

Geography and Climate for Agricultural Landscapes (Grades 6-8)

Grade Levels

6 - 8

Purpose

Students will discover how geography and climate influence the crops that are grown and the livestock that is raised in each state.

Estimated Time

60-90 minutes

Materials Needed

Interest Approach—Engagement:

- [Where Does it Grow?](https://cdn.agclassroom.org/media/uploads/2018/08/28/Fruit_and_Veg_Cards_1.pdf) (https://cdn.agclassroom.org/media/uploads/2018/08/28/Fruit_and_Veg_Cards_1.pdf) cards, 1 copy per class, cut into individual cards
- World Map to project on board or a [World Fabric Map](https://agclassroomstore.com/world-fabric-map/) (https://agclassroomstore.com/world-fabric-map/)

Activity 1:

- *How Does it Grow?* cards (from the Interest Approach)
- [Geography and Climate for Agricultural Landscapes](https://docs.google.com/presentation/d/1MT48rniBZ55VY8pZefghjVfsQpiQAvivkOkgHSbHMLE/edit?usp=sharing) (https://docs.google.com/presentation/d/1MT48rniBZ55VY8pZefghjVfsQpiQAvivkOkgHSbHMLE/edit?usp=sharing) [Google Slides](https://docs.google.com/presentation/d/1MT48rniBZ55VY8pZefghjVfsQpiQAvivkOkgHSbHMLE/edit?usp=sharing) (https://docs.google.com/presentation/d/1MT48rniBZ55VY8pZefghjVfsQpiQAvivkOkgHSbHMLE/edit?usp=sharing)
- [Geography and Climate for Agricultural Landscapes](https://cdn.agclassroom.org/media/uploads/2020/01/17/Geography_and_Climate_for_Agricultural_Landscapes.pdf) (https://cdn.agclassroom.org/media/uploads/2020/01/17/Geography_and_Climate_for_Agricultural_Landscapes.pdf) handout 1 per student

Activity 2:

- *Geography and Climate for Agricultural Landscapes* handout (continued from Activity 1)
- Computer and projector to display maps

Activity 3:

- [What If...?](https://cdn.agclassroom.org/media/uploads/2020/01/17/What_If_cards.pdf) (https://cdn.agclassroom.org/media/uploads/2020/01/17/What_If_cards.pdf) cards, 1 copy per group of 4 students, cut into individual cards
- *Agricultural Landscape* images and game instructions, [digital access on Google Slides](https://docs.google.com/presentation/d/1McgTUbd3Ndnn_-oeQ3JS5V9fVgXIDWJgFnApPMEt2c4/edit?usp=sharing) (https://docs.google.com/presentation/d/1McgTUbd3Ndnn_-oeQ3JS5V9fVgXIDWJgFnApPMEt2c4/edit?usp=sharing) or [print cards](https://cdn.agclassroom.org/media/uploads/2020/01/17/Agricultural_Landscapes.pdf) (https://cdn.agclassroom.org/media/uploads/2020/01/17/Agricultural_Landscapes.pdf)

Activity 4:

- Access to [State Agricultural Facts](https://www.agclassroom.org/teacher/agfacts/) (https://www.agclassroom.org/teacher/agfacts/) webpage and resources

Essential Files (maps, charts, pictures, or documents)

- [Agricultural Landscape images and game instructions](https://cdn.agclassroom.org/media/uploads/2020/01/17/Agricultural_Landscapes.pdf) (https://cdn.agclassroom.org/media/uploads/2020/01/17/Agricultural_Landscapes.pdf)
- [Geography and Climate for Agricultural Landscapes handout](https://cdn.agclassroom.org/media/uploads/2020/01/17/Geography_and_Climate_for_Agricultural_Landscapes.pdf) (https://cdn.agclassroom.org/media/uploads/2020/01/17/Geography_and_Climate_for_Agricultural_Landscapes.pdf)
- [What if...? cards](https://cdn.agclassroom.org/media/uploads/2020/01/17/What_If_cards.pdf) (https://cdn.agclassroom.org/media/uploads/2020/01/17/What_If_cards.pdf)

