

Geography by Design



VOLUME 2
ECONOMIC GEOGRAPHY
AND DEVELOPMENT

Lesson 5: Development of the Agricultural Industry

TEKS in the Lesson:

- 10C** Compare the ways people satisfy their basic needs through the production of goods and services such as subsistence agriculture versus commercial agriculture or cottage industries versus commercial industries
- 19C** Examine the environmental, economic, and social impacts of advances in technology on agriculture and natural resources
- 23B** Use case studies and geographic information systems (GIS) to identify contemporary challenges and to answer real-world questions

Essential Questions:

- How did the Neolithic Revolution forever change the way most human beings live their lives?
- What are the positive and negative impacts of agribusiness?
- Has the Green Revolution had more positive or negative impacts?

Materials:

- For each student
- IR-18
 - IR-19
 - IR-20
 - IR-21

Map Items:

- Latin America
- Sub-Saharan Africa
- South Asia
- Southeast Asia
- United States
- Canada
- Argentina
- New Zealand
- Mexico

Vocabulary Focus:

- Neolithic Revolution (First Agricultural Revolution)
- arable land
- nomad
- subsistence agriculture
- barter
- Commercial Revolution
- agribusiness
- Green Revolution

Expected Time for Lesson: 2 45-minute days

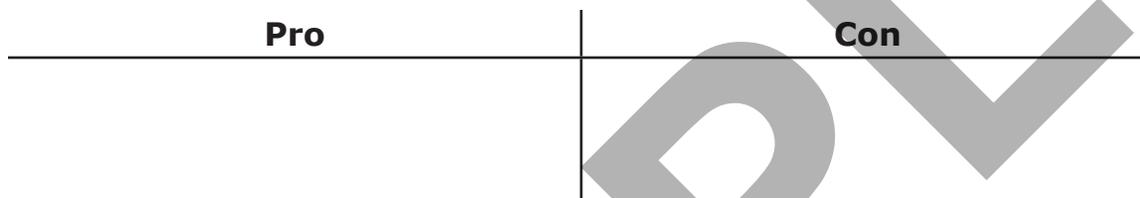
Advance Preparation

Duplicate IR-18–21.

Step 1: Preparing to Learn

1. Instruct students to create the following Pro/Con T-Chart in their geographer’s journals.

**Impact of Technology in Agriculture and on the Environment
Pro/Con T-Chart**



2. Conduct the following Think-Pair-Share-Square activity.

Think

- A. Instruct students to think about the pros and cons of the impact of technology in agriculture and on the environment.

Pair-Share

- B. Arrange students in pairs.
- C. Instruct students to discuss and create three pro and three con statements regarding the impact of technology in agriculture and on the environment.

Square

- D. Instruct student pairs to form a group with another pair, forming a group of four, and share the pro and con statements they created.
3. Conduct a whole-class discussion using the following questions:
 - A. Generally speaking, is agricultural technology beneficial to society? Why or why not? *Answers will vary; students should include facts to support their opinions.*
 - B. What type of technology is used in agriculture? *Answers will vary and may include but are not restricted to tractors, mechanical reapers, and irrigation systems.*
 - C. In what ways has technology in agriculture affected society? *Answers may include but are not restricted to greater amounts and varieties of food available to more people in the world.*

Step 2: Guided Practice

1. Students should work in pairs.
2. Distribute IR-18 to students.
3. Instruct students to make a prediction about the development of agricultural technology based on what they have learned so far from Step 1, focusing on technology's impact on the environment.
4. Instruct students to write questions they have about the Green Revolution based on what they have learned so far from Step 1.

| IR-18: Development of Agricultural Industry Inferences and Questions—Reading to Learn | |
|---|-------------------------------|
| Before Reading | Questions |
| Prediction | |
| After Reading | Additional Information |
| Answer | |
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Step 3: Reading to Learn

