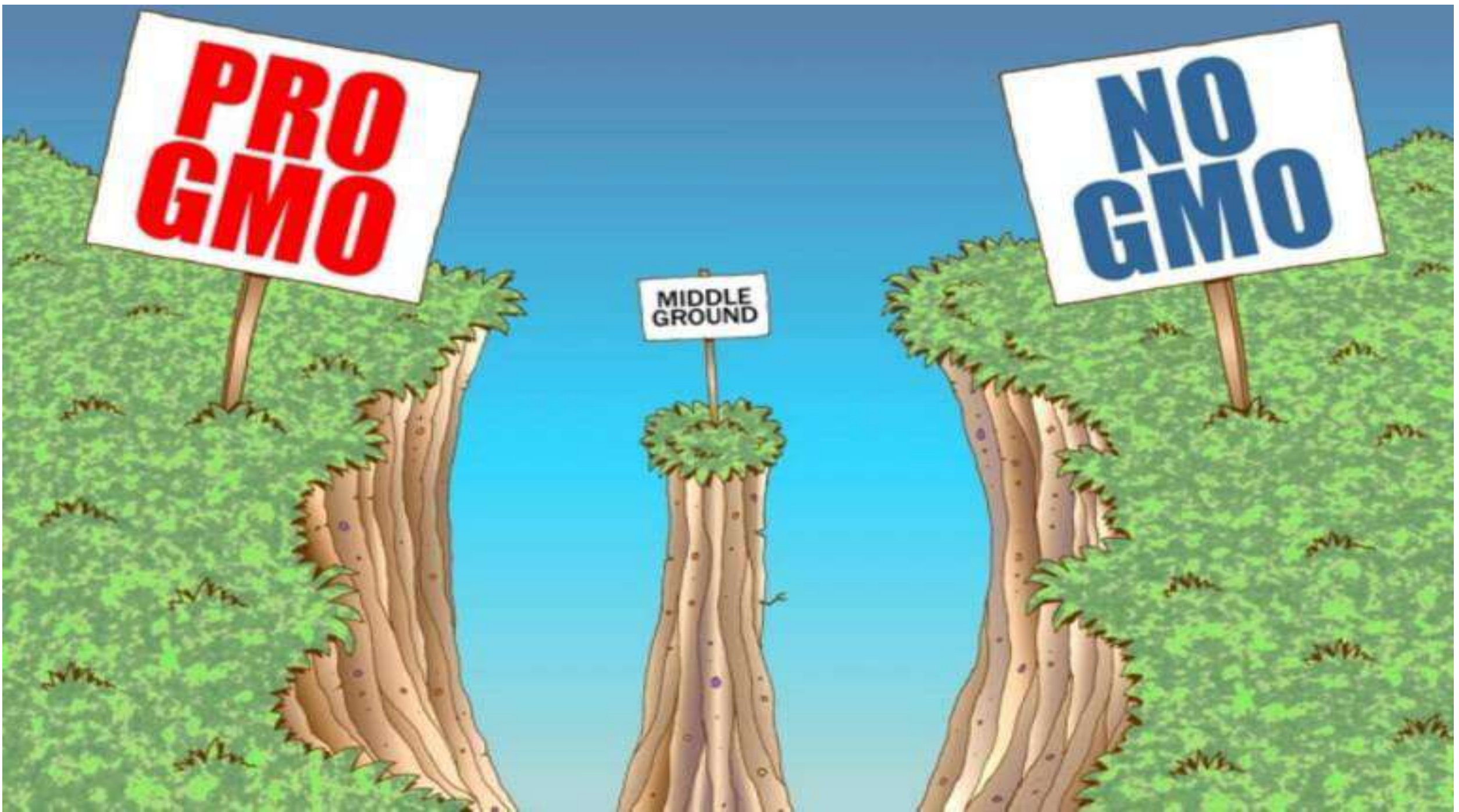
- Genetically modified organisms, or GMOs, are the result of a process in which humans use engineering techniques to change the DNA of a seed.
- First used in the 1970s and became widely used in the 1990s.
- In the US today, most corn, soybeans, and cotton are GMO varieties that have been developed in increase yield, or to resist diseases or the chemical used to kill weeds or pests.
- GMOs seem to offer benefits but critics believe that their potential problems have not been adequately studied.