Vocabulary Words

arable: land used or suitable for growing crops

climate: the weather conditions of an area over a long period of time

growing season: the part of the year during which rainfall and temperature allow plants to grow

soil: the upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles

temperate: a region or climate characterized by mild temperatures

tropical: a climate that is non-arid and in which all twelve months have a mean temperature warmer than 18°C

Did You Know? (Ag Facts)

- The 2017 Census of Agriculture reports that there are 2.04 million farms and ranches in the United States with an average size of 441 acres per farm.¹
- The U.S. is becoming more urban. Approximately 1 million acres per year are converted to cities and towns.²
- Agricultural land takes up about 1/5th of the land in the United States.²
- The land used to grow the food that Americans eat is equivalent to the states of Indiana, Illinois, and half of Iowa.²

Background Agricultural Connections

Most Americans have access to a wide variety of fruits, vegetables, grains, nuts, dairy, and meat products. Each food item may have been produced on a nearby farm, in a neighboring state, from somewhere across the country, or from overseas locations

A couple of generations ago the majority of the food we consumed was provided by our own gardens and farms or from local farmers. During these times, most consumers played some part in the production of their food. In contrast, only a very small portion of our population produces the food we all consume today.

Consider the following geographical factors that influence the production of plant-source foods:

Climate plays a large role in the production of plant-based foods. Every plant has its own climate requirement for product growth. For example, citrus fruits such as oranges, grapefruit, lemons, and limes require a tropical or subtropical climate. In the United States citrus fruits are grown primarily in Florida and Southern California. Tropical fruits such as pineapple, mangos, passion fruit, and papaya can only be grown in Hawaii or in other **tropical** climates. Berries and fruits such as strawberries, raspberries, peaches, and melons can be grown in more **temperate** climates as long as the length of the **growing season** is sufficient for the plants to produce their fruit. Other crops prefer cooler climates such as wheat, potatoes, sugar beets, and many vegetables such as broccoli, onions, lettuce, carrots, and spinach.

Soils worldwide have different properties that affect its ability to supply nutrients, hold water, and to ultimately support food production. Sandy soils under some conditions will not hold enough water. Clay soils might hold too much water and dry to the hardness of concrete where plants will not thrive. Soil fertility refers to the quality of a soil that allows it to provide adequate amounts of nutrients in the proper balance to support healthy plant growth. Fertile soil contains the correct balance of organic matter, lies within a specific pH (acid/base) range, cycles nutrients, and hosts a community of microorganisms.

Water is an essential resource for the growth of plants. Water requirements vary from crop to crop with some crops requiring a lot of water and others requiring relatively little water. For example, rice is a staple food crop that requires a lot of water. Rice fields can actually be submerged in water for part of the growing season. Geography impacts both water supply and the availability of fresh water.

Open space is another important factor to consider in evaluating our capability to produce food locally. In some areas, residential populations or businesses are too dense for some types of farming which may require larger fields for plant growth. Even more important than having open space is the fact that the land needs to be considered **arable** land; fertile, tillable, with access to water.

The livestock that produce our meat, eggs, and milk are slightly more adaptable to various climates and conditions, especially with the use of modern animal husbandry practices which provide temperature controlled buildings and shelters in unsuitable weather. However, consider the following geographical factors that influence the production of animal-source foods.

Resource Availability. Animals raised on farms for the production of meat, milk, and eggs require adequate feed and appropriate shelter for the climate and weather conditions. There is often a geographic correlation between the location of livestock farms and where the feed is produced. For example, pigs eat a mixture of corn and soybeans. Iowa produces more pork and corn than any other state. Among other factors, it is an economical choice to raise pigs close to where the feed is produced to eliminate shipping costs.

Open space. Livestock animals are raised in a variety of places. Beef cattle and sheep spend a large portion of their lives grazing on public or private rangelands. Many pigs and poultry animals are housed in climate-controlled indoor barns that may require relatively less space for animal housing, but also require locations that meet zoning requirements and provide proper manure and environmental management.