1. Students should continue working in pairs.
2. Distribute IR-19 to students.
3. Instruct students to read IR-19; their purpose for reading is to verify whether or not their predictions were correct and to answer the questions they wrote about the Green Revolution.
4. Instruct students to do the following:
 - A. Write answers to their questions.
 - B. Revisit their original predictions.
 - C. Provide additional information learned.
5. Conduct a whole-class discussion using the following questions:
 - A. How would you describe the development of agriculture? *Answers may include but are not restricted to the following: the development and implementation of new inventions and greater access to trade networks in order to increase food production.*
 - B. What role did technology play in developing agriculture? *Answers may include but are not restricted to the following: systems of roads, mechanized tools, and food processing factories in the field.*

| IR-19: The Development of Agriculture | |
|--|-------------|
| The Development of Agriculture | |
| <p>About 10,000 years ago, humans began to cultivate plants and domesticate animals. This is referred to as the Neolithic Revolution, or the First Agricultural Revolution. Once people understood the significance of arable land, land that is fertile enough to support agricultural activities, they were able to settle in one area and have a consistent food supply. The significance of this in human history was that it allowed humans to stop being nomadic, or moving about to search for seasonal plants or animals to eat. This, in turn, caused an increase in life expectancy of people, because they consumed a more consistent amount of calories and had access to greater varieties of food. However, farming tended to be self contained and on a very small scale. Early farmers produced only small amounts of food at a time in part because the family farms were relatively small. Additionally, without the use of mechanized tools, the manual labor took a long time and was very hard work. A farmer physically could not tend to a large parcel of land. Therefore, farmers practiced subsistence agriculture, which provided enough food for the farmer and his immediate family. If they could not produce what they needed on their own farm, the family would barter, or trade, with others in the small community. Bartering involves exchanging goods or services instead of using money to purchase them. Subsistence agriculture is still common throughout parts of Latin America, Sub-Saharan Africa, South Asia, and Southeast Asia.</p> <p>Commercial agriculture began in Europe and coincided with the Industrial Revolution in the mid-18th century. The main purpose of commercial agriculture was to produce and sell food for a profit. The use of machines allowed the mass production of food and other products. Commercial agriculture is practiced throughout the world, but countries that are the most mechanized are that lead the world in commercial agriculture include the United States, Canada, Argentina, and New Zealand.</p> <p>Commercial agriculture, also known as agribusiness, can be traced to ancient Roman times. The roads initially built to allow Roman legions to move throughout the empire easily were also used by farmers to get their goods to a central market. During the mid- to late 20th century, agribusiness caused a change from small farms to large-scale, corporate-owned farms integrated with businesses associated with food production, distribution, marketing, and retail aspects for the purpose of trade and profit rather than personal consumption.</p> <p>In other words, there is a tighter spatial connection between farm production and the network of businesses associated with producing and selling food.</p> | |
|  | |
| <p><i>How might less developed countries such as Kenya or Cambodia benefit from advanced technology in agriculture?</i></p> | |
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IR-18: Development of Agricultural Industry Inferences and Questions—Reading to Learn

Before Reading

| | |
|-------------------|------------------|
| Prediction | Questions |
|-------------------|------------------|

After Reading

| | |
|---------------|-------------------------------|
| Answer | Additional Information |
|---------------|-------------------------------|

IR-18: Development of Agricultural Industry Inferences and Questions—Reading to Learn—Answer Key

Before Reading

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| <p>Prediction</p> <p>Student responses will vary but may include the following:</p> <ul style="list-style-type: none">• <i>There are both positive and negative consequences in the use of technology.</i>• <i>The consequence of using technology does/does not outweigh the benefits.</i> | <p>Questions</p> <p>Student responses will vary but may include the following:</p> <ul style="list-style-type: none">• <i>Is it more important to be efficient or safe?</i>• <i>Will we find ways to make the use of technology both safe and useful?</i>• <i>What are the long-term effects on the economy?</i> |
|--|--|

After Reading

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| <p>Answer</p> <p>Student responses will vary but may include the following:</p> <ul style="list-style-type: none">• <i>Thus far it seems that efficiency is the priority for many large businesses.</i>• <i>Dr. Norman Borlaug used technology to cross wheat seeds from Mexico and dwarf seeds from Japan to create a strain that was more resistant to disease and that would produce greater yields.</i>• <i>The smaller farms cannot afford to compete with the larger factory farms, and many have gone out of business.</i> | <p>Additional Information</p> <p>Student responses will vary but may include the following:</p> <ul style="list-style-type: none">• <i>Subsistence agriculture is still prominent throughout Sub-Saharan Africa, South Asia, and Southeast Asia.</i>• <i>Countries that are the most mechanized and that lead the world in commercial agriculture include the US, Canada, Argentina, and New Zealand.</i>• <i>Agribusiness—incorporating large-scale, corporate-owned farms and the business associated with food production, distribution, marketing, and retail aspects for trade and profit rather than personal consumption</i> |
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The Development of Agriculture