**PRO  
GMO**

MIDDLE  
GROUND

**NO  
GMO**



# THE THIRD AGRICULTURAL REVOLUTION

- **The Green Revolution - Machinery**
  - In addition to using hybrids, chemical fertilizers, and pesticides, supporters of the Green Revolution encouraged the transfer of mechanical technology as well.
  - Machinery introduced to the developing world included tractors, tillers, broadcast seeders, and grain carts.
  - Assisted in production and challenged traditional labor-intensive farming practices.

# THE THIRD AGRICULTURAL REVOLUTION

- **Positive Impacts of the Green Revolution**
  - Global food production increased dramatically.
  - New seed technology, mechanization, pesticides, chemical (manmade) fertilizers, and irrigation *increased yields*.
  - Increased yields led to reduced hunger, lower death rates, and a growing population in many parts of the developing world.

# THE THIRD AGRICULTURAL REVOLUTION

- **Positive Impacts – Higher Yields**
  - The Green Revolution was most successful in Latin America, South Asia, East Asia, and Southeast Asia.
  - India went from being an importer of wheat to harvesting a surplus of wheat within a few decades after WWII curbing hunger in the country.
  - By the year 2010, The World Bank estimated that 80% of the developing world had an adequate diet.
  - From 1960 to 2000, it was reported that wheat yield increased by 208%, corn by 157%, rice by 109% and potatoes by 78%.

# THE THIRD AGRICULTURAL REVOLUTION

- **Positive Impacts – Money for Research and Business**
  - The Green Revolution helped to create high rates of investment in both the public and private sectors.
  - Using grant money, many US universities and other developed countries were able to research seed hybridization, fertilizers, and pesticides.
  - The research was then used by for-profit corporations to create and market the products used by farmers.
  - Ultimately, it benefited hungry people in poor regions and financially benefited universities and corporations in more prosperous regions.

# THE THIRD AGRICULTURAL REVOLUTION

- **Positive Impacts – Food Prices**
  - Higher yields and increased production led to falling food prices.
  - As supply of wheat, corn, and rice increased, the prices dropped.
  - More food at affordable prices helped ease economic stress of hunger and famine on governments and economic systems in the developing world.
  - However, in 2005, global food prices began to climb.

# THE THIRD AGRICULTURAL REVOLUTION

- **Negative Impacts of the Green Revolution**
  - Like all large and rapid change, the Green Revolution had some negative consequences.
  - Environmental damage
    - Double cropping and aggressive irrigation led to soil erosion
    - Chemicals led to potentially hazardous runoff into streams, rivers and lakes impacting ecosystems, habitats, and communities.
    - Increased fossil-based fuel for machines increased air, water, and sound pollution
  - Lack of sustained investment
  - Disregard for local needs

# THE THIRD AGRICULTURAL REVOLUTION

- **Impact on Gender Roles**

- Many participating countries had traditional economies where subsistence farming is the cornerstone of economic activity.
- Much of the farming labor is performed by women while men dominate societies.
- Therefore, it was the men who benefited from the Green Revolution and were given decision-making powers.
- As a result, the men generally operated the machinery while women were excluded, thus further marginalizing the role of women in many societies.



# THE THIRD AGRICULTURAL REVOLUTION

- **Poor Success in Africa**

- Africa has a greater diversity of climate and soils so developing the right fertilizers was very expensive.
- Africa has many harsh environmental conditions. Insects, plants, and viral strains were challenging for the technology and the researchers.
- Africa is so large and lacks sufficient transportation infrastructure making the cost of investment in research and development and transportation very high.
- Africa's staple crops such as sorghum, millet, cassava, yams, cowpeas, and peanuts were not always included in research.