Access to markets and processing facilities. While many livestock farms are located in remote or rural areas, they also need to have efficient access to processing and distribution facilities. For example, milk is a perishable food product. It is transported from the dairy farm to a processing plant where the milk is pasteurized and either bottled or processed into cheese, butter, or other dairy products. Close geographical proximity to a processing facility is essential.

Interest Approach - Engagement

- On the day prior to class, give each student one *Where Does it Grow?* card. Assign them a homework activity to visit the produce section of their local grocery store to discover the location where their assigned fruit or vegetable was grown. Give students the following tips to help them succeed:
 - If it was grown outside of the United States, it will have a sticker or label indicating the country it was produced in.
 - Packaged produce (like baby carrots or bags of apples) often lists the name and city/state of the farm where it was grown.
 - Loose produce, if it was grown in the United States, doesn't always have an individual label indicating its origin. They can ask a produce worker to check the shipment boxes, which often have the name and location of the farm.
 - If students exhaust the options above and cannot find an origin of their assigned fruit or vegetable, they should do a Google search and list the top 3 states (or countries) where it is grown.
- At the beginning of class, project a map of the world on the board. Place a star on the map indicating "you are here."
- Instruct students to tape their fruit/vegetable card to the board on the state or country where it was produced. Remind students that most if not all of these food items are available at a grocery store nearby. As you review the map, ask questions such as:
 - Which foods are grown closest to us?
 - Which foods have been grown the farthest away?
 - Are there any foods that are currently out of season for where we live? If so, are there any commonalities regarding the origin of out-of-season fruits and vegetables?
 - Are there any foods that we do not grow in the United States?
 - Sometimes when certain fruits and vegetables are out of season in one growing region, they are in season in another growing region that may be closer to or on the other side of the equator. Depending on the time of year and your climate, this pattern may be observed during this activity.



Procedures

Activity 1: How Geography Impacts Crop Production

- With the "How Does it Grow?" cards still on the map/board, ask, "How does geography impact food production?" Allow students to brainstorm answers using their prior knowledge. If needed, provide guiding questions:
 - Why are oranges (or another tropical fruit) grown in subtropical or tropical locations instead of Colorado or Nebraska? (*Climate. Citrus fruits do not tolerate cold temperatures.*)
 - Why aren't the bananas grown in the temperate United States?
 - If you are located in an urban city, ask why doesn't the food grow here? (*Little/no space for farming*)
 - Teacher Tip:** Additional guiding questions will be dependent on the current season and where you live.
- Give each student one copy of the *Geography and Climate for Agricultural Landscapes* handout.
- Project the [Geography and Climate for Agricultural Landscapes slides](https://docs.google.com/presentation/d/1MT48rniBZ55VY8pZefghjVfsQpiQAvivkOkGHSbHMLE/edit?usp=sharing) (<https://docs.google.com/presentation/d/1MT48rniBZ55VY8pZefghjVfsQpiQAvivkOkGHSbHMLE/edit?usp=sharing>). Use slide 2-5 and the handout to discuss four factors (climate, soil, water, and open space) that impact where food is grown.
- Instruct each student to:
 - Retrieve their *Where Does it Grow?* card from the board and glue or tape it to their handout.
 - Research their fruit/vegetable to see if it could be grown locally. Students should describe the availability of each resource and indicate if your local geography could support a farm to grow that crop. Share an [example](https://cdn.agclassroom.org/media/uploads/lp733/example.jpg) (<https://cdn.agclassroom.org/media/uploads/lp733/example.jpg>) of growing oranges in Chicago, Illinois (also found on slide 6).
 - Teacher Tip:** It may be difficult for students to find out what type of soil is in your local area with an internet search. As an alternative, have them find the type of soil their crop prefers and then ask them to consider if the other three required factors are met.
- After each student has completed page one of the handout, have students share their findings. Make a list of foods you could and could not consume if you were only to consume produce grown in your state.