About 10,000 years ago, humans began to cultivate plants and domesticate animals. This is referred to as the **Neolithic Revolution**, or the **First Agricultural Revolution**. Once people understood the significance of **arable land**, land that is fertile enough to support agricultural activities, they were able to settle in one area and have a consistent food supply. The significance of this in human history was that it allowed humans to stop being **nomadic**, or moving about to search for seasonal plants or animals to eat. This, in turn, caused an increase in life expectancy of people, because they consumed a more consistent amount of calories and had access to greater varieties of food. However, farming tended to be self contained and on a very small scale. Early farmers produced only small amounts of food at a time in part because the family farms were relatively small. Additionally, without the use of mechanized tools, the manual labor took a long time and was very hard work. A farmer physically could not tend to a large parcel of land. Therefore, farmers practiced **subsistence agriculture**, which provided enough food for the farmer and his immediate family. If they could not produce what they needed on their own farm, the family would **barter**, or trade, with others in the small community. Bartering involves exchanging goods or services instead of using money to purchase them. Subsistence agriculture is still common throughout parts of Latin America, Sub-Saharan Africa, South Asia, and Southeast Asia.

Commercial agriculture began in Europe and coincided with the Industrial Revolution in the mid-18th century. The main purpose of commercial agriculture was to produce and sell food for a profit. The use of machines allowed the mass production of food and other products. Commercial agriculture is practiced throughout the world, but countries that are the most mechanized and that lead the world in commercial agriculture include the United States, Canada, Argentina, and New Zealand.

Commercial agriculture, also known as **agribusiness**, can be traced to ancient Roman times. The roads initially built to allow Roman legions to move throughout the empire easily were also used by farmers to get their goods to a central market.



How might less developed countries such as Kenya or Cambodia benefit from advanced technology in agriculture?

During the mid- to late 20th century, agribusiness caused a change from small farms to large-scale, corporate-owned farms integrated with businesses associated with food production, distribution, marketing, and retail aspects for the purpose of trade and profit rather than personal consumption.

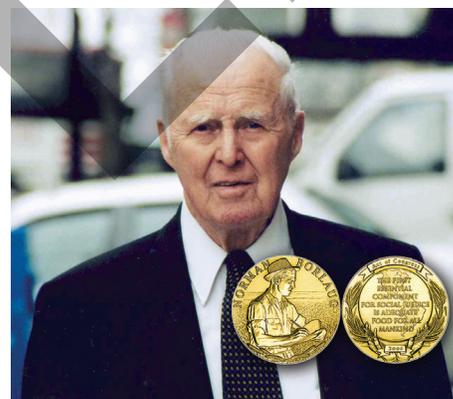
In other words, there is a tighter spatial connection between farm production and the network of businesses associated with producing and selling food.

IR-19: The Development of Agriculture

Some of the largest corporations in the United States involved in agribusiness include Con-Agra, Cargill, and Archer-Daniels-Midland. These companies pay farmers to grow food on corporate-owned farms. The companies also have food processing factories “in the field.” This helps to minimize transportation costs from the field to the processing plant. From this factory in the field, processed food can be shipped to stores or distribution centers more quickly, which in turn minimizes the time it takes to get the food from the field to the consumer. As a result, the company can increase its overall profits.

Agribusinesses can mass-produce agricultural products because they are highly efficient, have a streamlined organization, and are highly mechanized. This helps keep food costs low, but at the same time, these major corporate farms are problematic for family farms. Smaller family farms cannot afford to compete with larger factory farms, and many have gone out of business.