Climate:

Orange trees need temperatures between 55 and 100 degrees and winter temperatures above freezing. It's too cold to grow oranges in Illinois.

Water:

Chicago gets an average of 38 inches of rain per year which would be adequate for an orange orchard.

Chicago, Illinois



Soil:

Orange trees don't do well with heavy clay soils. They need well-drained soil.

Open Space:

Open space right in Chicago would be difficult or impossible to find.

Activity 2: How Geography Impacts Livestock Production

- Now that students recognize how geography impacts crop production, ask, "Does geography impact the livestock that produce the meat, milk, and eggs we eat?" Allow students to begin thinking and then prompt them to read page two of their *Geography and Climate for Agricultural Landscapes* handout.
- Use the following examples to illustrate geographic and agricultural correlations in the production of animal-source foods:
 - Resource Availability:** Hog Production is an example of an agricultural commodity being produced in the same area as one of its necessary resources. Pigs are raised for their meat, known as *pork*. Their primary diet is corn. Display the [Hog and Corn Production Maps](http://nefbmap.org/map.php?M=7&MV=0&P=39&PV=0) (<http://nefbmap.org/map.php?M=7&MV=0&P=39&PV=0>). Ask your students the following questions:
 - What are the top five hog producing states?
 - Iowa, North Carolina, Minnesota, Illinois, and Indiana (2019)
 - What are the top five corn producing states? (2019)
 - Iowa, Illinois, Nebraska, Minnesota, and Indiana
 - Is there a correlation between hog production and corn production? Why?
 - Yes. Corn is the primary diet for pigs. It is economical to raise pigs close to where their feed is grown. This decreases production costs for the farmer allowing the cost of food to be lower.
 - Note: Most large scale pig farms utilize climate controlled facilities to keep their pigs cool in the summer and warm in the winter. Consequently, pig farms are not restricted to being located in a specific climatic area.
 - Available Space:** Space is necessary for farmers to raise animals and grow crops. As a class, compare the [Farmer-operator and Geographic Area Maps](http://nefbmap.org/map.php?M=0&MV=0&P=44&PV=0). (<http://nefbmap.org/map.php?M=0&MV=0&P=44&PV=0>) Notice that California and Texas are among the largest sized states and have some of the highest numbers of farmers. Display and study the [Beef Cow and Geographic Area Maps](http://www.nefbmap.org/map.php?M=0&MV=0&P=35&PV=0) (<http://www.nefbmap.org/map.php?M=0&MV=0&P=35&PV=0>) and the [Beef Cow and Acres of Pastureland Maps](http://nefbmap.org/map.php?M=43&MV=0&P=35&PV=0) (<http://nefbmap.org/map.php?M=43&MV=0&P=35&PV=0>). Ask your students the following questions:
 - Can you see any correlations between geographic area of a state and their beef cattle production?
 - Yes. Beef cattle require more living space than other livestock species. Most beef cattle spend the majority of their lives grazing pastures and rangelands. Larger states have more likelihood of having fields, pastures, and rangelands for cattle to graze.
 - Notice that Nevada, Arizona, Utah and New Mexico rank among the largest states, but they are not among the higher producing states of beef cattle. Can you guess what one limiting factor might be?
 - Moisture. If your students need a clue to answer this question, show them the [Rainfall and Beef Cow Maps](http://nefbmap.org/map.php?M=35&MV=0&P=50&PV=0) (<http://nefbmap.org/map.php?M=35&MV=0&P=50&PV=0>). These four states are located in a desert region and have some of the driest overall conditions. Lack of rainfall decreases the amount of grazing available for cattle feed, thus decreasing the total number of cattle that can be raised per acre.
 - Access to Markets and Processing Facilities:** Animal-source foods must be processed and prepared for retail sale. For example, meat needs to be cut and packaged, eggs need to be washed and placed in cartons, and milk needs to be processed. Show students the [Milk](http://www.nefbmap.org/map.php?P=28&PV=0) (<http://www.nefbmap.org/map.php?P=28&PV=0>) map. Ask students what they notice about the distribution of dairy farms across the United States. Point out that unlike some other commodities, milk is produced in every state. Milk is a perishable product with a shorter shelf life than many other foods. It is produced in closer proximity to consumers.

Activity 3: What If...?

- Divide class into small groups of 3-4 students. Give each group one set of [What If...? cards](https://cdn.agclassroom.org/media/uploads/2020/01/17/What_If_cards.pdf) (https://cdn.agclassroom.org/media/uploads/2020/01/17/What_If_cards.pdf) (printed and cut individually) and one set of *Agricultural Landscape* images and game instructions ([printed](https://cdn.agclassroom.org/media/uploads/2020/01/17/Agricultural_Landscapes.pdf) (https://cdn.agclassroom.org/media/uploads/2020/01/17/Agricultural_Landscapes.pdf) or [digital slides](https://docs.google.com/presentation/d/1McgTUbD3Ndnn_oeQ3J5S5V9fVgXIDWJgFnApPMEt2c4/edit?usp=sharing) (https://docs.google.com/presentation/d/1McgTUbD3Ndnn_oeQ3J5S5V9fVgXIDWJgFnApPMEt2c4/edit?usp=sharing)).
- Instruct students to:
 - Place the stack of *Agricultural Landscape* images in the center of their desk/table.
 - Shuffle the *What If...?* cards, divide them equally among the group, and place them face down in front of them.
 - Begin with the first *Agricultural Landscape*. Read the card indicating the food product, the top-producing state in the United States, and study the farm landscape.
 - Each student will then flip over one *What if...?* card. Think about the hypothetical information in the geography of this food and research if necessary. Determine one of the following results:
 - No impact (Some circumstances would not impact the crop.)

- Increased difficulty to produce food
 - Farm would no longer exist
- e. Continue taking turns flipping over *What if...?* cards and determining the hypothetical result.
- f. Continue the process until you've progressed through all of the *Agricultural Landscape* cards.
- **Teacher Tip:** Determine how many *What if...?* cards your students should analyze per landscape according to the time you have available. Students could go through one card per person (per landscape) if time is short, or more if the time is available.
3. To summarize, have each group or individual student give a detailed answer to the question, "How does geography impact the production of food?"

Activity 4: The Food Geography of [Your State]

1. Assign students an activity to help them discover the geography of your state and what natural resources you have to support the production of food. Choose from the following ideas:
 - Develop a marketing campaign to promote one of your state's top commodities.
 - Create a state agriculture map with pictures of the top commodities grown/raised in your state. Explore your state's Ag Facts, State Agriculture in the Classroom program resources, and your states Department of Agriculture website to obtain information.
 - Complete the [Culinary Concepts](https://agclassroom.org/matrix/lesson/735/) (https://agclassroom.org/matrix/lesson/735/) Problem-based Learning (PBL) activity.
 - Create a commercial or video to promote one of your state's top commodities.
 - Interview a marketing expert from your state's department of agriculture to talk about the impact of what is grown/raised and sold from your state.
2. Visit the [State Agricultural Facts](https://www.agclassroom.org/teacher/agfacts/) (https://www.agclassroom.org/teacher/agfacts/) webpage. Click on your state to find more information and to customize this activity to your state's agricultural resources.



Career Spotlight: Marketing Specialist

This activity introduces students to the role a marketing specialist might play in the food industry. They oversee the promotion of a company's products in a variety of platforms including social media, websites, and other forms of advertising. Explore the career profile for a [Marketing Specialist](https://agexplorer.com/career/marketing-specialist) (https://agexplorer.com/career/marketing-specialist) to discover job outlook, education requirements, and average salaries.