Another significant development in agriculture that was coupled with technology was the **Green Revolution**. Dr. Norman Borlaug, a professor at Texas A&M University from 1984 to 2009, crossed wheat seeds from Mexico and dwarf seeds from Japan to create a strain that was more resistant to disease and produced a much greater yield. As a result of this research, he was able to increase food production in developing countries. His research was implemented in Mexico’s wheat fields, rice paddies throughout Asia, and the plains of Africa. Dr. Borlaug died in 2009, but the impact of his research had global implications.



Dr. Norman Borlaug coupled his knowledge of science and geography to address the problem of not being able to grow food sources in certain biomes. What other issues might be resolved by using both scientific and geographic ideas?

IR-20: Green Revolution Case Study

Dr. Borlaug, agricultural scientist and Nobel Peace Prize honoree, is known as the “father of the Green Revolution” because of his work in advancing plant breeding. In the 1960s, it was predicted that there would be mass famines as a result of rapid population growth, high costs of food, and food deficiencies. He made it his life’s work to find a solution to the predicted tribulations. He felt it was important to improve the standard of living for all people by teaching the world to be self-sufficient in food production.

In 1944, Dr. Borlaug lived in rural Mexico, where he was shocked to learn of the depleted and diseased soil. He believed that something must be done to ensure that people would not go hungry, and he worked tirelessly for years with the use of biotechnology to manipulate and cross seeds to breed high-yield crop varieties. As a result of his work in Mexico, he stated, “For, behind the scenes, halfway around the world in Mexico, were two decades of aggressive research on wheat that not only enabled Mexico to become self-sufficient with respect to wheat production but also paved the way to rapid increase in its production in other countries.” His manipulations led to wheat, rice, and maize varieties that were used to feed the people of Mexico, Africa, Asia, and other areas around the world.

Various criticisms have emerged as a result of Dr. Borlaug and his work. Some argued that genetically engineered food created in labs was socially and environmentally detrimental. He believed that the human element of feeding the hungry far outweighed the use of biotechnology. Critics also believed that genetically engineered food was not being tested to ensure safety for human consumption. In fact, the food crops have been tested by the EPA, ESTA, and FDA. Furthermore, critics questioned the long-term effects on the body and the environment. Allies of the Green Revolution and the use of biotechnology argued in favor of the safety of the food due to the various tests performed by the agencies to ensure public health, protect the environment, and ensure food safety. There was a concern that genetically engineered food would lead to an overreliance on government or corporate control. The critics feared this would lead to limited choices when purchasing organic versus genetically engineered food. Among other concerns was the potential that this process would displace small farmers. He felt that the ability of farmers to continue cultivating the land helped to save the rainforests and additional land areas. During his lifetime, he was a firm believer in the use of chemical fertilizers and the currently banned, synthetic, cancer-causing pesticide DDT. Later in life, he altered his view on the use of chemical fertilizers and pesticides and agreed that they should be limited.