This lesson explores foundational concepts about how climate and geography impact the production of our food and the location of farms throughout the United States and abroad. If you live in the following states, refer to your local agricultural literacy geography resources:

- [Minnesota](https://minnesota.agclassroom.org/educator/fft/) (https://minnesota.agclassroom.org/educator/fft/)

Concept Elaboration and Evaluation

After conducting these activities, review and summarize the following key points:

- Geographic components such as climate and natural resources determine the type of crops and livestock that can be grown and raised in a particular area.
- Relying on locally grown foods has both pros and cons. It supports local economies, but may limit the variety of foods that can be consumed for a balanced diet depending on where you live.
- Consuming foods from national and international sources can increase cost efficiency allowing the food to be produced in the ideal location and then be shipped to consumers.



We welcome your [feedback](https://usu.co1.qualtrics.com/jfe/form/SV_4HhIVpN4L8IC2IT) (https://usu.co1.qualtrics.com/jfe/form/SV_4HhIVpN4L8IC2IT)! Please take a minute to tell us how to make this lesson better or to give us a few gold stars!

Enriching Activities

- Watch [The Geography of Fruit](https://www.youtube.com/watch?v=hu6Y-gTZtc) (https://www.youtube.com/watch?v=hu6Y-gTZtc).

- Scroll through the maps, [Here's How America Uses Its Land](https://www.bloomberg.com/graphics/2018-us-land-use/?fbclid=IwAR02Y4ks6wiqQBM3Xdqbh2QIn8nrMa1ddV0Bzt02ArLEr0wYYreUpRYWFq0) (https://www.bloomberg.com/graphics/2018-us-land-use/?fbclid=IwAR02Y4ks6wiqQBM3Xdqbh2QIn8nrMa1ddV0Bzt02ArLEr0wYYreUpRYWFq0).
- Assign students to discover examples of how technology can help overcome some geographic limitations in food production. For example, if climate is a limiting factor, greenhouses can help extend a growing season. If rainfall is not sufficient for crop growth, irrigation can make crop growth possible. Even further, new genetic varieties with added drought tolerance can increase the ability to grow food in climates otherwise considered unsuitable.
- Discuss the concept of eating only locally grown food. What are the benefits and limitations? Would any foods be eliminated from your diet?
- Use Google Earth to see the satellite view of actual farms. Have students make note of the presence or absence of specific geographical factors.

Sources

1. <https://www.usda.gov/media/press-releases/2019/04/11/2017-census-agriculture-data-now-available> (https://www.usda.gov/media/press-releases/2019/04/11/2017-census-agriculture-data-now-available)
2. <https://www.bloomberg.com/graphics/2018-us-land-use/?fbclid=IwAR02Y4ks6wiqQBM3Xdqbh2QIn8nrMa1ddV0Bzt02ArLEr0wYYreUpRYWFq0> (https://www.bloomberg.com/graphics/2018-us-land-use/?fbclid=IwAR02Y4ks6wiqQBM3Xdqbh2QIn8nrMa1ddV0Bzt02ArLEr0wYYreUpRYWFq0)

Suggested Companion Resources

- [The Story of Food: An Illustrated History of Everything We Eat](https://agclassroom.org/matrix/resource/938/) (https://agclassroom.org/matrix/resource/938/)
- [40 Maps that Explain Food in America](https://agclassroom.org/matrix/resource/536/) (https://agclassroom.org/matrix/resource/536/)
- [Quiz: Can you name a food by looking at where it comes from?](https://agclassroom.org/matrix/resource/550/) (https://agclassroom.org/matrix/resource/550/)
- [World Fabric Map](https://agclassroom.org/matrix/resource/809/) (https://agclassroom.org/matrix/resource/809/)
- [How Does it Grow? Video Series](https://agclassroom.org/matrix/resource/472/) (https://agclassroom.org/matrix/resource/472/)
- [Sweetpotato Ag Mag](https://agclassroom.org/matrix/resource/1044/) (https://agclassroom.org/matrix/resource/1044/)
- [National Geographic: What the World Eats](https://agclassroom.org/matrix/resource/574/) (https://agclassroom.org/matrix/resource/574/)
- [State Fact Sheets](https://agclassroom.org/matrix/resource/512/) (https://agclassroom.org/matrix/resource/512/)

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