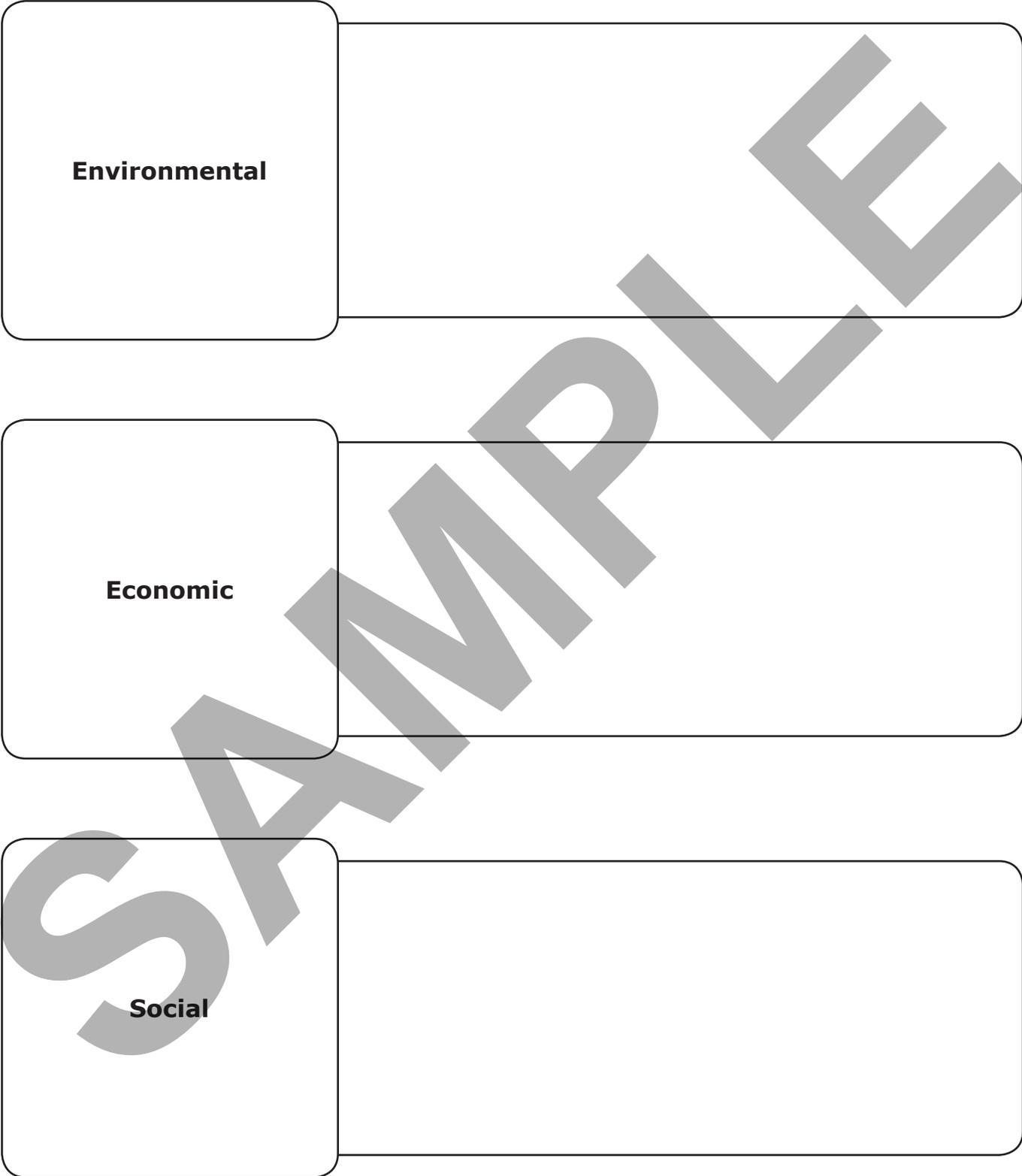
Because of the work of Dr. Borlaug and others, millions of people are fed each day.

The destiny of world civilization depends upon providing a decent standard of living for all mankind.
—Dr. Norman Borlaug

IR-21: Green Revolution Case Study Graphic Organizer

Use the note-taking guide below while reading the Green Revolution Case Study to examine the environmental, economic, and social impacts of advances in technology on agriculture and natural resources.

Environmental



Economic

Social

IR-21: Green Revolution Case Study Graphic Organizer—Answer Key

Use the note-taking guide below while reading the Green Revolution Case Study to examine the environmental, economic, and social impacts of advances in technology on agriculture and natural resources.

Environmental

- *Genetically engineered food created in labs was socially and environmentally detrimental.*
- *Genetically engineered food was not being tested to ensure safety for human consumption.*
- *Long-term effects on the body and the environment*
- *Dr. Norman Borlaug felt that the ability of farmers to continue cultivating the land helped to save the rainforests and additional land areas.*
- *Dr. Borlaug was a firm believer in the use of chemical fertilizers and the currently banned, synthetic, cancer-causing pesticide DDT.*
- *Later in life, Dr. Borlaug altered his view on the use of chemical fertilizers and pesticides and agreed that they should be limited.*

Economic

- *Enabled Mexico to become self-sufficient with respect to wheat production but also paved the way to rapid increase in its production in other countries*
- *This process would displace small farmers.*

Social

- *Genetically engineered food created in labs was socially and environmentally detrimental.*
- *Limited choices when purchasing organic versus genetically engineered food*
- *Because of the work of Dr. Borlaug and others, millions of people are fed each day.*
- *Later in life, Dr. Borlaug altered his view on the use of chemical fertilizers and pesticides and agreed that they should be limited.*